PART B – PROGRAMME BUSINESS CASE

6 Options, Assessment and Alternatives

6.1 Option Assessment

The following sections analyse options for addressing the problems and issues identified in the Strategic Case.

For the assessment of the data, peer group analysis and option assessment, a five point "traffic light" rating system has been used as shown in the following table.

This rating system is based on a qualitative assessment of the LOS and cost comparison data.

Rating	Symbol	For LOS this means:	For Costs & Achievement this means:
Very Good		Much Better than Peer Group Average	Much Less than Peer Group Average
Good		Better than Peer Group Average	Less than Peer Group Average
Average/Moderate		Similar to the Peer Group Average	Similar to the Peer Group Average
Poor		Worse than Peer Group Average	Higher than Peer Group Average
Very Poor		Much Worse than Peer Group Average	Much Higher than Peer Group Average
No Data		No Data	No Data

For the analysis of options, a qualitative assessment of the effectiveness and impact on LOS has been made. The cost impact of the options has also been considered and an assessment of the 30 year Net Present Value (NPV) costs has also been made to determine the relative whole of life costs of each option.

For options which represent the Status Quo, we have shown the current work category budgets which have been averaged over the 2015/18 period. For all other options we have shown the relative change in the annual average budget (2015/18 period) required to fund the option.

6.2 Sealed Roads

Work Categories: **111 Sealed Pavement Maintenance, 212 Sealed Road Resurfacing, 214 Sealed Road Pavement Rehabilitation & 341 Low Cost/Low Risk Improvements**
(Associated activities: 113 Routine Drainage Maintenance & 213 Drainage Renewals)

6.2.1 Links to Strategic Case

Problem Statement: Our sealed roads have some of the highest costs per kilometre in our peer group. This is largely due to our high VKT and our sealed roads being vulnerable to damage, particularly from logging trucks and other heavy vehicles, because of having thin, narrow pavements, poor geology and semi-tropical climate, over-stabilisation and historical under investment in renewals. We also have a significant length of old void fill seals which are overdue for resurfacing and are resulting in higher maintenance costs.

Benefits of Addressing Problem: A fit for purpose Level of Service for our sealed roads that is suitable for the traffic demands, particularly freight, while optimising the long-term maintenance costs. Over time our narrow pavement widths will be widened.

Consequences of Not Addressing the Problem: Our sealed roads will deteriorate under increasing traffic and freight demand leading to a reduced level of service, reduced resilience during wet weather events, increased road hazards (pot holes etc) and increased maintenance costs.

6.2.2 Levels of Service

ONRC Customer Outcomes:
ONRC Amenity CO1 – Smooth Travel Exposure (STE) – roughness of the road
ONRC Amenity CO2 – Peak roughness

Customer Levels of Service:
ONRC Amenity TO1 – Roughness of the road (median and average)
ONRC Safety TO4 – Loss of Control on wet roads
ONRC Safety TO7 – Hazardous faults (NO DATA AVAILABLE)
ONRC Cost Efficiency 1 – Pavement rehabilitation
ONRC Cost Efficiency 2 – Chipseal resurfacing
ONRC Cost Efficiency 3 – Asphalt resurfacing
ONRC Cost Efficiency 5 – Overall network cost
LTP 1.1.5 – Percentage of the sealed local network that is resurfaced (Current measure - DIA)
LTP 1.1.6 – Percentage of the sealed road network that is rehabilitated (Current measure)

LTP 1.1.X – Yr 1, 5, 10, 30 Condition distributions are maintained within the set condition envelope (New measure)

6.2.3 Evidence and Gap Analysis

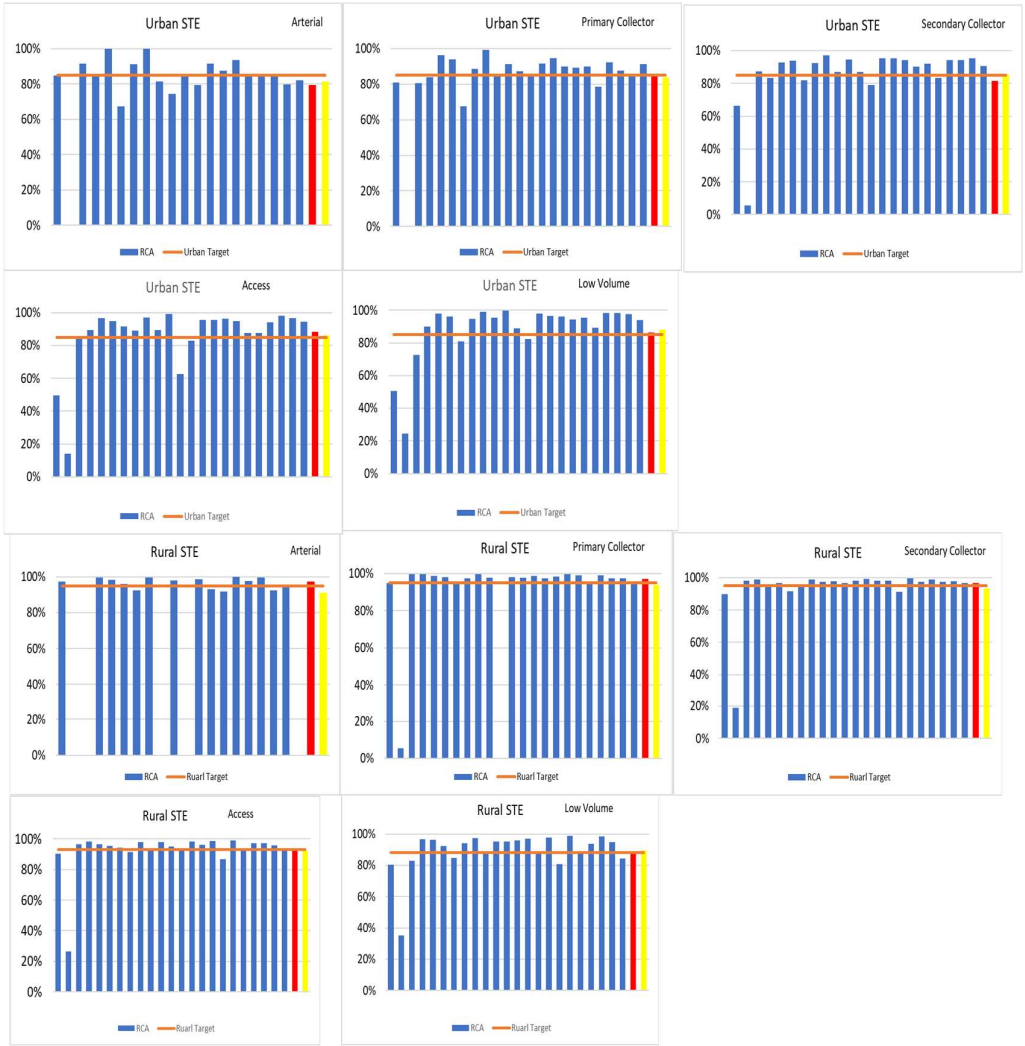
ONRC Amenity CO1 – Smooth Travel Exposure (STE)

The smooth travel exposure of Whangarei's urban Arterials and Secondary collectors is below (worse) the peer group average.

The other urban road classes are either at or above (better) the average for the peer group.

Whangarei's rural roads ae generally at or above the average STE for the peer group.

ONRC	Urban	Rural
Arterial		
Primary Collector		
Secondary Collector		
Access		
Low Volume		



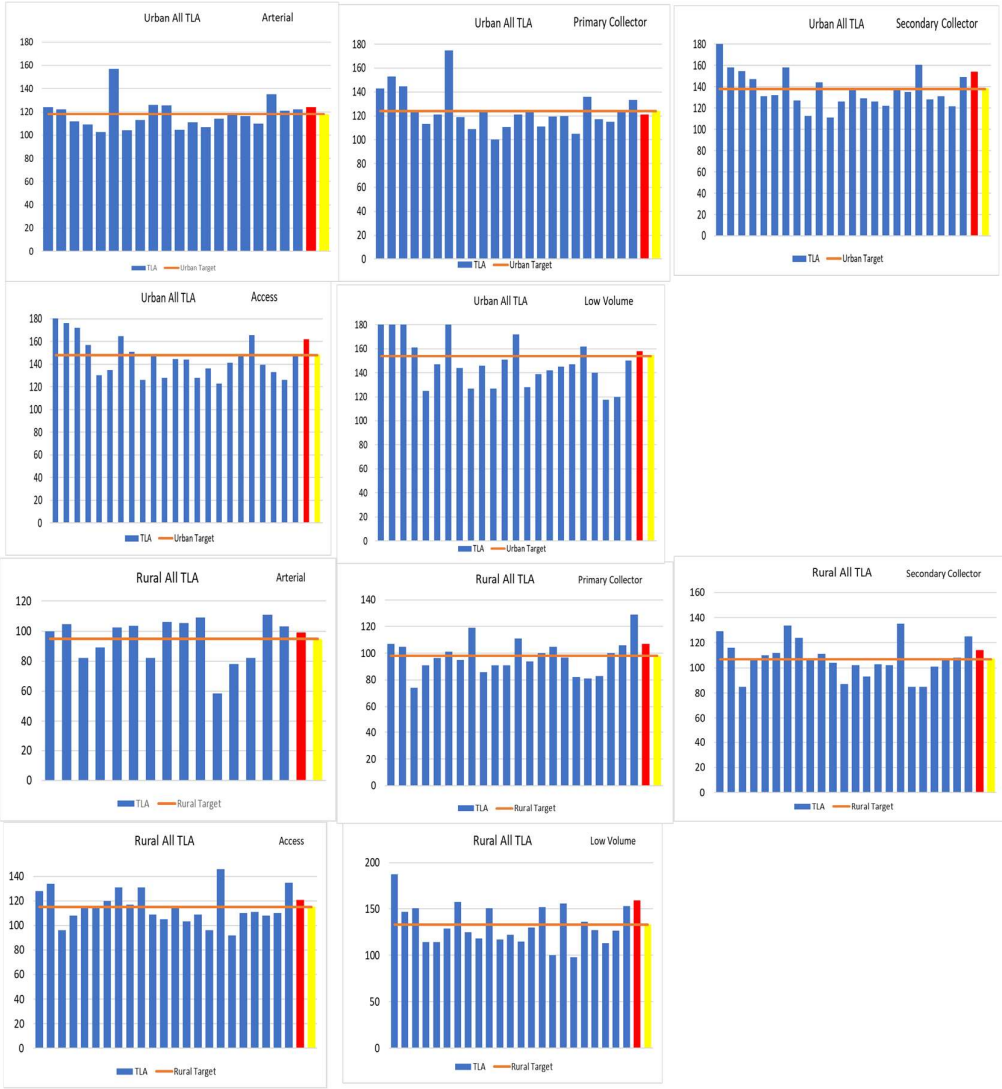
ONRC Amenity CO2 – Peak Roughness

Peak roughness on Whangarei's urban network are higher than the peer group for the Arterial, Secondary Collector and Access roads. This is likely to be due to the effects of uneven service lid covers which is a major issue in the urban area.

The other urban road classes are similar to the peer group average.

Peak roughness on the rural network is above the peer group average for all road classes. This is a concern, particularly on the Arterial , Primary Collectors and Secondary Collectors due to high speeds and freight traffic on these roads.

ONRC	Urban	Rural
Arterial		
Primary Collector		
Secondary Collector		
Access		
Low Volume		



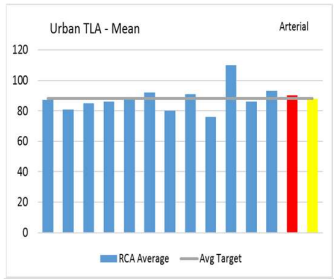
ONRC Amenity TO1 – Median Roughness

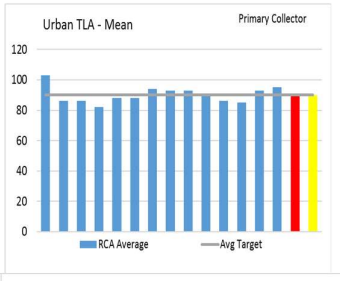
Whangarei's median roughness on its Secondary Collector, Access and Low Volume roads are all above the peer group average. This indicates that further work to address overall roughness is required to bring the median roughness down to the peer group average.

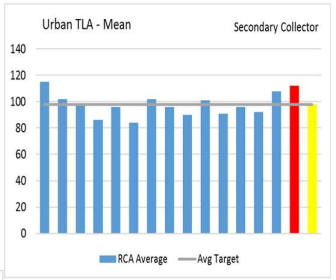
The median roughness in the rural area is indicating that the Secondary Collector and Low Volume roads are above the peer group average. Again, further work is required to reduce the median roughness on these roads to the peer group average.

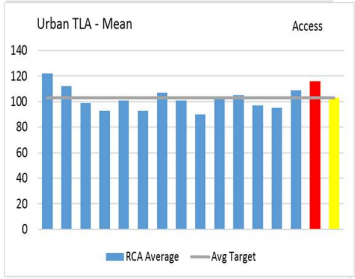
The other road classes are at the peer group average.

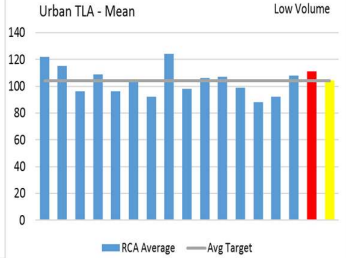
ONRC	Urban	Rural
Arterial		
Primary Collector		
Secondary Collector		
Access		
Low Volume		

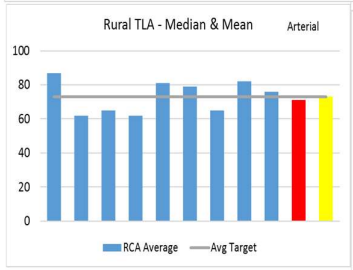


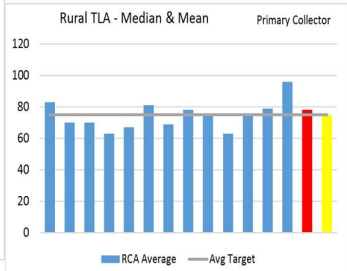


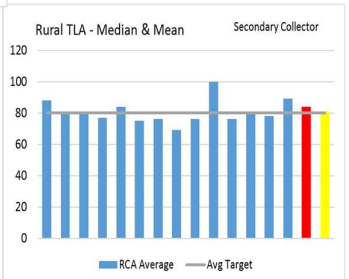


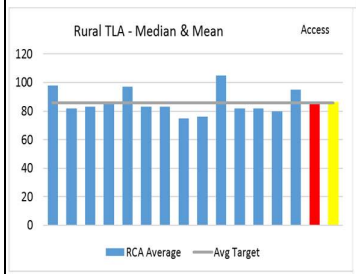


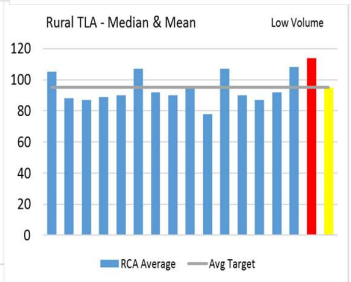


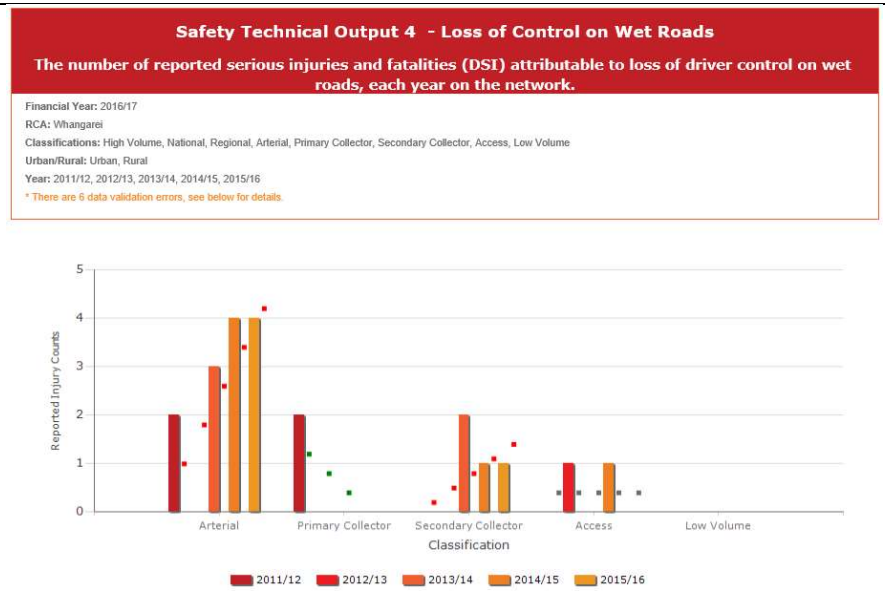
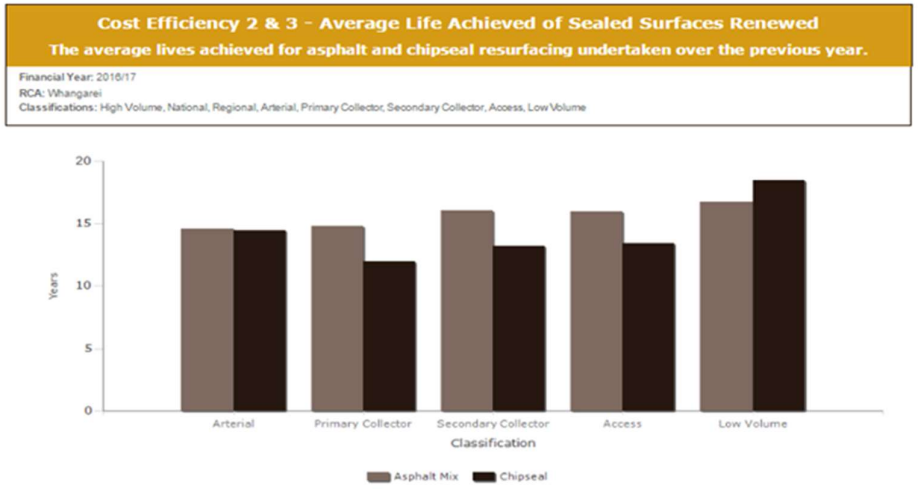


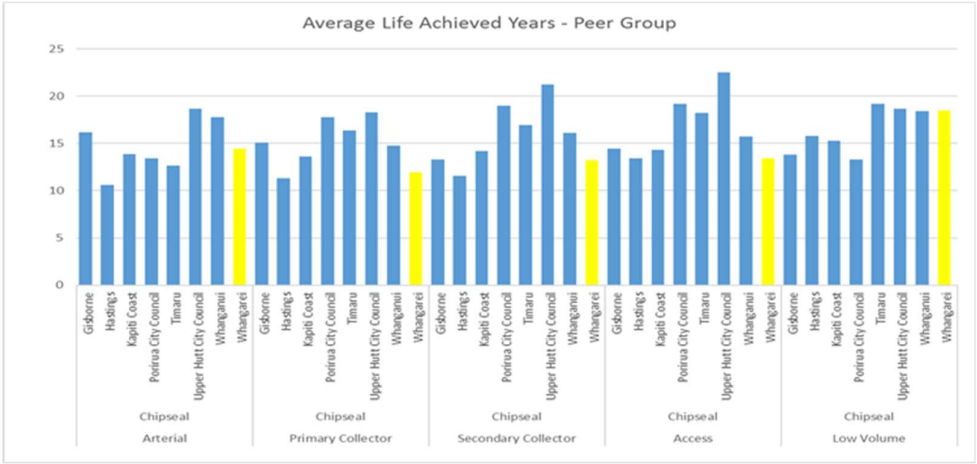
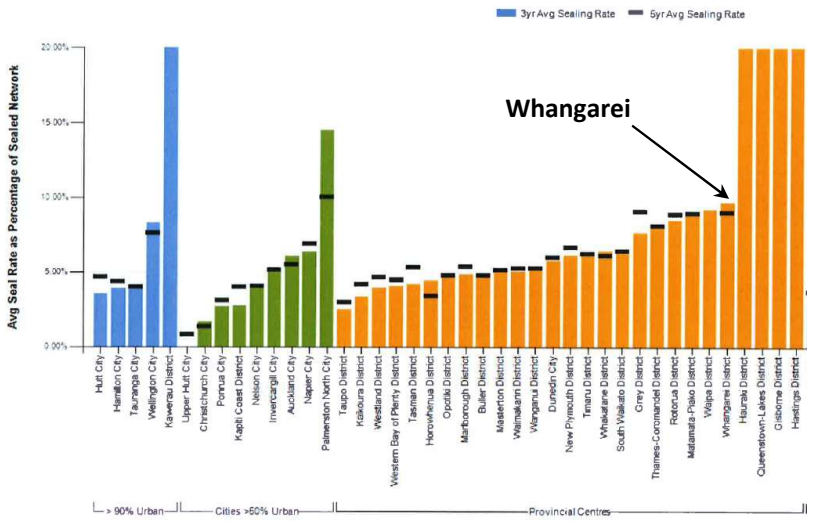


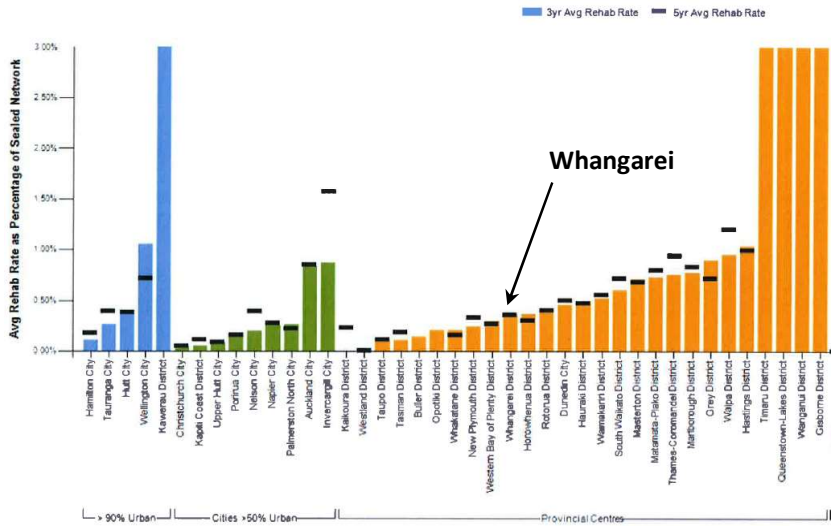
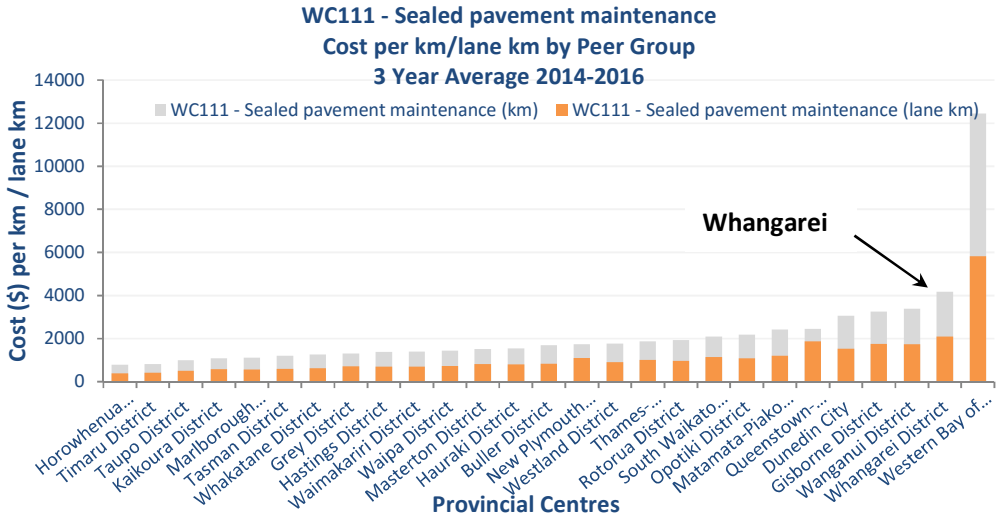


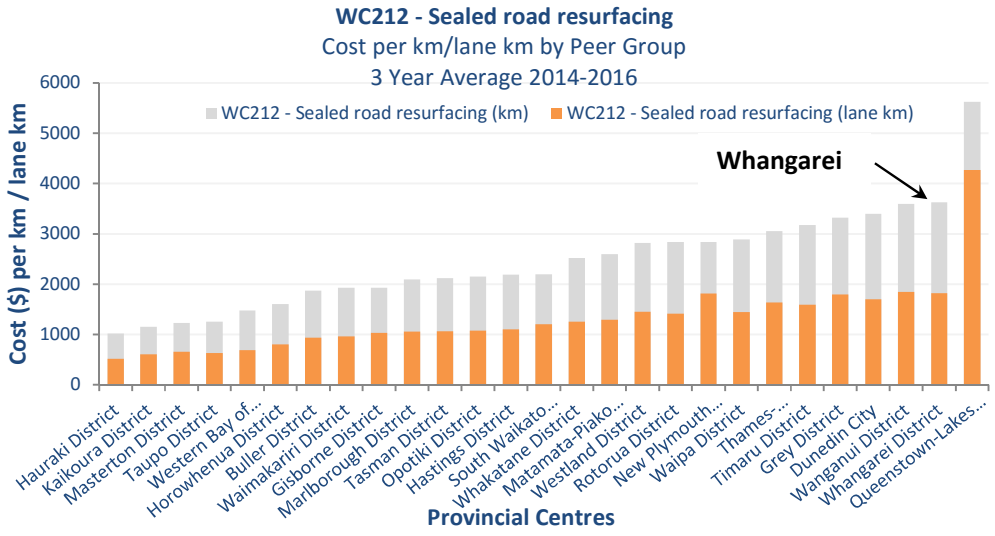


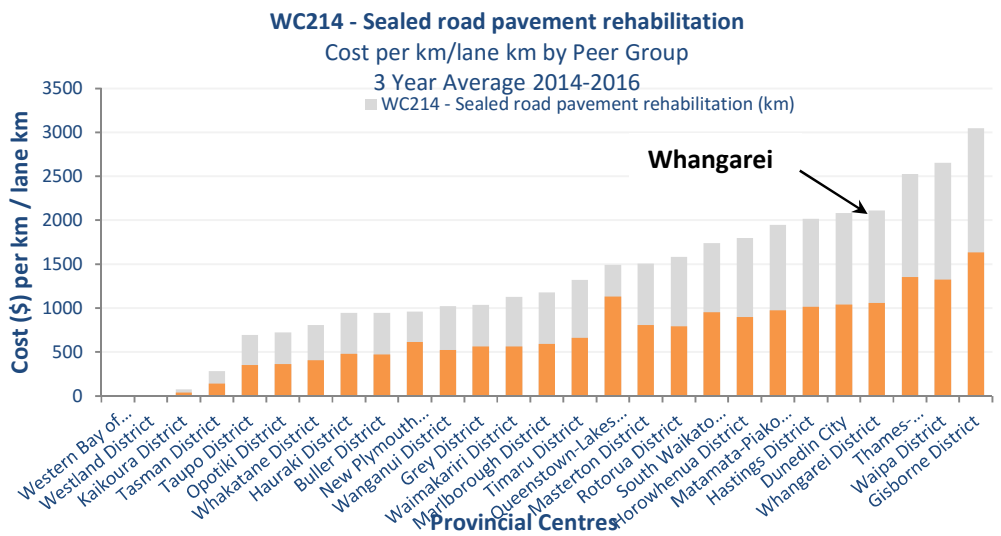


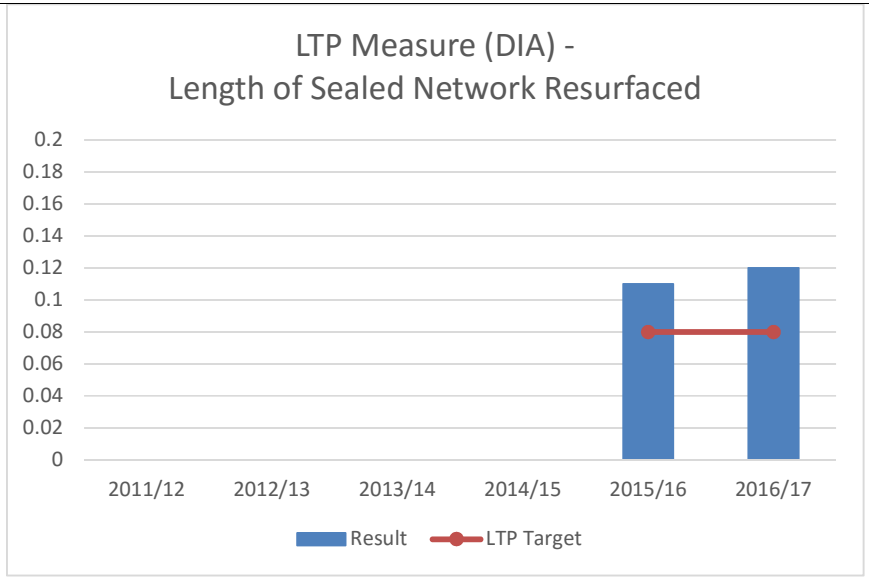
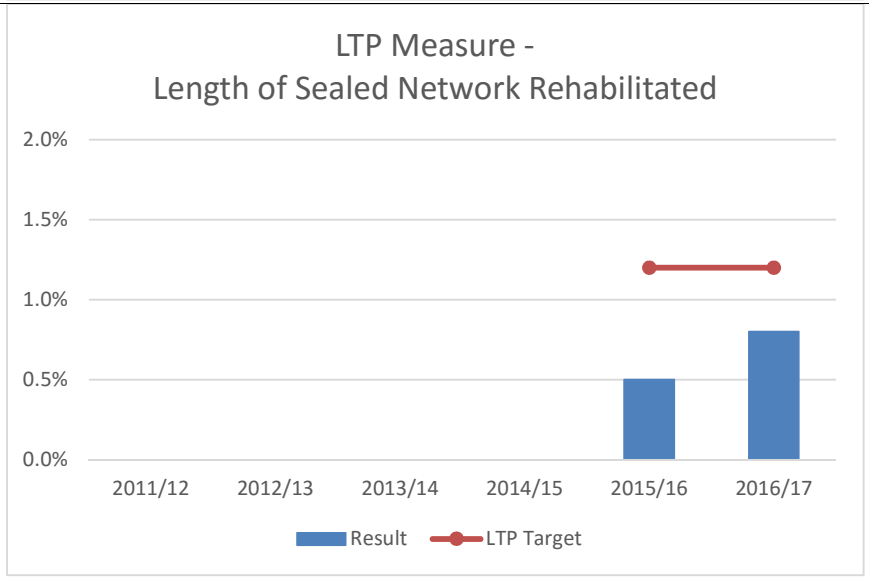
ONRC Safety TO4 –Loss of Driver Control on Wet Roads It should be noted that there is not much data available for this LOS and this reduces the usefulness of this measure. However, it does appear that there is a significantly increasing trend of serious injury and fatal wet road loss of control crashes on the Arterial road network in Whangarei. The crashes in the wet on Secondary Collector roads may also be increasing.	**ONRC** **Arterial** **Primary Collector** **Secondary Collector** **Access** **Low Volume**	
ONRC Cost Efficiency 2d & 3d – Chipseal and Asphalt Resurfacing Whangarei's resurfacing cycle time is 14 years on average which suggests that the resurfacing cycle times are appropriate. Resurfacing times for asphalt are generally higher than for chip seal.		

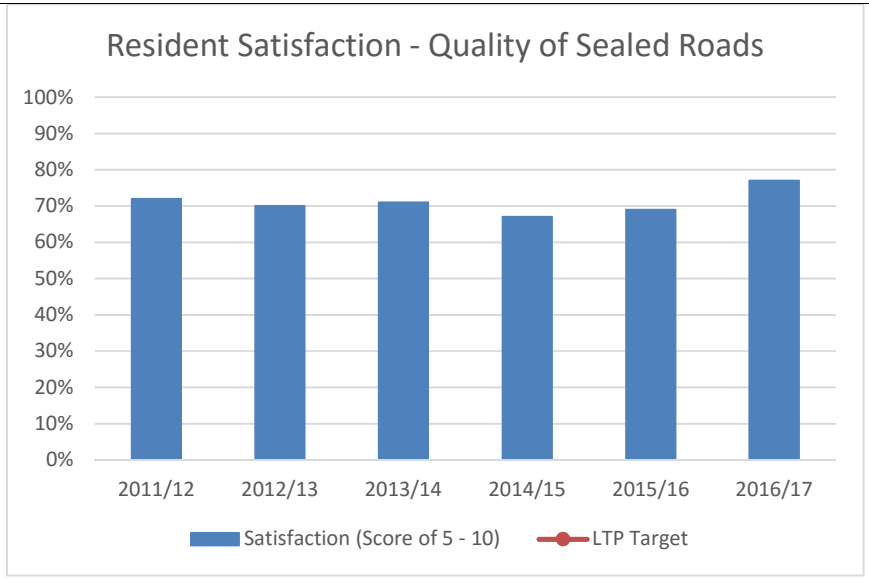
ONRC Cost Efficiency 2d – Chipseal Resurfacing When compared to its peer group, Whangarei generally achieves a shorter chipseal life, apart from Arterial and Low Volume roads which achieve average lives. This suggest that Whangarei can start to ease back on its current strategy to achieve 100km of resurfacing per year to address a historic backlog of resurfacing due.	**ONRC** Arterial Primary Collector Secondary Collector Access Low Volume	
NZTA Peer Group Charts – 3 year Sealing Rates When compared to its peer group, Whangarei is carrying out more resealing per annum than most of its peer group. This high resurfacing rate was to address a historic backlog of resurfacing due to previous under investment. This again suggests that Whangarei can start to reduce the amount of annual resurfacing being carried out.	**Overall**	

NZTA Peer Group Charts – 3 year Rehabilitation Rates When compared to its peer group, Whangarei is carrying out less pavement rehabilitation per annum than most of its peer group. The achievement over the past 3 years has been less than 0.5%/annum of the whole network being rehabilitated. A funding increase was obtained in 2015/18 to address this low level of achievement and this needs to be continued to increase the rehabilitation rate to a more sustainable level of about 1% per annum.	**Overall** 	
NZTA Peer Group Charts – 3yr Cost/km W/C 111 - Sealed Pavement Maintenance Whangarei has the second highest spend per km on sealed pavement maintenance and about twice the peer group average. It should be noted that Whangarei charges all of its contractor management costs to W/C 111 and this adds about 20% or $800/km to the overall cost/km. If this was removed it would place Whangarei at a similar level to Dunedin and Gisborne. It should also be noted that Whangarei has the third highest VKT/km in its peer group with a high portion of freight and weak	**Overall** 	

pavements and subgrades which also contributes to higher costs/km. However, Whangarei consider that some efficiency can be gained by targeting sealed pavement maintenance on higher ONRC class roads and tightening up on its dispatch raising processes which should see a decrease in these costs. The increased investment in pavement renewals over the last 2-3 years will also have an effect on reducing sealed maintenance costs.		
NZTA Peer Group Charts – 3yr Cost/km W/C 212 - Sealed Road Resurfacing Whangarei has the second highest spend per km in its peer group. This is likely to be as a result of a number of factors including shorter reseal lives due to high VKT, targeting expensive urban TAC sites in the last 2 years and elevated annual reseal lengths to reduce a historical backlog due to previous under investment. As mentioned above, Whangarei is looking at reducing its reseal programme because sufficient progress has now been made in addressing the historical backlog and by using longer life single coat seals where possible.	**Overall** 	

NZTA Peer Group Charts – 3yr Cost/km W/C 214 - Sealed Road Pavement Rehabilitation Whangarei is in the upper third of its peer group for spend per km on sealed road pavement rehabilitation. This is likely to be due to a greater focus on rehabilitations in the last 2 years to correct a significant period of historic under investment. Whangarei has also been focusing on expensive urban rehabilitations that generally cost more than $1M/km to construct. As mentioned above, continued focus on pavement rehabilitation will be required to help address above average roughness levels and reduce the high sealed pavement maintenance spend (W/C 111).	**Overall**	

LTP Measure 1.1.5 – Percentage of the Sealed Road Network that is Sealed (DIA) This is a Department of Internal Affairs (DIA) measure that was introduced in 2015/16. The percentage of the network resurfaced in the last two years has been significantly higher than the target of 8%. As mentioned earlier, this high resurfacing rate was to address a historic backlog of resurfacing due to previous under investment. It also was making use of lower bitumen prices which enabled more resurfacing to be achieved. WDC will now look at reducing the amount of resurfacing going forward.	**Overall** 	
LTP Measure 1.1.6 – Percentage of the Sealed Road Network that is Rehabilitated The percentage of the network rehabilitated in the last two years has been significantly less than the target of 1.2%. This is due to Whangarei focusing on more expensive urban rehabilitations which has resulted in less rehabilitation being achieved. It also reflects that the reduced demand for rehabilitation resulting from the hand-over of the Mangakahia Rd/Otaika Valley Rd route to NZTA as SH15. WDC will look to reset this target down to a level based on its current network condition.	**Overall** 	

Resident Satisfaction Survey – Quality of Sealed Roads The resident satisfaction with Whangarei's sealed road network has been increasing over the last two years. This is likely to be in response to the increase in pavement rehabilitation work that has been done starting in the 2015/16 year. This demonstrates that keeping up a reasonable level of pavement renewals improves the customers satisfaction with the network.	**Overall** 	

SUMMARY – Whangarei's sealed roads generally have peak and median roughnesses that are the same or worse than the average for their peer group. Smooth travel exposure (STE) is the same or better than the peer group average apart from on urban Arterials and Secondary Collectors which are worse, partially caused by uneven service covers. The Arterial and Secondary Collector crashes are also showing increasing trend of serious injury and fatal loss of control crashes on wet roads.

The amount of sealed road resealed in Whangarei is high when compared to the peer group, but the amount of pavement rehabilitated is low. Sealed road costs in Whangarei are some of the highest in the peer group, which is not a surprise given that Whangarei has the third highest VKT and has poor subgrades and lack of quality pavement materials. Resident satisfaction with the quality of the sealed roads has increased in the last year, which is likely be due to the increase in pavement rehabilitations undertaken in 2015/16.

Overall this indicates that Whangarei is not over maintaining their roads and that their costs are high mainly due to environmental factors (climate, soils, VKT and lack of pavement aggregate).

6.2.4 Options to be Considered

Based on the above data and the problem definition, the following options have been considered for addressing the sealed pavements:

Option	Description	Benefits / Consequences
No Pavement Rehabilitations	Carry out no pavement rehabilitation. Carry out only reactive routine maintenance and reseals only. Maintenance costs will increase and reseal lives will decrease.	Cost Efficiency – will reduce pavement rehabilitation costs but will result in increased pavement maintenance and reseal costs.
Prioritised Maintenance	Enhanced assessment of maintenance repairs based on ONRC hierarchy and LOS.	Cost Efficiency – will target the right maintenance, on the right roads at the right time.
Investigatory Test Pits	Carry out test pits with subgrade scalar penetrometer testing on roads with a high amount of repair work required to determine the appropriate treatment before the contractor access the site. This will help eliminate situations where there is insufficient pavement to carry out the planned repair method (ie stabilised patches) which results in more expensive treatments being required such as digout repairs. This should enable better decision making as to whether a repair or renewal response is required.	Cost Efficiency – will enable better decision making to be undertaken which will reduce the whole of life costs.
Large Chip or Single Coat Chip Seals	Use large chip or single coat chip seals for future reseals where possible and appropriate to improve waterproofing and extend seal life, particularly on rural Arterial and Collector roads and freight routes. Reduce use of small chip void fill seals by limiting use to low stress urban roads or rural Access and Low Volume roads.	Cost Efficiency – will extend the life of the chip seals.
High PSV Seals/Water Cutting	Introduce a programme of high PSV seals (SCRIM seals) and water cutting on the top 5% of High Risk Rural Roads targeting areas with wet road loss of control crashes. This could include the use of Glenbrook melted slag (GMA).	Safety – will reduce loss of control crashes in the wet.
Improved Pavement Drainage	Carry out a programme of high shoulder removal and watertable maintenance to reduce water ingress into pavements and softening of weak and sensitive subgrades. It will also remove water from the road edge which will reduce the risk of loss of control crashes due to hydroplaning.	Cost Efficiency – will extend the life of the pavements. Safety – will reduce the likelihood of loss of control crashes due to hydroplanning.
Reduced Chip Reseal Programme	In conjunction with the use of single coat chip seals, consider a reduced reseal programme to reflect progress made in removing the backlog of surfacing required.	Cost Efficiency – will reduce the amount of resurfacing work done.

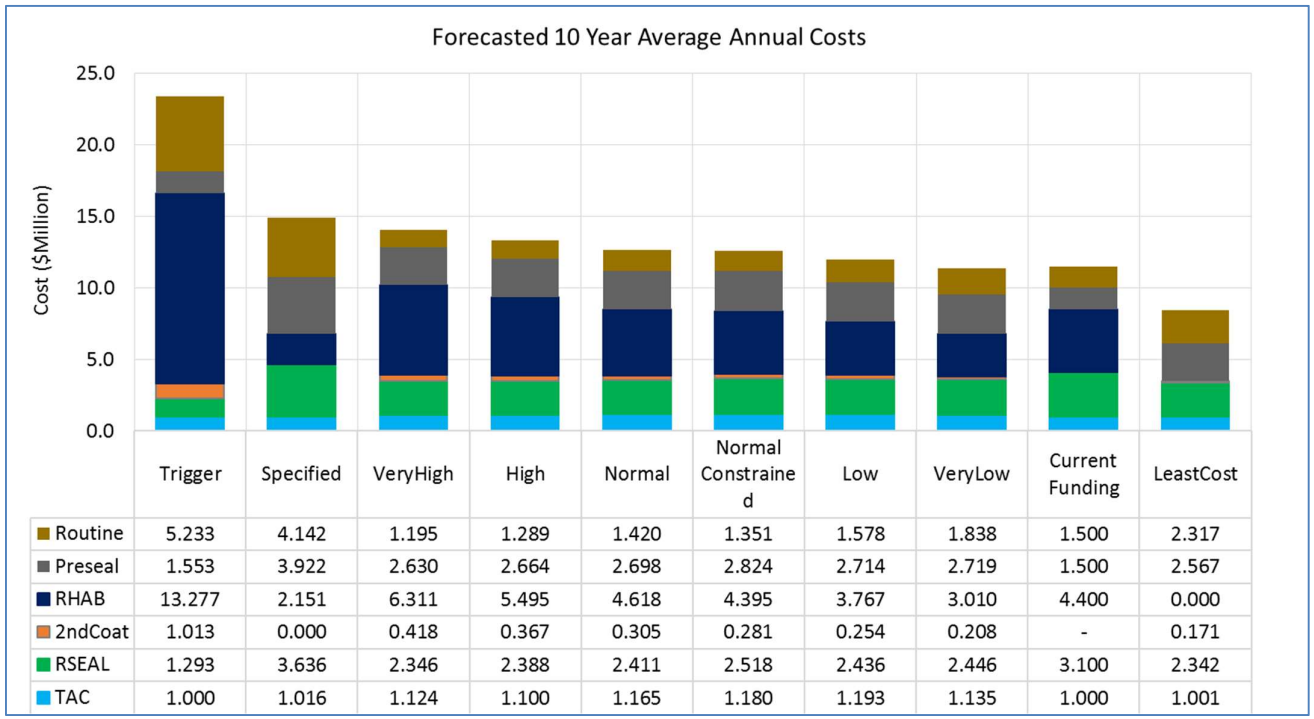
Option	Description	Benefits / Consequences
Increased Thin AC Programme	Increase the thin asphaltic concrete (TAC) programme to address historic lack of renewal of these surfaces. This will help reduce the number of TAC sites in the urban area requiring expensive rehabilitation.	Cost Efficiency – will reduce the whole of life cost of the TAC surfacings.
Optimised Rehabilitation Programme	Optimise a sustainable level of pavement rehabilitation to minimise whole of life pavement costs and to control average and peak roughness on the network with a continued focus on urban arterials. This option would include a RAPT type assessment of the forward works programme to ensure robustness of programme.	Cost Efficiency – will reduce the whole of life costs of the pavement. Amenity – will bring the overall average roughness of the network back in line with the peer group.
Service Lids	Relevel service lids in the urban area when carrying out renewal activity to minimise roughness. Consider using adjustable service lids where possible.	Amenity – will help address the high level of roughness in the urban area.

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

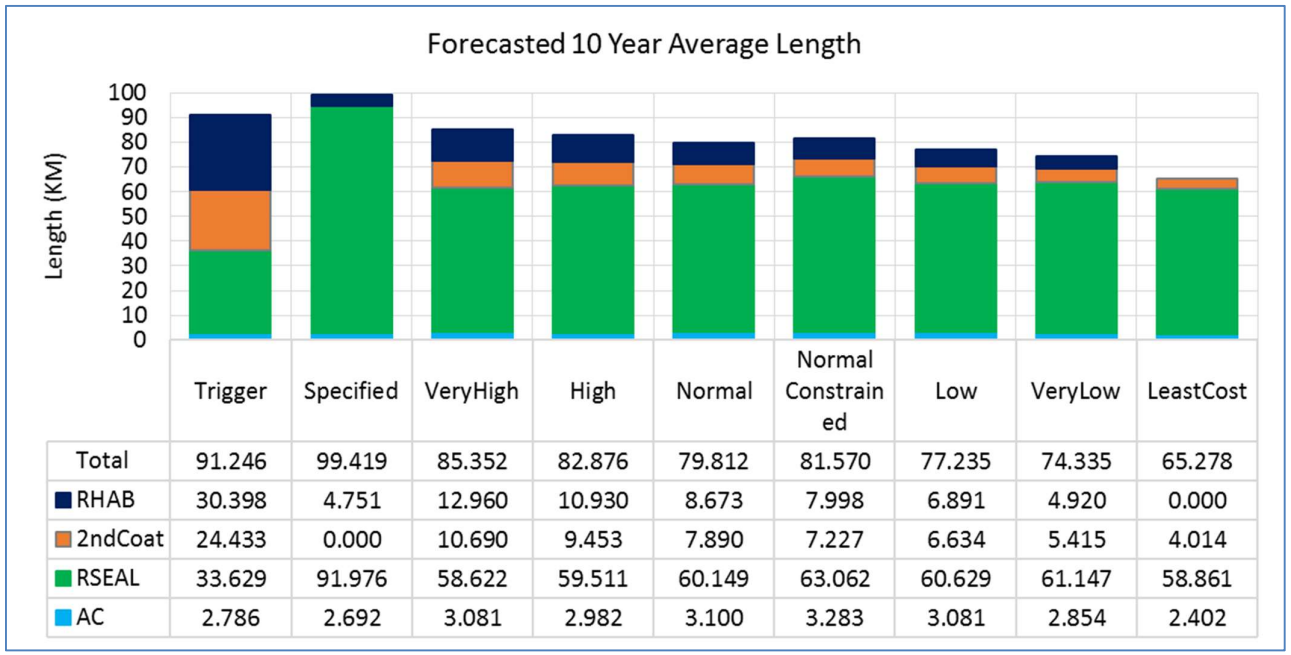
As part of the modelling an option of “Normal Constrained” was also tested. This was done to test that the reduced level of pavement renewal from the previous plan to 6km from 10km would provide a stable network outcome. This was achieved through splitting the optimised budget programme into approximately 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

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.

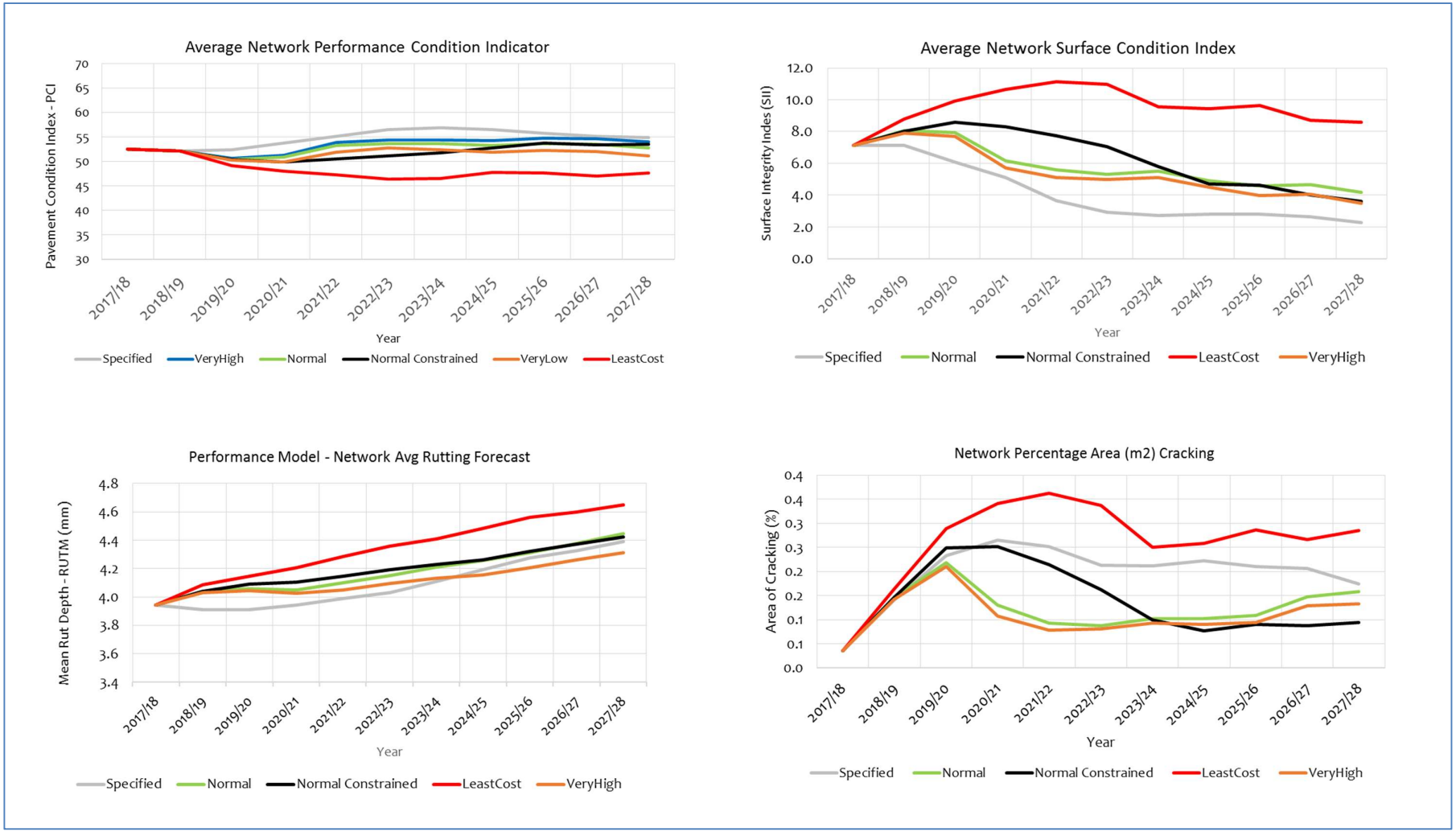


Figure 6-3: Forecasted Network Outcomes

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

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

Option	Assessment	Problem being Addressed	Effectiveness	LOS Impacts	Annual Cost	30yr PV Cost ($M)
Service Lid Adjustment and Renewal	Annual programme of $100,000/yr for 5 years to address worst service lids on key routes then drop to $50,000/yr. Will improve ride comfort and remove road hazards.	Amenity/Safety	Good	Moderately Better	W/C 111: +$100,000	$0.9

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

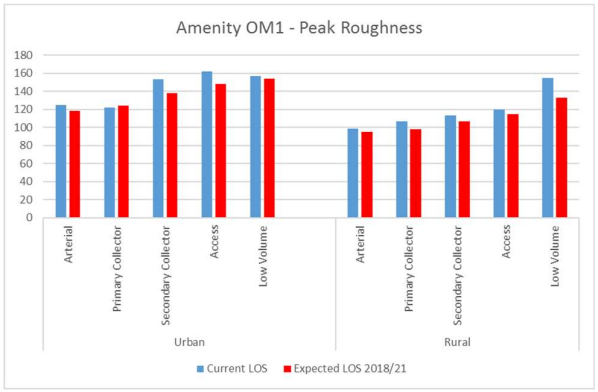
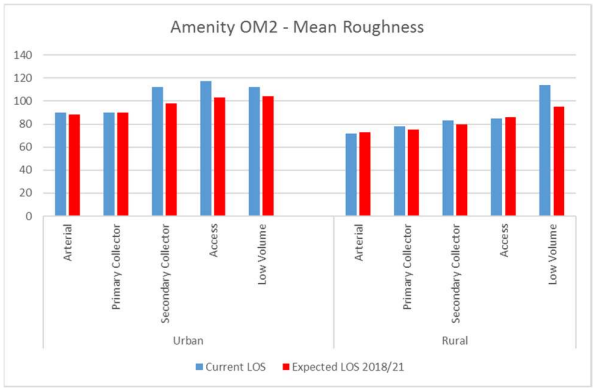
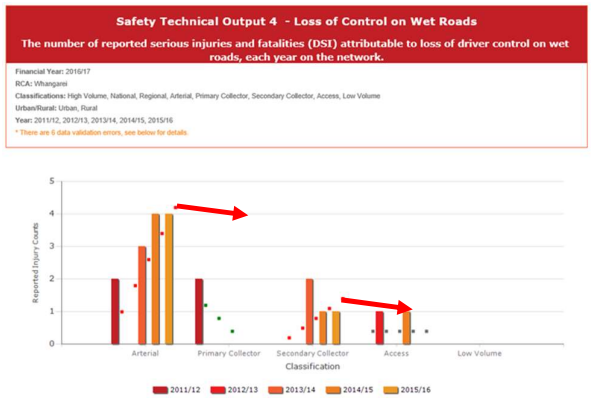
6.2.6 Financial Impact

The following table shows the financial impact of the options selected (note some of the costs have been rounded off):

W/C	Description	Cost Impact	Overall Impact (excl Growth & Escalation)
111	Sealed Pavement Maintenance	-$400,000/yr due to implementation of ONRC principals and additional watertable maintenance +$50,000/yr to carry out test pits +$100,000/yr to carry out service lid adjustments	-$250,000/yr
212	Sealed Road Resurfacing	-$235,000/yr for reduction in reseals to 90km/yr and use of large chip/single coat chip seals +$150,000/yr for an increase in the TAC programme to target poor condition sections or urban arterials +$300,000/yr to carry out high skid resistance (SCRIM) seals or watercutting	+$215,000/yr
214	Sealed Road Pavement Rehabilitation	No change	No change
113	Routine Drainage Maintenance	+$100,000/yr to carry out additional watertable maintenance.	+$100,000/yr

6.2.7 Level of Service Impact

The following table shows the expected Level of Service impact of the options selected:

		
AMENITY – Expect a decrease in peak roughness for both urban and rural roads. This is due to better targeting of the highest roughness areas when undertaking maintenance activities, increased TAC in urban areas and the smoothing of uneven service covers.	**AMENITY** – We also expect a decrease in mean (average) roughness. This gain will be achieved by targeting the peak roughness areas. Over time, we are expecting the roughness to match the peer group average on which our targets are based.	**SAFETY** – We expect a decreasing trend in wet road loss of control crashes on all road classes. This will be achieved by implementing the proposed programme of SCRIM seals. This will reverse the increasing trend on Arterials and Secondary Collectors.

These expected gains in level of service will improve customer ride comfort and safety on our network.

6.2.8 Improvement Plan

Improvements that should be considered during the 2018/21 period for inclusion in the next AMP are as follows:

- Development and implementation of a RAPT type process for reviewing the forward work programmes of the NTA councils.

- Drainage programme to be included in the dTIMS model to prioritise the optimal programme of watertable maintenance work and to determine the effect of this work on the sealed road network.

6.3 Unsealed Roads

Work Categories: **112 Unsealed Pavement Maintenance, 211 Unsealed Road Metalling & 325 Seal Extension (Associated activities: 113 Routine Drainage Maintenance & 213 Drainage Renewals)**

6.3.1 Links to Strategic Case

Problem Statement: Lack of condition data for our unsealed roads means that we are reactive, leading to significant customer dissatisfaction and suboptimal maintenance practices, particularly on logging and other heavy vehicle routes or roads with high traffic volumes. Dust is also a significant issue on heavy vehicle routes, resulting adverse health effects to residents and resident blockades to protest against dust.

Benefits of Addressing Problem: A fit for purpose Level of Service for our unsealed roads that improves customer satisfaction, while optimising the long-term maintenance costs. Road dust on unsealed freight routes will be controlled to minimise health impacts to residents.

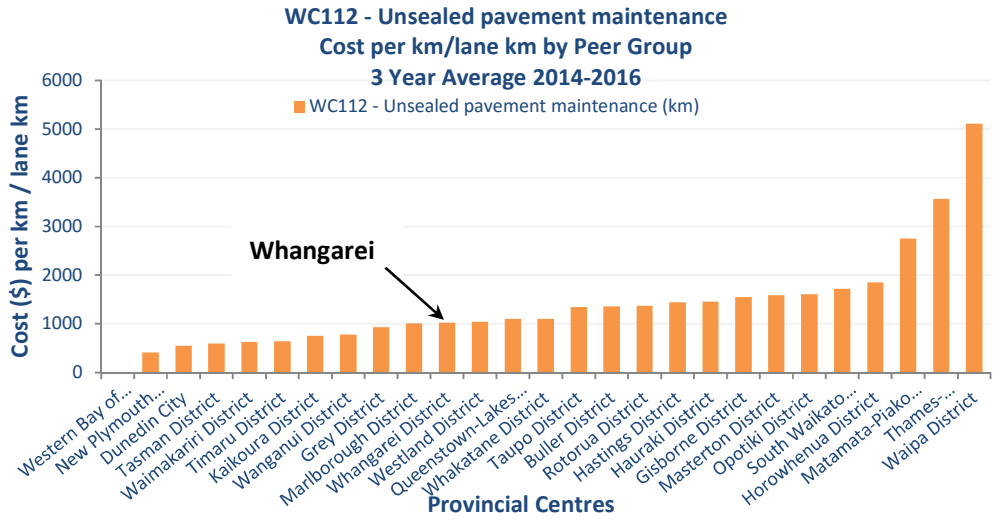
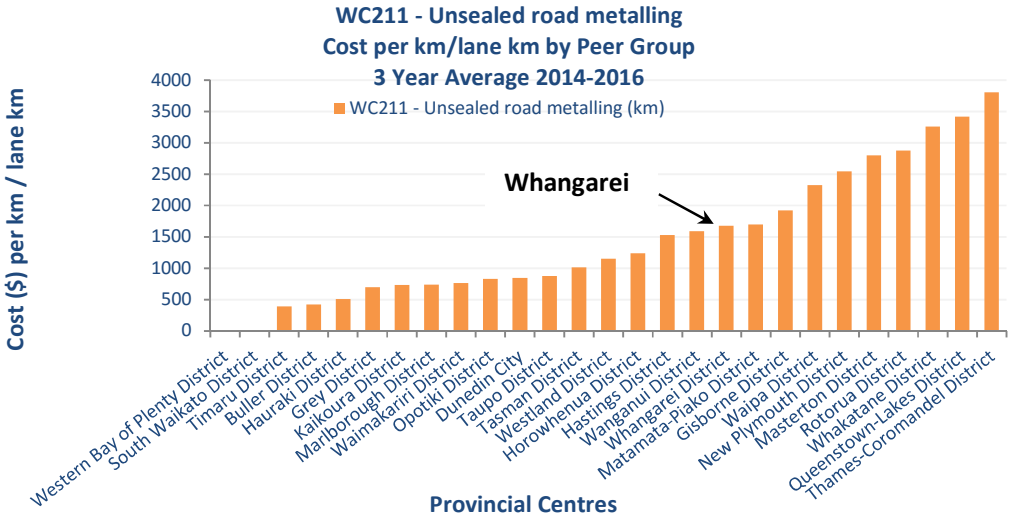
Consequences of Not Addressing the Problem: Our customers will continue to be dissatisfied with our condition and maintenance practices on unsealed roads, with continued dust issues on heavy vehicle routes potentially resulting in further protest action and blockading of freight routes.

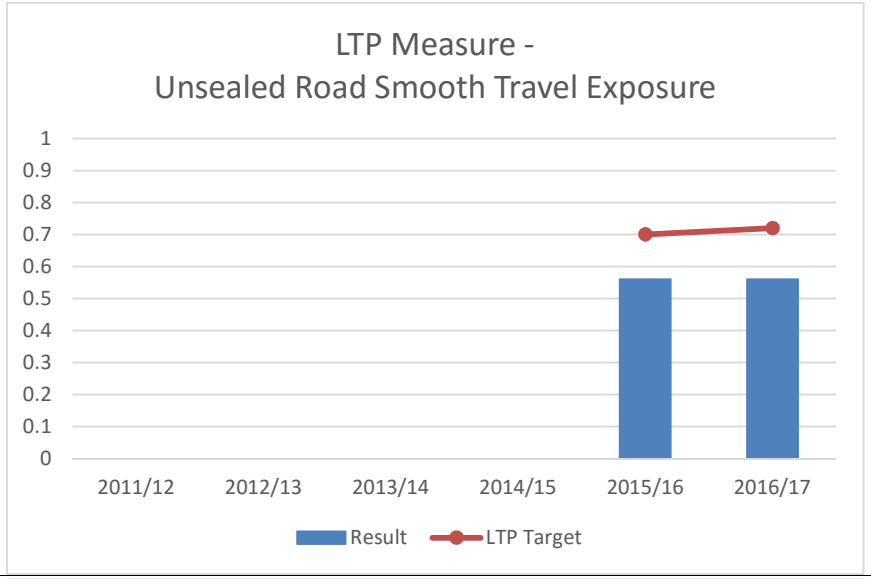
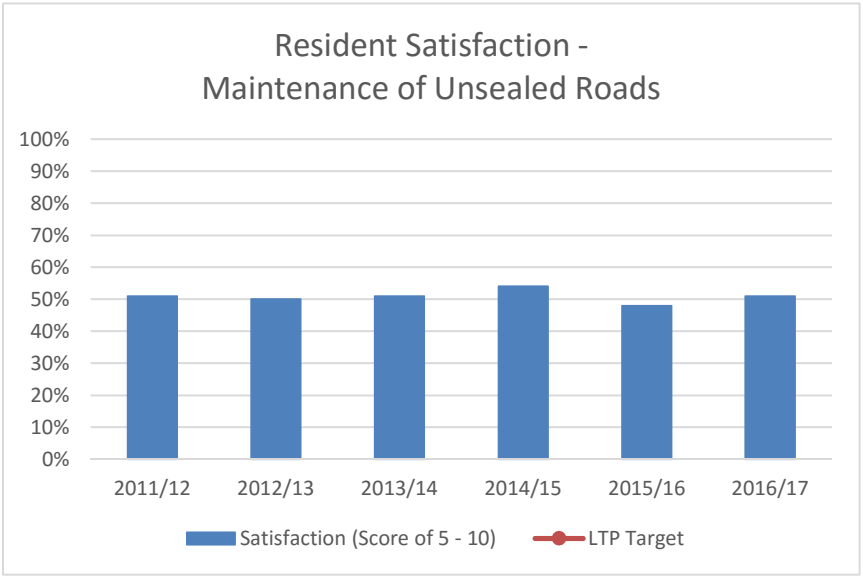
6.3.2 Levels of Service

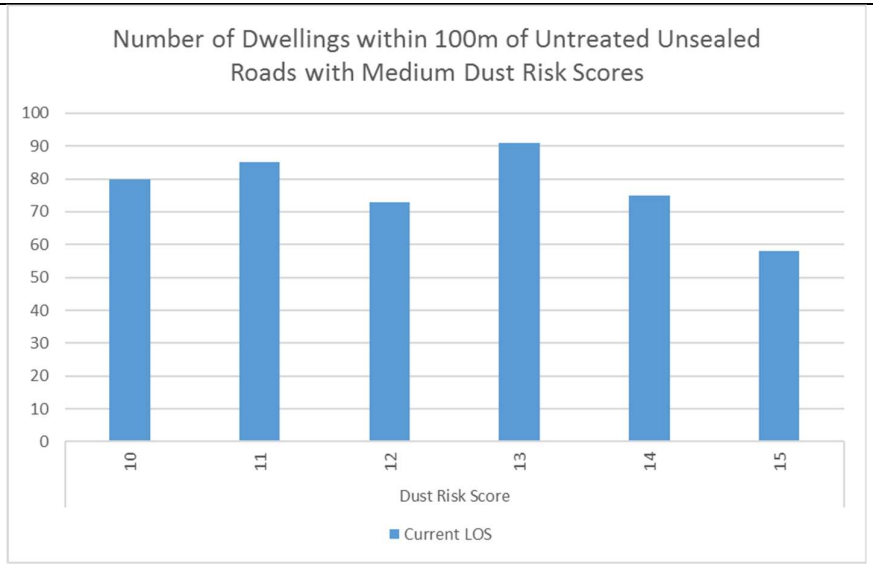
ONRC Customer Outcomes: None

Customer Levels of Service:
ONRC Safety TO7 – Hazardous faults (NO DATA AVAILABLE)
ONRC Cost Efficiency 4 – Unsealed road metalling (NO DATA AVAILABLE)
ONRC Cost Efficiency 5 – Overall network cost
LTP 1.1.7 – Average quality of ride on the unsealed local network (Current measure)
LTP 1.1.X – Yr 1, 5, 10, 30 Condition distributions are maintained within the set condition enveloped (New measure)
Dust Risk – Dwellings exposed to Medium dust risk (as determined by NZTA General Circular 16/04) (New measure)

6.3.3 Evidence and Gap Analysis

NZTA Peer Group Charts – 3yr Cost/km W/C 112 - Unsealed Pavement Maintenance Whangarei's spend on unsealed pavement maintenance is below the average for its peer group. Given Whangarei's issues with weak subgrades, significant freight volume on the unsealed network and issues with dust, this spend is lower than expected.	**Overall** 	
NZTA Peer Group Charts – 3yr Cost/km W/C 211 - Unsealed Road Metalling Whangarei's spend on unsealed road metalling is slightly above the average for its peer group. It should be noted that in the 2015/16 year, Whangarei spent $440,000 on dust coat seals on the Wright/McCardle forestry route which will increase the spend per km for metalling. Again, given Whangarei's issues with weak subgrades, significant freight volume on the unsealed network and issues with dust, this spend is lower than expected.	**Overall** 	

LTP Measure 1.1.7 – Quality of Ride on the Unsealed Road Network by % of Smooth Travel This is a new measure that was introduced in 2015/16. The smooth travel exposure on Whangarei's unsealed road network is significantly lower than the current target of around 72%. This may reflect why only 50% of residents are satisfied with WDC's unsealed roads. As this is a relatively new measure, WDC will review the target to make sure that this is reasonable.	**Overall** 	
Resident Satisfaction Survey – Maintenance of Unsealed Roads Resident satisfaction with Whangarei's unsealed road network has been a consistent 50% for the past 6 years. This is low, particularly when considering that unsealed roads only make up 40% of Whangarei's road network. This indicates that further work is required to raise the satisfaction level with WDC's unsealed road network.	**Overall** 	

Dust Risk Whangarei has over 450 dwellings exposed to a medium dust risk (dust risk score of 10 or more). Approximately half of these routes are on forestry roads. This indicates that there is likely to be an exposure to health effects of PM_{10} dust to people living on these routes. There is currently significant pressure on Council to address this issue and has resulted in blockading of forestry routes last Summer.	**Overall** 	

SUMMARY – The cost to maintain Whangarei's unsealed roads is about the same as the peer group average, which seems low given Whangarei's poor subgrade conditions, freight demands and dust issues. The unsealed road network is rougher than the LTP target and the resident satisfaction is low. There is also over 450 dwellings located on roads with a medium dust risk. This indicates that further effort is required to improve the unsealed road network.

6.3.4 Options to be Considered

Based on the above data and the problem definition, the following options have been considered for addressing the unsealed pavements:

Option	Description	Benefits / Consequences
No Heavy Metalling	Carry out only routine reactive maintenance, running course and grading. No heavy metalling to replace aggregate depth. This option would also include wet, roll and grades on problem site.	Cost Efficiency – will reduce heavy metalling costs, but will also result in deterioration of the LOS over time and likely to increase maintenance costs overall.
Increased Management of Unsealed Roads and Asset Information	Implementation of a comprehensive and robust process for the detailed recording of unsealed asset information such as life cycle costs, asset inventory, and condition data.	**Support for better decision making:** This will provide confidence in the information used to make informed asset management decisions.

Option	Description	Benefits / Consequences
Increased Level of Measurement for Unsealed Roads	Programme of test pit and roughness data capture to provide Council with a baseline knowledge of their network. This will include monthly roughness surveys (using RoadRoid or similar) and a series of test pits to be undertaken throughout year 1. This will enable pro-active maintenance, maintenance being undertaken at the right time and improved customer perception that roads are being managed. It will also help avoid reactive measures such as expensive wet, roll and grades.	**Support for better decision making:** This will provide valuable information to make informed asset management decisions.
Increase in Maintenance Metalling and Wearing Course	Using the data captured, produce a forward works programme for reinstating lost metal to build up road strength and then to provide a wearing course (based on the findings from the aggregate blend trials) to protect the pavement. The metal would likely use blended aggregates that hit the "sweet spot" on the Paige-Green charts to maximise pavement binding and reduce aggregate loss.	**Reduced operational expenditure:** This will extend the life of the pavement and result in an overall reduction in maintenance costs. Amenity – will reduce the roughness of unsealed roads over time.
Drainage Improvements	Programme of drainage work to prolong the life of the pavement and assist in mitigation against storm events. This will consist of ensuring adequate culvert size, deepening of water channels and installation of subsoil drainage.	**Reduced operational expenditure:** This will extend the life of the pavement and result in an overall reduction in maintenance costs.
Traction and Bridge Approach Seals	Carrying out a programme of traction and bridge approach seals to mitigate areas with high ongoing roughness and maintenance costs.	Cost Efficiency – will reduce the whole of life costs of the road. Amenity – will reduce road roughness.
Change the District Plan to Limit Subdivision on Unsealed Roads	Change the District Plan to limit future subdivision on unsealed road. This will both limit traffic increases on unsealed roads and the number of people exposed to the effects of PM_{10} dust.	Cost Efficiency – will limit increases in traffic and consequential maintenance costs in the long term. Safety – will limit increasing the effects of dust to residents health and the blinding effects of dust on road users in the long term.

Option	Description	Benefits / Consequences
Dust Suppression	Programme of dust suppression in front of houses on HCV routes to reduce the effects of PM_{10} dust on residents health.	Safety – will reduce the effects of dust to residents health and will reduce the blinding effects of dust on road users.
Dust Coat Seals	Programme of sealing house frontages on HCV routes to reduce the effects of PM_{10} dust on residents health.	Safety – will reduce the effects of dust to residents health and will reduce the blinding effects of dust on road users. Amenity – will reduce road roughness.
Seal Extensions	Programme of seal extensions focusing on HCV routes, through roads and highly trafficked unsealed roads.	Safety – will reduce the effects of dust to residents health and will reduce the blinding effects of dust on road users. Amenity – will reduce road roughness.
Wright Road Seal Extension	As for the Seal Extension option above, but just focusing on completing the 4km of unsealed road on the Wright Road forestry route.	Safety – will reduce risk of logging truck crashes. Travel Time Reliability – will improve travel times by removing the voluntary speed restrictions on this route. Amenity – will improve road roughness, reducing operating costs to logging trucks.

6.3.5 Option Assessment

Unsealed Road Condition

Option	Assessment	Problem being Addressed	Effectiveness	LOS Impact	Annual Cost	30yr PV Cost ($M)
No Heavy Metalling	Assume that the long term maintenance costs double. The unsealed road condition will also deteriorate with potholing and corrugation becoming more common. Some roads becoming unpassable in winter due to lack of metal (clay punchouts). More wet, roll and grades required to maintain shape.	Unsealed Road Condition/ Cost Efficiency	Very Poor	Significantly Worse	W/C 112: +$1,215,000 W/C 211: -$800,000	$34.5
Status Quo	Reactive routine maintenance, grading and metalling. Wet, roll and grade used at problem sites. Note - wet, roll and grades $400,000/year have been moved from W/C 211 into W/C 112 (which is where these should be funded from).	Unsealed Road Condition/ Cost Efficiency	Poor	Neutral	W/C 112: $1,215,000 W/C 211: $800,000	$28.6
Increased Management of Unsealed Roads and Asset Information	No additional cost - could be undertaken within existing budgets. Will help build up better RAMM records of pavement depth, aggregate loss and maintenance activities.	Lack of asset information	Moderate	Neutral	W/C 112: +$0 W/C 211: +$0	$28.6
Increased Level of Measurement for Unsealed Roads	This is expected to cost an additional $50,000/year for test pits and roughness data collection and analysis. This cost is likely to be balance by maintenance savings due to reduced grader activity on some roads. Will enable better decision making and establishment of a pro-active forward works programme for unsealed roads.	Lack of asset information	Moderate	Neutral	W/C 112: +$0 W/C 211: +$0	$28.6

Option	Assessment	Problem being Addressed	Effectiveness	LOS Impact	Annual Cost	30yr PV Cost ($M)
Increase in Maintenance Metalling and Wearing Course	Shaping and providing 100mm average depth structural metal and 75mm running course – over a 10 year programme for all unsealed roads (or 70km/annum). Then would drop to a lower level for maintenance of the running course. W/C 112 is expected to decrease by 30% in the long term due fewer pothole and corrugations. Also much less likely to require wet, roll and grades.	Unsealed Road Condition/ Cost Efficiency	Very Good	Significantly Better	W/C 112: -$0 increasing to -$365,000 by Year 10 W/C 211: +$730,000	$29.4
Drainage Improvements	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. Assume 10% reduction in unsealed maintenance costs	Unsealed Road Condition/ Cost Efficiency	Good	Slightly Better	W/C 112: -$125,000 W/C 211: +$0 W/C 113: +$135,000	$28.8
Traction and Bridge Approach Seals	Programme of sealing 10 bridges per year over 10 years to address areas with high maintenance cost. Assume 10% reduction in unsealed maintenance costs.	Unsealed Road Condition/ Cost Efficiency	Good	Moderately Better	W/C 112: -$120,000 W/C 211: +$500,000	$30.7

PREFERRED OPTIONS – Improved Management and Measurement and Increase in Maintenance Metalling and Wearing Course - This will reduce our long term maintenance costs by providing a robust pavement with tight wearing course, having better information to make just in time maintenance action which will help minimise expensive wet, roll and grade treatments and will help change resident's perception that our unsealed roads are not being maintained.

The option to carry out a specific programme of Drainage Improvements to reduce potholes forming and pavement damage due to water ingress, is not preferred at this stage because it is not cost effective on its own, and this some of this work can be incorporated into normal grading cycles anyway.

Dust

Option	Assessment	Problem being Addressed	Effectiveness	LOS Impact	Annual Cost	30yr PV Cost ($M)
Status Quo	No dust mitigation.	Dust & Unsealed Road Condition	Very Poor	Neutral	W/C 112: $0 W/C 211: $0	$0.0

Option	Assessment	Problem being Addressed	Effectiveness	LOS Impact	Annual Cost	30yr PV Cost ($M)
Change the District Plan to Limit Subdivision on Unsealed Roads	District plan change currently underway. No additional cost	Dust & Unsealed Road Condition	Good	Slightly Better	W/C 112: $0 W/C 211: $0	$0.0
Dust Suppression	There is 50km of unsealed forestry roads plus 33km of other medium dust risk road (score of 12 or more). There are 137 houses within these lengths requiring suppressant. Each house is expected to require 500m and 3 applications of dust suppressant per year. The dust suppression is expected to mitigate the health effects of dust at these houses. There will also be some minor maintenance and renewal cost savings.	Dust & Unsealed Road Condition	Good	Moderately Better	W/C 112: +$2,410,000 W/C 211: -$50,000	$10.2
Dust Coat Seals	As for the Dust Suppression option, there are 137 houses requiring dust coast seals. Assume 10 year programme of dust coat seals. This will eliminate the health effects of dust at these houses. There will also be some maintenance and renewal saving resulting from this work, but this will be offset by increased sealed road maintenance costs.	Dust & Unsealed Road Condition	Very Good	Significantly Better	W/C 112: -$200,000 W/C 211: +$2,260,000 W/C 111: +$340,000	$17.6
Mix of Dust Coat Seals & Suppression	This option would use Dust Coat Seals on long term HCV routes (eg 10yrs+) and Dust Suppression would be used on other routes. Assume 50% dust suppression and 50% dust coat seals.	Dust & Unsealed Road Condition	Very Good	Significantly Better	W/C 112: +$1,105,000 W/C 211: +$1,105,000 W/C 111: +$170,000	$13.9
Seal Extensions	This option would seal the 83km of unsealed forestry roads and medium risk dust roads over a 10 year period. This would result in elimination of the health effects of dust on these routes and would reduce operating costs for freight. However, it requires a significant investment which would be difficult to justify.	Dust & Unsealed Road Condition	Very Good	Significantly Better	W/C 112: -$250,000 W/C 211: +$3,235,000 W/C 111: +$415,000	$24.9

Option	Assessment	Problem being Addressed	Effectiveness	LOS Impact	Annual Cost	30yr PV Cost ($M)
Wright Road Seal Extension	This option would seal the remaining 4km of unsealed roads on the 77km strategic forestry route from the Pipiwai forest to the port. This would result in a consistent sealed route, reduced operating costs for logging trucks and improved safety on this route. It will also reduce political pressure from local residents to have this forestry route sealed.	Dust & Unsealed Road Condition	Very Good	Significantly Better	W/C 112: -$40,000 W/C 111: +$40,000 W/C 212: +$30,000 **One-off Capital Costs:** W/C 341: +$2,000,000	$2.2

PREFERRED OPTIONS – Limited dust suppression only on forestry routes with a dust risk rating of 12 or more. This will address PM_{10} dust effects on residents from freight traffic on approximately 40km of road. This option will target the highest dust risk roads with forestry traffic at a reduced estimated cost of $500,000/year.

Sealing of the Wright Road forestry route to complete this strategic forestry route to the port and to reduce logging truck operating costs and improve road safety.

The Council is proposing limited ratepayer subsidised seal extensions (2km/year) to partially satisfy public pressure for road sealing. This work would start in 2019/20. This work would not be NZTA funded.

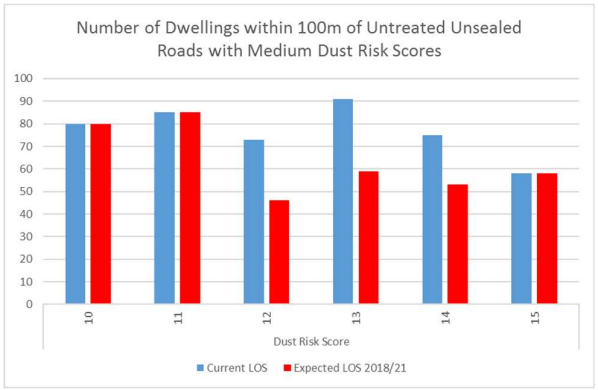
6.3.6 Financial Impact

The following table shows the financial impact of the options selected (note some of the costs have been rounded off):

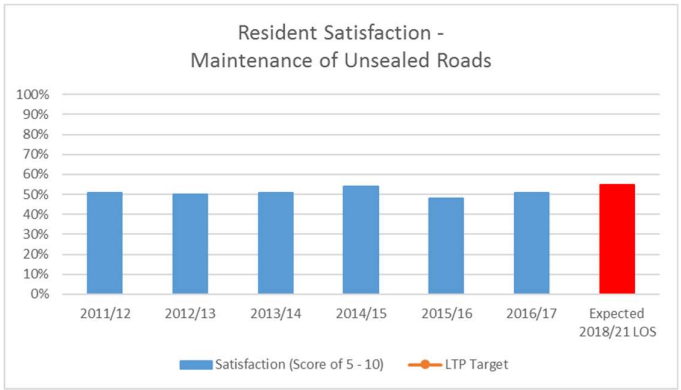
W/C	Description	Cost Impact	Overall Impact (excl Growth & Escalation)
112	Unsealed Pavement Maintenance	+$500,000/yr for dust suppression on forestry routes +$200,000/yr for wet, roll and grades (transfer from W/C 211)	+$700,000/yr
211	Unsealed Road Metalling	-$200,000/yr for wet, roll and grades (transferred to W/C 112)	-$200,000/yr
113	Routine Drainage Maintenance	No Change	No Change
341	Low Cost/Low Risk Improvements	+$2,000,000 for the Wright Road Seal Extension	+$2,000,000 one-off cost
	Seal Extension (Unsubsidised)	$1,000,000/yr to seal 2km per annum. This work would be ratepayer subsidised with no NZTA funding.	+$1,000,000/yr

6.3.7 Level of Service Impact

The following table shows the expected Level of Service impact of the options selected:



PUBLIC HEALTH – We expect to reduce the number of dwellings with a medium dust risk score by almost 20% by carrying out dust suppression on forestry roads. The unsubsidised seal extension will also have an impact on these medium risk sites, but this has not been taken into account in the above graph due to uncertainty as to which sites will be approved by Council.



RESIDENT SATISFACTION – We also expect an increase in resident satisfaction during the 2018/21 period, because Council will be seen to be taking proactive treatment of the worst roads affected by dust and will have reinstated a minor seal extension programme.

Overall it is expected that there will be a decrease in the number of dwellings affected by PM_{10} dust and there will be an increase in the level of satisfaction of the Council's unsealed road network.

6.3.8 Improvement Plan

Improvements that should be considered during the 2018/21 period for inclusion in the next AMP are as follows:

- Further segmentation of the unsealed network into sub-classifications to ensure roads are maintained to their intended purpose and use.

- Capture 12-months of unsealed roughness data using RoadRoid or similar to establish a baseline and to see how roughness changes over the year. Use this data to develop roughness levels of service for the unsealed network and a pro-active grading programme.
- Undertake test-pits on major routes to prioritise heavy metalling programmes.
- Develop a forward works programme to address heavy metalling and wearing course application. This could include determining whether RoadRoid or similar roughness data can be used as an input into the HDM 4 Unsealed Roading Model.

6.4 Drainage

Work Categories: **113 Routine Drainage Maintenance, 213 Drainage Renewals & 341 Low Cost/Low Risk Improvements**

6.4.1 Links to Strategic Case

Problem Statement: Our roads are subject to sub-tropical high intensity rainfall events which combined with undersized or blocked culverts are often the cause of flooding and slips which limits access on our roads and makes them less resilient. Our roads often have poor or inadequate side drains which leads to water ingress into pavements which can soften the weak subgrades and lead to early pavement failure. These issues are only expected to get worse over time due to the effects of climate change.

Benefits of Addressing Problem: A fit for purpose drainage system which minimises water ingress into pavements thus extending pavement life and reduces the likelihood of flooding and slips during heavy rain events.

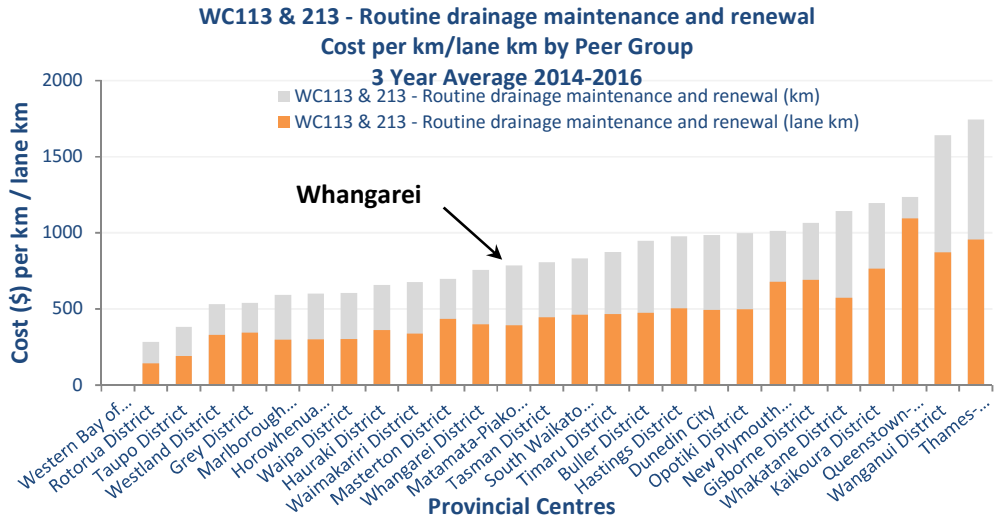
Consequences of Not Addressing the Problem: Pavements will continue to failure prematurely due to water ingress. Slips and flooding will continue to cause resilience issues on our roads during heavy rain events resulting in road closures that often affect freight, tourist and detour routes, key lifelines and isolated communities.

6.4.2 Levels of Service

ONRC Customer Outcomes:
ONRC Resilience CO1 – The number of journeys impacted by unplanned events (NO DATA AVAILABLE)
ONRC Resilience CO2 – The number of instances where road access is lost (NO DATA AVAILABLE)

Customer Levels of Service:
ONRC Cost Efficiency 5 – Overall network cost
LTP 1.1.X – Decreasing trend in resilience related faults on key routes (New measure) (NO DATA AVAILABLE)
LTP 1.1.X – Yr 1, 5, 10, 30 Condition distributions are maintained within the set condition enveloped (New measure)

6.4.3 Evidence and Gap Analysis

NZTA Peer Group Charts – 3yr Cost/km W/C 113 & 213 Routine Drainage Maintenance and Drainage Renewals Whangarei's spend on drainage maintenance and renewals is slightly below the average for its peer group. Given Whangarei's issues with high rainfall events and clayey soils that result in high runoff, this spend is lower than expected.	**Overall**	

SUMMARY – The cost to maintain Whangarei's drainage system is less than the peer group average, which is lower than expected due to Whangarei's frequent high intensity rainfall events.

6.4.4 Options to be Considered

Based on the above data and the problem definition, the following options have been considered for addressing the drainage systems:

Option	Description	Benefits / Consequences
No Drainage Renewals	Carry out only routine drainage maintenance work. Drainage systems will fail and block over time and lead to pavement failure and wash outs/slips during heavy rain.	Cost Efficiency – will reduce drainage renewals costs, but could increase pavement maintenance costs. Resilience - would increase the likelihood of flooding and slips.

Option	Description	Benefits / Consequences
Programme of Drainage Renewals	Programme renewals of drainage systems based on condition with focus on upgrading systems that are under capacity, particularly on freight or detour routes and main arterials and collectors. This would include addressing surface water tables where water is entering pavements and replacing broken or undersized culverts.	Cost Efficiency – will help reduce pavement maintenance costs. Resilience - would reduce the likelihood of flooding and slips.

6.4.5 Option Assessment

Drainage

Option	Assessment	Problem being Addressed	Effectiveness	LOS Impact	Annual Cost	30yr PV Cost ($M)
No Drainage Renewals	Assume drainage maintenance will increase by 50% and pavement maintenance will increase by 10% for both sealed and unsealed roads. Risk of flooding and culvert collapse would significantly increase over time.	Sealed pavement condition & Resilience	Very Poor	Moderately Worse	W/C 113: +$330,000 W/C 213: -$960,000 W/C 111: +$420,000 W/C 112: +$80,000	$25.4
Status Quo	Carry out routine drainage works such as cleaning culverts on a reactive basis. Limited surface water table maintenance. Drainage renewals mainly as associated improvements in conjunction with rehabilitation projects.	Sealed pavement condition & Resilience	Poor	Neutral	W/C 113: $860,000 W/C 213: $960,000	$25.8
Programme of Renewals	Carry out a programme to remove High Lip and reinstate surface watertables with a 10 years average cycle time for all rural roads and 5 year cycle time for forestry and collector routes (or 190km of SWC/annum) Also include a programme of culvert and concrete channel renewals assuming 100 year life (or 1,200m of culvert and 5,000m of concrete K&C replaced per annum). Assume pavement maintenance will decrease by 10% for both sealed and unsealed roads.	Sealed pavement condition & Resilience	Good	Slightly Better	W/C 113: +$325,000 W/C 213: +$100,000 W/C 111: -$420,000 W/C 112: -$120,000	$24.2

PREFERRED OPTION – Programme of renewals, as this will enable proactive drainage renewals and upgrades to be undertaken to retain and improve the drainage system resulting in less water ingress into pavements and reduced incidences of washout and slips caused by drainage blockage and failure. 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 focus on sealed roads that are being resurfaced.

6.4.6 Financial Impact

The following table shows the financial impact of the options selected (note some of the costs have been rounded off):

W/C	Description	Cost Impact	Overall Impact (excl Growth & Escalation)
113	Routine Drainage Maintenance	+$100,000/yr for increased watertable maintenance on sealed roads.	+$100,000/yr
213	Drainage Renewals	+$100,000/yr for increased culvert replacement.	+$100,000/yr

6.4.7 Improvement Plan

Improvements that should be considered during the 2018/21 period for inclusion in the next AMP are as follows:

- Record condition data on drainage assets, and in particular surface watertables, so that this can be used to develop programmes of work. This should be included in the road maintenance contracts that are currently being developed.
- Drainage programme to be included in the dTIMS model to prioritise the optimal programme of watertable maintenance work and to determine the effect of this work on the sealed road network.
- Develop a programme of culvert upgrades as a result of work on the proposed Resilience Strategy.

6.5 Structures

Work Categories: **114 Structures Maintenance, 215 Structural Component Replacement, 341 Low Cost/Low Risk Improvements & 322 Replacement of Bridges and Other Structures**

6.5.1 Links to Strategic Case

Problem Statement: There are twenty bridges on our network that restrict 50Max vehicle movement and many of our State Highway detour routes are not suitable for HPMV vehicles which can substantially delay HPMV vehicles during an emergency event when these detours are being used. We also have a large number of large steel plate culverts which have been concrete-lined in the past but are now at the end of their life.

Benefits of Addressing Problem: A fit for purpose bridge and retaining wall asset that provide access for freight and high productivity vehicles (50Max and HPMV) on arterial, freight and detour routes.

Consequences of Not Addressing the Problem: Our structures will deteriorate over time leading to further restrictions to freight and increasing risk of bridge or retaining wall failure resulting in safety issues and complete loss of access.

6.5.2 Levels of Service

ONRC Customer Outcomes:
ONRC Resilience CO1 – The number of journeys impacted by unplanned events (NO DATA AVAILABLE)
ONRC Resilience CO2 – The number of instances where road access is lost (NO DATA AVAILABLE)
ONRC Accessibility CO1 – Proportion of the network not available to Class 1 heavy vehicles and 50MAX vehicles

Customer Levels of Service:
ONRC Safety TO1 – Permanent hazards (NO DATA AVAILABLE)
ONRC Cost Efficiency 5 – Overall network cost
LTP 1.1.X – Decreasing trend in resilience related faults on key routes (New measure) (NO DATA AVAILABLE)
LTP 1.1.X – Yr 1, 5, 10, 30 Condition distributions are maintained within the set condition enveloped (New measure)

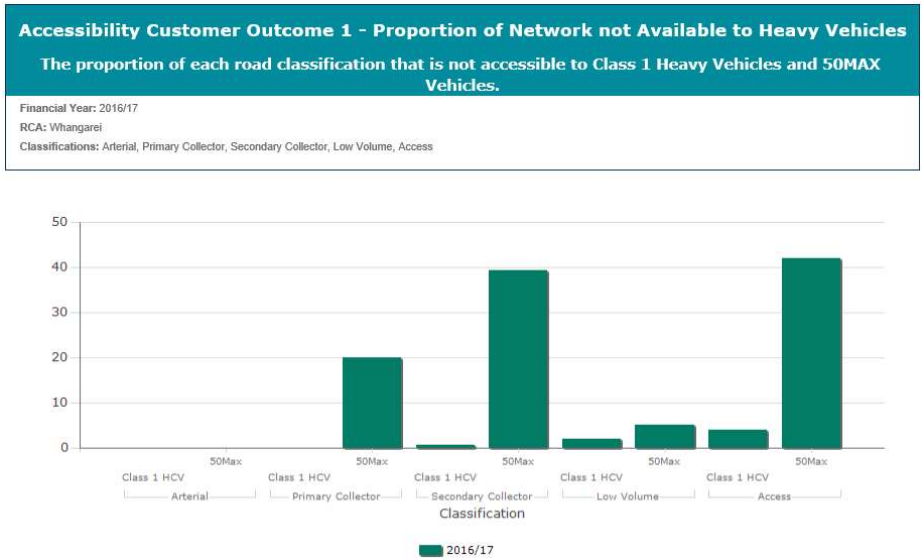
6.5.3 Evidence and Gap Analysis

ONRC Accessibility TO1 – Proportion of Network not Available to Heavy Vehicles

There are only seven weight restricted bridges in Whangarei which results in most of the road network being available to Class 1 Vehicles.

There are twenty 50MAX restricted bridges on the Whangarei network. The location of these and difficulties in a 50MAX vehicle turning on these roads results in 20km (10%) of the Primary Collector roads and approximately 40km of the Secondary Collector (9%) and Access (7%) roads being unavailable for 50MAX vehicles.

ONRC	Class 1	50Max
Arterial		
Primary Collector		
Secondary Collector		
Access		
Low Volume		

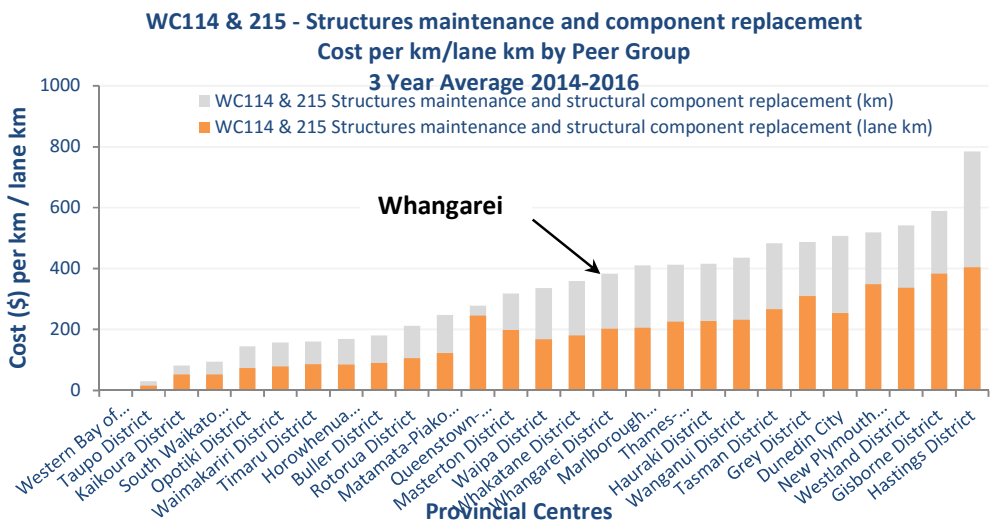


NZTA Peer Group Charts – 3yr Cost/km W/C 114 & 215 Structures Maintenance and Structural Component Replacement

Whangarei's spend on its structure maintenance and renewals is about the average for its peer group.

This is likely to be because Whangarei's structures are generally in adequate condition. Whangarei is also focussing on more maintenance and renewal to extend the lives of their structures rather than have a large replacement programme.

Overall	



SUMMARY – Heavy vehicle access on Whangarei's network is generally good, but there are significant lengths of the Primary Collector, Secondary Collector and Access roads which have 50MAX restrictions. This suggests that further work may be required to enable more 50MAX vehicle journeys. The cost to maintain and renew Whangarei's structures is about average for the peer group.

6.5.4 Options to be Considered

Based on the above data and the problem definition, the following options have been considered for addressing the bridge and structures network:

Option	Description	Benefits / Consequences
No Structural Work	Routine maintenance only. No bridge or retaining wall renewals or replacement – run down asset and increase weight and 50Max restrictions over time.	Cost Efficiency – will reduce structural renewal costs, but will increase maintenance costs and will have higher whole of life costs in the long term. Accessibility – will reduce accessibility for freight and 50Max vehicles over time. Resilience – Risk of structure failure resulting in completed loss of access increased.
No Replacement Work	Routine maintenance and structural component replacement where required to maintain assets in their current condition. No bridge or retaining wall replacement. Not likely to be practical with large number of concrete lined steel plate culverts reaching the end of their useful life in the next 10 years.	Cost Efficiency – will reduce structural replacement costs, but may increase structural renewals and maintenance costs. Accessibility – may reduce accessibility for freight and 50Max vehicles over time. Resilience – May increase the risk of structure failure resulting in completed loss of access increased.
Retaining Wall & Steel Arch Culvert Replacement	Programme of maintaining and renewing retaining walls and also addressing the 50 steel arch culverts that have previously been lined but are now badly corroded.	Accessibility – will retain accessibility for freight and 50Max vehicles. Resilience – Will decrease the risk of structure failure resulting in completed loss of access.
Detour & Freight Routes	A programme of upgrading bridges on detour and freight routes. This would include strengthening to at least 50Max standard, widening and bridge approach work. Strengthening to HPMV standard on key State Highway detour routes.	Accessibility – will improve accessibility for freight and 50Max vehicles on detour and freight routes, and for HPMVs on key State Highway detours routes.

Option	Description	Benefits / Consequences
Removal of Weight and 50Max Restrictions	As per Detour and Freight Route option, but also with a programme to upgrade all weight restricted and 50Max vehicle restricted bridges.	Accessibility – will improve accessibility 50Max vehicles on all routes, and for HPMVs on key State Highway detours routes.

6.5.5 Option Assessment

Bridges & Retaining Walls

Option	Assessment	Problem being Addressed	Effectiveness	LOS Impact	Annual Cost	30yr PV Cost ($M)
No Structural Work	Assume long term maintenance costs would double. This option is not practical because there is no way to maintain the many steel pipe arch culverts which are due for replacement over the next 10-20 years. This option would see weight restrictions on numerous bridges and would greatly increase the risk of catastrophic failure.	Resilience & Accessibility	Very Poor	Significantly Worse	W/C 114: +$265,000 W/C 215: -$760,000 W/C 341: -$285,000	$7.5
No Replacement Work	This option would see the long term maintenance and structural component replacement costs increase significantly. Again, this option is not practical because there is no way to maintain the many steel pipe arch culverts which are due for replacement over the next 10-20 years.	Resilience & Accessibility	Poor	Moderately Worse	W/C 114: +$135,000 W/C 215: +$380,000 W/C 341: -$285,000	$21.9
Status Quo	Routine maintenance and structural component replacement where required to maintain assets in their current condition. Limited bridge replacement.	Resilience & Accessibility	Moderate	Neutral	W/C 114: $265,000 W/C 215: $760,000 W/C 341: $285,000	$18.6

Option	Assessment	Problem being Addressed	Effectiveness	LOS Impact	Annual Cost	30yr PV Cost ($M)
Retaining Wall & Steel Arch Culvert Replacement	688 retaining walls & 80 major steel arch culverts. Increase maintenance cost by $100,000 to maintain retaining walls. Increase structural component replacements by $200,000/yr to enable 3-4 retaining walls to be replaced per year. Replace 3 steel arch culverts per annum.	Resilience & Accessibility	Good	Slightly Better	W/C 114: +$105,000 W/C 215: +$240,000 W/C 341: +$215,000	$26.6
Detour & Freight Routes	This option may not be required depending whether the SH1 Whangarei to Te Hana project includes a new off-line alignment. To be confirmed/determined through Regional Resilience Strategy.	Resilience & Accessibility	Very Good	Moderately Better	TBD	TBD
Removal of Weight and 50Max Restrictions	Estimated to cost $1,640,000 to strengthen five 50MAX restrictive bridges on freight routes (Reyburn St, Walton St, Kara Rd, Pipiwai Rd and Millbrook Rd) and two HPMV restrictive bridges on a SH bypass (Great North Rd and Kamo Rd). This equates to $550,000/year for 3 years. This option would be confirmed by undertaking detailed 50MAX and HPMV assessments for these bridges (an Improvement Plan activity)	Resilience & Accessibility	Very Good	Moderately Better	W/C 114: +$105,000 W/C 215: +$240,000 W/C 341: +$765,000	$28.1

PREFERRED OPTION – Retaining Wall & Steel Plate Arch Culvert Replacement – to retain the current access for freight and reduce the likelihood of road closure due to structure failure.

6.5.6 Financial Impact

The following table shows the financial impact of the options selected (note some of the costs have been rounded off):

W/C	Description	Cost Impact	Overall Impact (excl Growth & Escalation)
114	Structures Maintenance	+$100,000/yr for retaining wall maintenance.	+$100,000/yr
215	Structural Component Replacement	+$150,000/yr for retaining wall renewal +$100,000/yr for additional bridge component renewal.	+$250,000/yr
341	Low Cost/Low Risk Improvements	+$215,000/yr for additional replacement of steel pipe arch culverts.	+$215,000/yr
322	Replacement of Bridge & Other Structures	None programmed – No change.	No Change

6.5.7 Improvement Plan

Improvements that should be considered during the 2018/21 period for inclusion in the next AMP are as follows:

- Develop a programme in conjunction with the Transport Agency (HNO) for structural upgrades on State Highway detour routes. This should include assessments for suitability for 50Max and HPMV vehicles.
- Carry out full assessment on key bridges that have current 50Max restrictions to determine whether these restrictions are necessary.
- Seismic assessments to be carried out on structures on key life lines, arterials and freight routes. Develop a programme of remedial work as required.
- Retaining walls to be included in the annual bridge inspection programme and condition rated.

6.6 Environmental

Work Categories: **121 Environmental Maintenance & 221 Environmental Renewals & 341 Low Cost/Low Risk Improvements**

6.6.1 Links to Strategic Case

Problem Statement: Aesthetic faults such as litter and graffiti on the Twin Coast Discovery Route and byways is likely to detract from visitor experience of Northland. Oil and rubbish in stormwater run-off from the urban road network is also polluting our rivers and beaches which also detracts from visitor experience and government's drive for cleaner rivers. Vegetation and weed-species growth is rapid due to our subtropical climate and this results in increased costs to keep sightlines clear and to remove tree hazards from the road corridor.

Benefits of Addressing Problem: Visitor perception of Whangarei and water quality of our rivers and harbours will improve over time. Sightlines and road side tree hazards will be minimised improving road safety.

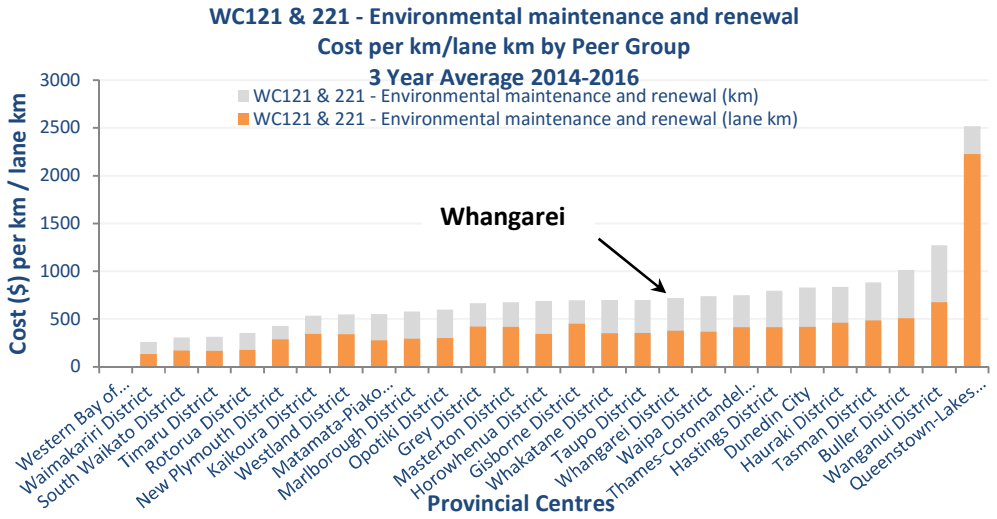
Consequences of Not Addressing the Problem: The risk of visitors having a bad perception of Whangarei is increased, resulting in less tourism growth. Our harbours and rivers will continue to be polluted by urban road run-off. Sightlines will become blocked and tree hazards in the road corridor increased resulting in increased risk of fatal and serious injuries.

6.6.2 Levels of Service

ONRC Customer Outcomes: None

Customer Levels of Service:
ONRC Safety TO3 – Sight Distances (NO DATA AVAILABLE)
ONRC Safety TO10 – Roadside Obstructions (NO DATA AVAILABLE)
ONRC Amenity TO2 – Aesthetic Faults (NO DATA AVAILABLE)
ONRC Cost Efficiency 5 – Overall network cost

6.6.3 Evidence and Gap Analysis

NZTA Peer Group Charts – 3yr Cost/km W/C 121 & 221 Environmental Maintenance and Renewals Whangarei's spend on environmental maintenance and renewals is about average for its peer group. This is much lower than expected given Whangarei's rapid vegetation growth and high tourism numbers which should be driving more amenity treatments such as litter removal.	**Overall** 	

SUMMARY – The cost of environmental maintenance and renewal on Whangarei's network is about the same as the peer group average. This is lower than expected due to Whangarei's subtropical climate which results in rapid vegetation growth and the high number of tourists which should be driving a higher level of amenity.

6.6.4 Options to be Considered

Based on the above data and the problem definition, the following options have been considered for addressing the environmental issues on the network:

Option	Description	Benefits / Consequences
Litter Removal	Provide monthly litter removal supported by rubbish bins at rest areas and trouble spots on the Twin Coast Discovery Highway and byways and on arterial roads.	Amenity – will improve the perception of tourists and other customers of the road network.

Option	Description	Benefits / Consequences
Water Quality Treatment	Provide water quality treatment to stream and harbour outfalls to reduce oil and litter entering the environment with a focus on urban areas.	Amenity – will reduce litter in rivers and harbours which will improve the perception of tourists and customers of Whangarei as a whole. Environmental - It will also assist in the government direction to clean its rivers to swimmable standard
Mowing Rural Berms	Mowing of rural berms instead of the current spraying activity. Mowing is expected to be required more frequently than spraying due to faster regrowth.	Amenity – improve the appearance of the road corridor.
Programmed Tree Trimming by Boom Mounted Mulcher	Carry out an annual programme of boom mounted mulcher trimming of roadside vegetation on freight, tourist and arterial routes to clear trees from sight lines and clearance envelopes.	Safety – will help clear sightlines which will reduce the likelihood of crashes occurring. Amenity – improve the appearance of the road corridor.
Targeted Tree Removal on Tourist and Arterial routes	As per the Programmed Tree Trimming by Boom Mounted Mulcher option, but with complete tree removal on tourist and arterial routes.	Safety – will help clear sightlines and will remove hazardous trees which will reduce the likelihood of crashes occurring. Amenity – improve the appearance of the road corridor.

6.6.5 Option Assessment

Aesthetic Faults

Option	Assessment	Problem being Addressed	Effectiveness	LOS Impact	Annual Cost	30yr PV Cost ($M)
Status Quo	No road litter removal included in maintenance contract. Graffiti removal done through Council by separate operator.	Amenity	Poor/Moderate	Neutral	$0	$0.0
Litter Removal	160km of litter removal per month (in accordance with the ONRC Visual Guide)	Amenity	Good	Slightly Better	W/C 121: +$96,000	$1.4

PREFERRED OPTION – Litter Removal: will keep tourist routes and byways and arterial roads looking clean and will support the perception that Northland is a nice place to visit and live.

Water Quality

Option	Assessment	Problem being Addressed	Effectiveness	LOS Impact	Annual Cost	30yr PV Cost ($M)
Status Quo	Carry out earthworks using NRC minimum standards. Minimal water quality treatment. Only maintain the existing few water quality facilities.	Amenity/Environmental	Poor	Neutral	$0	$0.0
Water Quality Treatment	Carry out a 10 year programme to provide gross pollutant traps and grease traps at each major stormwater outfall from the Whangarei Cuty area. This will result in an improvement to the water quality of the Hatea River and associated tributaries. There would be an ongoing maintenance costs expected to be $50,000/year to clean these facilities.	Amenity/Environmental	Good	Slightly Better	W/C 121: +$50,000 W/C 341: +$1,000,000	$8.3

PREFERRED OPTION – Status Quo: Maintain the existing limited water treatment facilities.

Vegetation Control

Option	Assessment	Problem being Addressed	Effectiveness	LOS Impact	Annual Cost	30yr PV Cost ($M)
Status Quo	Spraying of rural berms two or three times a year. Mowing of sightlines. Urban berms maintained by adjacent landowners. Programming tree removal or trimming on arterials or when affecting site lines and clearance envelopes. Eventually trying to get to a sustainable tree mulching programme. Spraying/ removing noxious weeds in accordance with NRC requirements.	Safety/Amenity	Moderate	Neutral	W/C 121: $1,260,000	$17.9

Option	Assessment	Problem being Addressed	Effectiveness	LOS Impact	Annual Cost	30yr PV Cost ($M)
Mowing Rural Berms	Mowing rural berms instead of spraying. Allowance has been made for more frequent mowing due to regrowth faster than spraying. This option would result in a slight improvement to amenity.	Safety/Amenity	Moderate	Slightly Better	W/C 121: +$270,000	$21.7
Programmed Tree Trimming by Boom Mounted Mulcher	Programme of tree trimming by boom mounter mulcher on freight, tourist and arterial routes – Assume 2 yearly cycle (or 150km/annum). This will keep slightlines clear of vegetation.	Safety/Amenity	Good	Moderately Better	W/C 121: +$150,000	$20.0
Targeted Tree Removal on Tourist and Arterial routes	Programme of complete tree removal on tourist and arterial roads – Assume 5 yearly cycle (or 30km/annum). This would help keep sightlines clear and would remove some hazardous trees from the roadside.	Safety/Amenity	Very Good	Moderately Better	W/C 121: +$245,000	$21.4

PREFERRED OPTIONS – Tree Clearance by Boom-Mounted Mulcher and Targeted Tree Removal of Tourist and Arterial Routes: will keep trees away from sight lines and clearance envelopes improving safety and road amenity.

6.6.6 Financial Impact

The following table shows the financial impact of the options selected (note some of the costs have been rounded off):

W/C	Description	Cost Impact	Overall Impact (excl Growth & Escalation)
121	Environmental Maintenance	+$200,000/yr for increased tree removal and trimming. -$150,000/yr for minor slips (transferred to W/C 140 Minor Events)	+$50,000/yr
221	Environmental Renewals	None programmed – No change.	No Change

6.6.7 Improvement Plan

Improvements that should be considered during the 2018/21 period for inclusion in the next AMP are as follows:

- None identified.

6.7 Traffic Services

Work Categories: **122 Traffic Services Maintenance & 222 Traffic Services Renewals & 341 Low Cost/Low Risk Improvements**

6.7.1 Links to Strategic Case

Problem Statement: Our delineation at night is poor with lack of continuous edgelines on some tourist routes, arterial and collector roads and a poor standard of edge marker posts. This could be contributing to the increasing trend of fatal and serious injury crashes in Whangarei. Guide signage in Whangarei is generally poor at major intersections with few signs indicating road names and destinations which is likely to be confusing to tourists and visitors. There are also areas in Whangarei City and outlying coastal communities that have poor levels of streetlighting and result in dark areas which are considered to be unsafe for walking and cycling at night.

Benefits of Addressing Problem: Delineation will be improved reducing the likelihood of loss of control crashes. Improved guide signage will allow tourists and visitors to navigate their way through Whangarei City. Streetlights will provide adequate lighting levels that provide more confidence for people to walk and cycle after dark.

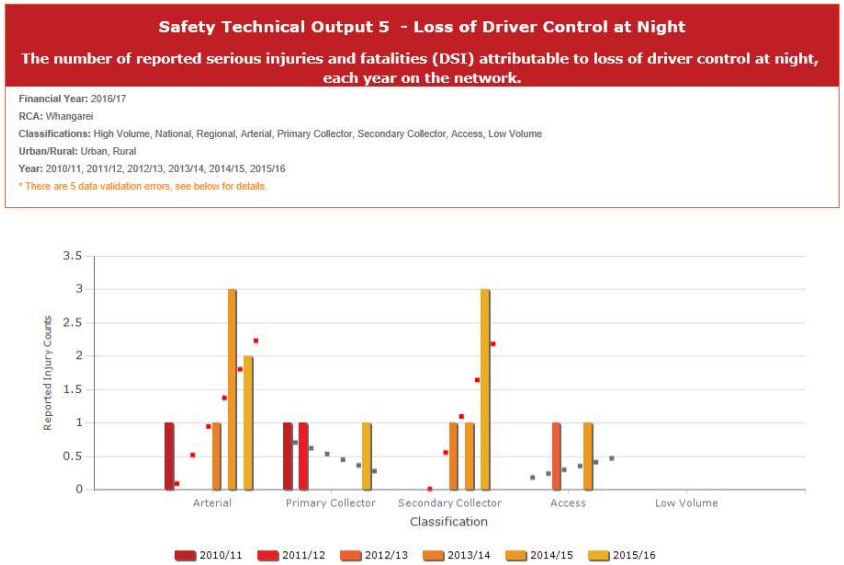
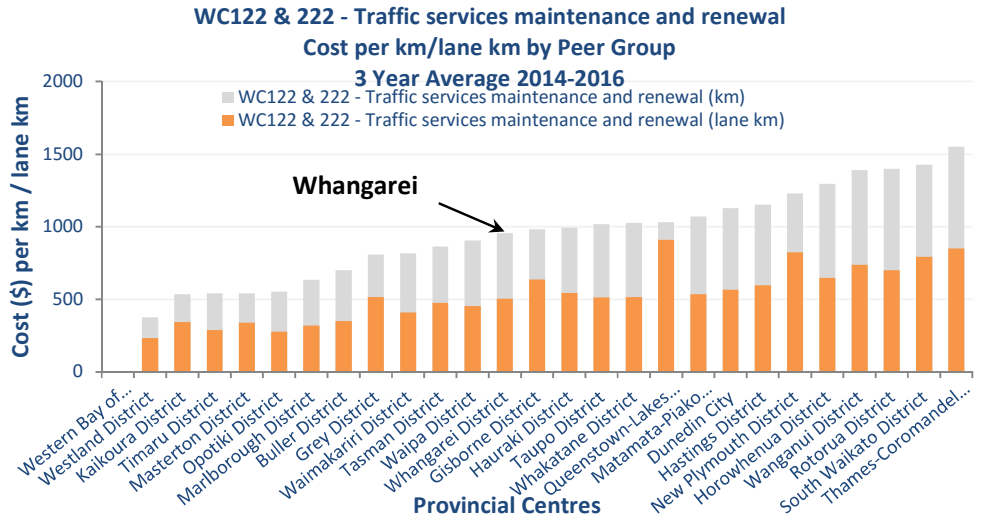
Consequences of Not Addressing the Problem: Loss of control crashes will continue, increasing the risk of fatal and serious injury. Tourists and visitors may struggle to navigate their way in Whangarei City, leading to confusion and reduced positive perception of the area. Less people walking and cycling at night which will limit the number of commuters taking active modes, particularly in winter when the days are shorter.

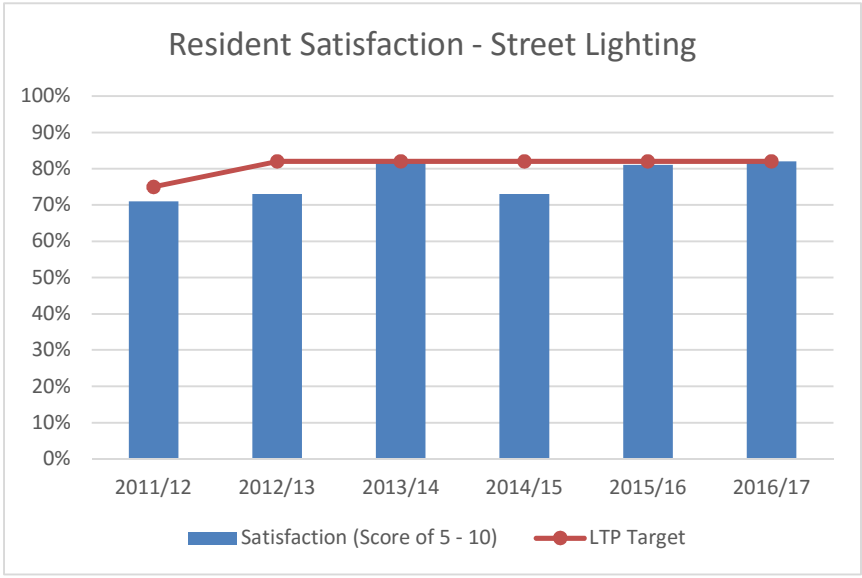
6.7.2 Levels of Service

ONRC Customer Outcomes: None

Customer Levels of Service:
ONRC Safety TO1 – Permanent Hazards (NO DATA AVAILABLE)
ONRC Safety TO5 – Loss of driver control at night
ONRC Accessibility TO1 – Accessibility (guide signage) (NO DATA AVAILABLE)
ONRC Cost Efficiency 5 – Overall network cost
LTP 1.1.X – Yr 1, 5, 10, 30 Condition distributions are maintained within the set condition enveloped (New measure)
LTP 1.2.4 – Residents satisfaction with lighting in urban area (Current measure)

6.7.3 Evidence and Gap Analysis

ONRC Safety TO5 –Loss of Driver Control at Night It should be noted that there is not much data available for this LOS and this reduces the usefulness of this measure. However, it does appear that there is a significantly increasing trend of serious injury and fatal loss of control crashes on the Arterial and Secondary Collector road networks in Whangarei at night.	**ONRC** **Arterial** **Primary Collector** **Secondary Collector** **Access** **Low Volume**	
NZTA Peer Group Charts – 3yr Cost/km W/C 122 & 222 Traffic Services Maintenance and Renewals Whangarei's spend on traffic services maintenance and renewals is slightly below the average for its peer group. This is lower than should be expected given WDC's high VKT which should result in more spend on pavement markings. This low spend is partially due to WDC only doing a partial remark of its line markings in the 2014/15 and 2015/16 years.	**Overall**	

This cost per km is expected to reduce significantly as a result of WDC's planned LED streetlight conversion which will replace the 5,000 existing lights on Whangarei's network with more energy efficient and long life luminaires.		
LTP Measure 1.2.4 – Resident Satisfaction with Street Lighting in Urban Areas Resident satisfaction with Whangarei's street light network is good and currently matches the target of 82%. This is likely to improve with the LED conversion project being undertaken in 2017/18, because the quality of lighting will improve and there will be an upgrade of the lighting at major intersections.	**Overall** 	

SUMMARY – There is an increasing trend of high severity loss of control crashes at night on Arterial and Secondary Collector roads, which suggests that further work is required to delineate these roads. The cost to maintain and renew Whangarei's traffic services is about the same as the peer group average. This may be affected by Whangarei only doing a partial remark in two of the three last years. The LED streetlight conversion project will further reduce these costs. Resident satisfaction with the streetlight network is good and this is likely to improve with the LED streetlight conversion project in 2017/18.

6.7.4 Options to be Considered

Based on the above data and the problem definition, the following options have been considered for addressing the traffic services facilities:

Option	Description	Benefits / Consequences
Full Annual Line Re-Mark	Carry out a full annual re-marking of all lines.	Safety – will improve the visibility of markings and reduce crashes.
Long-life markings	Use and maintain long-life markings on major intersections in Whangarei City that frequently require a repaint.	Cost Efficiency – will reduce the cost of marking intersections.
Continuous Edgelines	Paint continuous edgelines on all tourist routes, arterials and collector roads.	Safety – will reduce the likelihood of loss of control crashes at night.
Programme of Edge Marker Posts and RRPM Renewals	Carry out regular inspection of edge marker posts and raised reflectorized pavement markers. Programme renewals and improvements where required.	Safety – will reduce the likelihood of loss of control crashes at night.
Improved Guide Signage	Provide improved and new direction signage on Twin Coast Discovery Route and byways and at major intersections in Whangarei City. This includes providing Intersection Direction signs (ID) and Confirmation Direction (CD) signs and better road name signage.	Accessibility– improve the ability for tourists and visitors to navigate through Whangarei.
Programme of Pole Renewals	Programme renewals of streetlight poles based on a pro-active condition assessment with a view to replaced each pole on a 30 year cycle.	Safety– will reduce the likelihood of pole collapse leading to pedestrian or motorist injury.
Infill LED lighting	To provide additional LED lights on roads and cycleways to infill existing gaps in the streetlight network to meet current AS/NZS standards.	Safety – will improve lighting resulting in less crashes at night.

6.7.5 Option Assessment

Line Marking & Delineation

Option	Assessment	Problem being Addressed	Effectiveness	LOS Impacts	Annual Cost	30yr PV Cost ($M)
Status Quo	Continue to maintain markings with waterborne paint with very limited use of long-life markings. Edgelines marked on corners only for some arterials and collector roads. Some significant work on replacing broken edge marker posts has been done on some arterial routes but much more required. Loose chip after reseals undertaken reduces the life of the new markings. Currently achieving ¾ of a full remark per annum.	Safety	Poor/Moderate	Neutral	W/C 122: $305,000	$4.3
Full Annual Line Re-Mark	This will allow for one full re-mark of the network per annum to make sure that markings are visible.	Safety	Moderate	Slightly Better	W/C 122: +$100,000	$5.8
Long-life markings	There are 25 major intersections which could be marked with long-life markings. Assume require remarking every 5 years. The additional costs for the long-life markings would be offset by the ongoing marking of these intersections so this option is effectively cost neutral.	Safety	Good	Slightly Better	W/C 122: +$0	$4.3
Continuous Edgelines	Marking edgelines on all sealed arterial, collector and tourist route. This equates to 713km x 2 = 1426km/year. This option will significantly improve night time delineation on these routes and reduce crashes at night.	Safety	Very Good	Moderately Better	W/C 122: +$150,000	$6.5
Programme of Edge Marker Posts & RRPM Renewals	Provide and maintain edge marker posts and RRPMs on all sealed arterial, collector and tourist routes. This again will significantly improve night time delineation on these routes and reduce crashes at night.	Safety	Very Good	Moderately Better	W/C 122: +$50,000	$5.0

PREFERRED OPTIONS – Full Annual Line Re-Mark: will improve the visibility of markings. Long-Life Markings: will make intersection markings more visible for longer, improving intersection safety and reducing expensive remarks on busy intersections. Continuous Edgelines and Programme of Edge Marker Post Renewals: will improve night time delineation on rural roads, reducing the likelihood of loss of control crashes.

Guide Signage

Option	Assessment	Problem being Addressed	Effectiveness	LOS Impacts	Annual Cost	30yr PV Cost ($M)
Status Quo	Maintain and renew existing signage. Only improve when associated with capital projects. Poor road name signage in Whangarei City on major intersections.	Accessibility	Poor/Moderate	Neutral	W/C 341: $0	$0.0
Improved Guide Signage	There are 25 major intersections that would require intersection destination signs and confirmation destination signs. This would improve way finding through Whangarei City for tourists and visitors.	Accessibility	Good	Moderately Better	W/C 341: +$400,000	$0.4

PREFERRED OPTION – Although it would be desirable to improve the guide signage during the 2018/21 period, this work will be deferred until after the Twin Coast Discovery Highway project for township and signage improvements is developed as this will guide what works are required.

Streetlights

Option	Assessment	Problem being Addressed	Effectiveness	LOS Impact	Annual Cost	30yr PV Cost ($M)
Status Quo	Replacing streetlights with LED on a like-for-like basis (committed project). Some limited renewal of streetlight columns as condition issues identified. Condition data indicates that $1.6M of streetlight poles are in poor/very poor condition. Current spend of $810,000/year less forecast savings from LED streetlight conversion $300,000/year = $510,000/year	Streetlights	Moderate	Neutral	W/C 122: $510,000	$7.2
Programme of Pole Renewals	This option would involve a 30 year programme to replace the 2700 streetlight poles in the District. This would help ensure that collapse of light poles is avoided.	Streetlights	Good	Slightly Better	W/C 122: +$100,000	$8.7

Option	Assessment	Problem being Addressed	Effectiveness	LOS Impact	Annual Cost	30yr PV Cost ($M)
Infill LED lighting	The estimated cost to complete the V-Category upgrades through Whangarei City (mid-block sections) is $2,000,000. This option would complete these upgrades over a 4 year period at $500,000/year. This option will improve the lighting on these arterial routes and will improve safety at night.	Streetlights & Safety	Very Good	Moderately Better	W/C 341: +$500,000	$1.8

PREFERRED OPTIONS – Programme of Pole Renewals and Infill LED Lighting: to provide an adequate level of lighting to give people confidence to walk and cycle at night, and to enable the streetlight network to be maintained in a fit for purpose condition and minimise the risk of pole collapse.

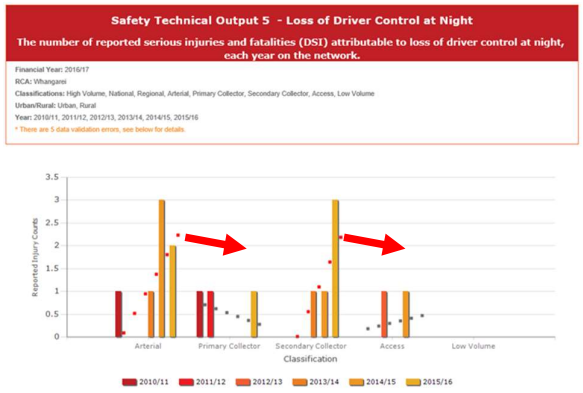
6.7.6 Financial Impact

The following table shows the financial impact of the options selected (note some of the costs have been rounded off):

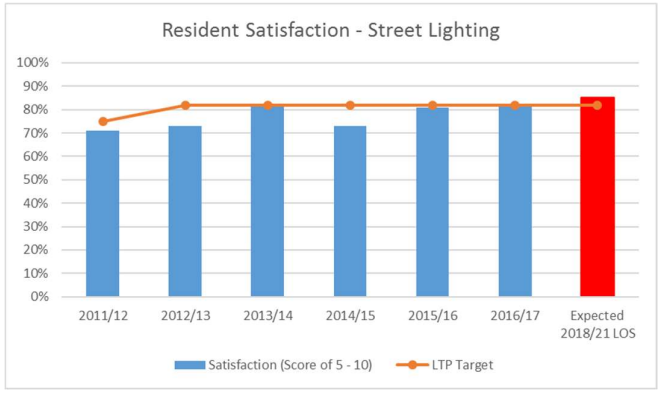
W/C	Description	Cost Impact	Overall Impact (excl Growth & Escalation)
122	Traffic Services Maintenance	-$300,000/yr due to reduced maintenance and lower power costs resulting from the LED conversion. +$100,000/yr to do a full line mark of the network per annum. +$200,000/yr for increased edgeline markings, EMPs and RRPMs. No net change for the use of long-life markings.	No Change
222	Traffic Services Renewals	+$100,000/yr for a programme of streetlight pole replacements.	+$100,000/yr
341	Low Cost/Low Risk Improvements	+$500,000/yr to continue the infill lighting on V-Category roads.	+$500,000/yr

6.7.7 Level of Service Impact

The following table shows the expected Level of Service impact of the options selected:



SAFETY – We expect that the loss of control crashes as night will show a decreasing trend for all road classes. This is due to improvements in edgelines, RRPMs, edge marker posts and road lighting.



RESIDENT SATISFACTION – We also expect an increase in resident satisfaction during the 2018/21 period, because of the effects of the LED upgrade and infill lighting.

Overall it is expected that there will be a decreasing trend in loss of control crashes at night and an improvement in the level of customer satisfaction with streetlighting.

6.7.8 Improvement Plan

Improvements that should be considered during the 2018/21 period for inclusion in the next AMP are as follows:

- Lux mapping survey (HISLAT survey) to be undertaken of the streetlight survey once the LED conversion project has been completed to determine “black” areas that require infill lighting.

6.8 Operational Traffic Management

Work Categories: **123 Operational Traffic Management, 222 Traffic Services Renewals & 341 Low Cost/Low Risk Improvements**

6.8.1 Links to Strategic Case

Problem Statement: Many of our traffic signal sites are old and have moisture problems affecting the detector loops which create efficiency issues and delays for motorists. There are also no cameras at any sites, which means that issues need to be solved on site and there is no back up from remote operation centres such as ATOC.

The operation of the Te Matau a Pohe lift bridge and Kotuitui Whitinga swing foot/cycle bridge are via a manned control room on site which results in high ongoing operational costs.

Benefits of Addressing Problem: Upgrading the traffic signals will result in more efficient movement of traffic reducing congestion. The provision of cameras at each site will allow issues to be addressed more quickly and enable ATOC support potentially reducing operating costs.

Providing a remote operation or reduced operating hours for the Te Matau a Pohe/Kotuitui Whitinga bridges would reduce ongoing operating costs.

Consequences of Not Addressing the Problem: Inconsistent levels of service from our traffic signals will continue, leading to delays and driver frustration. Signal issues will need to be solved on site which leads to longer response times to resolve issues.

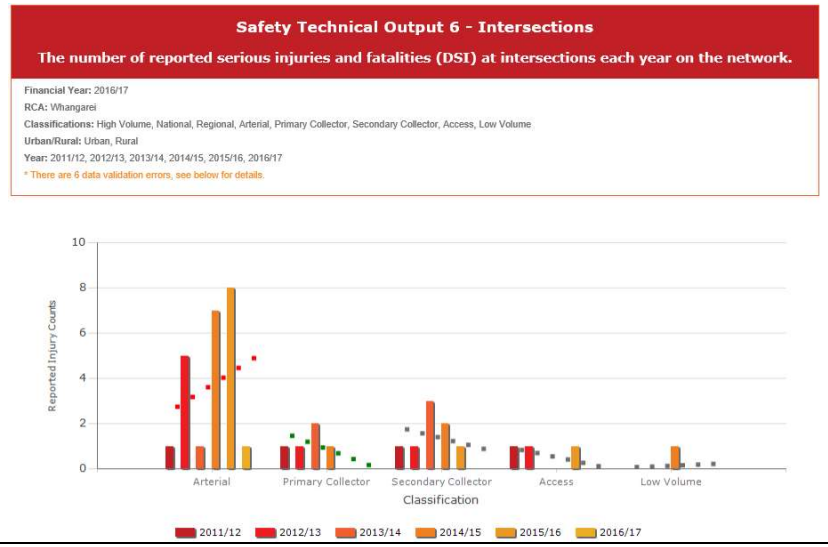
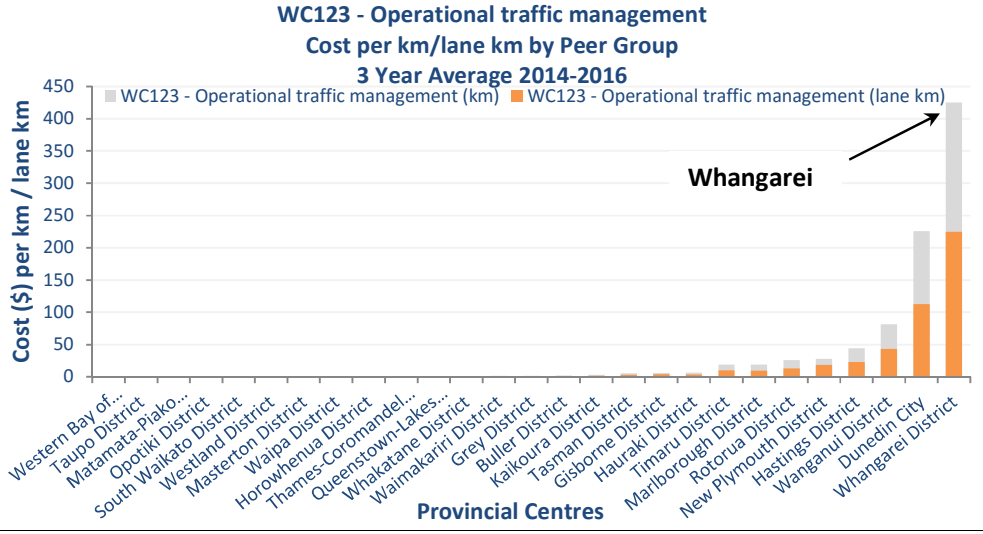
Continuing the current operating hours and manned operation of the Te Matau a Pohe/Kotuitui Whitinga bridges will result in high ongoing operating costs.

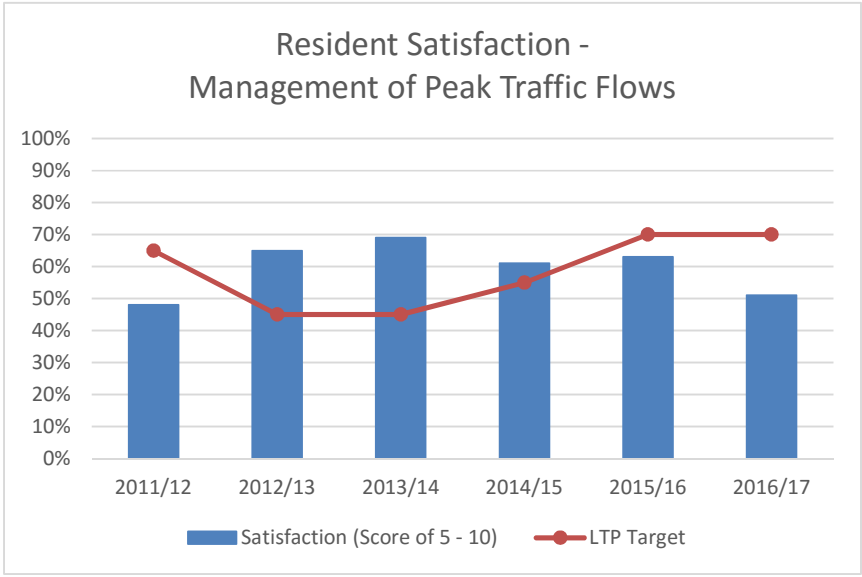
6.8.2 Levels of Service

ONRC Customer Outcomes: **ONRC Travel Time Reliability CO1** – Throughput at indicator sites (NO DATA AVAILABLE)

Customer Levels of Service: **ONRC Safety TO6** – Intersections
ONRC Cost Efficiency 5 – Overall network cost

6.8.3 Evidence and Gap Analysis

ONRC Safety TO6 – Intersection The serious injury and fatal crashes on Whangarei's Arterial road intersections is showing an increasing trend. The other road classes are showing a static or decreasing trend in high severity intersection crashes, although the lack of data for these road classes is reducing the usefulness of this measure.	**ONRC** **Arterial** **Primary Collector** **Secondary Collector** **Access** **Low Volume**	
NZTA Peer Group Charts – 3yr Cost/km W/C 123 Operational Traffic Management Whangarei's spend on operational traffic management is the highest in its peer group. This is not surprising as it spends $260,000 on average per annum on operating the Te Matau a Pohe bascule bridge. If this amount was removed, Whangarei's cost/km would be similar to Dunedin's. Whangarei also operates 25 traffic signals and 60 active school zone signs.	**Overall**	

Resident Satisfaction – Management of Peak Traffic Flows Resident satisfaction with Whangarei's morning and evening peak traffic flows has decreased significantly in the last year to 51% which is well below the target of 70%. The main reasons quoted for this dissatisfaction with the traffic flows were due to the effects of the construction works on SH1 at Kensington Ave/Manse St and on SH14 at Hospital Road. These projects have now been completed, although there is further construction work planned on SH1 at Tarewa Road and at the Porowini/Tarewa and Porowini/Maunu intersections. This work will need to be carefully managed to make sure that traffic flows are not adversely affected.	**Overall** 	

SUMMARY – There is an increasing trend of high severity intersection crashes on Whangarei's Arterial network, which will need attention. The cost to operate Whangarei's traffic management systems is the highest in the peer group. This is mainly due to the high ongoing costs to operate the manned Te Matau a Pohe lifting bridge. Resident satisfaction with the management of peak traffic flows has fallen significantly in 2016/17 which is expected to be due to congestion relating to the recently completed construction works on SH1/Kensington Ave and SH14/Hospital Road.

6.8.4 Options to be Considered

Based on the above data and the problem definition, the following options have been considered for addressing the operational traffic management of the network:

Option	Description	Benefits / Consequences
Programme of Signal Detector Loops Renewals	Programme an annual testing regime and upgrade programme of induction loop detectors at traffic signal sites. This will ensure that the signals are detecting queues adequately which will improve the allocation of green time given to each phase.	Travel Time Reliability – will improve efficiency of traffic signal sites and reduce delays.
Replace SCATS controller	The existing SCATS controller is about 30 years old and is at the end of its useful life. This option would replace this with new technology to improve performance and reliability of the signal controls.	Travel Time Reliability – will improve efficiency of traffic signal sites and reduce delays.
Fibre Connection with WiFi Backup	The current leased circuit point to point copper communication cables are not always reliable and may be phased out by the service provider. This option would replace these with a fibre optic cable using the cycleway network to provide secure communications to the signal sites. WiFi would also be used as a back-up system should the fibre network go down for any reason. This option would also enable communication to mobile phones for fault reporting to on-call staff. It would also enable communication to the councils school zone signs and cyclist traffic counting on the cycleway network.	Travel Time Reliability – will reduce communications drop outs at the traffic signal sites, improve the reliability of the service and reduce delays.
CCTV Camera Coverage of Signals	In conjunction with the Fibre Connection option, provide CCTV camera coverage of each signal site to enable back up of operation remotely and real-time footage for remote incident response. This will allow signal phasings to be control remotely and assessment of incidents without needing to visit the site.	Travel Time Reliability – will improve the response time to address issues at traffic signal sites and reduce delays.
Fully Remote Operation of Signals	This option includes the CCTV Camera Coverage option. Signals would be operated remotely by a Northland based control centre (similar to ATOC) with associated savings in management costs. It would also free up local resources to address problem issues and improvements rather than dealing with day-to-day operations. It would also enable back-up from ATOC.	Travel Time Reliability – will improve the response time to address issues at traffic signal sites and reduce delays. Cost Efficiency – will reduce the operational management costs.

Option	Description	Benefits / Consequences
Improve Detection Technology	In conjunction with the CCTV Camera Coverage option, this option would enable pedestrian detection systems to be installed to detect whether a pedestrian is still waiting to cross before calling a pedestrian phase. PTiPs could also be installed to give phase priority to public transport and emergency vehicles. In the future, the vehicle detection technology may also be able to be changed from vulnerable induction loops to CCTV based technology which will detect build-up of queues.	Travel Time Reliability – will improve efficiency of traffic signal sites and reduce delays. Accessibility – will provide a benefit to public transport over private vehicle use and will improve access for emergency vehicles.
Programme of Signal Renewals	Programme renewals of with a view to replace and upgrade each site every 15 years or so. This will ensure that traffic signals are maintained in a fit for purpose condition and obsolete controllers are replaced.	Travel Time Reliability – will improve the operation of traffic signals and reduce congestion.
Programme of School Zone Sign Renewals	Programme to replace the current school zone signs which leak and are causing deterioration of the internal electronics. These are currently costing a lot to maintain. The replacement signs would be a fully sealed unit.	Cost Efficiency – will reduce the whole of life costs to maintain these school zone signs.
Reduced Hours of Bridge Operation	Change manned hours to between the peak traffic periods of 8:45am to 4:00pm all year around. Would need to be agreed with the Marine Users Group which may be difficult to achieve.	Cost Efficiency – will reduce the cost of manned operation of the bridges, but increase in call out costs may actually end up costing more.
Remote Operation of Bridge Operations	Resolve expansion and CCTV camera issues so that full remote operation is possible from an offsite Northland regional control centre (similar to ATOC). This would also enable ATOC back-up. This option would require the long term creep and expansion issues to be resolved, a fibre connection to the bridges, and greatly improved camera technology to enable visibility of boats at night.	Cost Efficiency – will reduce the cost of operating the bridges.

6.8.5 Option Assessment

Traffic Signal & ITS Renewals

Option	Assessment	Problem being Addressed	Effectiveness	LOS Impact	Annual Cost	30yr PV Cost ($M)
Status Quo	Limited traffic signal renewals, mainly associated as a result of capital projects (eg Mill/Nixon project). Detection loops have issues with water ingress and pavement damage. The current SCATS controller was installed in the 1980's and is well past its replacement date, resulting in reliability issues. The current capacity of the controller is 40 sites and 32 sites will be use following the completion of the Kamo Cycleway in 2017/18. The 60 school zones signs leak, are unreliable and are costing a lot to maintain.	Signal Operation & Congestion (Travel Time Reliability)	Poor/Moderate	Neutral	W/C 123: $210,000 W/C 222: $325,000	$7.6
Programme of Signal Detection Loop Renewals	This would be a 3 year programme of replacing faulty detector loops and installing watertight bottle joints. This will make detectors more reliable resulting in better allocation of green time. The estimated cost is $70,000/year for the 3 years.	Signal Operation & Congestion (Travel Time Reliability)	Good	Moderately Better	W/C 123: +$0 W/C 222: +$70,000	$7.8
Replace SCATS Controller	This would replace the old, obsolete technology resulting in a more reliable traffic signal system. The cost of this is expected to be $50,000.	Signal Operation & Congestion (Travel Time Reliability)	Good	Slightly Better	W/C 123: +$0 W/C 222: +$50,000	$7.6
Programme of Signal Renewals	There will be 30 signal sites (once Kamo cycleway is built) so a 15 year replacement cycle would require 2 sites to be renewed every year. This programme would help ensure that obsolete technologies are replaced so that the traffic signals can operate reliabily and efficiently.	Signal Operation & Congestion (Travel Time Reliability)	Good	Moderately Better	W/C 123: -$30,000 W/C 222: +$300,000	$11.4

Option	Assessment	Problem being Addressed	Effectiveness	LOS Impact	Annual Cost	30yr PV Cost ($M)
Programme of School Zone Sign Replacements	The current school zone signs are currently costing $50,000/year due to issues with water ingress. This option would replace signs at 9 sites over a 3 year period with new technology that is water resistant. The renewal programme would then drop to a sustainable $50,000/year. This option would provide more reliable and lower cost school zone signage.	Cost Efficiency	Good	Slightly Better	W/C 123: -$50,000 W/C 222: +$105,000	$7.7

PREFERRED OPTIONS – Programme of Signal Detector Renewals and SCATS Computer Replacement - as this will ensure that the traffic signals are operating efficiently and will reduce the risk of the SCATS computer failing. The Programme of School Zone Sign Replacements will also reduce operating costs and ensure that these signs are effective.

Traffic Signal Operations

Option	Assessment	Problem being Addressed	Effectiveness	LOS Impact	Annual Cost	30yr PV Cost ($M)
Status Quo	Signal communications are via old copper wire which is obsolete and not being maintained by the service provider and is subject to occasional drop out of service. Management of signals locally with very little back up (back up is currently in Auckland).	Signal Operation & Congestion (Travel Time Reliability)	Poor/Moderate	Neutral	W/C 123: $120,000	$1.7
Fibre Connection with WiFi Backup	This will replace the old obsolete copper wire communication cables with fibre optic cables and WiFi backup. This will make the system more reliable by reducing the times that the signal sites have drop outs of service. The estimated cost of this is $200,000.	Signal Operation & Congestion (Travel Time Reliability)	Moderate	Slightly Better	W/C 123: $0 W/C 341: +$200,000	$1.9
CCTV Camera Coverage of Signals	This option will provide CCTV cameras at each of the traffic signal sites. The CCTV cameras will allow better response times to issues on site and remote operations and backup. The estimated cost of this is $350,000.	Signal Operation & Congestion (Travel Time Reliability)	Good	Moderately Better	W/C 123: $0 W/C 341: +$350,000	$2.3

Option	Assessment	Problem being Addressed	Effectiveness	LOS Impact	Annual Cost	30yr PV Cost ($M)
Fully Remote Operation of Signals	This option will allow for fully remote operation. The estimated cost of this option is $400,000.	Signal Operation & Congestion (Travel Time Reliability)	Good	Moderately Better	W/C 123: $0 W/C 341: +$400,000	$2.7
Improve Detection Technology	This option will improve signal operations by making pedestrian phases more efficient and providing more green time for traffic phases. The estimated cost of this option is $500,000.	Signal Operation & Congestion (Travel Time Reliability)	Very Good	Significantly Better	W/C 123: $0 W/C 341: +$500,000	$2.8

PREFERRED OPTIONS – Fibre/WiFi Connection, CCTV Coverage, Remote Operation and Improved Detection Technology - would improve the efficiency of the traffic signal network by enabling real-time changes to traffic signal phasing and assessment of incidents remotely without needing to visit the site. The Fibre/WiFi connection will provide a robust connection that will prevent site drop-out. Improved detection technology will further improve efficiency during pedestrian phases and by providing priority for public transport vehicles.

Te Matau a Pohe & Kotuitui Whitinga Bridge Operation

Option	Assessment	Problem being Addressed	Effectiveness	LOS Impact	Annual Cost	30yr PV Cost ($M)
Status Quo	Continue manual traffic control. Current operating hours have been optimised by analysing the last 3.5 years of bridge data.	Te Matau a Pohe Operation (Value for Money)	Poor	Neutral	W/C 123: $300,000	$4.3
Reduced Hours of Bridge Operation	Analysis of the logbook data over the past 3.5 years indicates that this option would cost an additional $5,000/year and would result is worse LOS for boats and could potentially be resisted by the Marine User Group who have to approve changes to operating hours	Te Matau a Pohe Operation (Value for Money)	Very Poor	Slightly Worse	W/C 123: +$5,000	$4.3

Option	Assessment	Problem being Addressed	Effectiveness	LOS Impact	Annual Cost	30yr PV Cost ($M)
Remote Operation of Bridge Operations	Capital cost for CCTV camera improvements, thermal imaging and improved PA system. The expected operational savings due to not requiring manned operation - assume 50% savings in operations (excl power). There will be a slightly better LOS for boats due to faster response time out of normal operating hours.	Te Matau a Pohe Operation (Value for Money)	Very Good	Slightly Better	W/C 123: -$135,000 W/C 341: +$500,000	$2.8

PREFERRED OPTION – Remote operation as this will enable operating costs to be minimised.

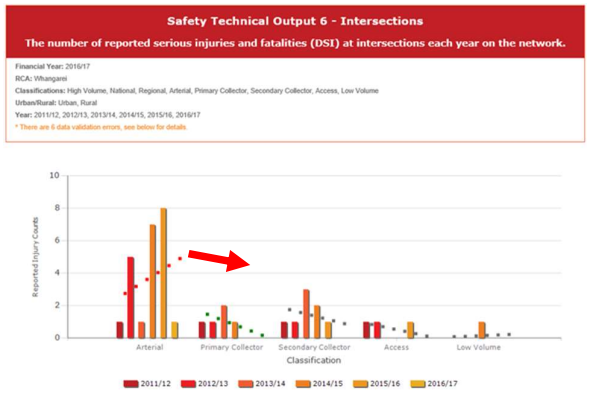
6.8.6 Financial Impact

The following table shows the financial impact of the options selected (note some of the costs have been rounded off):

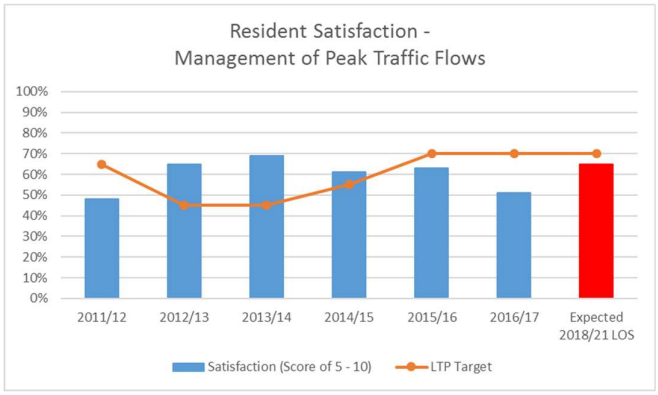
W/C	Description	Cost Impact	Overall Impact (excl Growth & Escalation)
123	Traffic Services Maintenance	-$50,000/yr due to replacement of School Zone signs prone to water ingress	-$50,000/yr
222	Traffic Services Renewals	+$100,000/yr for replacement School Zone signs.	+$100,000/yr
341	Low Cost/Low Risk Improvements	+$500,000/yr for programme of traffic signal upgrades including CCTV cameras, fibre optic connection, WiFi backup and central management. +$500,000 to upgrade Te Matau a Pohe CCTV cameras, PA and Comms system to enable it to be remotely operated.	+$670,000/yr

6.8.7 Level of Service Impact

The following table shows the expected Level of Service impact of the options selected:



SAFETY – We expect that the intersection crashes will show a decreasing trend for all road classes. This will be partly due to the investment in better traffic signal controls.



TRAFFIC FLOWS – We also expect an increase in resident satisfaction with peak traffic flows during the 2018/21 period. This will be partly due to the improvement to the traffic signals.

Overall it is expected that there will be a decreasing trend in intersection crashes and an improvement in the level of customer satisfaction with peak traffic flows.

6.8.8 Improvement Plan

Improvements that should be considered during the 2018/21 period for inclusion in the next AMP are as follows:

- Determine the feasibility of carrying out signal and bridge operations remotely through a Northland regional control centre (similar to ATOC) including assessment of ongoing operating costs.

6.9 Walking & Cycling

Work Categories: **124 Cycleway Maintenance, 125 Footpath Maintenance (New Work Category), 341 Low Cost/Low Risk Improvements, 451 Walking Facilities & 452 Cycling Facilities**

6.9.1 Links to Strategic Case

Problem Statement: Further work is required to connect the key cycleway routes to schools, parks and business to enable the full potential of the cycleway network to be realised. This should be supported by travel planning (through W/C 432).

Our footpaths are deteriorating due to lack of renewals which is leading to increased risk of trip hazards and obstructions, particularly with an aging population who are becoming less mobile and are requiring wider footpaths and crossings that are suitable for mobility scooters and wheelchairs.

Benefits of Addressing Problem: Providing cycleway connections with good infrastructure and supported by travel plans to schools, parks and businesses will encourage cycle use and maximise the full potential of the cycleway network.

Providing an adequate level of footpath renewals will reduce trip hazards and will make footpaths more accessible for an aging population.

Consequences of Not Addressing the Problem: Without adequate cycleway connections, potential cyclists may be put off from using the cycleway network which will result in lower uptake of users and less health and congestion relief benefits being achieved.

Without an adequate level of footpath renewals and improvements, trip hazards will increase, the footpath condition will worsen and footpaths will be less accessible for the aging population.

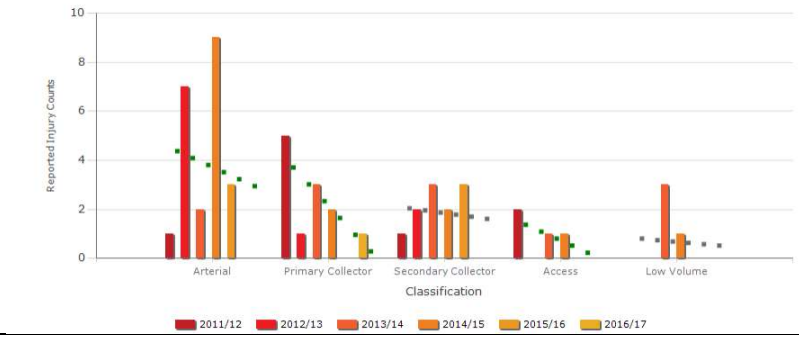
6.9.2 Levels of Service

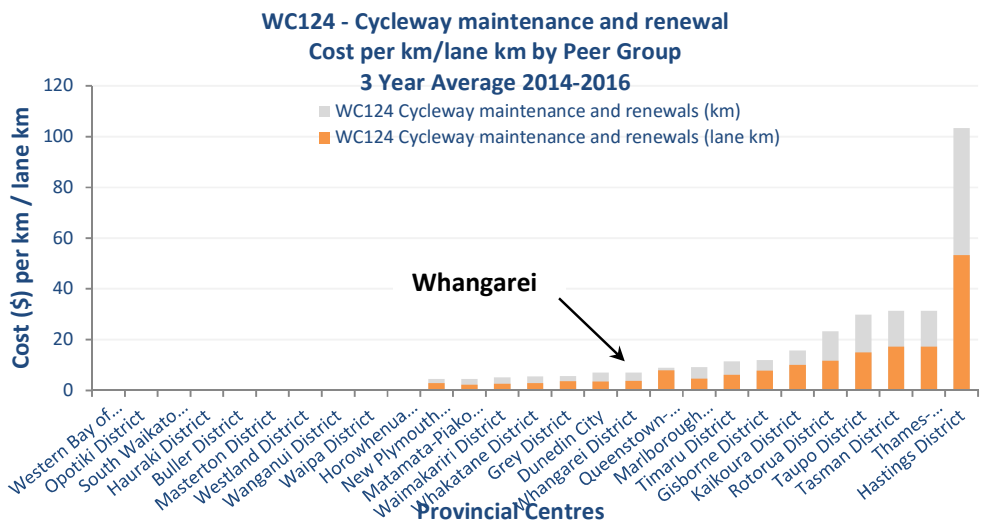
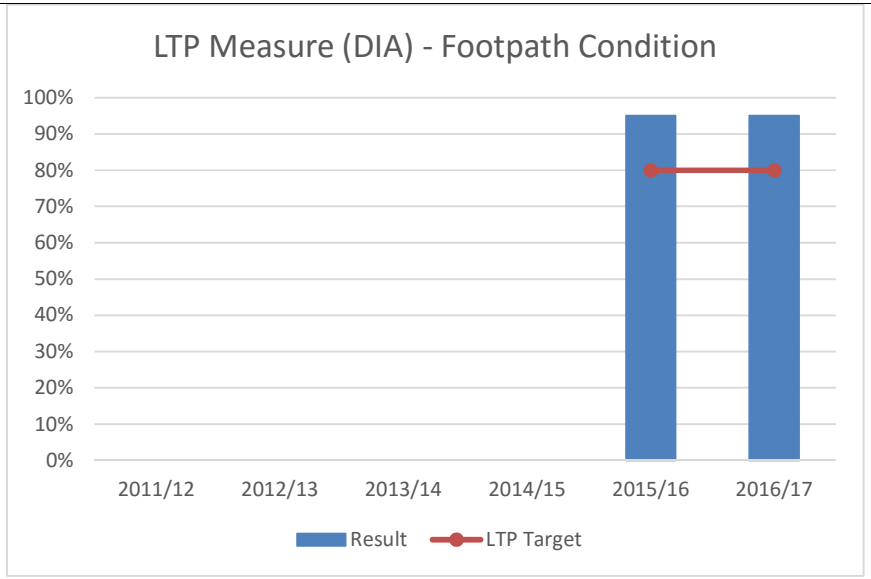
ONRC Customer Outcomes: None

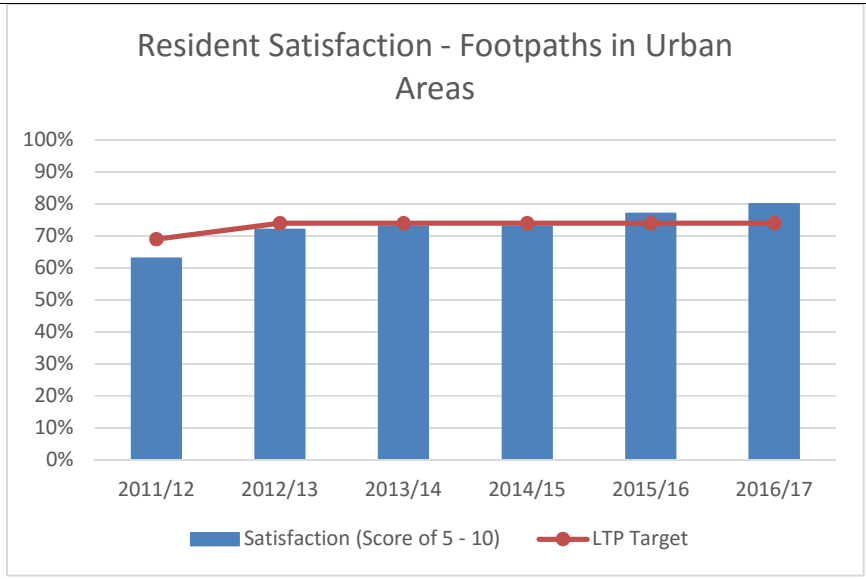
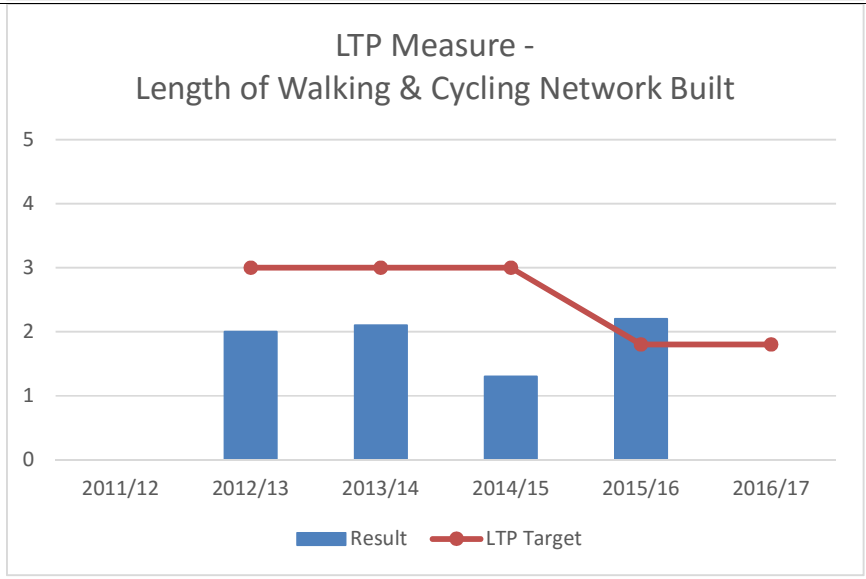
Customer Levels of Service: **ONRC Safety TO8** – Cycle Path Faults (NO DATA AVAILABLE)
ONRC Safety TO9 – Vulnerable Users
ONRC Cost Efficiency 5 – Overall network cost
LTP 1.1.X – Yr 1, 5, 10, 30 Condition distributions are maintained within the set condition enveloped (New measure)

LTP 1.2.1 – Percentage of footpaths in territorial authority that meet LOS standards (Current measure-DIA)
LTP 1.2.2 – Resident satisfaction with footpaths in urban area (Current measure)
LTP 1.2.3 – Length of walking and cycling network built each year (Current measure)
NZTA Technical Audit Findings

6.9.3 Evidence and Gap Analysis

ONRC Safety TO9 – Vulnerable Users **The serious injury and fatal crashes involving vulnerable users in Whangarei is showing a static or decreasing trend for all road classes.**	**ONRC** **Arterial** **Primary Collector** **Secondary Collector** **Access** **Low Volume**	**Safety Technical Output 9 - Vulnerable Users** **The number of reported serious injuries and fatalities (DSI) involving vulnerable users on the network.** **Financial Year:** 2016/17 **RCA:** Whangarei **Classifications:** High Volume, National, Regional, Arterial, Primary Collector, Secondary Collector, Access, Low Volume **Urban/Rural:** Urban, Rural **Year:** 2011/12, 2012/13, 2013/14, 2014/15, 2015/16, 2016/17 **Under Development** Currently the data is based on information in the Vehicle Type which indicates that a Vulnerable User has been involved. However, this is not the full story as CAS has a flag specifically for indicating Vulnerable Users. At this time, the Vulnerable User information is not available in the Crash data recorded in RAMM (which is the source of data for this report). Once the data is available in RAMM, this report will be modified to make use of it. * There are 5 data validation errors, see below for details. 
NZTA Peer Group Charts – 3yr Cost/km W/C 124 Cycleway Maintenance and Renewal Whangarei's spend on cycleway maintenance and renewal is below the average for the peer group for districts/cities that have cycleways. This is largely because Whangarei has a very new cycleway network that is still being	**Overall**	

developed. Also the use of concrete for most of WDC's paths mean that maintenance costs are low. The cost of maintaining the Kotuitui Whitinga cycle/footbridge are included in this activity.		
LTP Measure 1.2.1 – Percentage of Footpaths meeting LOS Standards (DIA) This is a Department of Internal Affairs (DIA) measure that was introduced in 2015/16. Whangarei's footpath condition is at 95% which significantly higher than the 80% target. This suggest that WDC's footpaths are in good condition. However it is noted that this data may not be robust as no condition rating has been undertaken since 2011. A video survey is being undertaken in July 2018 to give a better picture of the state of the footpath network condition.	**Overall** 	

LTP Measure 1.2.2 – Resident Satisfaction with Footpaths in the Urban Area The resident satisfaction with Whangarei's footpaths in the urban areas has been increasing and now is above the LTP target level. This increasing satisfaction is likely to be due to the significant investment in shared walking and cycle paths in the last 5 years.	**Overall** 	
LTP Measure 1.2.3 – Length of Walking and Cycling Dedicated Network Built The length of waking and cycling network built in Whangarei in the last year was zero. This was due to delays in getting KiwiRail approval to build the Kamo shared path. These approvals have now been received and the 5km long Kamo shared path is likely to be fully achieved in 2017/18.	**Overall** 	

NZTA Technical Audit Findings The NZTA Technical Audit identified that the footpaths and pedestrian crossings in the CBD had trip hazards and excessive changes of grade. This indicates that there is more work required to ensure that our footpaths are safe and accessible.	**Overall** 	The last NZTA Technical Audit (February 2016) noted the following regarding footpaths: An inspection of the footpaths and pedestrian crossings in the Whangarei central business area found a number of trip hazards and excessive changes of grade which will affect the ability of pedestrians to move around safety. The Transport Agency has released the Pedestrian Planning and Design guide (http://www.nzta.govt.nz/resources/pedestrian-planning-guide/). This identifies how footpaths and crossings need to be constructed for the safety of all users. We do acknowledge that the Transport Agency does not provide funding for the maintenance and renewals of footpaths but the Land Transport Management Act requires councils to provide safe facilities for pedestrians as it does for other modes.

SUMMARY – There is a decreasing trend of high severity crashes involving vulnerable road users on Whangarei's network. The cost maintain and renew Whangarei's cycleway network is low, mainly due to the young age of the network. Resident satisfaction with the footpaths in the urban area is above the LTP target and increasing, which is expected to be as a result of the construction of the new shared paths. However, the last NZTA Technical Audit noted that there were safety issues with footpaths and crossings in the CBD that need rectifying. The length of walking and cycling network that was built in 2016/17 was below the LTP target due to delays in gaining KiwiRail approvals for the Kamo Cycleway project.

6.9.4 Options to be Considered

Based on the above data and the problem definition, the following options have been considered for addressing the cycleway and footpath network:

Option	Description	Benefits / Consequences
Programme of Footpath Renewals	Develop a programme of footpath renewals based on condition. Provide facilities fit for mobility scooter use.	Accessibility – will improve accessibility of footpaths, particularly for an aging population.
Complete Cycleway Strategy	Develop connections to schools, sports fields and businesses to complete the cycleway network and maximise uptake. This will encourage mode shift to walking and cycling and will reduce social severance.	Accessibility – will improve accessibility of cycleways by connecting to destinations. Travel Time Reliability – encourage mode shift to cycling which will reduce reliance on private vehicles.
Travel Planning & "LET'S GO" website	Develop and implement travel plans for schools, sports clubs and businesses to educate and encourage uptake of active transport modes. This would also involve setting up a web-based community resource similar to New Plymouth's Let's Go website.	Travel Time Reliability – will encourage mode shift to walking, cycling, and public transport which will result in less congestion caused by private vehicle use.
Pohe Island Bike Skills Training Facility	Development of a regional bike skills training facility on Pohe Island. This would consist of a bike friendly track that mirrors road and shared path conditions including intersections so that children and adults can learn cycling skills in a safe environment. This facility would also be utilised by the Bikes Skills Training programme (refer to Education & Promotion Section 6.12).	Safety – will improve cyclist bike skills and confidence on road and shared path conditions.
Develop Heartland Rides	Develop a network of tourist orientated Heartland Rides that connect Whangarei to the Bay of Islands (Opua) and Whangarei to Auckland. This is supported by the Twin Coast Discovery Highway PBC which recommended a Tutukaka Coast cycle trail which would form part of this Whangarei to Bay of Island s route.	Economic Growth & Productivity – will encourage cyclist related tourist activity in Whangarei.

6.9.5 Option Assessment

Footpaths and Cycleways

Option	Assessment	Problem being Addressed	Effectiveness	LOS Impact	Annual Cost	30yr PV Cost ($M)
Status Quo	Limited maintenance and renewals of footpaths and cycleways. Complete the currently approved cycleways which does not include connections to school, parks and businesses.	Accessibility, Travel Time Reliability	Poor/Moderate	Neutral	Footpath Renewal $200,000 Footpath Maint $400,000 W/C 124: $20,000	$8.8
Programme of Footpath Renewals	This option would replace footpaths on an 80 year cycle or 4.7km/yr. The additional cost would be partially offset by a decrease in footpath maintenance costs. Customer satisfaction with footpath is increasing, so this option is not considered necessary at the moment.	Accessibility	Moderate	Slightly Better	Footpath Renewal +$270,000 Footpath Maint -$100,000 W/C 124: +$0	$11.2
Complete Cycleway Strategy	This option will complete the walking and cycling strategy in Whangarei City and will help encourage mode shift. This is a major capital programme which is supported by Whangarei Transportation Strategy, Walking & Cycling Strategy and each project will have BCR calculations.	Accessibility, Travel Time Reliability	Good	Moderately Better	Footpath Renewal +$0 Footpath Maint +$0 W/C 124: +$80,000 W/C 452: +$30M	$33.6
Pohe Island Bike Skills Training Facility	Funded by Bike Northland. No additional cost to Council.	Safety	Good	Slightly Better	Footpath Renewal +$0 Footpath Maint +$0 W/C 124: +$0 W/C 452: +$0	$8.8
Develop Heartland Rides	This option will provide opportunities for rural cycle routes which will encourage more tourists to visit the DIstrict. This is a major capital programme supported by the Twin Coast Discovery Highway PBC, the Walking & Cycling Strategy and each project wil have BCR calculations.	Economic Growth & Productivity	Good	Slightly Better	Footpath Renewal +$0 Footpath Maint +$0 W/C 124: +$80,000 W.C 452: +$15M	$21.8

PREFERRED OPTIONS – Complete the Cycleway Strategy and Pohe Island Bike Skills Training Facility – The completion of the cycleway strategy and the Pohe Island training facility will enable more people to take up cycling as their preferred means of transport and will help achieve the mode shift away from private vehicles. The Development of Heartland Rides will provide cycling facilities aimed at visitors and tourists and is supported by the Twin Coast Discovery Highway PBC.

Travel Planning

Option	Assessment	Problem being Addressed	Effectiveness	LOS Impact	Annual Cost	30yr PV Cost ($M)
Status Quo	No current travel planning being undertaken.	Travel Time Reliability	Poor/Moderate	Neutral	W/C 452: $0	$0.0
Travel Planning	This option would help develop travel plans for schools and workplaces to encourage the use of the shared paths and public transport network and will help promote the mode shift away from private vehicle use. Over time this will result in less congestion and an improvement in the travel time reliability in Whangarei City.	Travel Time Reliability	Good	Moderately Better	W/C 452: +$250,000	$3.6

PREFERRED OPTION – Travel planning: This activity will encourage mode shift to walking, cycling and public transport, will reduce congestion and help maximise the success of the cycleway programme.

6.9.6 Financial Impact

The following table shows the financial impact of the options selected (note some of the costs have been rounded off):

W/C	Description	Cost Impact	Overall Impact (excl Growth & Escalation)
124	Cycleway Maintenance	No change	No Change
125	Footpath Maintenance	+$738,000/yr transfer of LTP budgets from unsubsidised footpath maintenance and renewals to the new W/C 125 Footpath Maintenance. This budget will improve the condition and safety of our existing footpaths	+$738,000/yr
341	Low Cost/Low Risk Improvements	+$400,000/yr for new footpaths	+$400,000/yr
451	Walking Facilities	No programme – No Change	No Change
452	Cycling Facilities	+$5,000,000/yr to complete the existing cycleway paths, construct the Tikipunga Cycleway and to carry out travel demand planning to encourage mode shift to walking and cycling.	+$5,000,000/yr
	Footpath Maintenance & Renewals (Unsubsidised)	-$738,000/yr transfer of LTP budgets from unsubsidised footpath maintenance and renewals to the new W/C 125 Footpath Maintenance	-$738,000/yr

6.9.7 Improvement Plan

Improvements that should be considered during the 2018/21 period for inclusion in the next AMP are as follows:

- Carry out regular footpath and shared path condition rating.
- Develop a prioritisation hierarchy for the footpath and shared path network using count data and develop a strategy for renewals.

6.10 Network and Asset Management

Work Categories: **151 Network and Asset Management**

6.10.1 Links to Strategic Case

Problem Statement: Lack of adequate resourcing is a major issue for the transport industry in Northland which extends right through the supply chain from Council's ability to hire staff, to having enough consultants to provide technical support. These resourcing issues may mean the work may cost more due to lack of competition or may not be done to the same quality.

A key issue for customers is lack of communication of road works and the delays these cause motorists, freight operators and bus users.

Benefits of Addressing Problem: Improving resourcing would result in better quality staff making better decisions, shorter lead times for professional services and more competition resulting in reduced costs.

By providing better communication to the travelling public, they will be able to make informed decisions as to their routes to avoid unexpected delays.

Consequences of Not Addressing the Problem: Without addressing the resourcing gaps in the industry, there will continue to be shortages of appropriately qualified staff, lack of competition in the market and potentially poorer quality workmanship.

Without changes to the way Council communicates about road works, unexpected road works will continue to cause delay and frustration, particularly on key commuter, freight and public transport routes.

6.10.2 Levels of Service

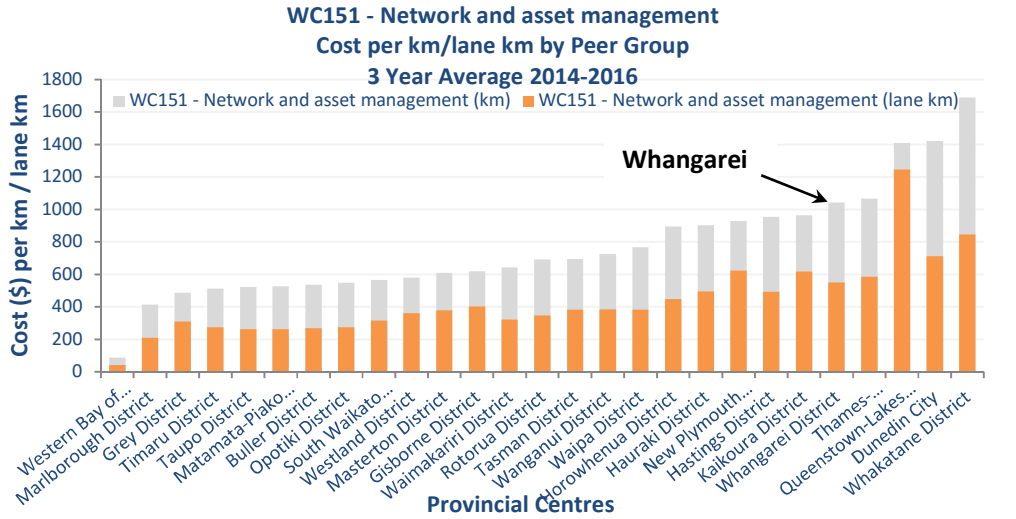
ONRC Customer Outcomes: None

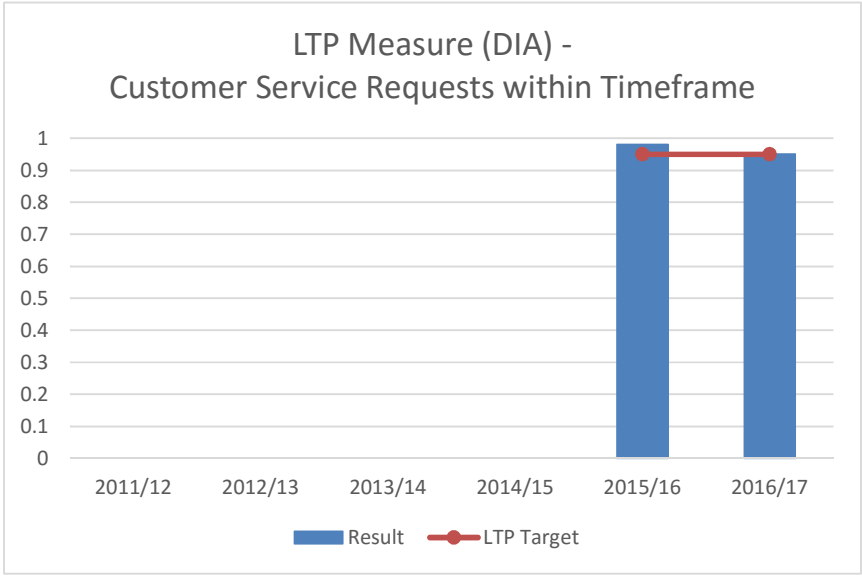
Customer Levels of Service:

ONRC Safety TO2 – Temporary Hazards (NO DATA AVAILABLE)
ONRC Safety TO10 – Roadside Obstructions (NO DATA AVAILABLE)
ONRC Cost Efficiency 5 – Overall network cost
LTP 1.1.8 – Percentage of CRM's relating to roads and footpaths responded to within LTP timelines (Current measure-DIA)
LTP 1.1.X – Yr 1, 5, 10, 30 Condition distributions are maintained within the set condition enveloped (New measure)

LTP 1.1.X – The number of unplanned events and incidents (New measure) (NO DATA AVAILABLE)
LTP 1.1.X – Number of freight journeys completed on time (New measure) (NO DATA AVAILABLE)
LTP 1.1.X – Residents satisfaction with the road network (New measure)

6.10.3 Evidence and Gap Analysis

NZTA Peer Group Charts – 3yr Cost/km W/C 151 Network and Asset Management Whangarei's spend on network and asset management is the in the upper third of its peer group. However, Whangarei has a relatively complex network compared to most of its peer group and this has increased its costs which are similar to other complex network such as Dunedin and New Plymouth. Also Northland, suffers from lack of adequate profession services resourcing and this also increases costs due to lack of competition.	**Overall** 	

LTP Measure 1.1.8 – Percentage of Customer Service Requests responded to within Timeframe (DIA) This is a Department of Internal Affairs (DIA) measure that was introduced in 2015/16. The percentage of customer service requests relating to roads and footpaths are responded to within the LTP timeframe are 95% which is the same as the target. This demonstrates that WDC responds to their customer requests within an appropriate timeframe.	**Overall** 	

SUMMARY – The cost of network and asset management on the Whangarei network is high compared to the peer group average, and this is expected to be due to Whangarei having a reasonable complex network and lack of professional service providers which is increasing costs. Whangarei is achieving its target for customer service requests being responded to within the LTP timeframes.

6.10.4 Options to be Considered

Based on the above data and the problem definition, the following options have been considered for addressing activity and network management of the network:

Option	Description	Benefits / Consequences
Shared Services for Asset Management	With the implementation of the Northland Transport Alliance (NTA), a key opportunity is for sharing of asset management services and combining these into region wide contracts to improve buying power and reduce procurement costs. This includes region wide contracts for high speed data collection, dTIMS analysis, RAMM database management, traffic counting, forward work planning and activity management planning. These efficiencies will offset the cost of running the NTA.	Cost Efficiency – reduce the costs of data collection and analysis. However, these cost savings will be offset by the running costs of the NTA.
Notifying of Road Works and Diversions on Social Media	Notify public of maintenance activities, capital project and diversions on social media (eg Facebook page, Twitter and AA Road Watch or similar).	Travel Time Reliability – provide real-time information to motorists of potential delays allowing informed route decision making.

6.10.5 Option Assessment

Asset Management

Option	Assessment	Problem being Addressed	Effectiveness	LOS Impact	Annual Cost	30yr PV Cost ($M)
Status Quo	Asset data such as RAMM, high speed data, FWD and traffic counts are collected by each council separately. In addition, data analysis such as dTIMS and the development of the forward works programme is also carried out by each council separately.	Lack of Resourcing	Poor/Moderate	Neutral	W/C 151: $2,000,000	$28.4
Shared Services for Asset Management	Minor cost efficiencies due to sharing of services through NTA. These efficiencies are mostly absorbed by the NTA management costs.	Lack of Resourcing	Good	Slightly Better	W/C 151: -$100,000	$27.0

PREFERRED OPTION – Shared services for asset data collection and analysis will result in cost efficiencies and better consistency of decision making across the region.

Communication with Public

Option	Assessment	Problem being Addressed	Effectiveness	LOS Impact	Annual Cost	30yr PV Cost ($M)
Status Quo	Continue limited notification of local residents via letter drops and newspapers when carrying out maintenance activities and capital projects.	Communication (Travel Time Reliability)	Poor	Neutral	W/C 151: $0	$0.0
Notifying of Road Works and Diversions on Social Media	This option would enable drivers to access information about road works and road closures in real time and make appropriate route choices. The estimated additional cost of this option is $50,000/year.	Communication (Travel Time Reliability)	Good	Moderately Better	W/C 151: +$50,000	$0.7

PREFERRED OPTION – Social Media will allow Council to communicate in real time with a wide portion of the travelling public.

6.10.6 Financial Impact

The following table shows the financial impact of the options selected (note some of the costs have been rounded off):

W/C	Description	Cost Impact	Overall Impact (excl Growth & Escalation)
151	Network and Asset Management	-$100,000/yr for efficiencies through shared services. +$50,000/yr for improved use of social media for notifying customers of road works and closures. +539,000 at NZTA's request to transfer funding from W/C 003 AMP to W/C 151.	+$130,000/yr

6.10.7 Improvement Plan

Improvements that should be considered during the 2018/21 period for inclusion in the next AMP are as follows:

- Investigate and develop opportunities for greater use of shared services through the NTA.
- Develop a regional AMP by combining the AMPs for WDC, KDC and FNDC into one document.
- Set rules about how to condition rate various assets and how to develop programmes of work.
- Improve RAMM data quality for inputting into ONRC performance tool.

- Determine which Council department has ownership and maintenance responsibilities for the Council-owned assets such as carparks, street furniture, shared paths, amenity lighting etc.

6.11 Low Cost/Low Risk Improvements

Work Categories: **341 Low Cost/Low Risk Improvements**

6.11.1 Links to Strategic Case

Problem Statement:

Safety: The number of fatal and serious injury crashes on our roads are high and are trending upward, particularly in the areas of wet loss of control, night time loss of control and intersection crashes on the Arterial, Secondary Collector and Low Volume network.

Resilience: Poor geology and a subtropical climate make our roads susceptible to slips and flooding during heavy rain events resulting in road closures that often affect freight, tourist and detour routes, key lifelines and isolated communities. This is only expected to get worse over time due to the effects of climate change. In addition, lack of funding provision for emergency works has led to renewals and capital programmes being cut in the past.

Benefits of Addressing Problem:

Safety: Fatal and serious injury crashes will decrease on our network, reducing the harm to our customers and communities.

Resilience: Our road network will be more robust during emergency events with reduced likelihood of delay and travel disruption due to road closures on freight tourist and detour routes and key lifelines. Access to isolated communities will be safeguarded.

Consequences of Not Addressing the Problem:

Safety: Fatal and serious injury crashes will continue increasing and will continue to cause significant harm to our customers and communities.

Resilience: Road closures during emergency events, such as heavy rain events, will continue to cause road closures, jeopardising key freight and tourist routes, life lines and access to isolated communities.

6.11.2 Levels of Service

ONRC Customer Outcomes:

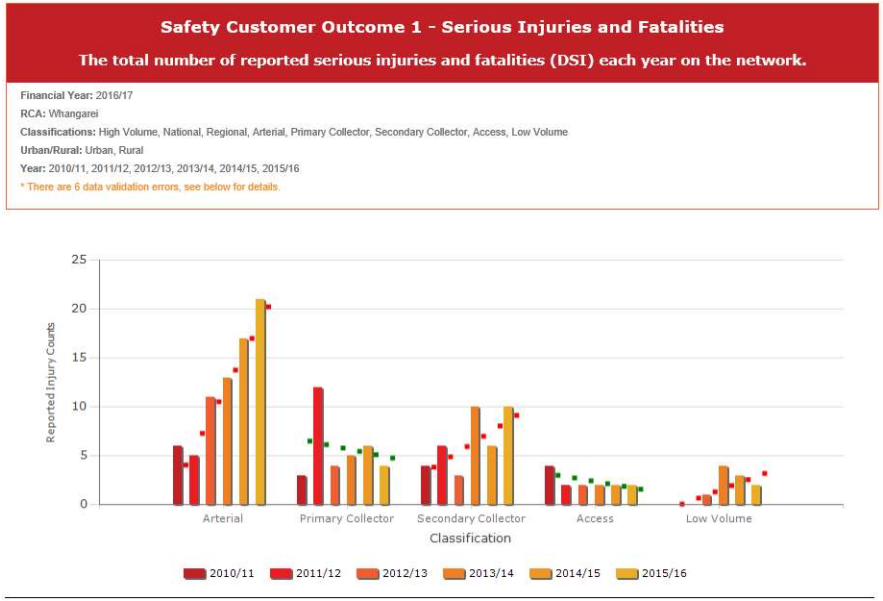
ONRC Safety CO1 – The Number of Fatal and Serious Injuries on the Network
ONRC Safety CO2 – Collective Risk
ONRC Safety CO3 – Personal Risk
ONRC Resilience CO1 – The number of journeys impacted by unplanned events(NO DATA AVAILABLE)

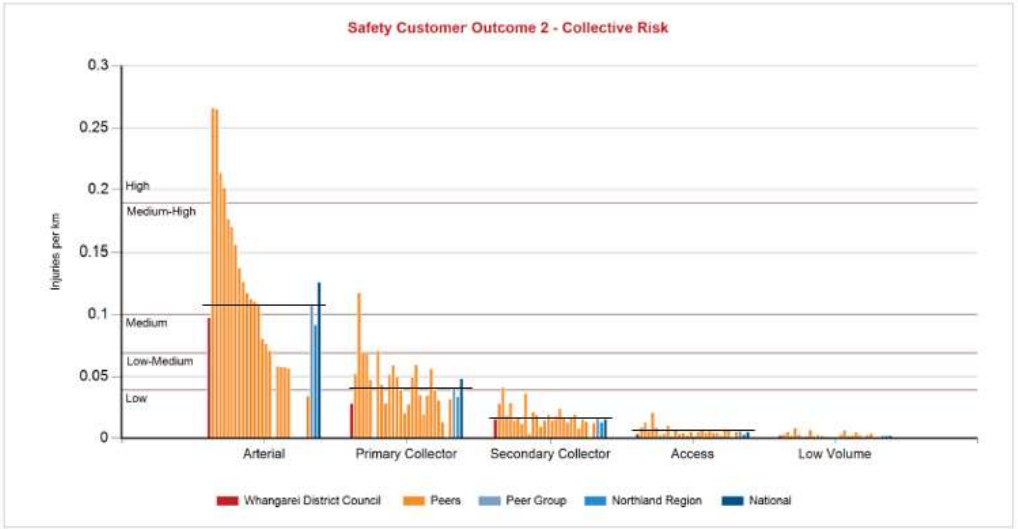
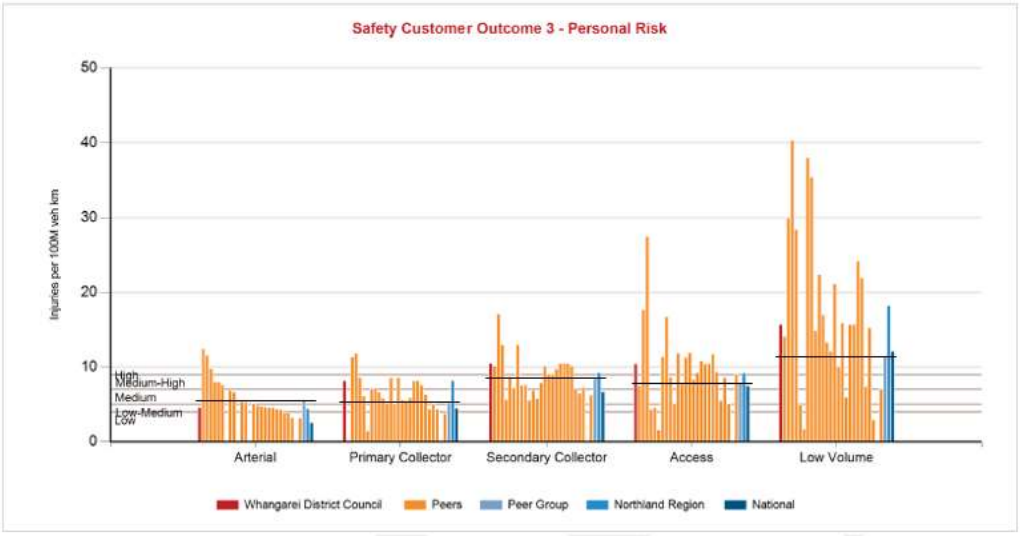
ONRC Resilience CO2 – The number of instances where road access is lost (NO DATA AVAILABLE)
ONRC Accessibility CO1 – Proportion of the network not available to Class 1 heavy vehicles and 50MAX vehicles
ONRC Travel Time Reliability CO1 – Throughput at indicator sites (NO DATA AVAILABLE)

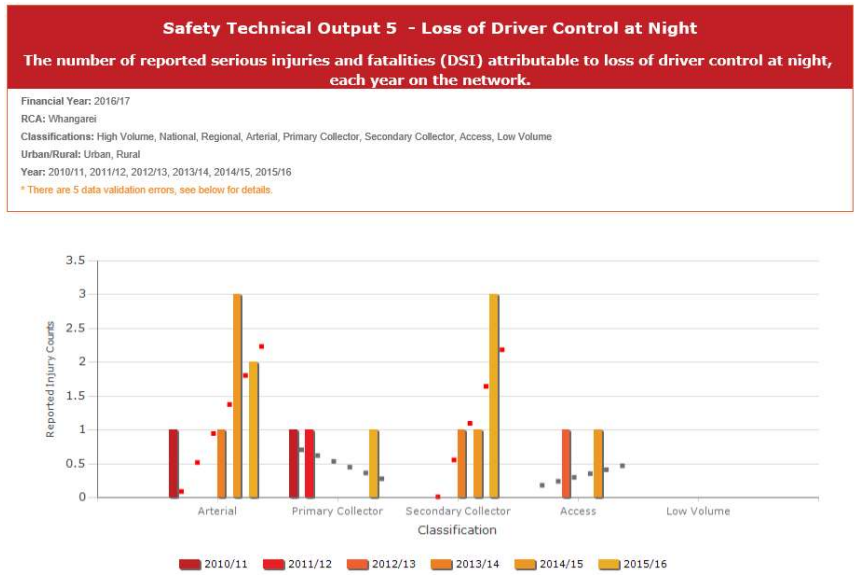
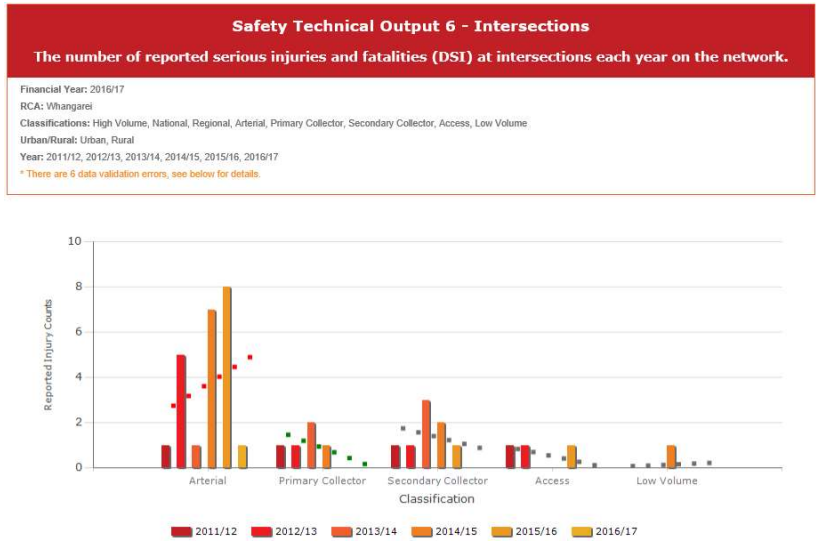
Customer Levels of Service:

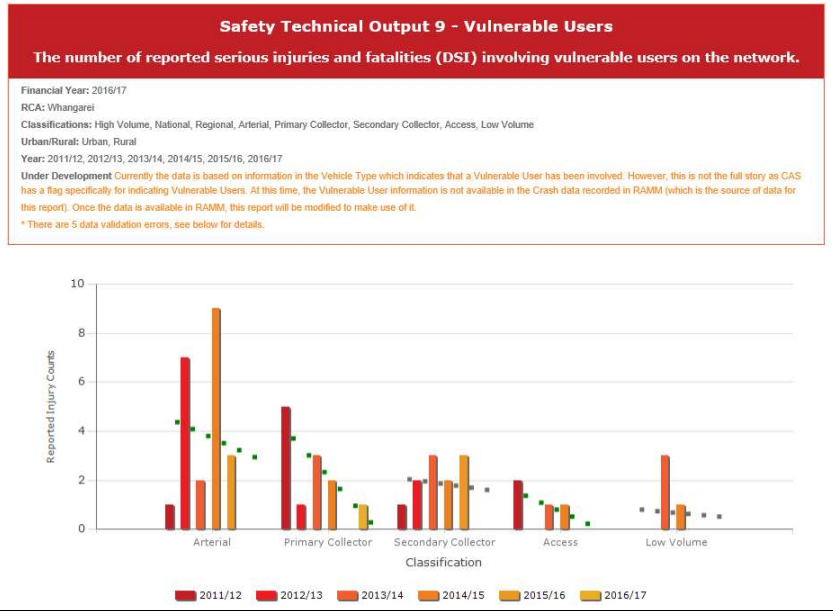
ONRC Safety TO1 – Permanent Hazards (NO DATA AVAILABLE)
ONRC Safety TO3 – Sight Distances (NO DATA AVAILABLE)
ONRC Safety TO5 – Loss of driver control at night
ONRC Safety TO6 – Intersections
ONRC Safety TO9 – Vulnerable Users
LTP 1.1.2 – The number change of fatal and serious crashes (Current measure-DIA)
LTP 1.1.X – Decreasing trend in resilience related faults on key routes (New measure) (NO DATA AVAILABLE)
LTP 1.1.X – The number of unplanned events and incidents (New measure) (NO DATA AVAILABLE)
LTP 1.1.X – Number of freight journeys completed on time (New measure) (NO DATA AVAILABLE)
LTP 1.1.X – Number of rest areas of key routes (Aspirational measure) (NO DATA AVAILABLE)

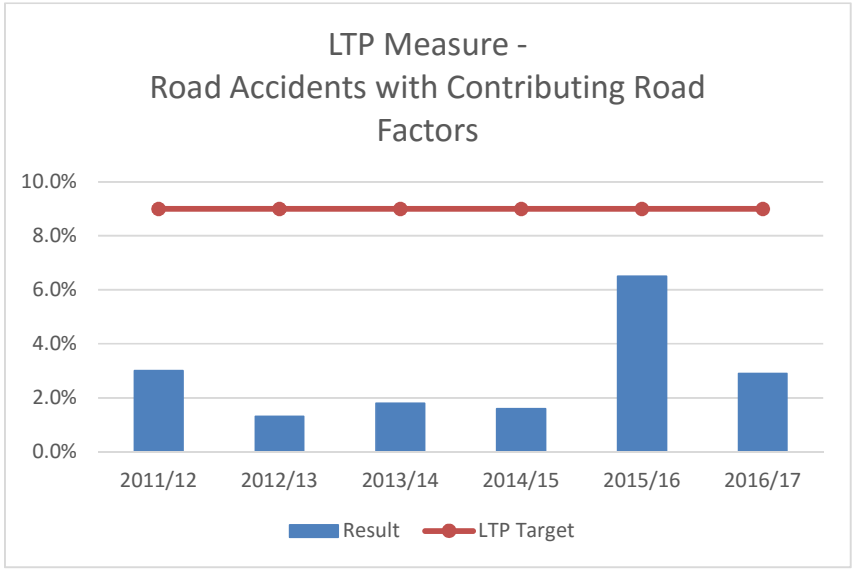
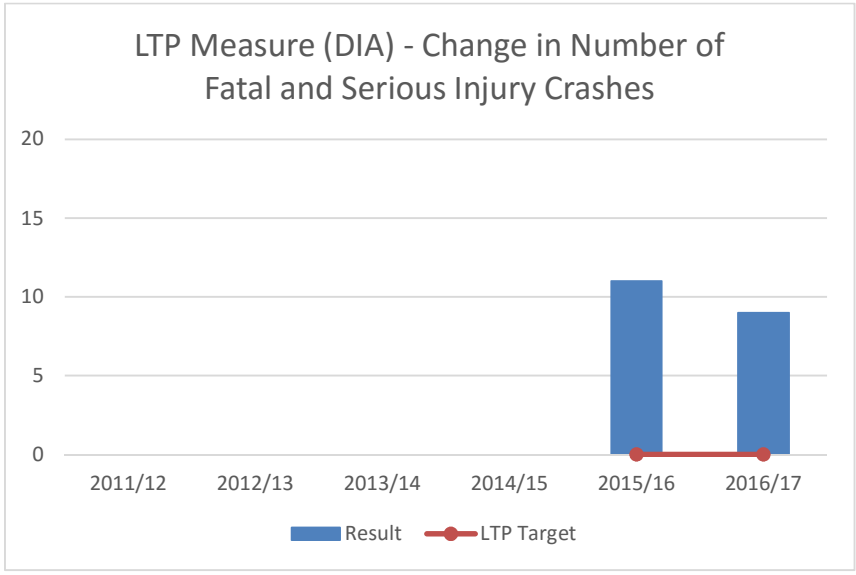
6.11.3 Evidence and Gap Analysis

ONRC Safety CO1 – Number of Fatal and Serious Injuries on the Network This graph indicates that WDCs reported serious injury and fatal crashes are increasing on the Arterial, Secondary Collector and Low Volume networks. The Arterial road network has a rapidly increasing trend. The serious and fatal crashes on the Primary Collector and Access roads are trending downward.	**ONRC** Arterial Primary Collector Secondary Collector Access Low Volume	

ONRC Safety CO2 – Collective Risk This data indicates that the Collective Risk of Whangarei's road network is at or below the peer group average for all ONRC road classifications. The Arterial roads have a Collective Risk of Medium and the other road classes have a risk of Low-Medium or Low.	**ONRC** Arterial Primary Collector Secondary Collector Access Low Volume	
ONRC Safety CO3 – Personal Risk The Personal Risk data on Whangarei's road network indicates that while the Arterial roads are below the peer group average, all of the other road classes are above or significantly above the average for the peer group. The Personal Risk rating for the Primary Collectors is Medium-High and for the Secondary Collector, Access and Low Volume networks is High.	**ONRC** Arterial Primary Collector Secondary Collector Access Low Volume	

ONRC Safety TO5 –Loss of Driver Control at Night As for Safety TO4 above, it should be noted that there is not much data available for this LOS and this reduces the usefulness of this measure. However, it does appear that there is a significantly increasing trend of serious injury and fatal loss of control crashes on the Arterial and Secondary Collector road networks in Whangarei at night.	**ONRC** **Arterial** **Primary Collector** **Secondary Collector** **Access** **Low Volume**	
ONRC Safety TO6 – Intersection The serious injury and fatal crashes on Whangarei's Arterial road intersections is showing an increasing trend. The other road classes are showing a static or decreasing trend in high severity intersection crashes, although the lack of data for these road classes is reducing the usefulness of this measure.	**ONRC** **Arterial** **Primary Collector** **Secondary Collector** **Access** **Low Volume**	

ONRC Safety TO9 – Vulnerable Users	ONRC	
The serious injury and fatal crashes involving vulnerable users in Whangarei is showing a static or decreasing trend for all road classes.	**Arterial**  **Primary Collector**  **Secondary Collector**  **Access**  **Low Volume** 	

LTP Measure 1.1.1 – Percentage of Road Accidents with Contributing Road Factors This shows that the percentage of crashes with contributing road factors is below the target of 9% over the last 6 years. This indicates that crashes resulting from road faults or issues are low (averaging about 3%). This suggests that road faults are being adequately managed.	**Overall** 	
LTP Measure 1.1.2 – Change in Number of Fatal and Serious Injury Crashes This is a Department of Internal Affairs (DIA) measure that was introduced in 2015/16. The number of fatal and serious injury crashes has increased by an average of 10 for both the last two years. This is well above the target of zero, and indicates that the rate of high severity crashes is increasing in the Whangarei. This matches the crash graph included in the problem assessment for safety undertaken in Section 5.1.5.2.	**Overall** 	

SUMMARY – Serious injury and fatal crashes are increasing on Whangarei's network, particularly on the Arterial and Secondary Collector networks. The Arterial and Secondary Collector crashes are also showing increasing trend of serious injury and fatal loss of control crashes at night. Arterial roads also have an increasing trend of high severity intersection crashes. All road classes apart from the Arterial Roads have higher Personal Risk than the peer group average.

6.11.4 Options to be Considered

Based on the above data and the problem definition, the following options have been considered for addressing the safety and resilience issues on the network:

Option	Description	Benefits / Consequences
Delineation and Hazard Protection Upgrades	This would include improved delineation, new guardrail installations, upgrade hazardous guardrail end terminals, replace inadequate bridge rails and seal widening on High Risk Rural Roads (HRRR).	Safety – will reduce the likelihood and severity of loss of control crashes.
Speed Management	Implement speed management guide as per the speed risk mapping. This will involve extensive community consultation. It is likely to require a full time equivalent staff position over the 2018/2021 period to implement the current high risk roads. May also require physical works to reinforce the speed limit.	Safety – will reduce the likelihood and severity of crashes.
Pedestrian Crossing Upgrades	This would include upgrading lighting and conspicuity of zebra crossing and upgrading of key disability routes.	Safety – will reduce pedestrian related crashes.
Audio Tactile Profile (ATP) Edgelines & Centrelines	Implement a programme of edgeline ATP on High Risk Rural Roads(HRRR) with high incidence of loss of control crashes or cross centreline crashes, particularly with fatigue or distraction as a factor.	Safety – will reduce the likelihood of loss of control and head on crashes
Wide Medians	Provide wide medians on HRRR with high traffic volumes and High/Medium High Collective risk, particularly those with a high incidence of head on or crashes where the vehicle crossed the centreline.	Safety – will reduce the likelihood of head on crashes
Intersection Upgrades	Implement a programme of upgrades on High/Medium High risk intersections. Could consider active warning signs and improving pedestrian connections in urban areas.	Safety – will reduce the likelihood of intersection crashes

Option	Description	Benefits / Consequences
Resilience Programme	Develop and implement a programme of resilience upgrades to address high risk areas (slips and flooding) on a proactive basis. Work is to focus on detour routes, major arterials/collectors, freight and tourist routes and roads serving isolated communities. Time work to suit resurfacing and rehabilitations.	Resilience – will reduce the incidence of road closures due to emergency events and help ensure that detour routes remain open.
Sea Level Rise/Climate Change	Programme of coastal protection and lifting low lying roads in critical areas to provide for the predicted effects of climate change. Also increase in culvert/bridge capacity on known problem areas on critical routes.	Resilience – will help protect against the forecast impacts of climate change.
Provide Rest/Viewing Areas	Help develop and implement with the freight and tourism industries a programme for the installation and maintenance of rest areas/viewing areas on arterial, freight and tourist routes and byways. These areas should have toilets and rubbish bins etc. The Twin Coast Discovery Highway PBC has identified an opportunity for a new rest area on Whangarei Heads Road between Tamaterau and Parua Bay.	Freight – will provide areas for truck drivers to rest and check their load. Safety – will provide safe rest areas to enable drivers to take a break, thus reducing fatigue crashes. Amenity – will improve the amenity for road users by providing scenic areas, toilet and rubbish bins.

6.11.5 Option Assessment

Safety

Option	Assessment	Problem being Addressed	Effectiveness	LOS Impact	Annual Cost	30yr PV Cost ($M)
Status Quo	5% of maintenance programme spent on safety. Programme a mix of High Risk Rural Roads (HRRR), Crash Reduction Study (CRS) sites and local road speed management. Safety audits are carried out on capital projects – but safety recommendations not always implemented due to budget restrictions.	Safety	Poor/Moderate	Neutral	W/C 341: $800,000	$11.4
Delineation and Hazard Protection Upgrades	Enhance the current programme to include more delineation improvements, guardrail protection and seal widening of HRRR routes and at CRS sites. This will result in a reduction of loss of control crashes and a severity reduction on the treated routes.	Safety	Good	Moderately Better	W/C 341: +$725,000	$21.7
Speed Management	Implement the Speed Management Guide on high risk routes. This will incorporate both speed limit review and change along with positive reinforcement of appropriate speeds. This is likely to significantly reduce the number of crashes and severity of the treated routes.	Safety	Very Good	Significantly Better	W/C 341: +$130,000	$13.2
Pedestrian Crossing Upgrades	Expand upon the current programme of pedestrian crossing upgrades to reduce social severance and reduce pedestrian crashes as identified in the Whangarei Transportation Strategy. Sites will tie in with current pedestrian demand or provide connections to the walking and cycling network.	Safety	Good	Moderately Better	W/C 341: +$50,000	$12.1

Option	Assessment	Problem being Addressed	Effectiveness	LOS Impact	Annual Cost	30yr PV Cost ($M)
Audio Tactile Profile (ATP) Edgelines & Centrelines	Carry out a 10 year programme to provide ATP on all rural arterial, freight and tourist routes. There would also be an ongoing maintenance cost to renew the ATP every reseal cycle. This option would significantly reduce loss of control crashes by providing drivers warning when they drift out of their lane.	Safety	Good	Significantly Better	W/C 341: +$900,000 W/C 222: +$375,000 (starting Yr 13)	$20.1
Wide Medians	Carry out a 30 year programme to provide wide medians on all rural arterial, freight and tourist routes. This option would significantly decrease the likelihood of a head on collision on these routes. This would be a substantial programme of widening which is not justified given there are lower costs alternatives which could be implemented first.	Safety	Good	Moderately Better	W/C 341: +$3,000,000	$54.0
Intersection Upgrades	Implement improvements at high risk intersections to improve width, channelisation and turning flares. These works would be identified through the HRRR or CRS processes and would result in a significant decrease in crashes at these intersections.	Safety	Very Good	Moderately Better	W/C 341: +$75,000	$12.4

PREFERRED OPTIONS – Delineation and Hazard Protection Upgrades, Speed Management, Pedestrian Crossing Upgrades and Intersection Upgrades – These options will reduce the likelihood and severity of crashes occurring on the network.

Resilience

Option	Assessment	Problem being Addressed	Effectiveness	LOS Impact	Annual Cost	30yr PV Cost ($M)
Status Quo	Implement some resilience works (mainly slip repairs) in conjunction with rehabilitations and a few stand alone repairs as budget allows.	Resilience	Moderate	Neutral	W/C 341: $220,000	$3.1

Option	Assessment	Problem being Addressed	Effectiveness	LOS Impact	Annual Cost	30yr PV Cost ($M)
Resilience Programme	Carry out an enhanced programme of resilience projects to reduce the incidence of roads being closed due to emergency events. This programme would focus on detour routes, major arterials/collectors, freight and tourist routes and roads serving isolated communities.	Resilience	Good	Moderately Better	W/C 341: +$780,000	$14.20
Sea Level Rise/Climate Change	Programme and timing to be determined by Resilience Strategy.	Resilience	Moderate/Good	Slightly Better	TBD	TBD

PREFERRED OPTION – Resilience Programme: will enable high risk areas to be prioritised and targeted to address known resilience problems on critical routes.

Rest/Viewing Areas

Option	Assessment	Problem being Addressed	Effectiveness	LOS Impacts	Annual Cost	30yr PV Cost ($M)
Status Quo	Do nothing.	Freight, Safety & Amenity	Poor	Neutral	W/C 341: $0	$0.0
Provide Rest/Viewing Areas	Provide a rest area/pull off area between Tamaterau and Parua Bay at turnoff to Manganese Point. This project was identified as an opportunity in the Twin Coast Discovery Highway PBC. The estimated cost includes land take and carpark construction.	Freight, Safety & Amenity	Good	Slightly Better	W/C 341: +$500,000	$0.5

PREFERRED OPTION – Provide Rest/Viewing Areas: to provide a viewing/rest area between Tamaterau and Parua Bay to support the tourism industry as identified by the Twin Coast Discovery Highway PBC. However, this option has been put on hold pending the Twin Coast Discovery Highway Rest Area Strategy that will be undertaken during the 2018/21 period.

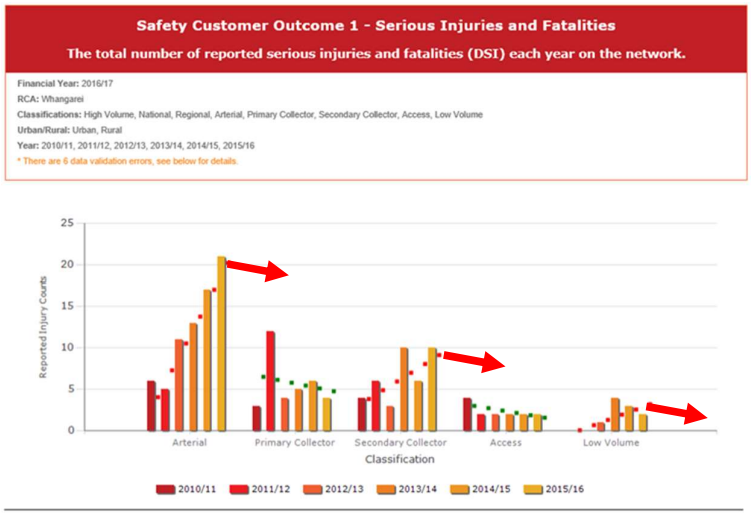
6.11.6 Financial Impact

The following table shows the financial impact of the options selected (note some of the costs have been rounded off):

W/C	Description	Cost Impact	Overall Impact (excl Growth & Escalation)
341	Low Cost/Low Risk Improvements	+$1,200,000/yr for improved programme of safety works. +$850,000/yr for a resilience programme to address historic slips.	+$2,050,000/yr

6.11.7 Level of Service Impact

The following table shows the expected Level of Service impact of the options selected:



SAFETY – We expect that the overall number of fatal and serious injury crashes will show a decreasing trend for all road classes. This will be due in part to an increased safety programme.

Overall it is expected that there will be a decreasing trend in crashes on the network.

6.11.8 Improvement Plan

Improvements that should be considered during the 2018/21 period for inclusion in the next AMP are as follows:

- Through the NTA, develop a resilience strategy for Northland that focuses on State Highway detour routes, arterial routes, freight and tourist routes as well as access to isolated communities. The strategy should identify key life lines that need protecting from the Northland Life Lines project. This strategy should take into account the expected impacts due to climate change. The result of the strategy should be a programme of resilience works.

6.12 Education & Promotion

Work Categories: **432 Road Safety Promotions**

6.12.1 Links to Strategic Case

Problem Statement: The number of fatal and serious injury crashes on our roads are high and are trending upward, particularly on our Arterial road network.

Benefits of Addressing Problem: Fatal and serious injury crashes will decrease on our network, reducing the harm to our customers and communities.

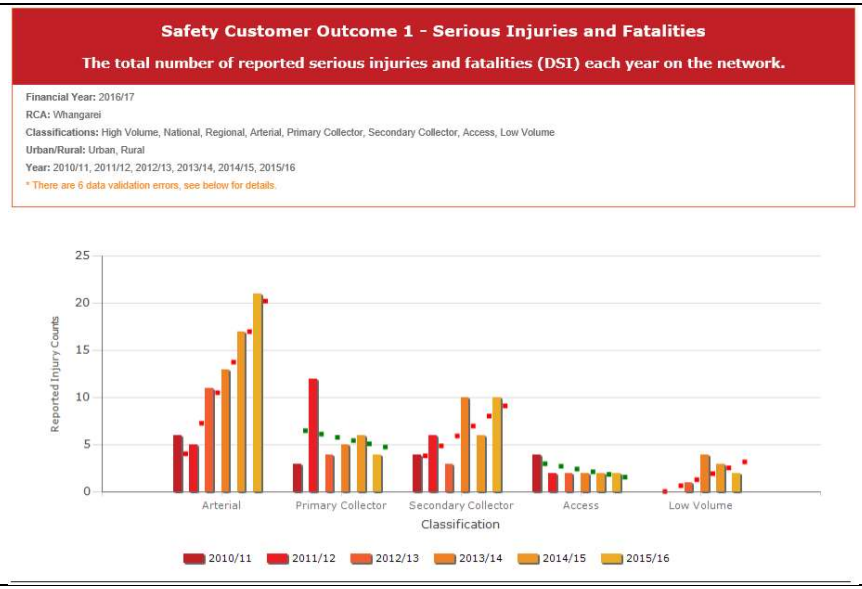
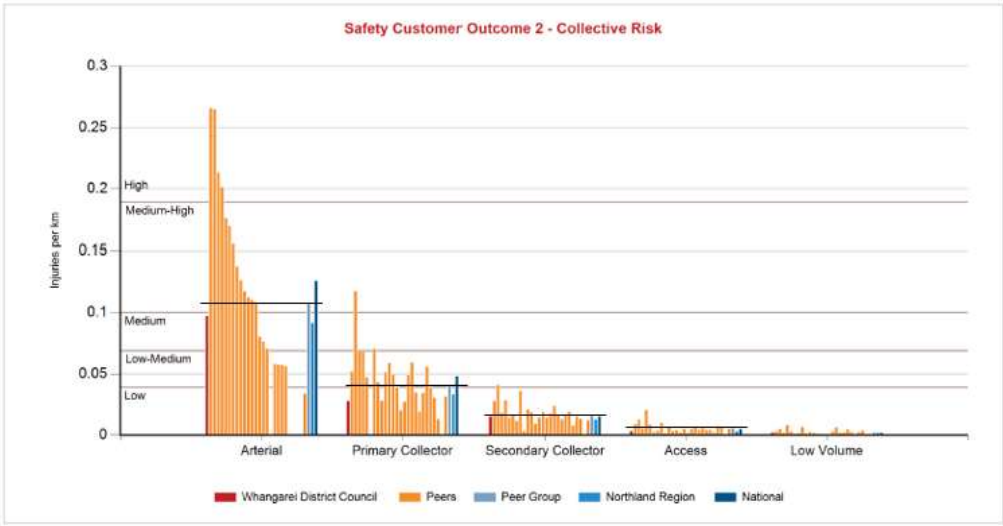
Consequences of Not Addressing the Problem: Fatal and serious injury crashes will continue increasing and will continue to cause significant harm to our customers and communities.

6.12.2 Levels of Service

ONRC Customer Outcomes:
ONRC Safety CO1 – The Number of Fatal and Serious Injuries on the Network
ONRC Safety CO2 – Collective Risk
ONRC Safety CO3 – Personal Risk

Customer Levels of Service:
NZTA Communities at Risk Register
LTP 1.1.X – Percentage of road safety promotion projects completed (New measure)

6.12.3 Evidence and Gap Analysis

ONRC Safety CO1 – Number of Fatal and Serious Injuries on the Network This graph indicates that WDCs reported serious injury and fatal crashes are increasing on the Arterial, Secondary Collector and Low Volume networks. The Arterial road network has a rapidly increasing trend. The serious and fatal crashes on the Primary Collector and Access roads are trending downward.	**ONRC** **Arterial** **Primary Collector** **Secondary Collector** **Access** **Low Volume**	
ONRC Safety CO2 – Collective Risk This data indicates that the Collective Risk of Whangarei's road network is at or below the peer group average for all ONRC road classifications. The Arterial roads have a Collective Risk of Medium and the other road classes have a risk of Low-Medium or Low.	**ONRC** **Arterial** **Primary Collector** **Secondary Collector** **Access** **Low Volume**	

ONRC Safety CO3 – Personal Risk

The Personal Risk data on Whangarei's road network indicates that while the Arterial roads are below the peer group average, all of the other road classes are above or significantly above the average for the peer group.

The Personal Risk rating for the Primary Collectors is Medium-High and for the Secondary Collector, Access and Low Volume networks is High.

ONRC

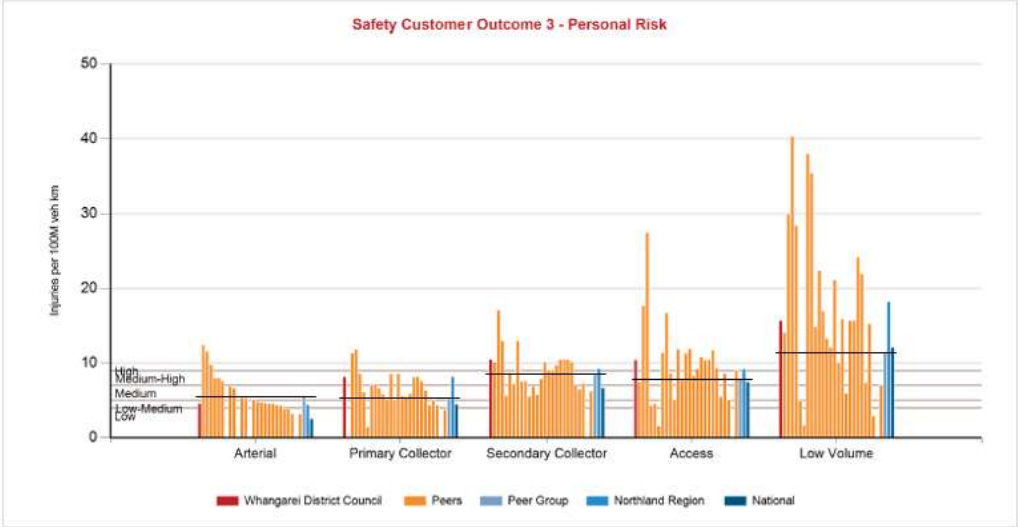
Arterial

Primary Collector

Secondary Collector

Access

Low Volume



NZTA Communities at Risk Register

Whangarei has many Medium Concern areas identified on the Communities at Risk Register. These include all Death and Serious Casualty, Young Drivers, Speed, Rural Intersections, Pedestrians, Fatigue and Older Road Users.

The Northland Region as a whole has many High Concern areas identified on the register. Many of these are the same issues that are identified for Whangarei.

Overall

Whangarei District	Northland Region
All Deaths and Serious Casualty (Medium Concern)	All Deaths and Serious Casualty (High Concern)
Young Drivers (Aged 16-24 yrs) (Medium Concern)	Young Drivers (Aged 16-24 yrs) (High Concern)
Speed (too fast for conditions) (Medium Concern)	Alcohol and/or Drugs (High Concern)
Rural Intersections (Medium Concern)	Speed (too fast for conditions) (High Concern)
Pedestrian Involved (Medium Concern)	Rural Road Loss of Control and/or Head On (High Concern)
Fatigue (Medium Concern)	Motorcyclist Involved (High Concern)
Older Road Users (Aged 75yrs or older) (Medium Concern)	Restraints (seatbelts not worn) (High Concern)
	Fatigue (Medium Concern)

SUMMARY – Serious injury and fatal crashes are increasing on Whangarei's network, particularly on the Arterial and Secondary Collector networks. All road classes apart from the Arterial Roads have higher Personal Risk than the peer group average. The Communities at Risk Register indicates many high and medium risk areas of

concern for Whangarei and Northland, including all deaths and serious injuries and continuing themes of alcohol/drugs, young drivers, speed, restraints, fatigue and rural loss of control on bends.

6.12.4 Options to be Considered

Based on the above data and the problem definition, the following options have been considered for addressing the safety issues on the network:

Option	Description	Benefits / Consequences
Bike Skills Training	Implement a Bike Skills Training programme to provide skills training for school children to build upon the success of the Bikes in Schools programme. This will provide children with the skills they need to cycle with confidence both on the shared path network and on roads. The programme will also target adult cyclists to encourage mode shift.	Safety – will reduce cycle crashes by improving cyclist skills. Travel Time Reliability – will increase the mode shift to cycling which will reduce road traffic and congestion.
Improved Road Safety Promotion	Implement an expanded education and promotion using internal resources (similar to Far North's Rural Education Activities Programme (REAP) organisation) to target high and medium risk issues identified by the NZTA Communities At Risk register (such as alcohol, young drivers, speed etc). This would make the programme less dependent on third party funding arrangements and in-kind donations. The current programme would be expanded to include motorcycle safety to make use of ACC funding and adoption of successful campaigns such as FNDC's One Tear Too Many speed campaign.	Safety – will reduce crashes resulting from poor driver behaviour.

6.12.5 Option Assessment

Road Safety Promotion

Option	Assessment	Problem being Addressed	Effectiveness	LOS Impact	Annual Cost	30yr PV Cost ($M)
Status Quo	Continue with current model with an external resource (currently RoadSafe Northland) providing education and promotion of high and medium risk issues identified by the NZTA Communities At Risk register.	Safety	Moderate/Good	Neutral	W/C 432: $313,000	$4.4

Option	Assessment	Problem being Addressed	Effectiveness	LOS Impact	Annual Cost	30yr PV Cost ($M)
Bike Skills Training	This option would help build children and adult cycle skills, giving them the skills and confidence to use the shared path and road networks safely and with confidence. This will encourage uptake of walking and cycling and reduce potential cycle related crashes.	Safety & Travel Time Reliability	Good	Moderately Better	W/C 432: +$400,000	$9.7
Improved Road Safety Promotion	To be determined through Improvement Plan item	Safety	Very Good	Significantly Better	TBD	TBD

PREFERRED OPTION – Bikes Skills Training: To provide training in cycle skills to reduce cyclist related crashes and encourage mode shift to cycling. It should be noted that the programme will increase to $400,000/yr by 2021. The average cost per annum over the 2018/21 period will be $250,000/year

6.12.6 Financial Impact

The following table shows the financial impact of the options selected (note some of the costs have been rounded off):

W/C	Description	Cost Impact	Overall Impact (excl Growth & Escalation)
432	Road Safety Promotion	+$250,000/yr for Bikes Skills Training to improve cyclist confidence.	+$250,000/yr

6.12.7 Improvement Plan

Improvements that should be considered during the 2018/21 period for inclusion in the next AMP are as follows:

- Development of a REAP type organisation to undertake road safety promotion and education activities.

6.13 Parking

Work Categories: **Parking (Unsubsidised)**

6.13.1 Links to Strategic Case

Problem Statement: There is no active signage to advise customers where parking is available which leads to people aimlessly driving around looking for a park in the CBD. Many of the parking meters use old technology which will soon be obsolete. Tension between providing sufficient parking with new developments and encouraging public transport use. Also demand for free parking in the CBD to compete with other "big box" developments which offer free parking.

Benefits of Addressing Problem: Advising where parking is available in real-time will reduce vehicle circulation in the CBD. Replacement of old parking machines will avoid problems with replacement parts etc when these become obsolete.

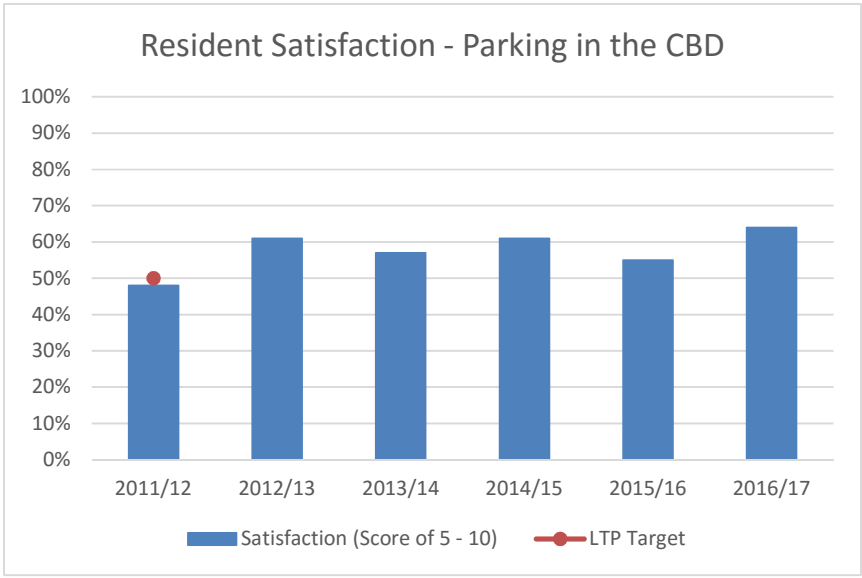
Consequences of Not Addressing the Problem: Without carrying out any changes to the parking in the CBD, customers will still be frustrated in driving around looking for a park. Obsolete parking machines will result in difficulty maintaining these machines, lowering the level of service and potentially increasing costs.

6.13.2 Levels of Service

ONRC Customer Outcomes: None

Customer Levels of Service: None

6.13.3 Evidence and Gap Analysis

Resident Satisfaction – Parking in the CBD The resident satisfaction with parking in the CBD has been slowly trending upwards over the past 6 years. This indicates that improvements in the parking meter technology over the past 5 years are showing benefits.	**Overall** 	

SUMMARY – Resident satisfaction with the parking in the CBD has been trending upwards over the past 6 years and may be as a result of improvements made to parking meter technology.

6.13.4 Options to be Considered

Based on the above data and the problem definition, the following options have been considered for addressing parking on the network:

Option	Description	Benefits / Consequences
Parking Sign Replacement	Programme of replacing the Pay & Display signs.	Parking – will ensure that parking signs are legible.
Programme of Car Park Resurfacing	Carry out a programme to resurface off-street carparks to improve their condition and reduce pothole and other failures.	Parking – will reduce the long term costs of maintaining carparks.

Option	Description	Benefits / Consequences
Increase Parking Charges	Increase the parking charges in-line with the Council's recently developed parking strategy. This will result in parking in the CBD being less attractive and would lead to less private vehicle use.	Travel Time Reliability – will encourage mode shift to walking, cycling, and public transport which will result in less congestion caused by private vehicle use.
VMS Parking Signs	Install VMS parking signs on arterial routes leading into the CBD to alert motorists where parking is available. This will reduce travel in the CBD when people are trying to find a park.	Travel Time Reliability – will reduce travel and congestion in the CBD.
Parking Monitoring using Smart City Technology	Use Smart City WiFi technology and sensors to monitor parking availability. Will enable the Council to better understand parking demand and identify high demand areas.	Parking – will enable better planning parking in the CBD.
Parking Mobile Phone App	In conjunction with the Parking Monitoring option, develop and implement a mobile phone app that advises people where the nearest carparks are to their destination.	Travel Time Reliability – will reduce travel and congestion in the CBD.

6.13.5 Option Assessment

Parking

Option	Assessment	Problem being Addressed	Effectiveness	LOS Impact	Annual Cost	30yr PV Cost ($M)
Status Quo	Provide parking in the CBD that targets an occupancy of between 70 and 90%. Set parking charges to achieve that strategy. Parking meters replaced as required due to obsolescence and damage.	Parking	Moderate	Neutral	Parking Maint: $140,000 Parking Ops: $130,000 Parking Renewals: $100,000	$5.3
Parking Sign Replacement	Replace the Pay & Display signs as necessary	Parking	Moderate	Neutral	Parking Maint: +$0 Parking Ops: +$0 Parking Renewals: +$20,000	$5.5

Option	Assessment	Problem being Addressed	Effectiveness	LOS Impact	Annual Cost	30yr PV Cost ($M)
Programme of Car Park Resurfacing	Programme resurfacing of off-street carparks. This option would improve the quality of the carparks and would reduce long term maintenance costs.	Parking	Moderate/Good	Slightly Better	Parking Maint: +$0 Parking Ops: +$0 Parking Renewals: +$100,000	$6.7
Increase Parking Charges	Increase the parking charges in-line with the Council's recently developed parking strategy. This option would encourage people to use less well utilised parks which will free up high demand areas and would help assist with mode shift to PT or walking and cycling. Increase cost in parking would be offset by increased parking revenue.	Travel Time Reliability	Very Good	Moderately Better	Parking Maint: +$0 Parking Ops: +$0 Parking Renewals: +$0	$5.3
VMS Parking Signs	Install VMS parking signs on arterial routes leading into the CBD to alert motorists where parking is available. This will encourage use of less utilised parks and to reduce traffic flows in the CBD while drivers try and find a carpark.	Travel Time Reliability	Moderate/Good	Slightly Better	Parking Maint: +$0 Parking Ops: +$10,000 Parking Renewals: +$0 Parking Imps: +$550,000 (one-off)	$5.9
Parking Monitoring using Smart City Technology	Use Smart City WiFi technology and sensors to monitor parking availability. Will enable the Council to better understand parking demand and identify high demand areas.	Parking	Moderate/Good	Slightly Better	Parking Maint: +$0 Parking Ops: +$10,000 Parking Renewals: +$0 Parking Imps: +$300,000 (one-off)	$5.7
Parking Mobile Phone App	In conjunction with the Parking Monitoring option, develop and implement a mobile phone app that advises people where the nearest carparks are to their destination.	Travel Time Reliability	Good	Slightly Better	Parking Maint: +$0 Parking Ops: +$20,000 Parking Renewals: +$0 Parking Imps: +$300,000 (one-off)	$5.8

PREFERRED OPTIONS – Parking Sign Replacement, Programme of Carpark Resurfacing and Increase Parking Charges – This will improve the condition and look of the off-street carparks and will help reduce reliance of private vehicle use and encourage mode shift to public transport and walking and cycling.

The Parking Monitoring and Mobile Phone App options will be considered by Council in the future following the bedding in of the VMS signage that was recently installed and the development of the CMS/WiFi networks being undertaken through the LED streetlight programme and the proposed traffic signal upgrades.

6.13.6 Improvement Plan

Improvements that should be considered during the 2018/21 period for inclusion in the next AMP are as follows:

- None identified.

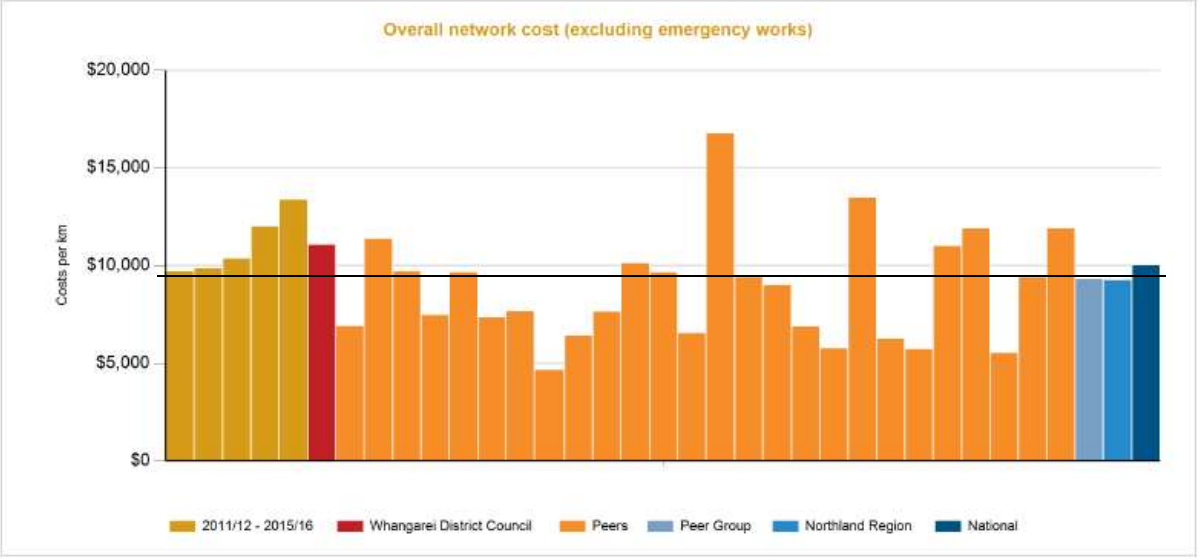
6.14 Value for Money

6.14.1 Overall Assessment

The overall value for money of Whangarei's transport activity has been assessed by considering the cost to deliver the activity and level of customer satisfaction. This is shown in the graphs below:

Cost Efficiency EEM5 - Overall Network Cost (Excluding Emergency Works)

Key Question: How does the Overall network cost compare to others?



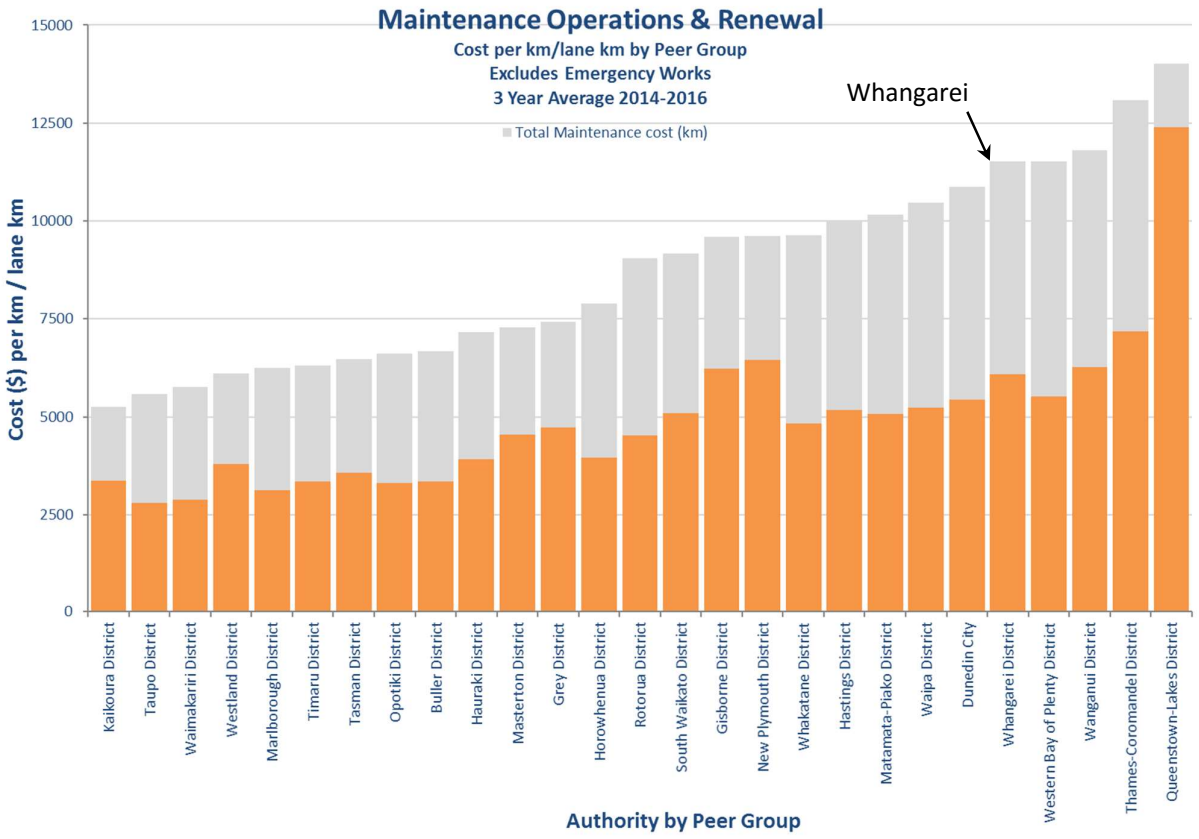
The above graph shows that the average overall network cost over the last 5 years is the 6th highest out of the 27 councils in their peer group and is increasing. While this is high, it should be recognised that Whangarei has the third highest traffic flows (VKT/km) on its sealed road network, significant heavy vehicle traffic, poor moisture sensitive subgrade conditions and lack of good quality aggregates that has driven up the cost to maintain the network.

The increase in costs in the last two years is due to a step change agreed with NZTA to increase the amount of pavement rehabilitations to address the rapidly increasing maintenance costs on the sealed road network. It also took into account the additional costs to operate the Te Matau a Pohe and Kotuitui Whitinga opening bridges.

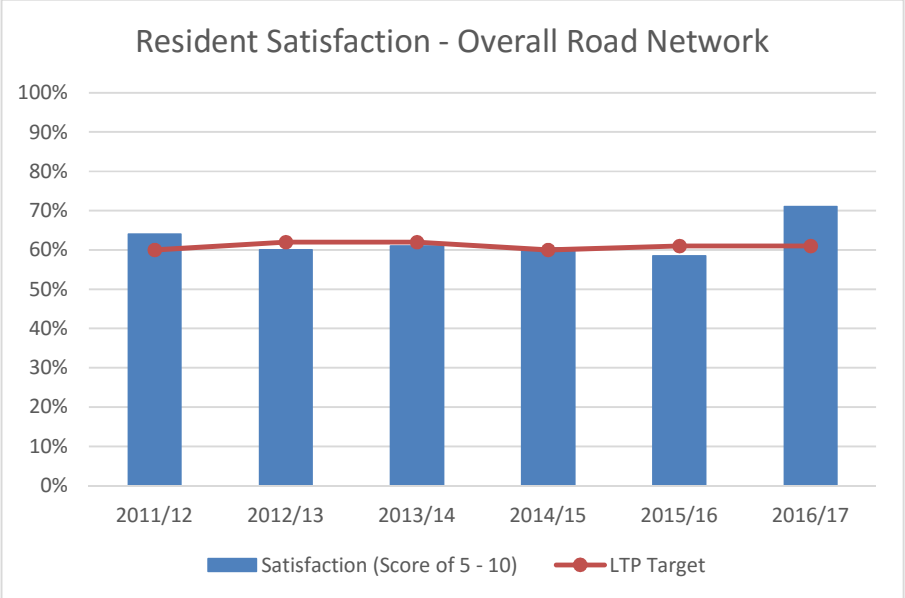
The graph below shows the overall network costs over the past 3 year period (2013/14 to 2015/16). This shows that in the last 3 years, Whangarei had the 5th highest network cost out of the 27 councils in their peer group. This increase in Whangarei's costs/km reflects the increased rehabilitation programme and bridge operation costs as described above. However, the following points should be noted:

- If the South Island councils were removed from this comparison (due to having generally lower traffic flows and better subgrades and access to good quality materials), Whangarei would be the 4th highest out of the 16 North Island councils.
- If Whangarei was compared to the upper North Island councils (with similar traffic and freight flows and ground conditions to the Whangarei District), WDC would be 3rd out of 8 councils.

This suggests that Whangarei's overall network cost are comparable with council's with similar traffic and geology.



Whangarei's annual resident satisfaction survey was also used to judge whether value for money was being obtained for the customer for the overall road network. This is shown in the following graph.



This graph indicates that there was a significant increase in the level of satisfaction from 59% to 71% in the 2016/17 survey and that satisfaction is currently higher than Whangarei's relatively low LTP target of 62%. This probably indicates that the increase in pavement rehabilitations starting in 2015/16 has had a positive effect on the customer experience by improving the road quality and ride comfort.

On the basis of the above, we believe that Whangarei is getting value for money for their investment into their road network.

6.14.2 Northland Transport Alliance Initiatives

Several workstreams have been developed to ensure the three Northland TLA's within the Northland Transport Alliance (NTA) work together to establish consistency and a collaborative approach for Northland. These workstreams are described below:

Activity Management Plans

Objective – Produce best practice BC-AMP's that manage each districts activities but support a regional approach for Northland.

Status – Development

Outcome - All three councils are working together to produce similar AMP's that will consider regional issues and aligned thinking. All are based on the same structure to allow for future alignment and possibly a single AMP for Northland, which would reduce the regional cost of AMP preparation each LTP/NLTP cycle.

Engineering Standards

Objective – Produce a single set of engineering standards to Northland.

Status – WDC is currently finalising its amended standards utilising KDC and FNDC standards. Once adopted KDC and FNDC will look to adopt.

Outcome – Single set of standards producing consistency throughout the Northland region to allow developers and practitioners to work easily across the region. Consistent materials and assets being specified making it easier and cheaper to supply, manage and utilise staff across regions to support workloads.

Unsealed Road Strategy

Objective - Produce a consistent approach to how all three road controlling authorities manage their unsealed road network.

Status - Currently developing the unsealed road strategy for Northland to be adopted by all three Councils. The objectives of the strategy are being developed into the current AMP's and new maintenance contracts.

Outcome – That the unsealed roads are managed better and the maintenance and renewal works are proactive and planned rather than reactive. Ensuring we are investing in the right areas.

Procurement – Tender timetables

Objective - Produce a list of works / projects for Northland that are to be tendered to the open market with indicative tender dates.

Status – Time table developed and published.

Outcome – All works have been set so as not to flood the market at once and give the industry advance warning of what is coming the following year.

Procurement Strategy

Objective - Provide a regional procurement strategic that each council can adopt.

Status – Development

Outcome – Developing one strategy rather than three has allowed cost saving and a greater level of expertise the feed into the strategy. While ensuring consistency across the region and developing new maintenance contracts that will drive quality and efficiency. This is described in more detail in Section 6.15.

New Maintenance Contracts

Objective – Develop one best practise maintenance contract to be used in each district that supports the benefits set out under Northland Transport Alliance (NTA);

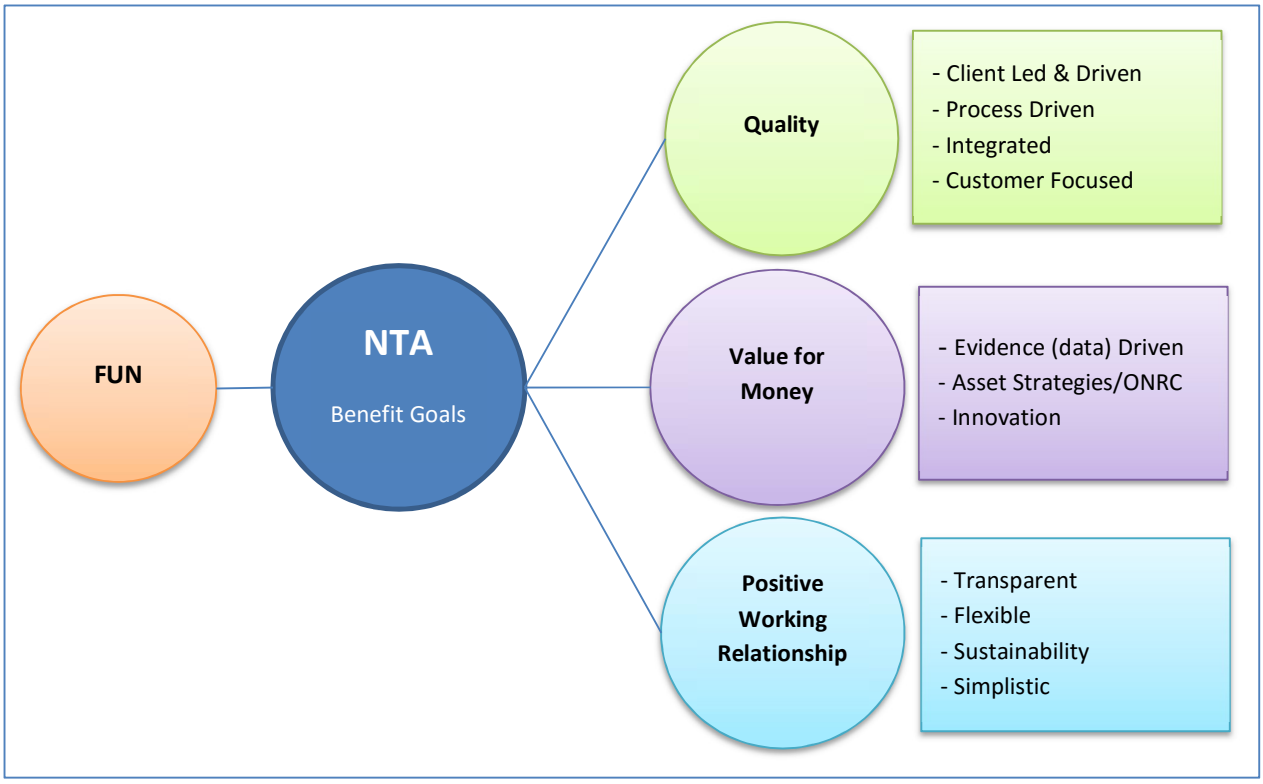
1. More engaged and capable workforce delivering superior asset management
2. Improved Transport/customer outcomes, enabling investment and social opportunities
3. Improved Regional strategy, planning and procurement
4. Transport Infrastructure is more affordable.

Status – Development

Outcome – To align how all northland roads are managed from processes to materials used. Resulting in better outcome for our customers.

The new maintenance contracts are seeking several objectives, outcomes and have defined what success means.

The development of the contracts identified initially what success means, this was encapsulated in the following:



The Registration of Interest (ROI) released to market, 4/10/2017 set out what is important to the NTA in delivery of the maintenance contracts.

- Delivering value for money
- Working collaboratively with Councils and other suppliers in a positive relationship
- Sharing learnings with supply partners Training and up-skilling their employees and provide opportunities for people to join the industry
- Fostering a culture of value creation and continual improvement
- Supporting, upskilling and increasing the learning of Small and Medium Enterprise (SME) contractors and their staff within Northland communities
- Demonstrating customer-focused outcomes
- Ensuring excellent Health & Safety
- Supporting flexibility over the duration of the contract
- Providing a seamless and professional transition for the start-up of the new contract

Specific to identification and delivery of work within this contract, we expect:

- Use of RAMM Contractor to systematically manage the whole work lifecycle
- Completeness and accuracy of inspection data
- Evidence driven decision making
- Contribution of knowledge and experience to support programming the right work at the right time
- Use of asset strategies to support annual and monthly programming processes
- Quality of workmanship.

In detail the contracts are being developed to ensure the following.

Apportion Risk Appropriately:

- Through clear scope and transparency in process and requirements the contract will ensure that risk apportionment is appropriate between the client and contractor. If the contractor clearly understands their scope and requirement, then this will mean the contractor will not have to include a risk premium in pricing the contract resulting in lower rates.

Consistency

- Delivering a consistent set of documents across the NTA means that the systems and process required can be developed and implemented once. The contractor understands the requirements are the same across all contracts therefore a singular understanding of system and process requirements. Reduces industry churn in reinventing the wheel multiple times over to slightly different requirements.

Evidence Led

- Inspection led process in relation to the asset strategies and tactical requirement such as ONRC intervention will provide the greater knowledge and evidenced based approach to how we go about investing. Couched within the consistent system and process focused on delivering quality will ultimately deliver investment as required to the defined service standard.

Flexible

- Through the appropriate allocation of risk this drives more flexibility around how the contract payment mechanisms can be aligned. Providing more control over how the client wishes to invest and when to invest. Flexibility in payment mechanism also provide some opportunity to scale investment dependent on budget allocation.

Quality

- Having inspection led process through strong auditing processes will ensure that the service standards set out in the contract are met and delivered.

Value for Money

- In discussion with industry contracts scale and term was set to provide both opportunity for new competition to enter the northland market. Bring further price competitiveness to the existing market. Keeping in mind the requirement to support SME in the local market through contract conditions.
- Increasing the scope of contracts to included resurfacing and pavement rehabilitation will provide cost certainty for these aspects of work which commonly go to the open market. Pavement rehabilitation, which is generally tendered annually, can be particularly cost volatile dependent on market conditions. Bringing this aspect into a term contract provides a level of cost certainty to what is high cost work.

Consideration that need to be considered for these contracts are:

- ONRC has not been fully implemented from a service provision point of view. Early implementation work has been in place to provide some understanding if there is GAP between current service provision and that offered under the ONRC. This early GAP work would indicate that from a maintenance point of view there are opportunities to redirect invest to provide a better customer outcomes. From a renewal point of view there would seem to be some GAP in the current investment levels to achieve the service standards for our customers required under ONRC.
- These contracts through consistent approach to system and process will look to fully embed ONRC on the networks and provide clear investment requirement. Given the flexibility being developed into the new contracts the impact of should be minimised.
- Whangarei District Council current resurfacing contracts were tendered and won on abnormally low rates. This contract has been delivered successfully. The risk in the new contracts is that these abnormally low rates will not be realised again, resulting in price increase for this portion of work. To offset this, the

increase the scope of works to include pavement rehabilitation may provide more competitive rates and cost certainty.

- The contracts are still in development. Cost of compliance remains one the larger cost risk areas as legislative standards become key requirements ensure safety everyone that these contracts may affect. Estimating the cost of this is not certain.
- The contracts are still in development and have not been fully tested in regards the engineers estimate to provide some scope in cost. The actual cost of these contracts will not be known until March 2018 at which time all funding request will be closed and being assessed by NZTA and councils.

Contract Manual and tendering Polices

Objective - Produce a single contract manual and procedures for all three road controlling authorities.

Status – Development

Objective - Develop a standardise consistent Northland approach when developing contracts and tendering works making it easier for the industry to tender for works across the region and allow staff to be utilised to support workloads across the NTA.

NZTA Memorandum of Understanding

Objective - Establish one Memorandum of Understanding (MOU) for all three councils in agreement with NZTA.

Status – Development

Outcome- A consistent procedure for staff when dealing with SH / Local road interface and utilising resources from best equipped supplier/RCA.

Staff Structure

Objective – Develop a staff structure to be best utilise the skills and expertise and allow in house specialisation.

Status – Development

Outcome – Develop in house expertise less reliant on consultants and attract specialist skills to the region.

6.15 Procurement

6.15.1 Procurement Strategy

The formation of the Northland Transportation Alliance (NTA) has provided the opportunity for a combined regional approach to be agreed and delivered through the adoption of regional procurement strategy. The strategy is expected to be adopted by all four councils that make up the NTA in August 2017 and is to be sent to NZTA for endorsement before October 2017.

This strategy covers the period until 2021. The update of the strategy then will align with the 2021/24 three year programme and the 2021/31 ten year Councils' Long Term Plans. Any major changes which substantially affect procurement during its term will lead to its review.

The establishment of the NTA provided the opportunity for an integrated approach to local government transportation procurement across Northland. A single strategy covering three Local Authorities and the Regional Council creates the potential to deliver local benefits through wider opportunities and regional coordination.

Key aspects within this strategy that have the potential to deliver value from procurement are:

- The development of a single procurement programme for transportation works that incorporates each Council's needs, manages conflicting requirements and engages with the supplier industry in a coordinated and regional approach.
- The potential to deliver local objectives (e.g. three Tier One contractors established in Northland) through regional procurement that attracts more competition in the market than in the past.
- The ability to work with the industry and encourage through procurement the inclusion of increased Small and Medium Enterprises (SME) involvement, recruitment of new trainees, value creation initiatives and staff training in response to tender opportunities.
- The ability to encourage competition from professional services consultants in procuring and developing a region-wide service for a portion of the required work.
- Through the alliance make-up involving the four Councils and the New Zealand Transport Agency (the Transport Agency) working closely together to understand each party's procurement needs and collectively work to efficiently deliver these in conjunction with the suppliers.
- The ability to procure five local roads Maintenance, Operations and Renewals (MO&R) contracts for the Northland network that are of a size that will attract companies to compete for these attractive term contracts and to enable opportunities for value for money through efficiencies of scale.
- The ability to coordinate the terms of all the local MO&R contracts with those of the Transport Agency's Network Outcome Contract (NoC) to enable a business case to be researched on the potential for a future one network approach.
- The ability to form a single regional pre-qualification register for both physical works and professional services.
- The ability to work with the suppliers to identify opportunities for regional coordination and support to improve the transport outcomes. An example of this is the suggestion to develop a single regional transport emergency management plan.

The key recommendations from the Regional Procurement Strategy are detailed as follows:

- Five MO&R contracts spanning the whole local road network of Northland (currently there are 8 road maintenance contracts and numerous other contracts such as road marking, reseals etc). There

would be two contracts covering each of the Whangarei and Far North Districts and one contract covering the Kaipara District.

- The MO&R contracts would have a term of 4+2+1+1 years (8 years maximum) and a start date of 1 July 2018. The 4+2 is to align with the Transport Agency's NOC completion dates of 2022/24. This will enable, if appropriate, joint consideration by the Councils and the Transport Agency of a whole of network approach for MO&R work for State Highways and local roads post 2024. The 1+1 will allow for future staggered timing of contract renewals if a whole of network approach does not occur.
- The MO&R contracts would be fence to fence involving most of the M&O aspects with road marking, bridge maintenance, reseals and a portion of rehabilitation work included.
- The price/quality procurement method will be used for determining the MO&R contractors. It is planned to adopt a 2-stage selection process where initially a short list of suppliers will be selected.
- The other renewal projects (not carried out by the MO&R contracts) will be bundled into a range of packages that generally have a combined value of between $0.5 million and $1 million. These would normally be procured using the Price/Quality method, although low risk projects may use the Lowest Price Conforming method. These will be tendered and awarded around September each year to enable an early start in the construction season and allow the flexibility for the supplier to decide the delivery programme, but with a completion date of no later than 1 April that financial year.
- The Northland Transportation Alliance, established as a Shared Services Business Unit, provides in house professional services to the four Northland Councils.
- External professional services shall be procured where necessary to provide additional technical support and specialist skills as required. One professional services contract will likely be procured using the Price/Quality method for a portion of the external work (say 40%) using a national consultant. The remaining work will be distributed to smaller consultants by pre-qualification using a professional services register to short list and procured using either Direct Appointment or Closed Contest methods.

The NTA will be seeking NZTA endorsement of the Procurement Strategy.

6.15.2 Smart Buyer Self-Assessment

The Whangarei District Council has carried out a self-assessment using the REG Smart Buyer form to determine how well their procurement processes are performing. A copy of this assessment is included in on the following pages.

The result of this self-assessment was a score of 56 out of a possible 70 (the higher the score the better). This indicates that WDC has embraced the Smart Buyer principles but that there is room for further improvement.

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Smart Buyer Self Assessment

This assessment is based on the Smart Buyer Principles identified in the Road Maintenance Task Force Report. Score the following by ticking the appropriate box - (1) Disagree to (5) Strongly Agree.

Whenever you score yourself "4 or 5" think of an example you can use to justify your score to an independent auditor or the other attendees at this workshop.

Assessment statement Our Organisation	Score				
	1	2	3	4	5
1. Fully understands the different contracting models available.					✔
2. Holds meetings that update the contracting industry on the forward works programme and any changes in approach, and proactively engages with the contracting industry to ensure it gains optimal value from any changes being implemented.				✔	
3. Has sufficient robust data (or is in the process of gathering robust data) on our networks to enable optimal integrated decision-making.				✔	
4. Has access to expertise that fully enables best use of the data available.				✔	
5. Is open to alternative solutions to those proposed in the contract documents.			✔		
6. Understands risk and how to allocate and manage it.				✔	
7. Has a Council that is prepared to pay more now to achieve a lower whole of life cost.			✔		
8. Actively pursues value for money & does not always award contracts to the lowest price.				✔	
9. Is able to manage supplier relationships/contracts to ensure optimal expenditure, which sustains infrastructural assets at appropriate levels of service.			✔		
10. Supports ongoing skill and competency training and development for staff.					✔
11. Actively shares and gains knowledge within the sector.				✔	
12. Is effective in keeping up with best practice in procurement, including best practice RFP/contract documentation.					✔
13. Regularly seeks and receives candid feedback from suppliers on its own performance as a client and consistently looks to improve its performance.			✔		
14. Explores opportunities for collaboration by either sharing in-house resources with neighbours, or by procuring together or tendering together. That exploration could be through an LGA s17A evaluation of transport function delivery options.					✔
Number of ticks in each column			4	6	4
Multiplying factor	x1	x2	x3	x4	x5
Total Score in Column			12	24	20
Total Score	**56**				

Score:	Interpretation
65 to 70:	Our organisation is a Smart Buyer - people love working for us and with us!
55 to 64:	Our organisation has embraced Smart Buyer principles but can still improve.
45 to 54:	Our organisation gets by but has opportunities for improvement.
30 to 44:	Our organisation is not rocking the boat when it comes to pursuing value for money.
0 to 29:	Our organisation is a bit of a basket case!

If you were to repeat this assessment in one or two years' time, how do you expect it will have changed? which questions will show the greatest change (up or down)? and what action/inaction will have been the driver of that change?

The need for 'smarter buyers' (pages 36 and 37 of the RMTF report)

A theme that underpins a number of the conclusions of this review is that RCAs must be both efficient and effective managers of their road assets and smart buyers of the services they require. These issues strongly relate to the concept of 'smart procurement' with a balanced focus across 'the three Es':

1. economy – through securing (or supporting) the provision of products, materials and expertise at the quality, in the volumes and at the times and locations required, at the lowest price
2. efficiency – through the processes used, including standard documentation and contracting forms selected for achieving best cost / quality and outcomes; and knowledge of the product / materials and supplier market applied
3. effectiveness – taking opportunities for changing from traditional products and materials by maintaining support for innovation in the nature and characteristics of products and materials, and for a strong supplier market

The impact of raising the capability of RCAs would include reduced supplier selection process costs, better management of risk and more objective assessment of performance for use in future supplier selection processes.

The contracting industry has provided the following useful analysis of the characteristics of a smart buyer: Some RCAs are smart buyers but this is believed to be the exception.

Smart buyers have:

- An improved understanding of costs that better inform their decision making process
- An understanding of the impact delivery models and supplier selection criteria can have on the value of contracts
- Robust forward work programmes that are communicated to the industry and supported by budgets that allows the work to be completed
- Knowledge of the network to determine treatments required based on physical evidence and supported by knowledge of the costs involved
- In house expertise that aids the decision making process and allows acceptance of innovative solutions possibly with or without the involvement of consultants
- A clear understanding of risk and how it is allocated and managed
- An understanding that lowest price will not always deliver desirable outcomes
- An understanding that being prepared to pay more may result in enhanced whole of life value for money.

Not so smart buyers:

- Award contracts predominately based on price – with little appreciation of any risk to best value for money
- Outsource work to the detriment of asset knowledge
- Choose contract forms that are fashionable, not well understood and poorly managed
- Lack technical and contractual management skills
- Lack asset management skills that prevent the development of robust forward work programmes
- Do not support forward work programmes with appropriate budgets.

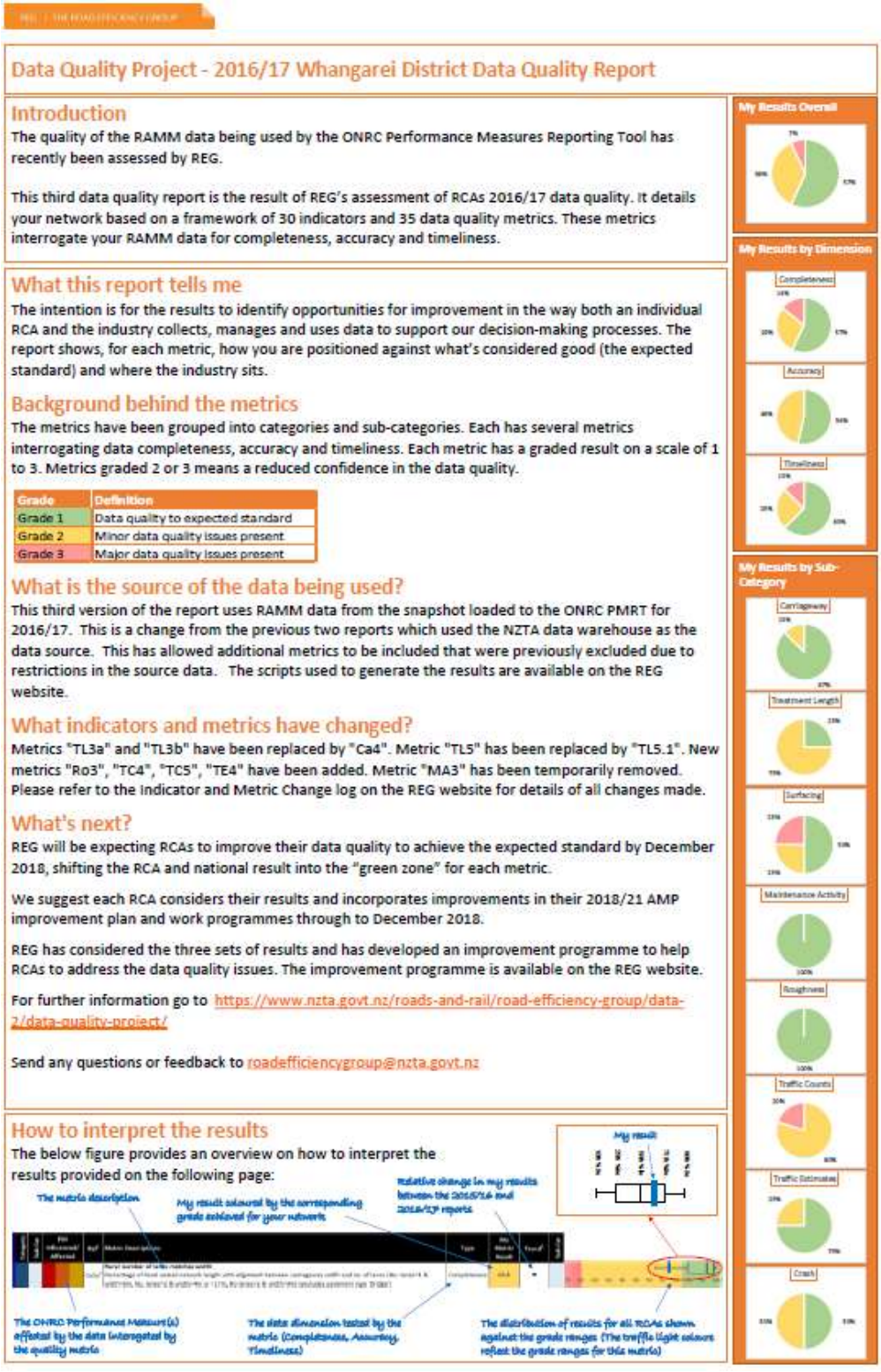
Task Force members debated the nuances around individual items in these lists but believe that they provide a platform on which to build a list of the characteristics that would be exhibited by an RCA that has the capability and the capacity to be a smart buyer.

One Task Force member described a smart buyer in the following terms:

A 'smart buyer' RCA ensures its staff are up-to-date, regularly shares best practice experiences with colleagues from other agencies, and supports and resources their teams appropriately in the recognition that getting the strategic direction right is a very small cost compared to the consequence of getting it wrong. This requires staff to be involved in regular training, attendance and participation in sector gatherings, and involvement in NZTA investigating teams and the like. Ironically in the interests of 'cost-saving' many agencies are limiting staff involvement in these activities. A smart buyer does not ask the question – what if I train my staff and they leave? – but rather asks the question – what if I don't train my staff and they stay?

6.16 Data Quality

Whangarei's RAMM data quality used in the ONRC Performance Reporting Tool has been assessed as follows. This data indicates that there may be some issues with Whangarei's traffic count, surfacing, crash and treatment length data. This will be included in the Improvement Plan for action in the 2018/21 period.



Data Quality Project - 2016/17 Whangarei District Data Quality Report

Introduction

The quality of the RAMM data being used by the ONRC Performance Measures Reporting Tool has recently been assessed by REG.

This third data quality report is the result of REG's assessment of RCAs 2016/17 data quality. It details your network based on a framework of 30 indicators and 35 data quality metrics. These metrics interrogate your RAMM data for completeness, accuracy and timeliness.

What this report tells me

The intention is for the results to identify opportunities for improvement in the way both an individual RCA and the industry collects, manages and uses data to support our decision-making processes. The report shows, for each metric, how you are positioned against what's considered good (the expected standard) and where the industry sits.

Background behind the metrics

The metrics have been grouped into categories and sub-categories. Each has several metrics interrogating data completeness, accuracy and timeliness. Each metric has a graded result on a scale of 1 to 3. Metrics graded 2 or 3 means a reduced confidence in the data quality.

Grade	Definition
Grade 1	Data quality to expected standard
Grade 2	Minor data quality issues present
Grade 3	Major data quality issues present

What is the source of the data being used?

This third version of the report uses RAMM data from the snapshot loaded to the ONRC PMRT for 2016/17. This is a change from the previous two reports which used the NZTA data warehouse as the data source. This has allowed additional metrics to be included that were previously excluded due to restrictions in the source data. The scripts used to generate the results are available on the REG website.

What indicators and metrics have changed?

Metrics "TL3a" and "TL3b" have been replaced by "Ca4". Metric "TL5" has been replaced by "TL5.1". New metrics "Ro3", "TC4", "TC5", "TE4" have been added. Metric "MA3" has been temporarily removed. Please refer to the Indicator and Metric Change log on the REG website for details of all changes made.

What's next?

REG will be expecting RCAs to improve their data quality to achieve the expected standard by December 2018, shifting the RCA and national result into the "green zone" for each metric.

We suggest each RCA considers their results and incorporates improvements in their 2018/21 AMP improvement plan and work programmes through to December 2018.

REG has considered the three sets of results and has developed an improvement programme to help RCAs to address the data quality issues. The improvement programme is available on the REG website.

For further information go to https://www.nzta.govt.nz/roads-and-rail/road-efficiency-group/data-2/data-quality-project/

Send any questions or feedback to roadefficiencygroup@nzta.govt.nz

How to interpret the results

The below figure provides an overview on how to interpret the results provided on the following page:

My Results Overall

My Results by Dimension

Completeness

Accuracy

Timeliness

My Results by Sub-Category

Carriageway

Treatment Length

Surfacing

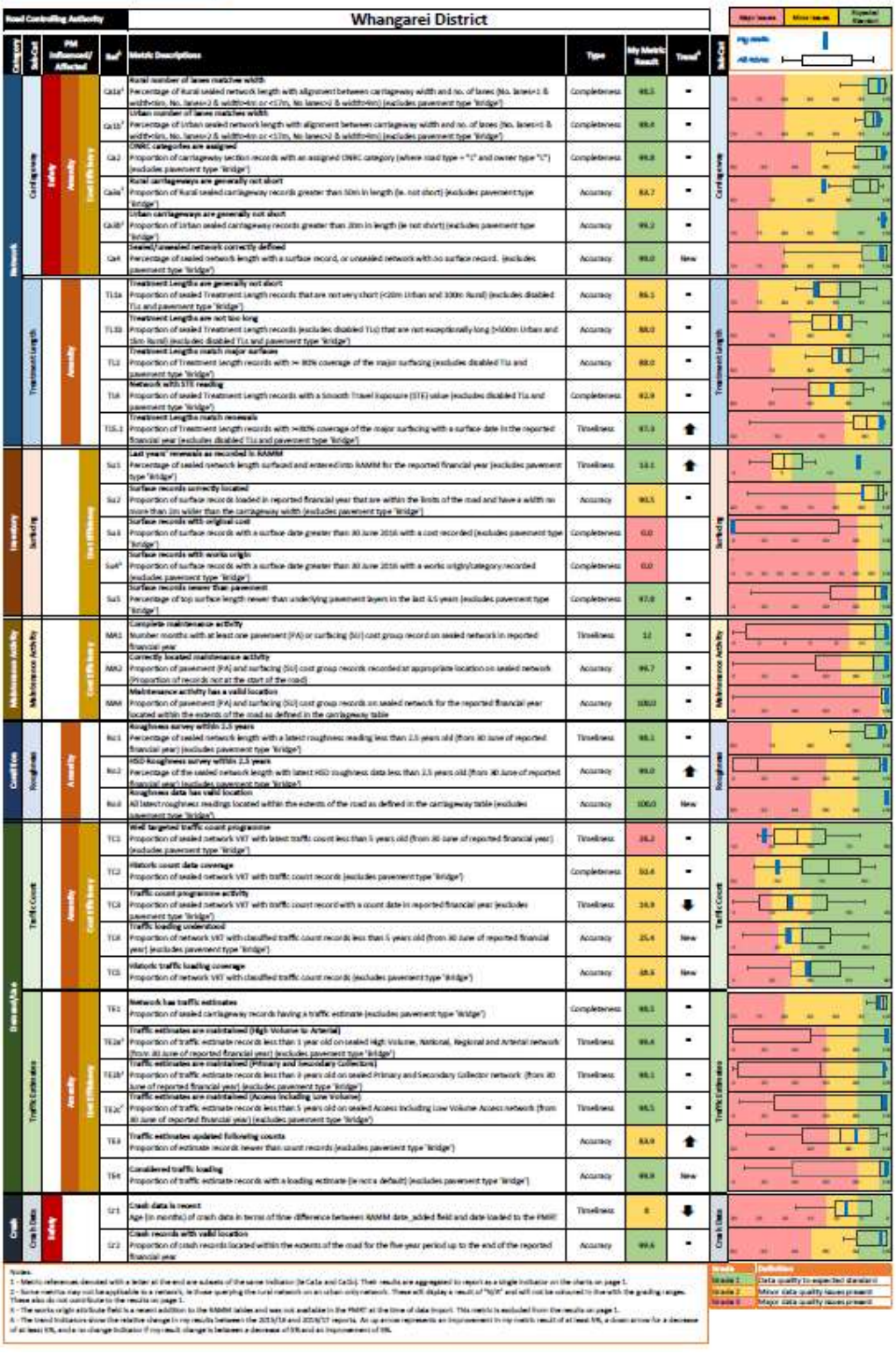
Maintenance Activity

Roughness

Traffic Counts

Traffic Estimates

Crash


Road Controlling Authority
Whangarei District
Category
Sub-Cat
PM Influenced/ Affected
Ref
Metric Descriptions
Type
My Metric Result
Trend
Sub-Cat
Major issues
Minor issues
Expected Standard
Avg metric
All metrics
Network
Carriageway
Safety
Amenity
Cost Efficiency
Ca1a
Rural number of lanes matches width
Percentage of rural sealed network length with alignment between carriageway width and no. of lanes (No. lanes=1 & width<4m, No. lanes=2 & width<6m or >11m, No lanes>2 & width<6m) (excludes pavement type 'Bridge')
Completeness
98.5
Ca1b
Urban number of lanes matches width
Percentage of Urban sealed network length with alignment between carriageway width and no. of lanes (No. lanes=1 & width<4m, No. lanes=2 & width<6m or >11m, No lanes>2 & width<8m) (excludes pavement type 'Bridge')
Completeness
98.6
Ca2
ONRC categories are assigned
Proportion of carriageway section records with an assigned ONRC category (where road type = "C" and owner type "L")
(excludes pavement type 'Bridge')
Completeness
99.8
Ca3a
Rural carriageways are generally not short
Proportion of Rural sealed carriageway records greater than 50m in length (ie. not short) (excludes pavement type 'Bridge')
Accuracy
84.7
Ca3b
Urban carriageways are generally not short
Proportion of Urban sealed carriageway records greater than 20m in length (ie not short) (excludes pavement type 'Bridge')
Accuracy
96.2
Ca4
Sealed/Unsealed network correctly defined
Percentage of sealed network length with a surface record, or unsealed network with no surface record. (excludes pavement type 'Bridge')
Accuracy
99.0
New
Treatment Length
Amenity
TL1a
Treatment Lengths are generally not short
Proportion of sealed Treatment Length records that are not very short (<20m Urban and 100m Rural) (excludes disabled TLs and pavement type 'Bridge')
Accuracy
86.5
TL1b
Treatment Lengths are not too long
Proportion of sealed Treatment Length records (excludes disabled TLs) that are not exceptionally long (>400m Urban and 1km Rural) (excludes disabled TLs and pavement type 'Bridge')
Accuracy
88.0
TL2
Treatment Lengths match major surfaces
Proportion of Treatment length records with >= 80% coverage of the major surfacing (excludes disabled TLs and pavement type 'Bridge')
Accuracy
88.0
TL6
Network with STE reading
Proportion of sealed Treatment Length records with a Smooth Travel Exposure (STE) value (excludes disabled TLs and pavement type 'Bridge')
Completeness
92.9
TL6.1
Treatment Lengths match renewals
Proportion of Treatment length records with >=80% coverage of the major surfacing with a surface date in the reported financial year (excludes disabled TLs and pavement type 'Bridge')
Timeliness
97.9
Inventory
Surfacing
Cost Efficiency
Su1
Last years' renewals as recorded in RAMM
Percentage of sealed network length surfaced and entered into RAMM for the reported financial year (excludes pavement type 'Bridge')
Timeliness
14.1
Su2
Surface records correctly located
Proportion of surface records loaded in reported financial year that are within the limits of the road and have a width no more than 1m wider than the carriageway width (excludes pavement type 'Bridge')
Accuracy
90.5
Su4
Surface records with original cost
Proportion of surface records with a surface date greater than 30 June 2016 with a cost recorded (excludes pavement type 'Bridge')
Completeness
0.0
Su4a
Surface records with works origin
Proportion of surface records with a surface date greater than 30 June 2016 with a works origin/category recorded (excludes pavement type 'Bridge')
Completeness
0.0
Su5
Surface records newer than pavement
Percentage of top surface length newer than underlying pavement layers in the last 4.5 years (excludes pavement type 'Bridge')
Completeness
97.8
Maintenance Activity
Maintenance Activity
Cost Efficiency
MA1
Complete maintenance activity
Number months with at least one pavement (FA) or surfacing (SU) cost group record on sealed network in reported financial year
Timeliness
12
MA2
Correctly located maintenance activity
Proportion of pavement (FA) and surfacing (SU) cost group records recorded at appropriate location on sealed network (Proportion of records not at the start of the road)
Accuracy
96.7
MA4
Maintenance activity has a valid location
Proportion of pavement (FA) and surfacing (SU) cost group records on sealed network for the reported financial year located within the extents of the road as defined in the carriageway table
Accuracy
100.0
Condition
Roughness
Amenity
Ro1
Roughness survey within 2.5 years
Percentage of sealed network length with a latest roughness reading less than 2.5 years old (from 30 June of reported financial year) (excludes pavement type 'Bridge')
Timeliness
98.1
Ro2
HSD Roughness survey within 2.5 years
Percentage of the sealed network length with latest HSD roughness data less than 2.5 years old (from 30 June of reported financial year) (excludes pavement type 'Bridge')
Accuracy
99.0
Ro4
Roughness data has valid location
All latest roughness readings located within the extents of the road as defined in the carriageway table (excludes pavement type 'Bridge')
Accuracy
100.0
New
Demand/Use
Traffic Count
Amenity
Cost Efficiency
TC1
Well targeted traffic count programme
Proportion of sealed network VKT with latest traffic count less than 5 years old (from 30 June of reported financial year) (excludes pavement type 'Bridge')
Timeliness
26.2
TC2
Historic count data coverage
Proportion of sealed network VKT with traffic count records (excludes pavement type 'Bridge')
Completeness
92.6
TC3
Traffic count programme activity
Proportion of sealed network VKT with traffic count record with a count date in reported financial year (excludes pavement type 'Bridge')
Timeliness
16.9
TC4
Traffic loading understood
Proportion of network VKT with classified traffic count records less than 5 years old (from 30 June of reported financial year) (excludes pavement type 'Bridge')
Accuracy
25.4
New
TC5
Historic traffic loading coverage
Proportion of network VKT with classified traffic count records (excludes pavement type 'Bridge')
Accuracy
18.8
New
Traffic Estimates
Amenity
Cost Efficiency
TE1
Network has traffic estimates
Proportion of sealed carriageway records having a traffic estimate (excludes pavement type 'Bridge')
Completeness
98.5
TE2a
Traffic estimates are maintained (High Volume to Arterial)
Proportion of traffic estimate records less than 1 year old on sealed High Volume, National, Regional and Arterial network (from 30 June of reported financial year) (excludes pavement type 'Bridge')
Timeliness
99.4
TE2b
Traffic estimates are maintained (Primary and Secondary Collectors)
Proportion of traffic estimate records less than 3 years old on sealed Primary and Secondary Collector network (from 30 June of reported financial year) (excludes pavement type 'Bridge')
Timeliness
98.1
TE2c
Traffic estimates are maintained (Access including Low Volume)
Proportion of traffic estimate records less than 5 years old on sealed Access including Low Volume Access network (from 30 June of reported financial year) (excludes pavement type 'Bridge')
Timeliness
98.5
TE3
Traffic estimates updated following counts
Proportion of estimate records newer than count records (excludes pavement type 'Bridge')
Accuracy
83.9
TE4
Considered traffic loading
Proportion of traffic estimate records with a loading estimate (ie not a default) (excludes pavement type 'Bridge')
Accuracy
99.9
New
Crash
Crash Data
Safety
Cr1
Crash data is recent
Age (in months) of crash data in terms of time difference between RAMM date_added field and date loaded to the PMIS
Timeliness
8
Cr2
Crash records with valid location
Proportion of crash records located within the extents of the road for the five year period up to the end of the reported financial year
Accuracy
99.6
Grade
Definition
Grade 1
Data quality to expected standard
Grade 2
Minor data quality issues present
Grade 3
Major data quality issues present

6.17 NZTA Audits

The Whangarei District Council has been subject to several NZTA audits and assessments over the past two years. The results of these audits have generally been very positive with very few issues being raised.

A summary of these audits and the actions being undertaken in responses to any feedback is detailed below:

NZTA Partnership Assessment Tool (PAT) **Audit Date: October 2015** **Auditor: Martin Taylor**

Question	Issues	Risk Assessment		Recommendations	WDC Action
Q.1	Relationship Assessment	Low		Northland Collaboration (plus discussions around finances with Inland Freight route being removed from WDC network)	WDC has joined the Northland Transport Alliance and has agreed the savings with NZTA due to the handover of the Mangakahia/Otaika Valley route.
Q.2	Financial Management Assessment	Low-Medium		Lessons learned from last quarter 14/15 for financial management process.	WDC is currently strengthening its financial forecasting both internally and with its contractors so that costs are kept within the budgets.
				Lessons learned from Mill Nixon project CSA.	WDC will develop projects to a more detailed design and have construction estimates before a funding application for
Q.3	Technical Assessment (Planning)	Low		None.	None Required
Q.4	Technical Assessment (Activity Management)	V. Low - Low		Ongoing improvements to AMP to demonstrate; best practice, value for money and business case approach.	WDC is currently developing a business case in line with REG's best practice and value for money principles.
				Deliver good practice with Minor Improvement programming and delivery.	WDC has developed and is delivering a prioritised Minor Improvements programme which targets improvements to high risk rural roads, high risk intersections, bridge replacements and resilience improvements. WDC is current working with
				Dust monitoring equipment for Wright road to measure effect of intervention.	WDC has actioned dust monitoring on Wright Road and is currently working through a business case with NZTA using the dust risk assessment process.
Q.5	Technical Assessment (Capital Improvements)	Low-Medium		Business Case for LED improvement project.	WDC is currently finalising its business case for the LED streetlight project.
				BCA for Whangarei Intersection improvement projects.	Being developed as part of the Whangarei Transportation Strategy business case.
				Develop a robust project delivery plan to ensure completion of Cycleway projects before June 2018.	WDC has developed a detailed delivery plan for the Kamo UCP cycleway and is currently working through the Kiwirail approval process.

NZTA Technical Audit **Audit Date: February 2016** **Auditor: Tony Lange**

Question	Issues	Risk Assessment	Risk	Recommendations	WDC Action	Suggestions	WDC Action
Q.1	Network Management	Green		That Council implements the Present Value case study for improved option analysis available from the REG website (link above)	WDC has implemented the principals of the REG Present Value case study in its assessment of the 2016/17 rehabilitation programme.	That Council increase cross-fall at the interface between seal and unsealed surfaces to 5% to reduce maintenance costs.	WDC currently aims for a 6-8% crossfall on any interfaces between sealed and unsealed roads.
				That Whangarei District Council develops a policy for the management and control of stock crossings and ensures an audit programme is established to monitor compliance.	Council has in place a Stock Control Bylaw that details the requirements management of stock crossings. Council accepts the need for more auditing of existing crossings to push the upgrading and compliance.		
Q.2	Asset Management Plan and Land Transport Programme	Green		None	None Required	None	None Required
Q.3	Databases	Green		None	None Required	None	None Required
Q.4	Safety Performance	Amber	Low	That council adopt the practice of installing a “mountable culvert headwall” to mitigate the risk of run of road crashes as part of its renewal programme	WDC is incorporating mountable culvert headwalls and traversable side slopes in its renewals wherever practical.	That Council modify its night inspection criteria to include Council staff as part of the audit process	WDC will aim to incorporate council staff on the night time inspections.

NZTA Investment Audit **Audit Date: August 2016** **Auditor: Yolanda Macale**

Question	Issues	Risk Assessment		Recommendations	WDC Action	Suggestions	WDC Action
Q.1	Previous Audit Issues	Low		None	None Required	None	None Required
Q.2	Financial Management	Low		None	None Required	None	None Required
Q.3	Procurement	Medium		Incorporate a late tendering policy in all contracts, and expands the provision on late tenders in its procurement manual to include clear guidelines to staff on how to deal with late tenders.	WDC's standard contract specification template currently includes the appropriate late tender clause. WDC's procurement strategy is currently under review as part of the Northland Transport Alliance procurement strategy review. Clear guidelines outlining the process for dealing with late tenders will be included in the procurement strategy update.	WDC finalises its draft Contracts Procedures Manual	WDC will look to finalise its Contracts Procedures Manual.
						Changes all reference to 'Transit New Zealand Competitive Pricing Procedures Manual' in its procurement manual and all ongoing and future contracts to 'New Zealand Transport Agency Procurement Manual'.	WDC will make this change to its standard contract template so that all future contracts will include reference to the 'New Zealand Transport Agency Procurement Manual'.
Q.4	Contract Management	Low		None	None Required	None	None Required
Q.5	Professional Services	Low		None	None Required	None	None Required
Q.6	Multi-Party Agreements	Low		None	None Required	None	None Required

6.18 Proposed Programmes 2018/21

On the basis of the programme business case assessment, the preferred programmes for the 2018/21 period are detailed in the following tables.

These programmes allow for the effects of asset growth, heavy vehicle growth and escalation.

The 2015/18 comparison in the tables is based on the current approved programme.

6.18.1 Maintenance, Operations and Renewals

For 2018/21 Whangarei is not really seeking a funding increase to their Maintenance, Operations and Renewals (MOR) programme, we are just looking to reinvest money where we can achieve the greatest impact on the Customer LOS. The 2018/21 budgets are largely the same as the 2015/18 budgets, but with increases for asset growth, heavy vehicle growth, and cost escalation which adds a total of about $2.3M or 5% to the total budget over the 3 year period (2018/21).

For comparison, the MOR programme for 2015/18 includes the following:

- The funding reduction in 2016/17 and 2017/18 due to the hand over of the Mangakahia Road/Otaika Valley Road route as SH15. This has reduced the overall 2015/18 MOR programme by $2.2M.
- The funding increase of $1.3M for the Wright Road/McCardle Road seal extension.

6.18.2 Low Cost/Low Risk Improvements

There are some large increases proposed in the Low Cost/Low Risk Improvements for 2018/21. These increases are to improve customer levels of service in the road safety, resilience and travel time reliability areas. The largest increases are described briefly below:

- Safety – effectively doubling the amount spent on safety to $1.7M/year
- Resilience – increasing the budget to $1M/year
- Lighting Upgrade – $0.5M/year to continue infill lighting on V-Category mid-block in Whangarei
- Traffic Signal Upgrades - $0.5M/year to upgrade the traffic signals to make these more reliable and efficient.
- Footpath Upgrades - $0.4M/year for new footpaths.

6.18.3 Road Safety Promotions

A large increase is being proposed for Road Safety Promotion for 2018/21. This is mainly to improve bike training to encourage uptake of cycling as a viable travel mode and supports the investment in the cycleway network.

6.18.4 Major Capital Works

The major capital works programme for 2018/21 focuses on the completion of the Kamo, Onerahi and Raumanga/Maunu cycleway paths in Whangarei City and the upgrade of urban intersections to reduce congestion in the city.

6.18.5 Investment Management (Transport Planning)

Investment management for 2018/21 includes a significant increase in the Activity Management Planning to fund the improvement plan. It is also proposed to fund a public transport infrastructure strategy and corridor management plans on key arterial routes in Whangarei City to determine future improvement works to encourage mode shift and capacity improvements.

6.18.6 Unsubsidised Activities (Activities with No Direct NZTA Co-Investment)

A large increase is proposed to the unsubsidised programme for 2018/21. This includes an increase for bus infrastructure including the upgrade/relocation of the Rose St bus terminal, more bus shelters and seats to encourage uptake in public transport use. There is also an increase in funding for seal extensions to fund approximately 2km per annum and an increase to footpath to provide more footpath links and to improve the condition of existing paths.

6.18.7 Growth & Escalation

All of the programmes make the following allowances for growth and escalation:

- Asset Growth: Typically 0.5% per annum. However, cycleway are currently growing much more rapidly, and seal extensions have an effect on the length of sealed and unsealed roads. In the long term, we have allowed for 20-30km of state highways to be handed to WDC as part of the Whangarei to Te Hana project.
- Traffic Growth: We have made allowance for the growth in heavy vehicles which is forecast as 1% growth per annum (almost 40% growth by 2042). This has been applied to pavement maintenance and renewals activities.
- Price Escalation: We have allowed for price escalation in line with the Local Government Cost Index developed from BERL data which shows a year on year cost increase of about 2% per annum in the short term, increasing to 2.6-2.8% per annum by 2028.

Maintenance, Operations and Renewals

W/C	Description	Proposed 2018/21 Budget	Current 2015/18 Budget	Difference 2015/18 vs 2018/21	Comments
111	Sealed Pavement Maintenance	12,617,000	12,581,000	36,000	-$400,000/yr due to implementation of ONRC principles and additional watertable maintenance. +$150,000/yr to carrying out test pits and service lid adjustments/replacements
112	Unsealed Pavement Maintenance	4,472,000	2,448,000	2,024,000	+$500,000/yr for dust suppression. +$200,000/yr for wet roll and grades (from W/C 211)
113	Routine Drainage Maintenance	3,016,000	2,580,000	436,000	+$100,000/yr for increased watertable maintenance
114	Structures Maintenance	1,139,000	797,000	342,000	+$100,000/yr for retaining wall maintenance.
121	Environmental Maintenance	4,094,000	3,773,000	321,000	+$200,000/yr for increase tree removal and trimming. -$150,000/yr for minor slips (transfer to W/C 140 Minor Events)
122	Traffic Services Maintenance	3,771,000	3,658,000	113,000	-$300,000/yr for LED light conversion. +$100,000/yr to do a full line remark per year. +$200,000/year for increased edgeline markings, EMPs and RRPMs
123	Operational Traffic Management	1,939,000	2,032,000	-93,000	
124	Cycleway Maintenance	92,000	74,000	18,000	
125	Footpath Maintenance	2,325,000	0	2,325,000	Current unsubsidised budgets from LTP moved into the new W/C 125. To improve condition of footpaths and uptake in walking mode share as identified in the Whangarei Transportation Strategy.
131	Level Crossing Warning Devices	154,000	70,000	84,000	
140	Minor Events	462,000	0	462,000	+$150,000/yr to match actual spend (transferred from W/C 121)
151	Network and Asset Management	6,351,000	6,028,000	323,000	Decrease due to targeting cost efficiencies and due to NTA start up costs being factored into the 2015/18 budgets. Includes $539,000 transfer from W/C 003 for AMP improvement plan at NZTA's request.
211	Unsealed Road Metalling	2,467,000	4,903,000	-2,436,000	Wright/McCardle sealing was included in 2015/18 budget. Also wet, roll and grade work now funded through W/C 112.
212	Sealed Road Resurfacing	13,707,000	12,611,000	1,096,000	Reduction due to decrease to 80-90km/year reseal results in saving of -$235,000/yr. This is balanced by an increase in TAC work to target poor condition or urban arterials +$150,000/yr. +$300,000/yr for SCRIM seals.
213	Drainage Renewals	3,263,000	2,877,000	386,000	+$100,000/yr for increased culvert replacement
214	Sealed Road Pavement Rehabilitations	12,149,000	11,728,000	421,000	Targeting 6km of rehabilitation/yr (approx same length as 2015/18), and continuing focus on urban area.
215	Structures Component Replacement	3,078,000	2,277,000	801,000	+$150,000/yr for retaining wall renewals. +$100,000/yr for additional bridge component replacement
221	Environmental Renewals	0	0	0	
222	Traffic Services Renewals	2,616,000	2,291,000	325,000	+$100,000/yr for ITS (School Zone) sign renewal
	TOTAL 3 YEAR BUDGET	**77,712,000**	**70,728,000**	**6,984,000**	

This change includes -$935,000/yr savings - which equates to a $2.8M reduction over the 3 years or 4% savings overall. It is proposed to reinvest these savings into new initiatives to improve the CLoS (+$2,250,000/yr). In addition, there has been a transfer of $2.9M from W/C 003 and for footpath maintenance. This results in an overall increase of $7.0M over the 3 year programme once the adjustment for the Wright/McCardle increase in 2015/18 and the effects of growth and escalation are accounted for.

Low Cost/Low Risk Improvements

W/C	Description	Proposed 2018/21 Budget	Current 2015/18 Budget	Difference 2015/18 vs 2018/21	Comments
341	Safety	6,091,000	2,505,000	3,586,000	Increase budget to $1.9M/year to make gains in reducing F&S crashes, by targeting top 5% of HRRR and high risk intersections. Interventions to include guardrails, speed management and pedestrian safety.
341	Resilience	3,078,000	470,000	2,608,000	Increase budget to $1M/year to reduce incidences of road closures and to provide funding for emergency works events.
341	Bridge Replacements	1,539,000	849,000	690,000	
341	Associated Improvements	1,231,000	852,000	379,000	
341	Lighting Upgrades	1,539,000	0	1,539,000	New programme to continue infill lighting/upgrades on V-Cat routes
341	Traffic Signals	1,539,000	0	1,539,000	New programme to provide CCTV cameras, fibre connection, WiFi back up and central management to better control the traffic signals.
341	Urban Intersection Upgrades	800,000	0	800,000	Porowini/Maunu Intersection Upgrade
341	Porowini Ave Bridge Widening	1,000,000	0	1,000,000	Widening of the narrow bridge on Porowini Ave
341	Te Matau a Pohe Remote Operation	500,000	0	500,000	Upgrade to Te Matau a Pohe CCTV Cameras, PA and Comms systems to enable it to be remotely operated, resulting in operational savings
341	Wright Road Seal Extension (3 Sections)	2,000,000	0	2,000,000	Completes the sealing of this strategic forestry route by sealing 3 sections of Wright Road
341	Footpaths	1,224,976	0	1,224,976	New footpaths to improve road safety and to promote active modes
341	Cycleways	0	1,741,000	-1,741,000	To be fully funded from W/C 452
341	Other	0	555,000	-555,000	
	TOTAL 3 YEAR BUDGET	**20,541,976**	**6,972,000**	**13,569,976**	

Road Safety Promotions

W/C	Description	Proposed 2018/21 Budget	Current 2015/18 Budget	Difference 2015/18 vs 2018/21	Comments
432	High Strategic Fit	1,037,000	776,000	261,000	Continuation of existing Alcohol & Drug, Young Driver and Speed programmes plus Restraints (which used to be an Emerging Risk but is now High risk). Increases in budget to all programmes.
432	Medium Strategic Fit	31,000	103,000	-72,000	Fatigue
432	Bikes Skills Training	777,000	0	777,000	New programme to provide cyclists with the skills to use the shared cyclepaths and road network.
432	Emerging Issue	0	60,000	-60,000	
	TOTAL 3 YEAR BUDGET	**1,845,000**	**939,000**	**906,000**	

Major Capital Programme

W/C	Description	Proposed 2018/21 Budget	Current 2015/18 Budget	Difference 2015/18 vs 2018/21	Comments
452	Cycleways	15,637,000	9,158,000	6,479,000	Completion of the Kamo, Onerahi and Raumanga/Maunu routes and connections. Behaviour change to encourage more take up of walking and cycling including the development of a web-based programme similar to New Plymouth's "LET'S GO" programme.
324	Urban Intersection Upgrades	3,596,000	1,088,000	2,508,000	Intersection upgrades to reduce congestion and improve travel time reliability in Whangarei City. Intersections to be trageted in 2018/21 are Maunu/Central/Walton/Water, and Bank/Dent.
324	Springs Flat Road Roundabout	4,153,540	0	4,153,540	The extension of Springs Flat Road and new SH1 roundabout to address future housing growth in high growth urban area.
324	Mill/Nixon Intersection Upgrades	0	9,996,039	-9,996,039	
324	LED Streetlight Upgrades	0	6,600,000	-6,600,000	Infill lighting being funded through Low Cost/Low Risk programme
	TOTAL 3 YEAR BUDGET	**23,386,540**	**26,842,039**	**-3,455,499**	

Investment Management (Transport Planning)

W/C	Description	Proposed 2018/21 Budget	Current 2015/18 Budget	Difference 2015/18 vs 2018/21	Comments
003	Activity Management Plan	205,000	155,000	50,000	Increase in funding to carry out improvement plan activities in AMP. Much of this increase ($539,000) has been transferred to W/C 151 at NZTA's request.
003	ONRC Transition Plan	153,000	157,000	-4,000	Continuation of the ONRC transition plan to incorporate new ONRC measures into AMP.
004	Crash Reduction Study	52,000	59,000	-7,000	New study to identify treatments for crash problem areas for the 2021/24 AMP.
004	Whangarei Transportation Strategy	102,000	80,000	22,000	Update of model and strategy reflect outcome of 2018 census data and new Stats Medium growth predictions.
004	Corridor Management Plans	306,000	0	306,000	Corridor studies as identified through the Whangarei Transportation Strategy to determine the appropriate treatments on the Bank St/Kamo Rd, Port Rd/Okara Dr/Reyburn St/Dent St, Riverside Dr/Onerahi Rd arterial routes.
004	PT Infrastructure Strategy	100,000	0	100,000	Strategy to provide infrastructure to support PT growth in Whangarei as identified in the Whangarei Transportation Strategy.
	TOTAL 3 YEAR BUDGET	**918,000**	**451,000**	**467,000**	

Unsubsidised Activities (Activities with No Direct NZTA Co-Investment)

W/C	Description	Proposed 2018/21 Budget	Current 2015/18 Budget	Difference 2015/18 vs 2018/21	Comments
	Rose Street Bus Terminal Upgrade	313,000	0	313,000	To improve uptake in PT mode share as identified in the Whangarei Transportation Strategy. Co-investment with NRC. Timing of project changed to 2020/21.
	Bus Shelters and Seats - New & Renewals	276,000	5,000	271,000	To improve uptake in PT mode share as identified in the Whangarei Transportation Strategy. Co-investment with NRC.
	Bus Shelters and Seats - Maint	154,000	73,000	81,000	
	Seal Extensions	2,081,000	1,094,000	987,000	To carry out approximately 2km of seal extension every year.
	Footpath - New	0	545,000	-545,000	Now funded through W/C 341
	Footpath - Renewals	0	654,000	-654,000	Now funded through W/C 125
	Footpath - Maintenance	0	745,000	-745,000	Now funded through W/C 125
	Amenity Lighting - New & Renewal	95,000	0	95,000	Re-introduction of amenity lighting improvements
	Amenity Lighting - Maint & Ops	154,000	60,000	94,000	
	Subdivision Works Contribution	153,000	2,000	151,000	To carry out improvement works in conjunction with subdivision development.
	Parking Meters - New & Renewal	369,000	217,000	152,000	To continue the programme of replacing obsolete parking meters
	Parking Meters - Maintenance	431,000	413,000	18,000	
	Parking Meters - Operations	400,000	64,000	336,000	
	Off-Street Parking Resurfacing	308,000	202,000	106,000	
	Coastal Protection Structures	246,000	173,000	73,000	
	Drainage - Maint (Unsub)	616,000	499,000	117,000	
	Walkway - Maint	431,000	480,000	-49,000	
	NZTA Admin Work	246,000	0	246,000	
	Work for Other Departments (Non-Recoverable)	149,000	44,000	105,000	
	Other Miscellaneous	292,000	594,000	-302,000	
	Land for Roads	0	460,000	-460,000	
	Sense of Place	291,000	518,000	-227,000	For Kamo Business District Upgrades
	TOTAL 3 YEAR BUDGET	**7,005,000**	**6,842,000**	**163,000**	

6.19 Improvement Plan

The improvement plan items identified during the assessment of each work activity in Sections 6.2 to 6.13 have been summarised into the following table. These improvements are recommended to fully implement the ONRC and BCA principles into the Activity Management Plan and to ensure that activities are undertaken as efficiently as possible.

Action	Priority	Estimated Cost	Target Date	Status
NEW TASKS FROM 2018/2048 ACTIVITY MANAGEMENT PLAN				
SEALED ROADS				
Development and implementation of a RAPT type process for reviewing the forward work programmes of the NTA councils.	High	$35,000	Yearly by June	
Drainage programme to be included in the dTIMS model to prioritise the optimal programme of watertable maintenance work and to determine the effect of this work on the sealed road network.	High	$50,000	Jun-19	
UNSEALED ROADS				
Further segmentation of the unsealed network into sub-classifications to ensure roads are maintained to their intended purpose and use.	High	$20,000	Dec-18	
Capture 12-months of unsealed roughness data using RoadRoid or similar to establish a baseline and to see how roughness changes over the year. Use this data to develop roughness levels of service for the unsealed network and a pro-active grading programme.	High	$30,000	Jun-19	
Undertake test-pits on major routes to prioritise heavy metalling programmes.		N/A		To be undertaken through the MOR programme
Develop a forward works programme to address heavy metalling and wearing course application. This could include determining whether RoadRoid or similar roughness data can be used as an input into the HDM 4 Unsealed Roading Model.	High	$20,000	Dec-19	
DRAINAGE				
Record condition data on drainage assets, and in particular surface watertables, so that this can be used to develop programmes of work. This should be included in the road maintenance contracts that are currently being developed.	High	$15,000	Yearly by June	
Drainage programme to be included in the dTIMS model to prioritise the optimal programme of watertable maintenance work and to determine the effect of this work on the sealed road network.				As per Sealed Roads above
Develop a programme of culvert upgrades as a result of work on the proposed Resilience Strategy.	Medium	$10,000	Jun-20	
STRUCTURES				

Action	Priority	Estimated Cost	Target Date	Status
Develop a programme in conjunction with the Transport Agency (HNO) for structural upgrades on State Highway detour routes. This should include assessments for suitability for 50Max and HPMV vehicles.	Medium	$20,000	Dec-19	
Carry out full assessment on key bridges that have current 50Max restrictions to determine whether these restrictions are necessary.	High	$65,000	Jun-19	
Seismic assessments to be carried out on structures on key life lines, arterials and freight routes. Develop a programme of remedial work as required.	Medium	$50,000	Jun-20	
Retaining walls to be included in the annual bridge inspection programme and condition rated.	Medium	$60,000	Yearly by June	
TRAFFIC SERVICES				
Lux mapping survey (HISLAT survey) to be undertaken of the streetlight survey once the LED conversion project has been completed to determine “black” areas that require infill lighting.	Low	$50,000	Jun-19	
WALKING & CYCLING				
Carry out regular footpath and shared path condition rating - 3 year rolling programme	Low	$45,000	Yearly by June	
Develop a prioritisation hierarchy for the footpath and shared path network using count data and develop a strategy for renewals	Low	$20,000	Jun-20	
NETWORK & ASSET MANAGEMENT				
Investigate and develop opportunities for greater use of shared services through the NTA.		N/A	Ongoing	To be actioned through NTA
Develop a regional AMP by combining the AMPs for WDC, KDC and FNDC into one document. This would include setting rules about how to condition rate various assets and how to develop programmes of work.	Med/High	$100,000	Jun-20	
Improve RAMM data quality for inputting into ONRC performance tool	High	$50,000	Jun-20	
Determine which Council department has ownership and maintenance responsibilities for the Council-owned assets such as carparks, street furniture, shared paths, amenity lighting etc	Low	N/A	Dec-19	Internally funded
MINOR IMPROVEMENTS				
Through the NTA, develop a Resilience Strategy for Northland that focuses on State Highway detour routes, arterial routes, freight and tourist routes as well as access to isolated communities. The strategy should identify key life lines that need protecting from the Northland Life Lines project. This strategy should take into account the expected impacts due to climate change. The result of the strategy should be a programme of resilience works.	High	$50,000	Jun-20	$50k per Council
ROAD SAFETY PROMOTION				
Development of a REAP type organisation to undertake road safety promotion and education activities.	Medium	$20,000	Jun-20	
TOTAL COST FOR 2018/21 IMPROVEMENT PLAN		**$710,000**		

Action	Priority	Estimated Cost	Target Date	Status
TASKS FROM 2015/2045 ACTIVITY MANAGEMENT PLAN				
ASSET DESCRIPTION				
Include a rough (or accurate if possible) % split of roads on clays vs roads on free draining volcanic soils (Section 3.1.2).	Low			To be incorporated into Resilience Strategy
Classify the surfaces and pavements based on maintenance costs	Low			Superseded by ONRC hierarchy
Determine ownership around Roading Department and Parks assets.	Medium		Jun-15	Underway MoUs being developed
Form a centralised transparent repository for the related programmes from across I&S.	Medium		Oct-15	Progressed through RAMM GIS layer, spreadsheet lists and monthly meetings
Complete the development of the ONRC for the network following Regional and National moderation.	High		Mar 2015	Completed Mar-15
Investigate reducing the length of the maintained network on roads serving one property	Medium		Jun 2016	Now resolved through ONRC maintenance LOS for Low Volume roads
ACTIVITY MANAGEMENT				
Further development of the Storm Management Plan.	High		Jun-15	Completed Aug-17
Development of a Safety Intervention Strategy (SIS).	High		Jun-15	Superseded by SafetyNet/HRRR/ONRC
Determine appropriate maintenance contract boundaries across the Northland Region and investigate opportunities for merging contracts across TLA's	Medium		Jun-16	Completed Aug-17
Modify maintenance contracts to be consistent with agreed ONRC levels of service and programme to address gaps	High		Dec-16	Underway - should be complete by Dec-17
Continue to investigate opportunities for collaboration of professional services across TLA boundaries, particularly with respect to Asset Management (RAMM, dTIMS etc.).	Medium		Jun-16	Being progressed through NTA
LEVELS OF SERVICE				
Undertake a review of components that may benefit in being linked to other assets.	Medium		Dec-15	Completed Jun-17
Determine cost of service associated with maintenance and operations intervention levels.	Low		May-17	Being revised and incorporated into maintenance contracts
Carry out surveys and data gathering for use in the ONRC gap analysis.	High		Mar-15	In progress
Identify gaps in ONRC outcomes and get stakeholder agreement to remedy gaps	High		Jun-15	In progress - completion Dec-17

Action	Priority	Estimated Cost	Target Date	Status
Developing investment (and dis-investment) programmes to address ONRC gaps in time for 2018/2021 NLTP	High		Dec-15	In progress - completion Oct-17
Negotiations with NZTA on addressing ONRC gaps	High		Mar-16	In progress - completion Dec-17
Modify AMP, District Plan and Environmental Engineering Standards to be consistent with ONRC and agreed levels of service	High		Jun-17	In progress - EES being changed. District Plan being reviewed
LIFECYCLE MANAGEMENT				
Verify the usability of the Safety Management Strategy and educate on its use.	High		Sep-15	Superseded by SafetyNet/HRRR/ONRC
Review use of site rails and possibility of replacing them with signage.	High		Jun-15	To be progressed by Dec-17
Policy of locating bus stops etc…Council need to develop policy There is an adhoc standard held by maintenance this may need to be revised and used as the WDC policy/standard. ?? Is WDC the owner and deliver of this activity??	Medium		May-15	Replaced by Public Transport Infrastructure Strategy to be developed in 2018/19
Collect data around traffic calming devices for RAMM. Where, what, purpose, vegetation etc.	Medium		May-15	Completed Dec-16
Stage 2:Revise data collected widths determine class in line with ONRC Implementation.	High		Jun-15	No longer relevant
Develop process of using Opti Grade results in decision making process for unsealed pavements.	High		Apr-15	Replaced with Unsealed Road Strategy & RoadROID baseline
Identify high maintenance areas to quantify problem.	High		May-15	Completed in Jun-16 and being refined
Improved condition rating over assets - not many assets have been rated	High		Dec-15	Lighting and culvert assets being rated - as above for setting rules for rating.
Carry out a review of the operation of the Te Matau a Pohe and Kotuitui Whitinga bridges to see if these can be remotely operated.	High		March 2015	In progress
Carry out FWD annual investigations on the sealed pavement network	Medium		Yearly by June	Programme developed and being progressed
Annual condition rating of footpaths	Medium		Yearly by June	Replaced by new task
Include a structural assessment of retaining walls in the annual bridge inspection cycle	Medium		Yearly by June	Replaced by new task
DEMAND				
Include an 'Environmental Mitigation' section.	Medium		Dec-16	To be included in next AMP
Update the Whangarei Transportation Model based on the 2014 Growth Model	Medium		June 2015	Completed Jun-16

Action	Priority	Estimated Cost	Target Date	Status
Update the Whangarei Transportation Network Strategy based on the Transportation Model outputs. Incorporate the capital projects and timings identified into the AMP.	Medium		June 2015	Underway - completion due Oct-17
Carry out a crash reduction study to identify high risk safety hazards and identify treatments	High		June 2015	Completed Jun-15

PART C – DETAILED BUSINESS CASE

7 Preferred Options

Detailed analysis of the preferred options

7.1 Lifecycle management Plan (how we provide the service)

This chapter is split into sections based on the following different asset groups:

- Section 7.2 – Introduction
- Section 7.3 – Pavements & Surfacing
- Section 7.4 – Sealed Pavements and Surfacing
- Section 7.5 – Unsealed Pavements
- Section 7.6 – Structures
- Section 7.7 – Road Drainage
- Section 7.8 – Traffic Facilities
- Section 7.9 – Operational Traffic Management
- Section 7.10 – Network lighting
- Section 7.11 – Footpaths & Cycleways
- Section 7.12 – Carparking
- Section 7.13 – Environmental
- Section 7.14 – Network and Asset Management
- Section 7.15 – Safety Management
- Section 7.16 – Major Capital Programme

7.2 Introduction

The life cycle of assets involves the following steps:

- Acquisition/Creation of new assets
- Maintenance and Operations of existing assets
- Renewal of existing assets which have reached the end of their useful life
- Improvement of existing assets to provide a higher level of service
- Disposal of assets that are no longer required or are obsolete

The overall life cycle management objective for the Transport Network is:

OBJECTIVE	To maintain performance measures that will ensure current strategies do not consume the asset, leading to an unexpected increase in maintenance/renewal expenditure in the future.

7.2.1 Background data (what assets we have)

Activity Group	Asset Type	Component (Asset Breakdown)	Database - Table
Pavements Sealed	Sealed Pavements Sealed Surfaces	Chip Surface AC Surface Base-course Sub-base Formation (not held in RAMM, Valuation Component)	RAMM – Surface Structure RAMM – Pavement Structure
Pavement Unsealed	Unsealed Pavements Unsealed Surfaces	Unsealed Wearing Course Base- course Sub-base Formation (not held in RAMM, Valuation Component)	RAMM – Surface Structure RAMM – Pavement Structure
Structures	Bridges & Major Culverts	Bridges (incl. footpath bridges) Stock Underpasses Rail Under/Over Major Culverts Stairs	RAMM-Bridge RAMM-Drainage (large Drain Structures) RAMM-Minor Structure
	Retaining Walls	Retaining Walls Seawalls	RAMM-Retaining Wall
	Minor Structures	Under / over passes etc.	RAMM-Minor Structures
Complex Assets	Large Structures	Te Matau a Pohe (Complex Bridge) Kotuitu Whitinga Walk Bridge (Complex Bridge)	RAMM – Bridges RAMM – UDT (Custom Table)
Drainage Systems	SW Channel	Kerb & Channel Earth Channel	RAMM-Surface Water Channel
	Sub Surface Drains	Culverts Catch Pits (Not owned by Roading in Urban Area) Subsoil Drains Manholes	RAMM-Drainage
Corridor Traffic Devices & Facilities	Signs/Marking/Delineation	Regulatory Signs Permanent Warning Signs Information Signs Destination Signs EMPs Culvert Markers Sight Rails Line Markings RRPMs	RAMM-Signs RAMM-Signs RAMM-Signs RAMM-Signs RAMM-Signs RAMM-Signs RAMM-Railing RAMM-Marking RAMM-Marking
	Traffic Islands (Calming/management devices asset derived from function and form)	Kea Crossing Pedestrian Crossing Pedestrian Refuge Speed Humps/Table	RAMM-Island RAMM-Island RAMM-Island RAMM-Traffic Facility
	Road Safety Barriers	Barriers Wire & Rope Concrete Barriers	RAMM-Railing
	Street Furniture	Benches Bollard Bins (ownership with parks) Fences (Decorative) Bus Stops Bus Shelters (Bus Stops maintained through other budget lines)	RAMM-Minor Structure
Corridor Lighting	Lighting	Poles Lights/Lamps Brackets	RAMM-Streetlight
Operational Traffic Control Systems	Intelligent Traffic Systems	Driver Feedback Moveable Signs School Zone Loops Cabinets Permanent Counters	RAMM-ITS RAMM-ITS RAMM-ITS RAMM-ITS RAMM-ITS RAMM-ITS
	Traffic Signals	Poles Lanterns	RAMM-Intersection -Traffic Signals

Activity Group	Asset Type	Component (Asset Breakdown)	Database - Table
		Cables Cabinets/Controller Loops Pedestrian Call Buttons Software (SCATS) Servers (comms)	
Off Street Parking (Ring fenced Asset - Self Funding)	Parking Metres	Pay & Display Individual Meters	RAMM-Feature
	Car Parks	Surface Pavement Line Markings Buildings / Structures Lighting/Lamps Footpaths Drainage (K&C)	RAMM-Surface Structure RAMM-Markings RAMM-Minor Structure RAMM-Streetlight RAMM-Footpath RAMM-Carriageway RAMM-Drainage
Environmental Management	Environmental / Road Environments	Sight lines Spray Areas Roadside Mowing Storm Water Devices Stock Effluent Disposal Sites	N/A RAMM-Vegetation RAMM-Vegetation RAMM-Drainage N/A
Walking & Cycling	Footpaths & Walkways	Footpaths Kerb Drop Downs Crossing Places Barriers (restrict access)	RAMM-Footpath RAMM-Crossing RAMM-Crossing RAMM-ITS
	Shared Paths (Pedestrian/Cycle Facilities)	Shared Path (Walking/Cycleway) Network	RAMM – Roads/Carriageway RAMM-Footpath
Safety Management	All Assets	Safety Management systems, processes and analysis	
Network and Asset Management	All Assets	Network and Asset Management systems and processes and analysis	

7.2.2 Life Cycle Management Objectives

The diagram below shows the life cycle management objectives that are achievable based on the proposed funding levels;

LIFE CYCLE MANAGEMENT OBJECTIVES	
ACQUISITION	To provide capital investment within the district that is the right thing, at the right time, at an affordable cost, to help deliver the community outcomes and core values in this plan.
MAINTENANCE	To maintain the network through continued maintenance programming and approval based on the *Maintenance Intervention Strategy*, to allocate available funds to only the highest priority works.
RENEWALS	To undertake renewal/replacement of assets on a whole of life cycle cost basis determined by condition and economic need, with regard to required Level of Service.
IMPROVEMENT	The provision of limited capital improvement investment to treat only the highest priority need.

7.2.3 Life Cycle Management Inputs

Life cycle management planning is generally based on the following factors;

7.2.3.1 Condition

Condition measures are used to determine if an asset requires maintenance or renewal and prioritises the programme of works. Intervention levels are determined from the condition of the asset.

In general the assets assessed from the customer performance point of view with a related condition profile:

Table 7-1: Asset Customer and Condition Profiles

Rank	Customer Performance Description	Condition Description
Excellent	The customer experiences a very smooth ride. There is no visible deterioration of the surface. The customer is provided a safe no surprises environment clear sight lines.	Generally new or near new asset, no signs of distress receiving normal routine maintenance.
Good	The customers ride quality has diminished slightly. There is minor visible signs of the defect in the surface. The surrounding road corridor presents a consistent message to the customer.	Generally new or near new asset, minor signs of distress operating as expected receiving only routine maintenance.
Fair	The customers ride quality has diminished further experiencing bumps at irregular intervals. The surrounding corridor presents some inconsistencies to the customer.	Aging asset, has more evident signs of distress, requires proactive planned maintenance as expected for the age of the asset.
Poor	The customer ride quality continues to diminish becoming very bumpy at regular intervals. The surrounding corridor presents inconsistent message to the customer poor sight lines and customer experiences a number of surprises.	Aging asset, significant levels of distress, requires both large scaled planned maintenance and reactive maintenance to maintain serviceability
Failing	The customer experiences a very bumpy or undulating ride occurring at very frequent intervals. There is significant amounts of defect or repair evident. The surrounding corridor is very inconsistent with limited recovery from error, poor sight lines.	The asset needs replacing as it can no longer provide the service qualities expected

7.2.3.2 Performance

Performance measures are used to determine if an asset requires improvement. An example of a performance measure is the difference between the capacity and the demand on a section of road. If the demand is found to exceed the capacity, the road is under-performing and requires improvement.

7.2.3.3 Criticality

Criticality is used to prioritise works based on asset types (e.g. bridges are more critical) and works based on the individual assets (e.g. bridge on a high volume, sealed route is more critical than on a low volume, unsealed route).

7.2.3.4 Age & Useful Life

The age and useful life of assets is often used as another measure of condition, with the useful life used as an indicator of when an asset is likely to require renewal. In the absence of all other factors above, age may be used to determine the replacement of an asset to ensure that a burgeoning future replacement programme is avoided.

7.2.3.5 Valuation and Depreciation

The valuation and depreciation information provides a link to the financial investment expected based on the useful lives of the assets, the replacement value and the depreciation patterns. This provides an opportunity to compare the annual depreciate with actual planned renewal investment and provides a measure of the gap, positive or negative, between deprecation and renewal investment. This then provides an input into the long-term investment planning of the network.

7.2.3.6 Funding

The level of funding has a large impact on how all roading assets are managed. The measures above are generally used to prioritise the works that need to be undertaken, while the available funding determines how much of this work is completed and in what time-frame.

7.2.4 Acquisition / Creation Plan

Acquisition works are those works that create a new asset that did not previously exist. They may result from growth or social or environmental needs. Assets may be acquired at no direct cost to the organisation (e.g. sub-divisional development) or through Council funded projects.

Council funded projects generally result through growth in traffic volumes through population growth and land use development.

7.2.5 Maintenance Plan

Maintenance and operation includes all work necessary to keep roads open and trafficable at the Levels of Service described under the Approved LTP Funding profile and within this plan.

Once the maintenance required to ensure an asset is in a safe and reasonable condition becomes too expense or time consuming the asset is considered for renewal.

The maintenance needs of the sealed carriageways are primarily determined from regular inspections of the network with all observed defects logged into the maintenance defect pool within RAMM Contractor. The work typically includes the minor issues (pothole repairs, sealing of cracks, dig-out repairs, repair of edge breaks and removal of detritus).

Other routine maintenance includes:

1. carriageway pavement and surface maintenance to ensure that the carriageway is free of major defects resulting in safe and comfortable travel;
2. bridge maintenance to ensure that the structural integrity of all bridges is protected and that their load capacity is maintained;
3. maintaining footpaths to provide for safe pedestrian access;
4. maintaining parking areas in a clean and tidy state, with clear paint markings and a reasonable surface;
5. the regular cleaning of drains and culverts to minimise blockages and ensure flows through the drainage system are as regular as possible. Also, the repair or replacement of damaged culverts and other drainage structures;
6. the regular re-marking of pavement markings is undertaken to maintain a high level of delineation, promoting safety;
7. cleaning and vegetation control around signs and other safety assets including edge marker posts and guardrails to ensure their visibility;
8. maintenance of the vegetation alongside roads to maintain visibility sight lines and ensure an adequate open envelope is available, especially for larger vehicles;
9. street cleaning in the urban areas;
10. restoration after emergencies. When there is an emergency such as a major traffic crash or storm damage (such as a washout or over-slip that blocks the road) Council's goal is to restore the road to at least one viable traffic lane within 24 hours, then back to at least its original condition as soon as possible thereafter that, depending on the availability of funding (including Government co-investment); and
11. management of the maintenance activity including regular inspections to identify necessary work, regular maintenance patrols, planning and prioritisation of work, budget management and control and regular customer satisfaction surveys.

All routine maintenance physical works are contracted out over three separate areas of the District: north, south and central.

7.2.6 Renewal Plan

Condition and performance of assets are generally used to determine if it requires renewal, with these measures. The assets condition, criticality and the funding available are used to prioritise the works.

Renewals work for small assets (signs, edge markers etc.) are included in the maintenance contract as 'Authorised Works'. Larger renewals works (bridge replacements, pavement rehabilitations etc.) are contracted out either individually or as a package of works.

7.2.7 Improvement Plan

The improvement of assets generally occurs for the following reasons;

- New technology is developed that will increase the performance or safety of the asset,
- An upgrade is required to increase the capacity of the asset, or
- An upgrade is desired by the community to improve the level of service.

Improvement works are generally prioritised and contracted out in the same way as renewal works and whenever possible they are co-ordinated with renewals to achieve efficiencies of scale (e.g. seal widening is normally done in conjunction with pavement rehabilitation).

7.2.8 Disposal Plan

The disposal plan for any of the assets managed by the Roading Department generally consists of any recoverable items being returned to Council. Disposal of the transportation assets normally occurs due to renewal/rehabilitation works and assets are rarely sold.

Often during renewal works any surplus material (such as old bridge beams) becomes the property of the contractor carrying out the works for them to reuse or dispose of. Any scrap value from these assets are generally obtained through a reduction in the contractors tendered price. Where assets are recognised as being obsolete, surplus or uneconomic to continue to own, these are identified and disposed through appropriate an process.

7.3 Pavements & Surfacing

7.3.1 Introduction

Pavements and surfacing make up the core of Whangarei District Council's road network. They are critical for providing road access throughout the district.

They have a current combined value of $567M which constitutes 77% of WDC's total transportation asset value (excluding land value).

This asset group includes:

- Sealed pavements
- Sealed road surfacing
- Unsealed pavements

The breakdown between sealed and unsealed roads is shown in

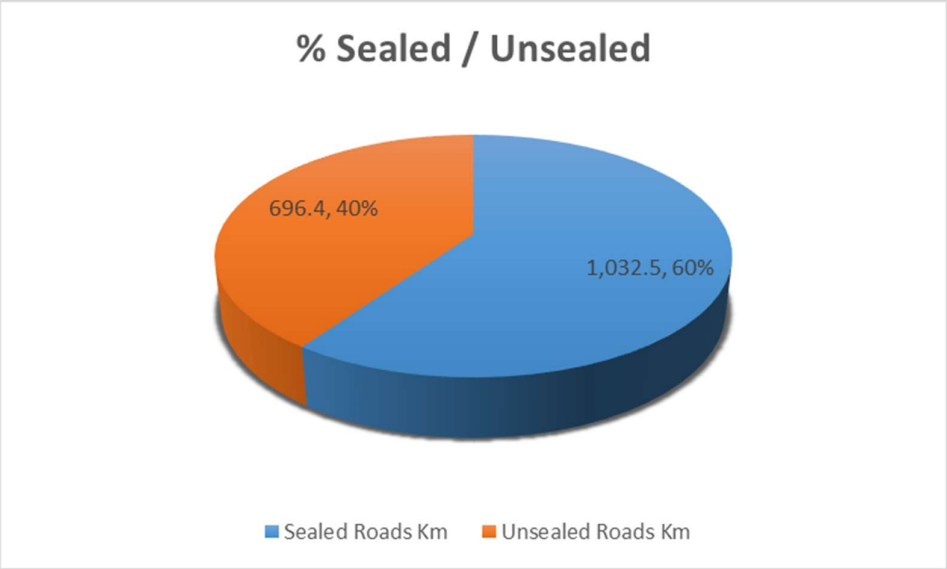


Figure 7-1 below:

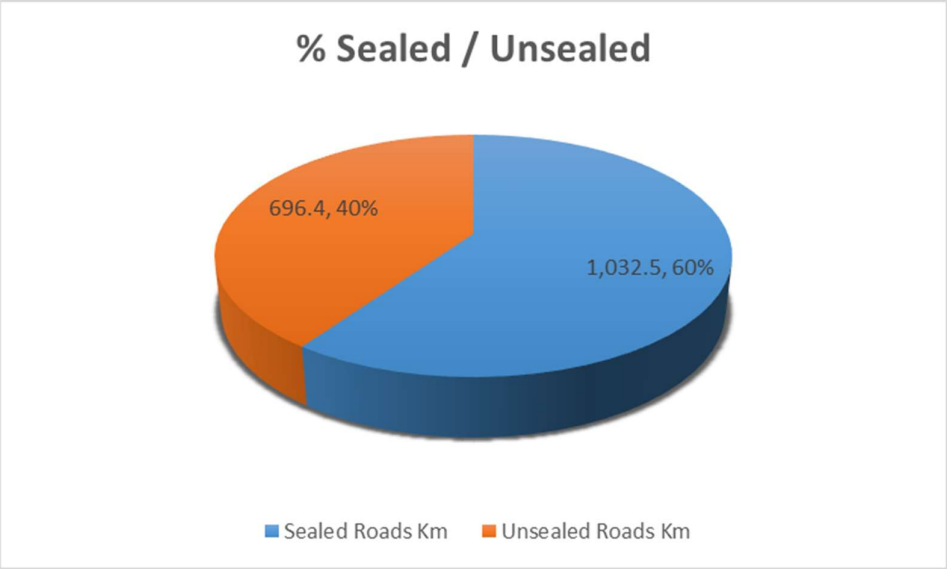


Figure 7-1 Breakdown of road network by sealed or unsealed roads

The following sections describe the background and issues affecting WDC's pavements and surfacing.

7.3.2 Background

7.3.2.1 Method of Contracting

Pavement and surfacing maintenance and operations are undertaken through Council's *Road Maintenance Contracts*.

Reseals are currently undertaken through Council's *Reseal Contract*.

Pavement rehabilitations are normally packaged together into contracts of around $1M each. These are currently tendered using separate professional service contracts (for design) and physical works contracts (for construction).

A new *Road Maintenance Contract* is currently being prepared which will include reseals and most simple pavement rehabilitations in the one contract. This is described further in Section 6.15.

7.3.3 Geology

The geology of the Whangarei District consists generally of poor clay soils with some pockets of volcanic soils and sandy soils on the coast. In general, the common clay subgrades are weak and form a poor foundation for pavements. They are often highly sensitive to moisture and are not free draining which results in pavements failing during periods of wet weather. Ensuring adequate drainage in these soils is a priority.

The weak subgrades also require thicker pavements to support the design loads over the life of the pavement. This results in more expensive pavements.

Some soils within the Whangarei District, and in particular the Northland Alocthon (otherwise known as Onerahi Chaos), are subject to ongoing subsidence. This often results in deformation of pavements and ongoing remedial repairs. Where possible these areas of subsidence are addressed through preventative maintenance or repaired when associated with an emergency event.

7.3.4 Aggregate Sources & Stabilisation

Due to the poor geology, there are relatively few sources of aggregate suitable for road maintenance and construction activities within the Whangarei District. The following quarries are currently used by the Whangarei District Council for the supply of roading aggregates:

- Winstones (Otaika)
- Atlas Quarries (Piroa)
- Dickson Road Quarry (Whareora)
- Brewer Road (Poroti)
- Wood Road (Kara)
- Elliots Quarry (Whangaruru – is this Far north) used occasionally
- Mountfield Quarry
- Ruarangi Quarry
- Blue Chip Quarry (Houtu Road)
- Drinnon Road Quarry
- Clements Quarry (Westwood – Maunu)
- Kokopu Road Quarry
- A&S Quarries (Lower Port Road)
- Puhipuhi Quarry
- Millbrook Road Quarry

There is a reasonable spread of quarries throughout the District, although some quarries are not suitable for basecourse materials and only two quarries (Winstones and Atlas Quarry at Piroa) are suitable for sealing chip. This can lead to long cartage runs to truck in metal and hence increased costs for constructing and maintaining roads.

There are few quarries that can produce aggregate to the NZTA M/4 specification. The cost of producing this M/4 material is high and for this reason, most basecourses within the Whangarei District and indeed within Northland are constructed using inferior GAP40 aggregate which is then either lime or cement stabilized to bind up the fines. This has been the traditional approach for constructing pavements in Northland for the past 15-20 years and generally results in a stiff top pavement layer. However, on routes with high heavy vehicle volumes these stabilized pavements can suffer from block cracking of the bound pavement layer and this is starting to become evident on some forestry and arterial roads within the Whangarei District.

7.3.5 Ownership & Responsibilities

The Whangarei District Council is responsible for maintaining the road network within the Whangarei District. The Council is not responsible for any pavements or surfacing on the State Highway network.

As part of the Council's Memorandum of Understanding (MOU) with NZTA, NZTA will maintain the pavements on district roads up to 10m from the intersection with a State Highway. Any costs involved with the maintenance of defects that straddle the 10m distance will be apportioned to each authority by agreement.

NZTA subsidise pavement related activities for maintenance, renewal, and capital improvement where this meets with NZTA funding rules.

7.4 Sealed Pavements & Surfacing

7.4.1.1 Asset Description

Sealed pavements make up 1,032km or 60% of WDC's total road network. These pavements consist of the following main pavement types:

- Unstabilised M/4 pavements
- Stabilised pavements (generally with either lime or cement)
- Other pavements (structural asphalt or concrete bridges etc.)

The majority of surfacing is chip seal (98%).

The breakdown of the sealed pavements by urban/rural split is shown in Volume 2 - Appendix A and is summarized in the *Figure 7-2* below.

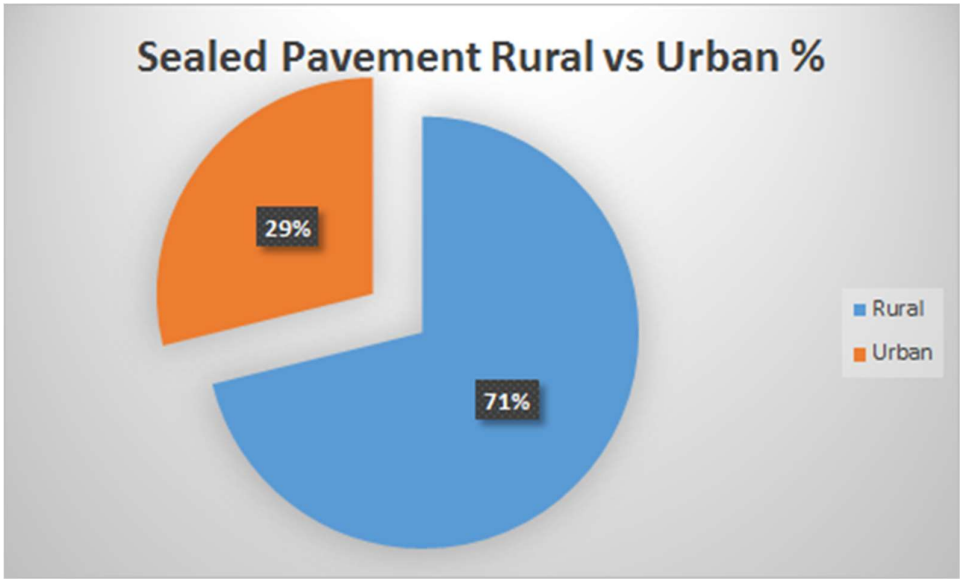


Figure 7-2 Sealed Pavements by Urban or Rural areas

The breakdown of the sealed surfaces on these pavements are listed in Figure 7-3 below.

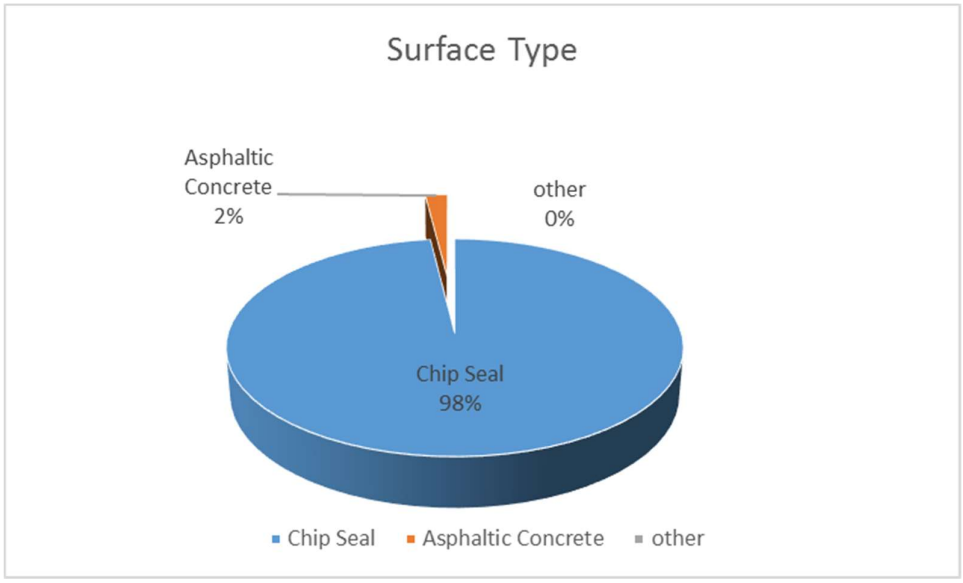
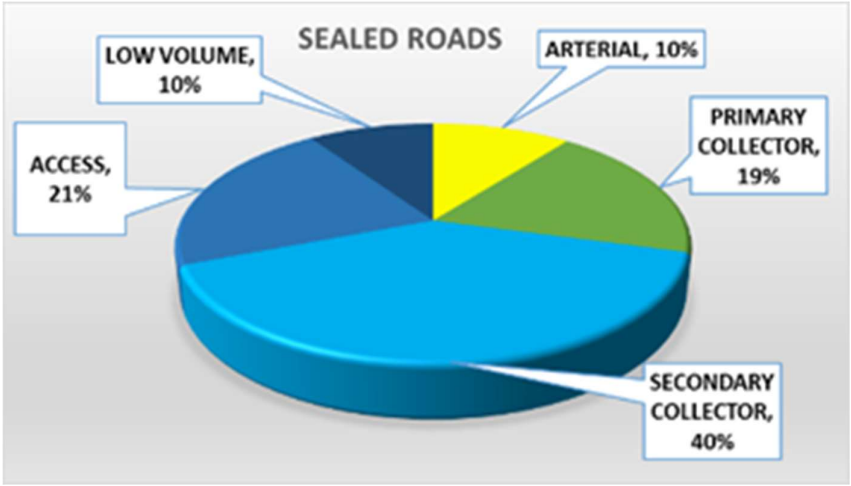


Figure 7-3: Sealed Surface Types on the Network

The ONRC hierarchy of the sealed road network is mostly made up of Arterial, Primary Collector and Secondary Collector roads as detailed in the figure below:



7.4.1.2 Acquisition (Growth) Plan

Growth in sealed pavements is based on the following;

- Capital projects undertaken by Council to reduce congestion and delays by providing additional road links or road widening. These projects are usually major capital projects identified through the Council *Whangarei Transportation Network Strategy*. Future projects which will increase the sealed pavement network over the next 10 years are:
  - Urban intersection upgrades which will result in larger sealed intersections in Whangarei City.
  - Riverside Drive 4-laning.
  - Port Road/Kioreroa Road intersection upgrade and 4-laning.
  - One Tree Point Road, Ruakaka Beach Road and McEwan Road widening.
- Assets that are created by a third party for development reasons and vested to council.
- Assets that are given to Council due to revocation of State Highway. The 4-laning of SH1 to the south of Whangarei is likely to result in 20-30km of the old SH1 being revoked and included in Council's road network over the next 10-20 years.
- The *Seal Extension Plan* that upgrades unsealed pavements to sealed pavements (see Section 7.5.6).

In recent years, there has been a trend towards subdivisional development using expensive asphaltic concrete surfacing on local and collector roads where a chip seal surfacing would be suitable. An example of this is the Totara Parklands Estate development in Tikipunga which is adding over 2km of asphaltic concrete surface to Council's network. The expectation from residents is that these surfacing will be renewed in the future at significant extra cost to Council.

To address this issue going forward, Council will look to chip seal over asphalt where an asphalt surface is not required to handle either the traffic volume or the stress level of the road surface but will balanced with amenity value and environment in which the switch out from AC to chip seal may occur. In general, asphalt will be applied where the ADT is greater than 8,000 vehicles per day or on high stress intersections and tight corners where chip seal surfaces are not likely to survive.

7.4.1.3 Maintenance Plan

The general overall approach to managing maintenance work is provided in Figure 7-4.

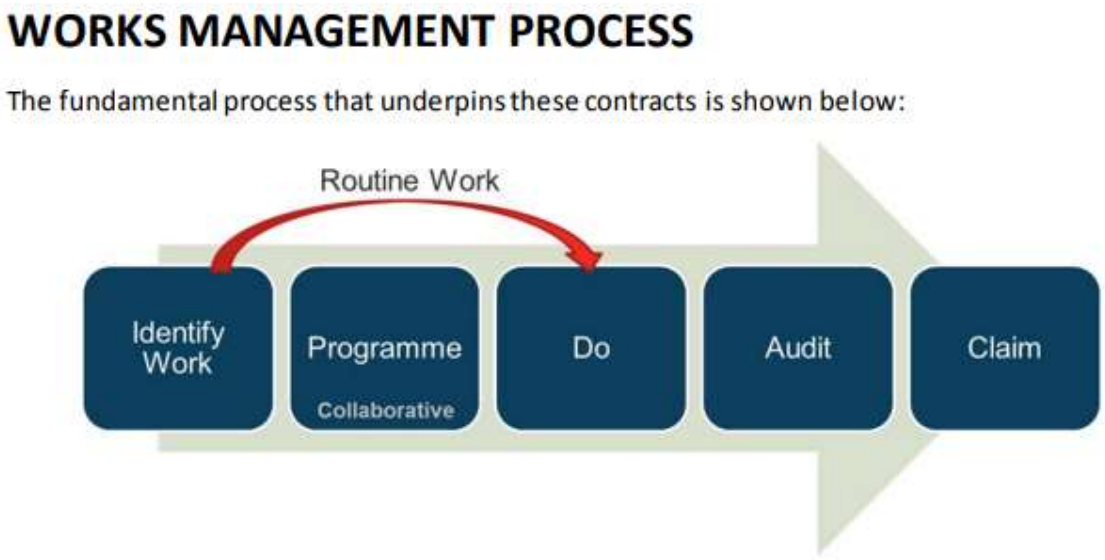


Figure 7-4: Works Management Process

This process is embedded in Road Maintenance Contracts July 2018.

As described in Section 6.2, the demand on the sealed pavement maintenance budget has been increasing due to the Council's patch and reseal strategy that was adopted in the 2012/15 period due to constrained funding. This has seen pre-reseal repairs increase from historic levels of $400,000 to about $1,500,000 per annum. In addition, the impacts of forestry on the road network and block cracking of stabilised pavements is also increasing the amount of pavement maintenance required. These effects have resulted in Whangarei having some of the highest sealed pavement maintenance costs in their peer group. During the 2015/18 period an increase in the sealed pavement rehabilitation budget was approved to try and address these issues. This is starting to stabilise the sealed pavement maintenance costs.

The adoption of the One Network Road Classification and an increase in drainage maintenance on sealed roads is expected to result in a decrease in sealed maintenance costs during the 2018/21 period. It is proposed that some of these savings be invested into test pits to determine the appropriate treatments and to lift sunken manholes and service covers to reduce roughness on urban roads.

The maintenance of sealed pavements is provided through the *Road Maintenance Contract*. Minor routine and reactive maintenance is undertaken as described in Volume 2 - Appendix E, with any major defects becoming programmed work and managed according to the maintenance plan under the approved LTP funding according to priority.

The application of major sealed maintenance is based on the *Maintenance Intervention Strategy (MIS)* and the renewals identified in the Forward Works Programme. The MIS sets out criteria for prioritising maintenance activities as described below:

Table 7-2: Maintenance Defect Priority Score

Priority	Name	Description	
9	**Routine**	Work completed as of right, the "house-keeping" generally found under the routine work lump sum items, but may include routine measure and value work as well.	This work has a clear intervention point at which point a response time is initiated
Urgent	**Urgent / Callout**	Poses an immediate safety issue to customers	RESPOND
1	**Must Do**	Immediate work required or major failure/defect with significant impact on the network in terms of safety or asset preservation.	To be programmed.
2	**Should Do**	Work that is required in accordance with good practice and doesn't have an urgency that would make it a Priority 1.	Programmed after priority 1's and when resources and budget available.
3	**Monitor**	The defect does not require work at this stage, but it is apparent that at some point in the near future that it will require attention	Not to be programmed unless the repair exists in a Resurfacing site and needs to be completed as a pre-seal repair to protect the integrity of the Resurfacing treatment.

The maintenance decision process is based on the priority of the work in relation to the severity of the defect, the risk they pose based on the road hierarchy and their location in the road corridor. Further details of this decision process are provided in Volume 2 Appendices.

Maintenance dispatches are raised either by Council's network inspector or the Contractor and then verified by Council area engineers. Currently there are issues in that dispatches are raised on a piece-meal basis with some roads having detailed assessments (mostly on next years reseals) and other roads having just cursory or no assessments. This leads to difficulties in programming works and determining whether a renewal treatment is required rather than repairs. In particular, when maintenance crews start programming a site for repairs in the following month they carry out a detailed dispatch pick up and this

often results in a substantial increase in the amount of dispatch leading confusion as to the appropriate treatment.

Improvements to this process are proposed, by carrying out detailed dispatch assessment on the next two years of reseal site and other high risk roads such as forestry roads or arterials so that a genuine state of the network is recorded. This will help identify sites that should be repaired and other sites that should be rehabilitated. By picking up two years worth of reseals, this means that there is a year between the dispatch pick up and the repairs being undertaken so that appropriate decisions can be made in a timely fashion and the forward works programme adjusted as appropriate.

The strategy going forward to maintain Council's pavements is to focus on carrying out the priority one repairs and fund the pre seal repairs.

7.4.1.4 Renewals Plan

Pavement Renewals

The Council is proposing a programme of about 6 km of pavement rehabilitation per annum. This is based on the actual need determined through dTIMS analysis and site validation and equates to a cycle time of pavement rehabilitations of about 170 years.

High priority renewals will be undertaken based on increasing maintenance costs or to intervene on pavements where maintenance is no longer the most economic option. These will be prioritised by ONRC hierarchy, risk and criticality. The forestry and urban Arterial/Collector road networks will be a focus of this programme over the next three years with a mix of strategic rural sites. Access and Low Volume roads will not be treated unless they meet the criteria set out above and are deemed a high risk to the customers.

Pavement rehabilitations have been in past typically identified through high speed data collection, dTIMS analysis, site validation and then inclusion on the forward works programme. However, this approach has lead to problems when the NPV calculations are undertaken which show that the site does not have a positive NPV or new sites (often proposed reseal sites) are identified due to having a high amount of maintenance dispatches raised. This issue seems to revolve around the timing of when dispatches are raised which can often be out of date if a site has not been looked at for a while and focuses attention on reseal sites which have higher levels of dispatches raised. In addition, positive NPVs can be difficult to achieve if sites are looked at in isolation of the trends in its condition.

To try and address these issues going forward, the forward works programme will be assessed by a RAPT type team in the field on an annual basis with access to good quality trend data using the Juno platform to make decisions about each site. This will be supplemented with up to date maintenance dispatches and costs. Upon sites being assessed as candidates for pavement rehabilitation, NPV calculations will be completed using current dispatches, historic maintenance costs, condition trend data and how the site is performing based on the ONRC performance measures. This process should result in a robust selection process for identifying rehabilitation sites.

Once the pavement renewal has been committed into the following years programme the process in Figure 7-5 is applied. This process is embedded in the new 2018 Maintenance contract.

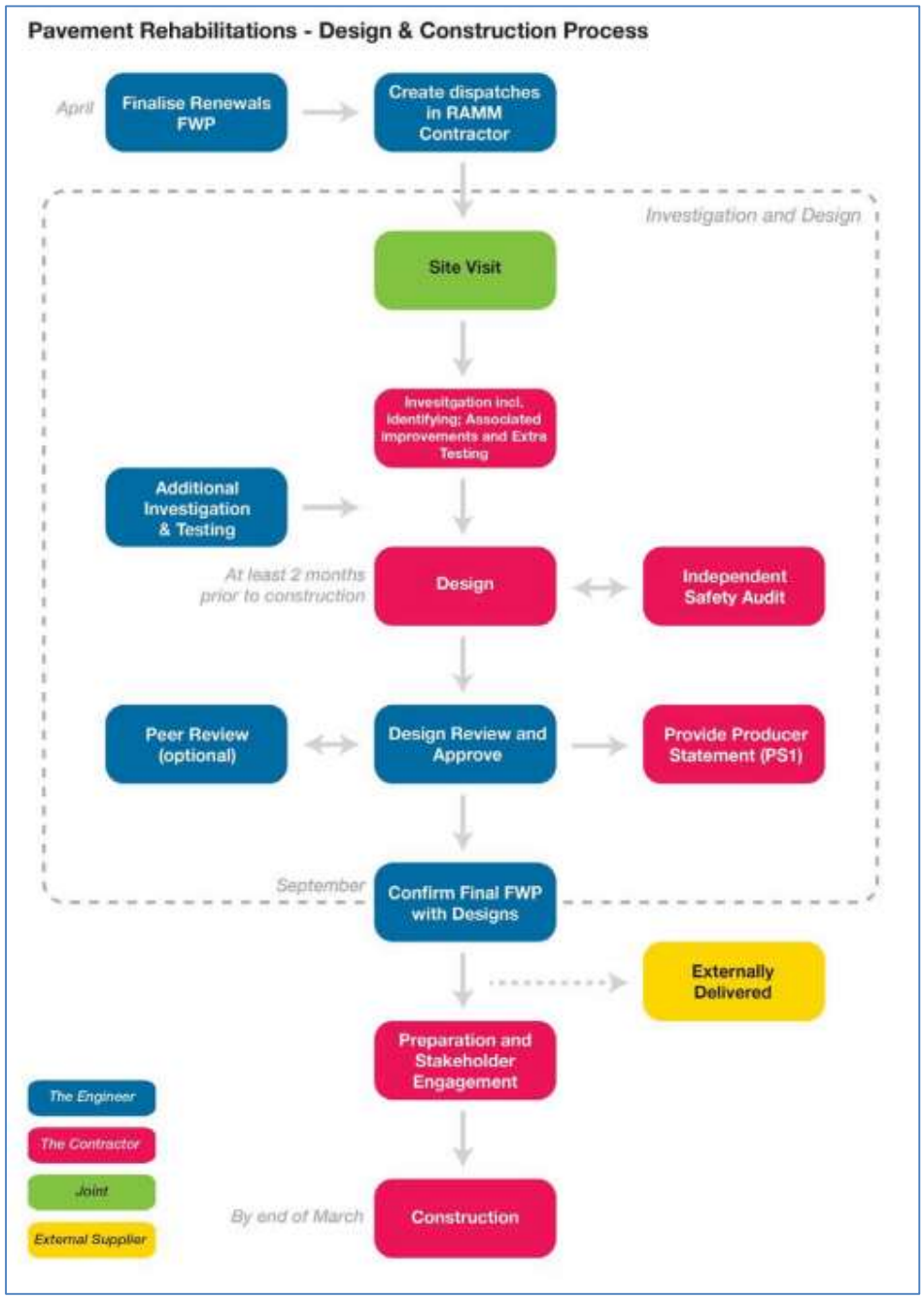
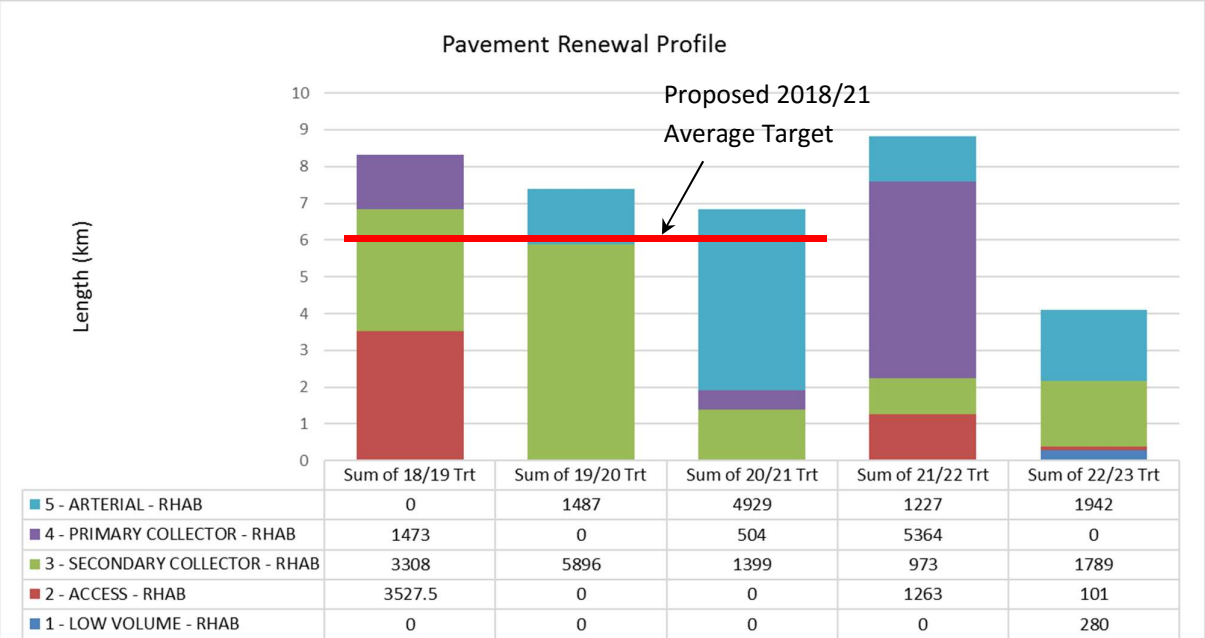


Figure 7-5: Pavement Renewal Design and Construction Process

Figure 7-6 provides break down of the pavement renewal programme by ONRC. The total programme currently exceeds the programme request of 6km. this will be managed within the approved funding profile but indicates that we have a fully subscribed programme of pavement renewal work. With a five year average of approximately 7km. As part of the ongoing justification process monitoring and assessment of each site will continue. Year one of the programme has a significant length of access roads. These are in poor condition with high forecasted maintenance expenditure, deep rutting with resilience issues to maintain access to farming areas.



	Sum of 18/19 Trt	Sum of 19/20 Trt	Sum of 20/21 Trt	Sum of 21/22 Trt	Sum of 22/23 Trt
5 - ARTERIAL - RHAB	0	1487	4929	1227	1942
4 - PRIMARY COLLECTOR - RHAB	1473	0	504	5364	0
3 - SECONDARY COLLECTOR - RHAB	3308	5896	1399	973	1789
2 - ACCESS - RHAB	3527.5	0	0	1263	101
1 - LOW VOLUME - RHAB	0	0	0	0	280

Figure 7-6: 5 Year Pavement Renewal Profile

Considering the 11 Year profile of pavement renewal, Figure 7-7 there is some risk in the current funding request that will need to be managed as works are deferred to meet budget profiles.

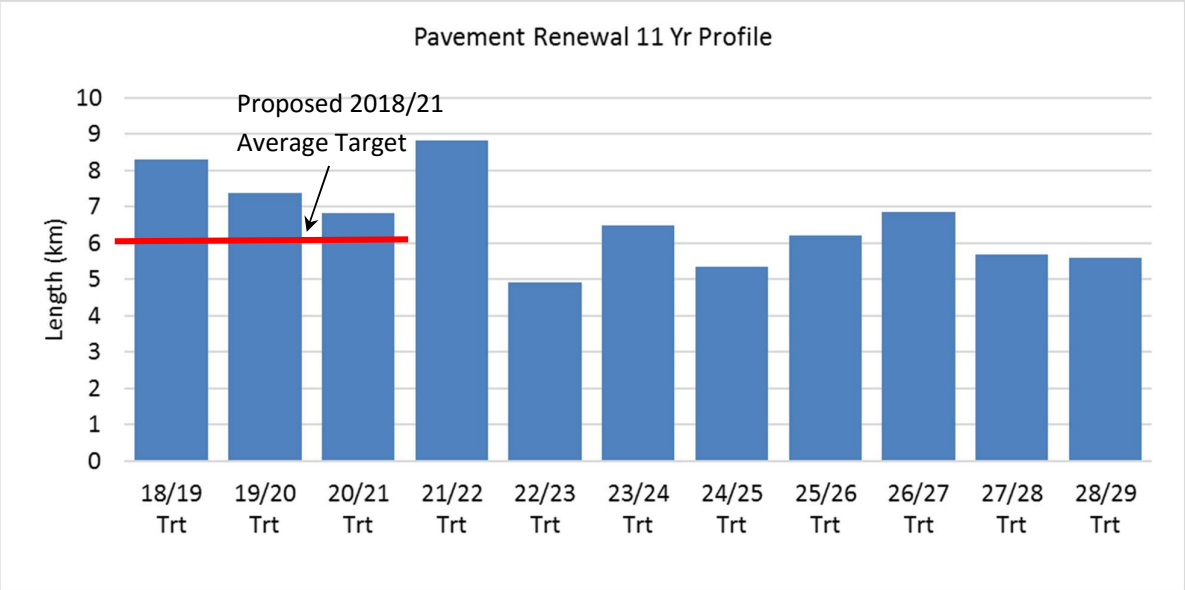


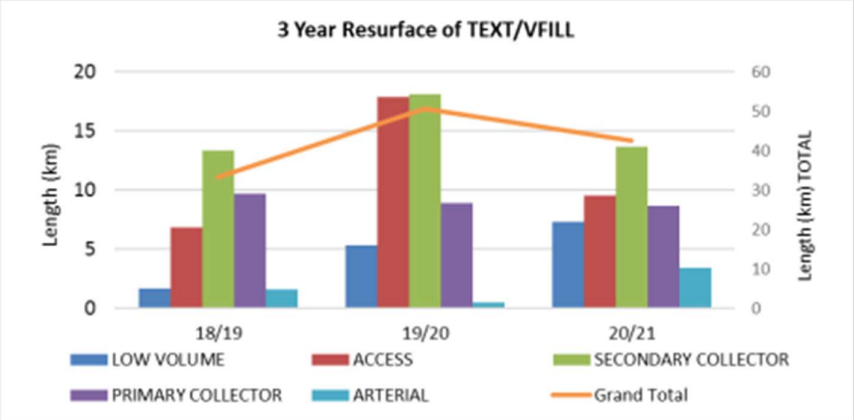
Figure 7-7: 10 Year Pavement Renewal Profile

Surfacing Renewals

Over the 2015/18 period, the Council has been achieving approximately 100-110km of reseal per annum. This is in part due to low bitumen prices which has meant that more resurfacing can be achieved for the same amount of money. The historic backlog of chip seal resurfacing has now been largely removed although there are still a lot of old void fill seals which require resurfacing to provide adequate waterproofing. As described in Section 6.2, the Council is now looking at decreasing its chip seal resurfacing programme to 90km per

annum to reflect the improved condition of the sealed surfacing and to bring it more in line with its peer group.

As mentioned above, our programme for the next 3 years is 90km of reseal per annum which works out to be a 11.5 year cycle time for chip seal. This programme is slightly higher than optimal to address the high amount of old void fill seal that needs to be addressed in the next 3 years. If we don't address this issue, our sealed maintenance costs will remain high due to failure of the void fills. Our proposed programme will address an average of 40km/year of void fill over the next 3 years as shown in the figure below. This equates to about 45% of our reseal programme over the next 3 years being used to address historic void fills.



We have deliberately reduced our rehab programme from the optimal 8km/year to our proposed 2018/21 programme of 6km/year to enable use to fund this extra reseal work.

It should be noted that we have significantly reduced our reseal programme from the current 3 year average of 110km/year down to our proposed 90km/year. Longer term we expect to reduce the reseal programme down to a sustainable 80km/yearr which would enable us to meet our proposed LOS targets of 12-15year cycle times (refer Section 3.5, Table 3-2, Measure 41).

We also note that our network will always have a lower chip seal cycle time than our peer group average due to our higher VKT and the high proportion of HCVs that we have on the Whangarei network.

Over the past 2 years there has been an increased investment in asphalt resurfacing which has started to reduce the significant backlog of very old sites, particularly in the Whangarei City area. A programme of 3km of asphalt resurfacing per annum needs to continue over the next 10 years to reduce this backlog. This may ultimately affect how much chip sealing we can do, but the age, condition and amount of high strategic asphalt sites in the urban network has reached a critical level. There will also be an amount of rural asphalt renewals required on tight bends to be addressed in the next 10 years. Asphalt concrete surfacing may be resealed with chip seal if this is considered appropriate.

Reseals are initially identified through assessing the age of the seal vs its expected life. This is then developed into a 5 year reseal programme by assessing seals on site and prioritised based on the ONRC hierarchy, cost, the condition and risk posed, the criticality of the route and the number of wet road crashes that have occurred at the site. The renewals plan will consist of as much high priority reseals as the funding allows.

If a surface site is too expensive to repair and has a history of repeated maintenance investment, the site will not be re-surfaced and will be managed until such time as a better long term treatment, such as a pavement rehabilitation, can be undertaken.

Once the pavement renewal has been committed into the following years programme the process in Figure 7-8 is applied. This process is embedded in the new 2018 Maintenance contract.

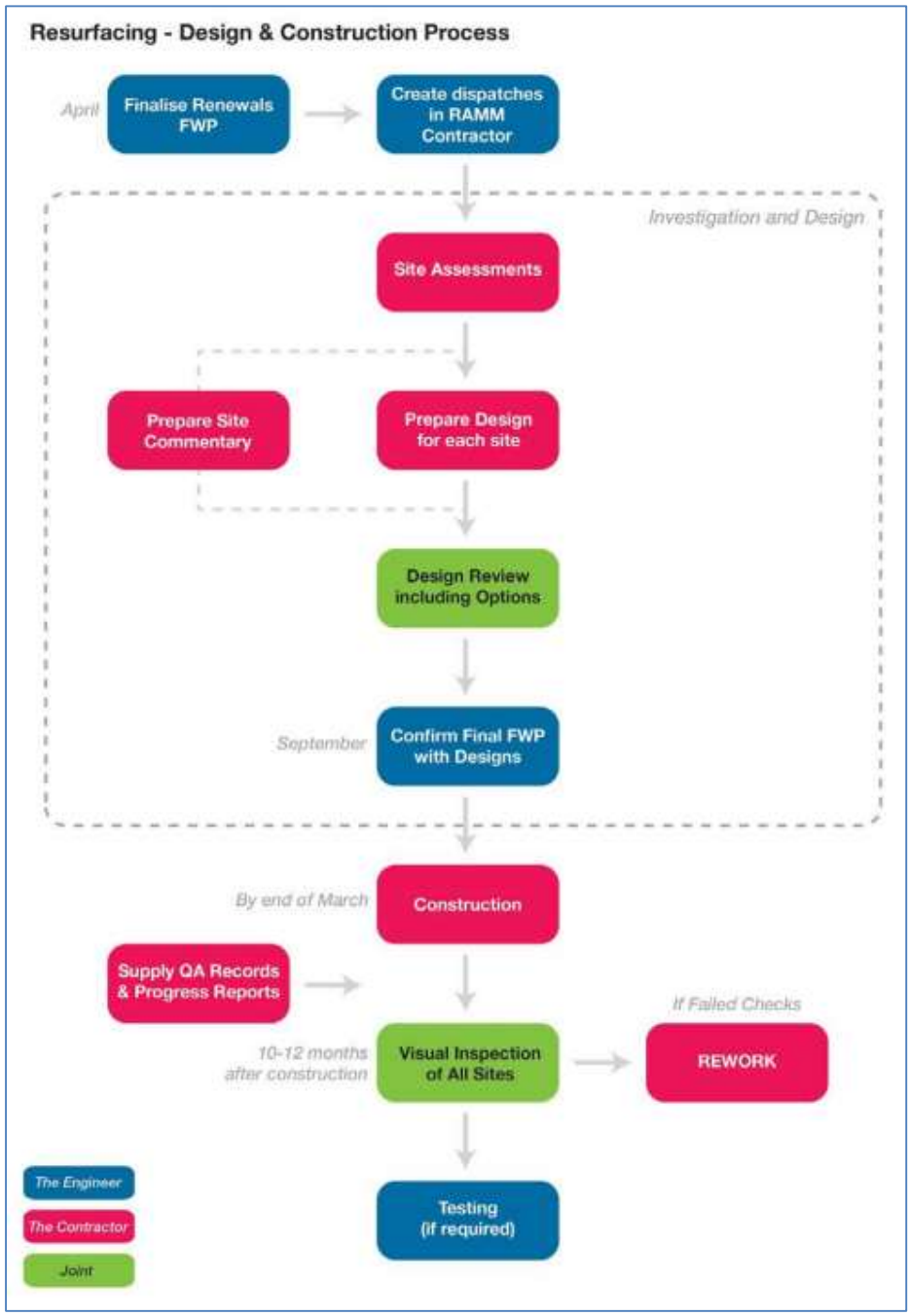
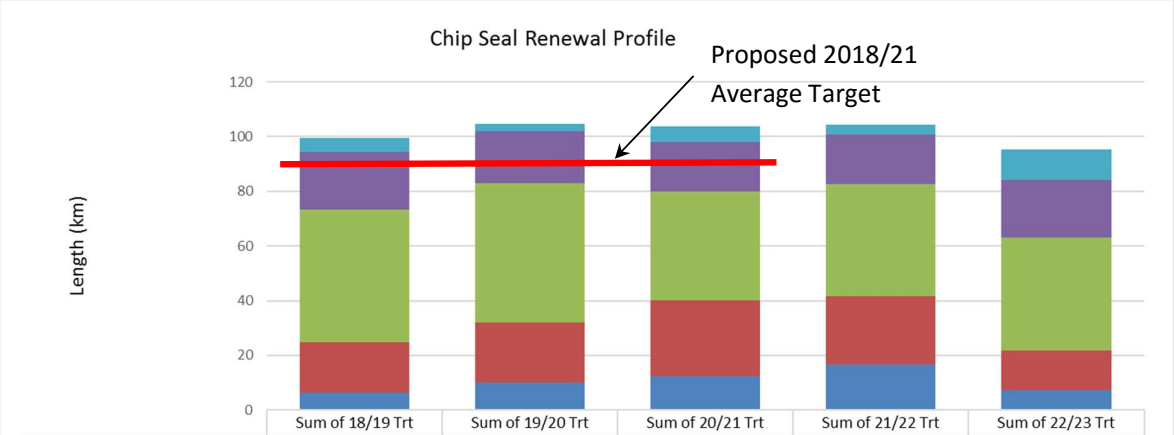


Figure 7-8: Resurfacing Design & Construction Process

Figure 7-9 following provides break down of the Chip seal programme over the next 5 years including reseal and second coat seals by ONRC. This programme is slightly above the requested programme fund. This indicates that the programme is completely subscribed and that through process of detailed field validation prior to each year a review of each site is completed. This process will look to defer work to fit within budget. It also indicates that we have constrained the funding in relation to the actual need on the network. This is acceptable but requires careful monitoring and management. The risk is that at the end of year three there may be a requirement to lift the chip seal programme for the next funding cycle (2022-to 2025) to attend to some backlog.

The overall 10 year programme indicates a trough in the 2022 to 2025 cycle however we cannot defer chip seals in year two or three of this programme until we can more accurately determine actual performance closer to the actual treatment year.



	Sum of 18/19 Trt	Sum of 19/20 Trt	Sum of 20/21 Trt	Sum of 21/22 Trt	Sum of 22/23 Trt
5 - ARTERIAL - CS	5164	2820	5796	3460	11209
4 - PRIMARY COLLECTOR - CS	21166	19164	17966	18059	20991
3 - SECONDARY COLLECTOR - CS	48442	50808	39796	41081	41567
2 - ACCESS - CS	18416.5	22069	27782.5	24936	14211
1 - LOW VOLUME - CS	6432	9942	12409	16752	7425

Figure 7-9: 5 Year Chip Seal Renewal Profile

As noted the chip seal surfacing programme does has trough in 22-25 and stabilise out to about 80km per annum after 2026. In terms of the current profile in relation to the funding request this may see a bow wave pushed into future years. As long as this bow wave can be maintained within 5-10km of the current funding profile this risk can be managed.

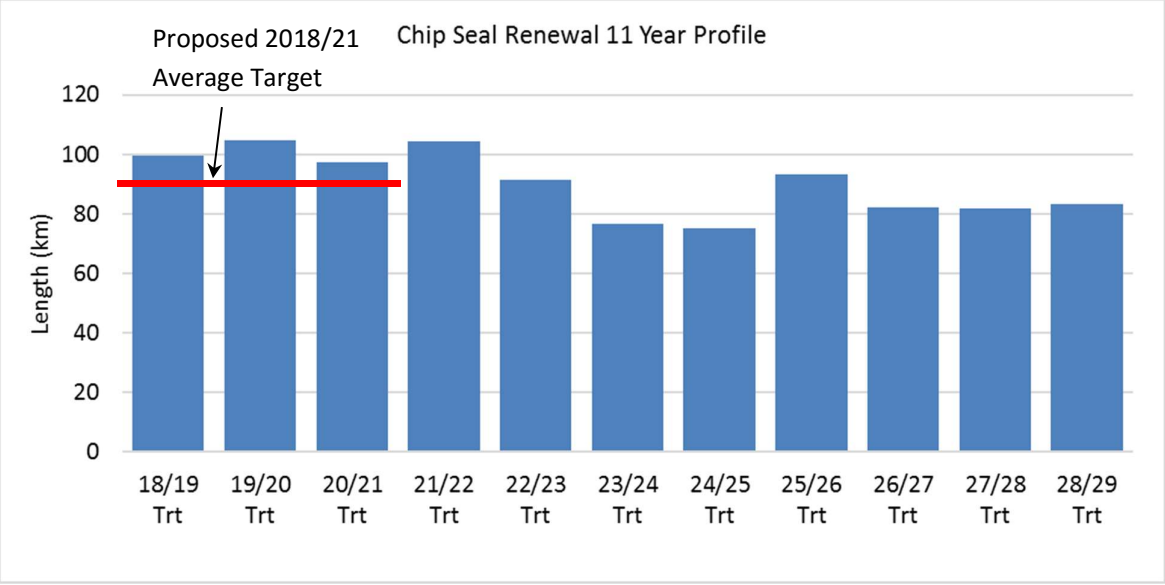
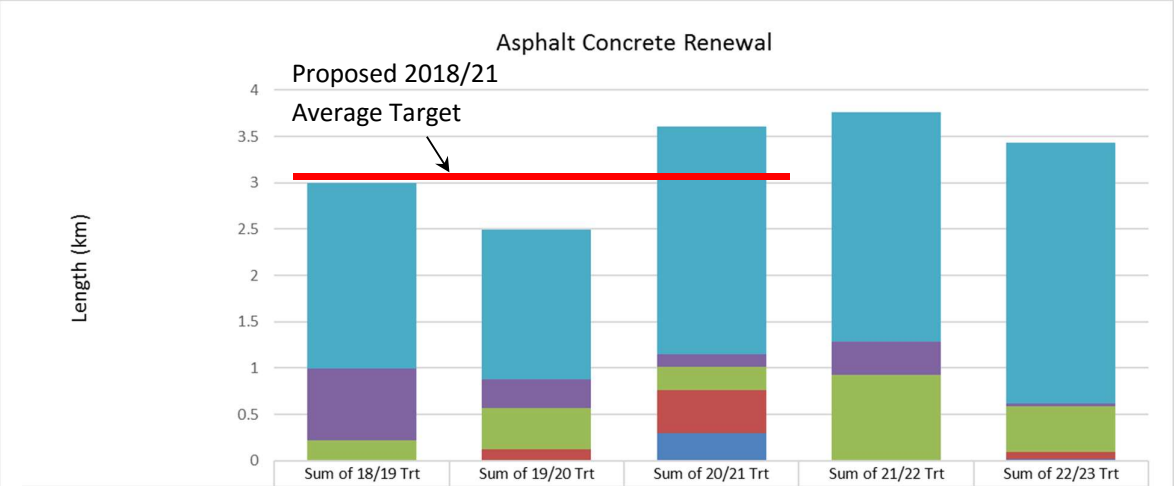


Figure 7-10: 11 Year Chip Seal Renewal Profile

The thin asphalt programme shown in Figure 7-11 below by ONRC reflects the growing asphalt renewal need on the network. Currently there is a significant length of high volume roads that are in or rapidly approaching poor to very poor condition. As can be seen the clear majority of the programme is in the

Arterial network. Where there is asphalt programmed on the Access and Low Volume parts of the network these are on rural high stress corners which are due for replacement as condition dictates.



	Sum of 18/19 Trt	Sum of 19/20 Trt	Sum of 20/21 Trt	Sum of 21/22 Trt	Sum of 22/23 Trt
5 - ARTERIAL - TAC	1996	1613	2455	2473	2808
4 - PRIMARY COLLECTOR - TAC	777	310	139	356	38
3 - SECONDARY COLLECTOR - TAC	222	450	250	929	493
2 - ACCESS - TAC	0	119	465	0	74
1 - LOW VOLUME - TAC	0	0	294	0	16

Figure 7-11: 5 Year Thin Asphalt Renewal Profile

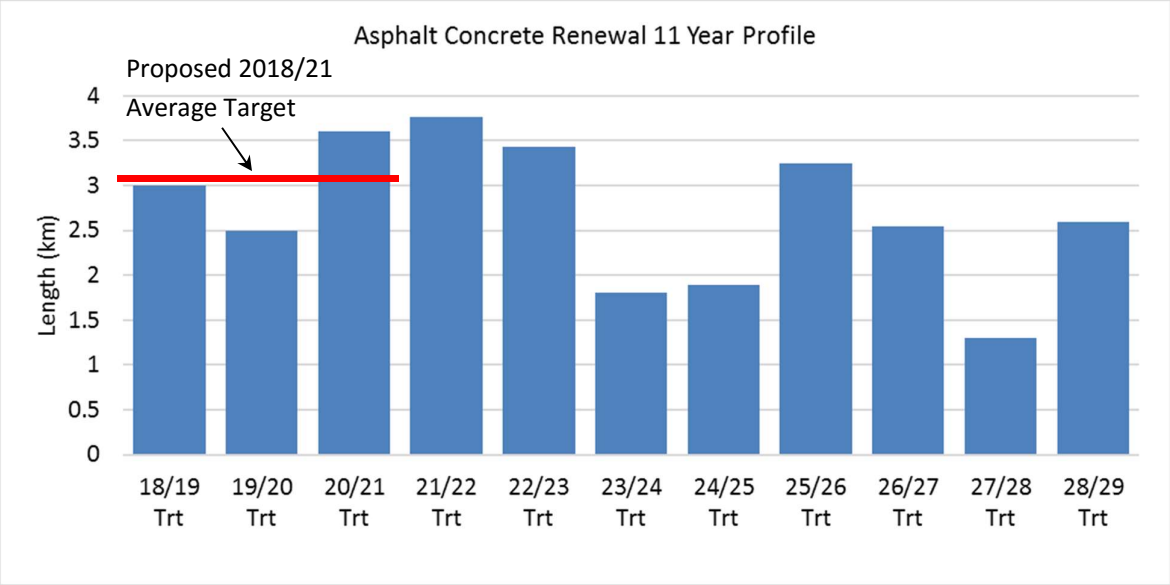


Figure 7-12: 11 Year This Asphalt Renewal Programme

When considering the remaining age of asphalt concrete, Figure 7-13 there is some 5.2km in backlog that this programme is trying to deal with. This backlog is a legacy issue of affordability and is now requiring attention.

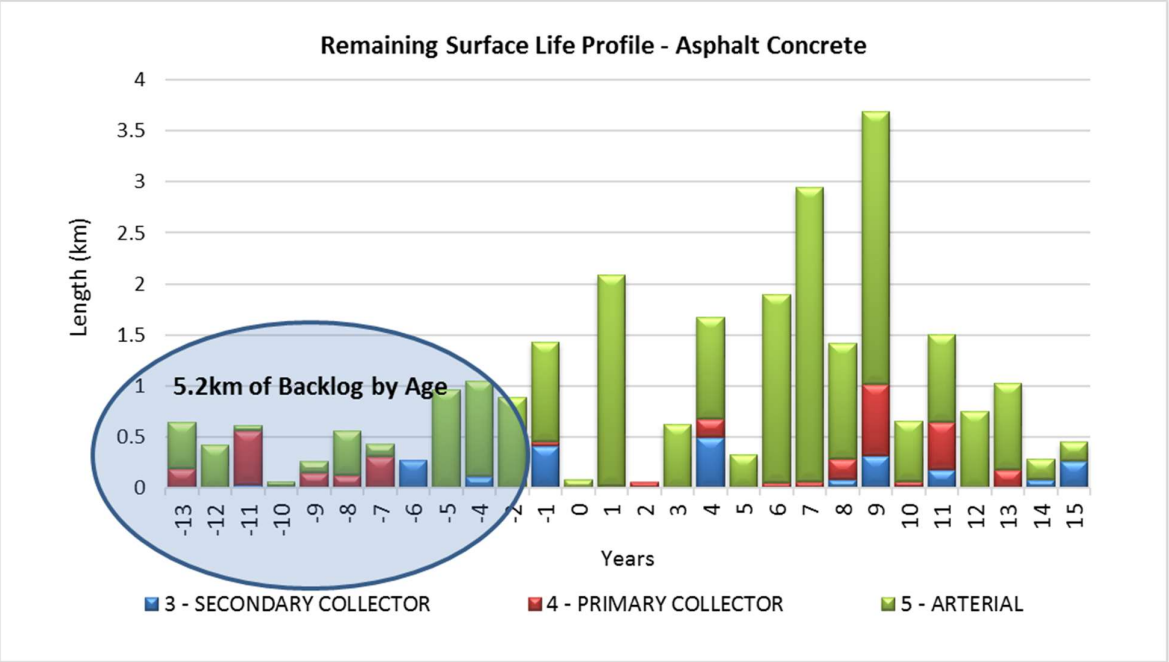


Figure 7-13: Asphalt Concrete Remining Life Profile

On further analysis, comparing condition with remaining age, Figure 7-14 it becomes evident that the large majority of this backlog is true condition backlog. Therefore, there is an emerging condition based funding issue that this programme is looking to address.

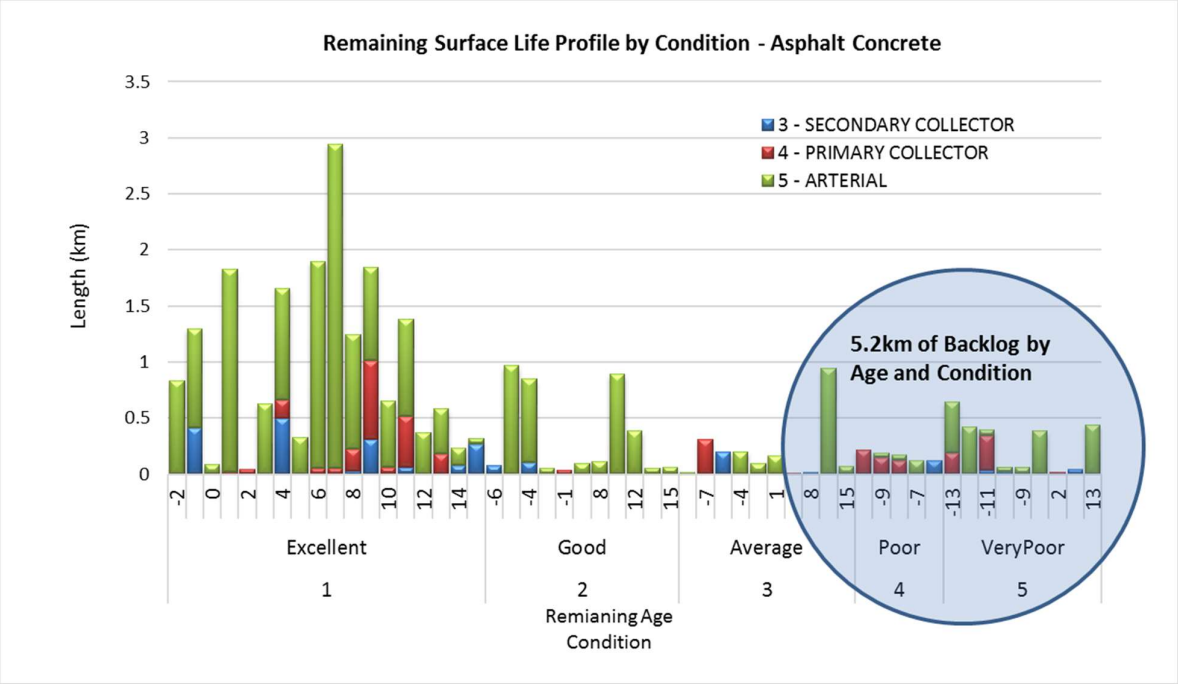


Figure 7-14: Asphalt Concrete Remaining Age and Condition

Surface Renewals Skid Resistance

As identified in Section 5.1.5, the increasing trend of wet road loss of control crashes is a significant concern. The Northland State highway network is recognised as having the worst rate of loss of control crashes in the country and it is therefore not surprising that Whangarei also has a high rate of wet road loss of control crashes.

The surfacing renewals programme also considers the application of high quality skid resistant chip where the is a history of loss of control crashes on corners. The programme is defined in number of ways on a risk based approach.

- Assessment of network is undertaken based on the curve data to derive several factors:
  - Rural curves less than 500m curve radius
  - Calculated Approach speeds
  - Derive Curve risk rating

This is applied to the network to develop a curve risk table, held in RAMM (under development). This table is then used to help define where high friction surface treatments should be undertaken.

As part of the programming process the latest surfacing renewal programme is compared with the crash data and the identified high risk curves. This is used to then determine if as part of the current programme a surface renewal is being undertaken as an asset seal. If so, a High Friction Surface (HFS) material is used for the asset seal surfacing. In the instance where there is no asset seal taking place within the 5 year window of the programme, a high friction surface will then be considered for programming. Considerations for programming a High Friction Surface are:

- Curve Risk Rating
- Loss of control wet curve crashes
- Injury or Non-injury
- Loss of Control Dry Curve crashes

Current funding application of $300,000/annum approximates to 4.5km of high friction surfacing each year. Where current total quantity of HFS exceeds current annual budget the quantity would be spread over 5 year term of the programme on priority basis as set out above.

This budget was initially set by assessing the routes identified in the 2015 Crash Reduction Study (CRS) as having a high incidence of wet road loss of control crashes. The 2015 CRS identified $1.24M of high skid resistance surfacing required. When this was spread over a 4 year programme this resulted in an annual budget of $300,000/annum. The roads identified in the CRS as requiring high skid resistance surfacing were:

- Kokopu Road
- Mangapai Road
- Matapouri Road
- Vinegar Hill Road
- Whangarei Heads Road
- Whareora Road

Figure 7-15 and Figure 7-16 provide a further assessment of the 5 year surface programme against loss control wet crashes on curves only. Analysis of this indicates that there is approximately 17km of HFS required outside of the asset surfacing programme. The application of the HFS sites would be of direct benefit to the Wet Loss of Control crashes that is trending upwards on the network as reported under the ONRC customer measures.

On this basis, there is a 4 year programme of remedial HFS work on the network for wet curve injury crashes only. This does not yet consider all the loss control crashes on curves at this stage. The indicative list of roads and lengths are presented in Table 7-3.

Area	Road	Total
North Area	Kokopu Road	1.27
	Ngunguru Road	2.5
	Pipiwai Road	2.05
	Vinegar Hill	1.2
	Whananaki Road	0.45
	Whangarei Heads road	4.42
North Area Total		11.89
South Area	Cove Road	0.45
	Mangapai Road	1.06
	Marsden Point Road	0.95
	Maungakaramea Road	1.65
	Tauraroa Road	0.3
	Various	1
South Area Total		5.41
Grand Total		17.3

Table 7-3: High Friction Surface Road List

Red Dots are Loss of control wet crashes on corners. Black lines are the 5 year asset resurfacing programming.

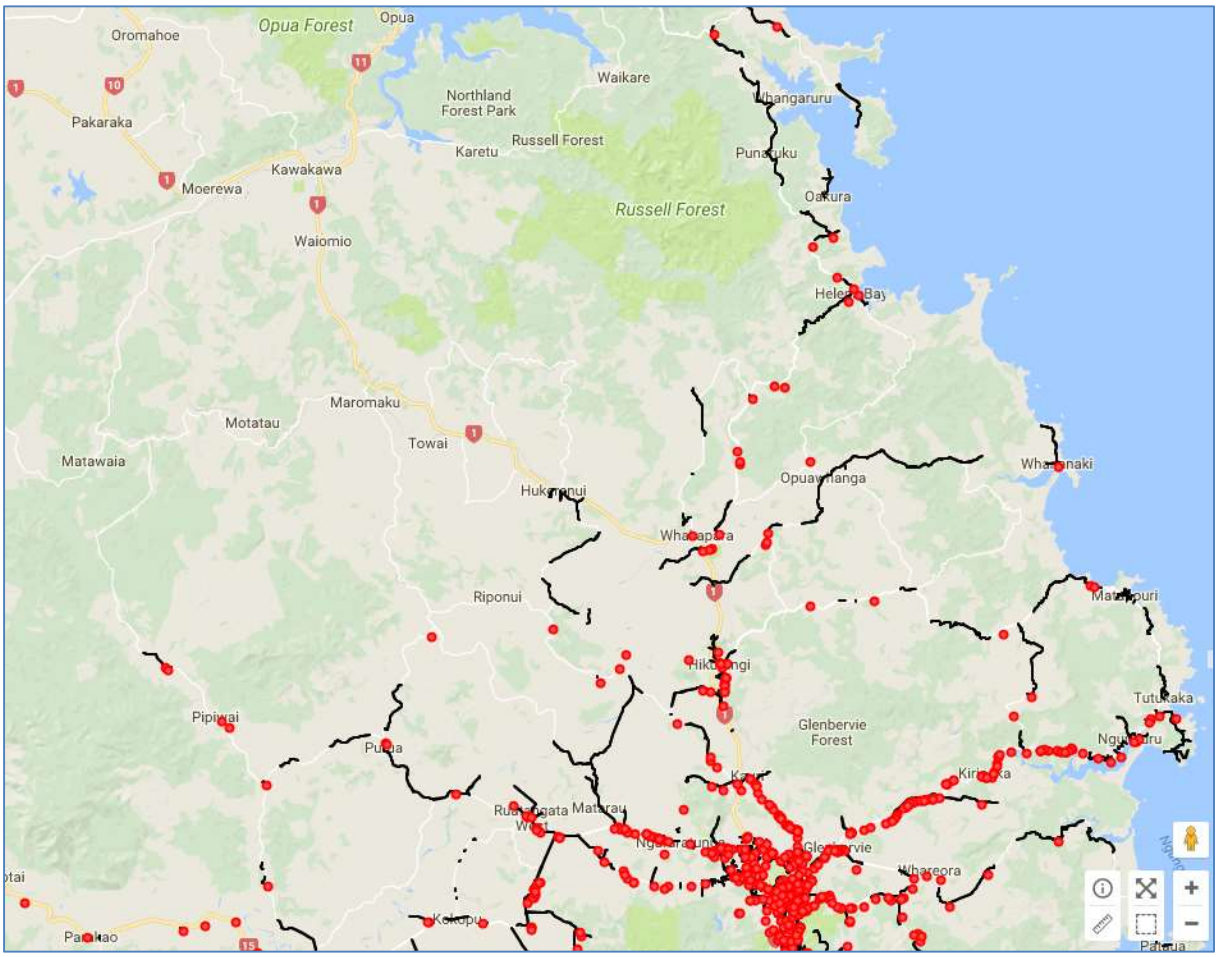


Figure 7-15: 5 Year Surface Programme vs. Loss Control Curve Wet Crashes North Area

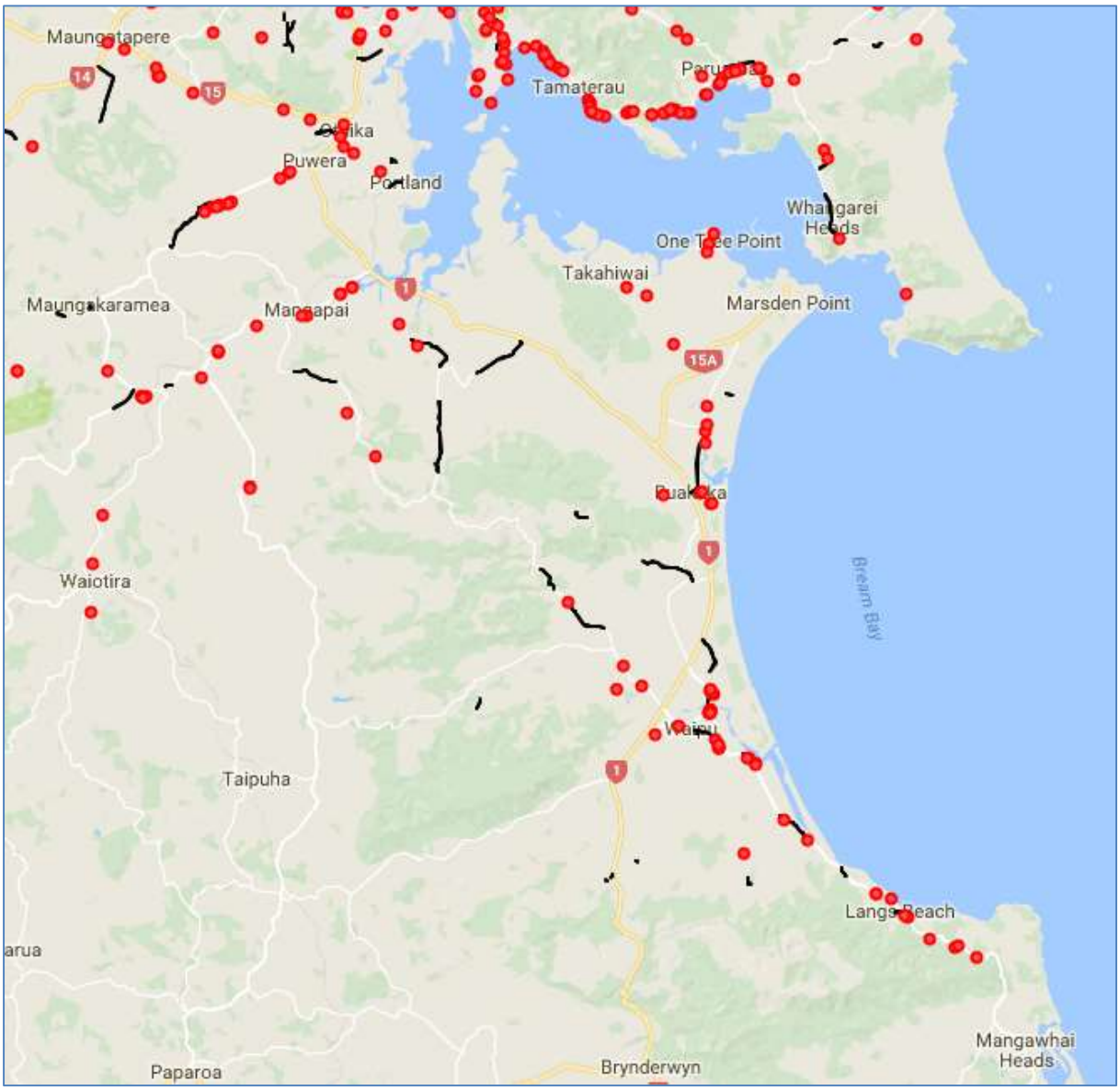


Figure 7-16: 5 Year Surface Programme vs. Loss Control Curve Wet Crashes South Area

7.4.1.5 Improvement Plan

Pavement improvement covers the widening and realignment of the pavement. This is often undertaken as associated improvements in conjunction with pavement rehabilitation projects. Improvements can also be through the minor improvements programme or major capital projects to increase the road width and capacity of critical routes.

Widening of seals will generally be done to provide a "fit for purpose" road width. For rural forestry and arterial routes this will be generally to 7.5-8m width, and for other roads this will be to 6.5-7m width depending on the road hierarchy and terrain.

In terms of new designs, the base design life assumption is 30 years for all new pavements.

For surfacing, improvements can be through the asphalting of previously chip sealed pavements. This is normally only considered on urban arterial roads and on tight rural curves where there are high tyre stresses.

The improvement projects planned for the next ten years are shown in Section 10.2.10.

7.4.1.6 Disposal Plan

Opportunities to stop maintenance on pavements that serve only one property will be investigated.

7.5 Unsealed Pavement Activity

7.5.1 Asset Description

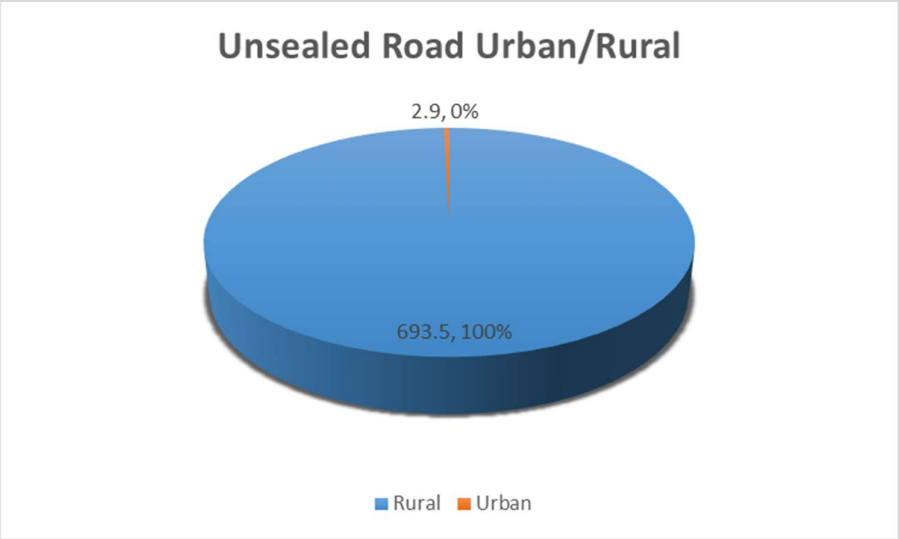
The Unsealed Pavement Activity includes the following categories;

- Unsealed Base-Course Pavements
- Unsealed Stabilised Pavements

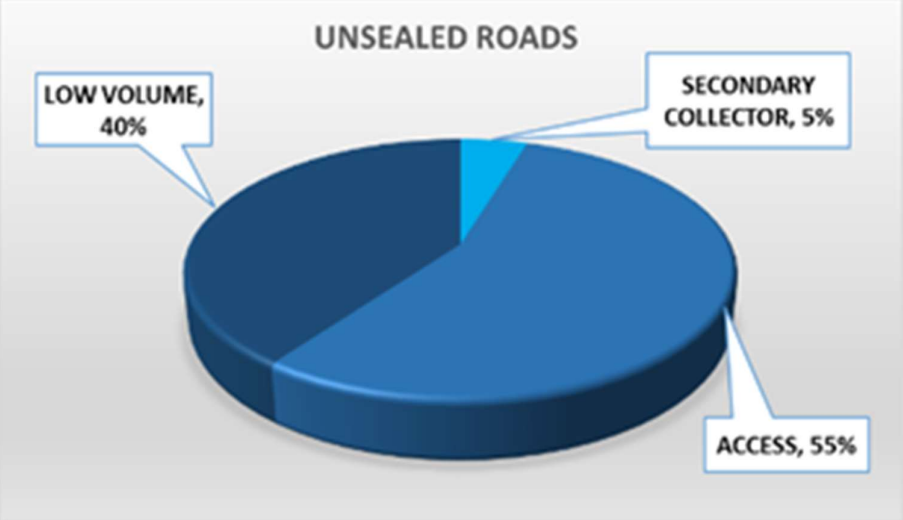
Unsealed pavement is also broken into three broad functional groups;

- Two Wheel Track Roads (U1) – farm at end, no other service, no exit, average width 3 metres
- Three Wheel Track Roads (U2) – farming, low housing possible, no exit, average width 4 - 5 metres
- Four Wheel Track Roads (U3) – farms & medium housing, through road, increasing development, average width 5 - 7 metres

There is a total of 696.4km of unsealed pavement in the district which represents 40% of the total road network. Almost all of unsealed roads are classed as rural road. This is shown in the following figure:



The ONRC hierarchy of the unsealed road network mostly consists of Access and Low Volume roads as shown in the following figure:



7.5.2 Unsealed Road Strategy

The Northland Transport Alliance is currently developing a regional unsealed road strategy. The outcome of this strategy is to develop and implement maintenance practices that result in more proactive management of the unsealed network that results in a better level of service and improved customer satisfaction. Currently the unsealed road network is the worst performing of Council's roading assets with a customer satisfaction of only 51%. The strategy should be completed in 2018.

To date the strategy has identified the following issues:

- There is very little data collection for unsealed roads which makes it difficult to determine maintenance programmes.
- Maintenance that is undertaken on unsealed roads is poorly recorded in RAMM making it difficult to identify where this work was undertaken, what its cost was and what was done.

- Maintenance interventions are largely reactive in response to customer complaint which leads to inappropriate maintenance treatments such as grading in summer, which typically requires an expensive wet, roll and grade treatment.

- Maintenance aggregate are generally blue aggregates which, while good foundation materials for structural pavement, result in poorly bound surfaces which result in higher rates of metal loss and dust generation. Most of these pavements were constructed when there was an expectation that these roads would be subject to a future seal extension and that the pavement would form part of the sealed road subgrade.

Based on the strategy developed to date the following improvements are being proposed in the 2018/21 period:

- Improve data collection of the unsealed road network using RoadRoid or similar technology to determine the roughness profile of each road so that grading cycles can be determined for each road.

- Carry out test pits on the unsealed network to determine the pavement thickness and to determine long term aggregate loss.

- Accurately record the location, type and cost of maintenance activities on the unsealed road network.

- Carry out metal trials to determine appropriate metal blends to provide a bound, low maintenance, low dust wearing surface for unsealed roads.

This information will provide baseline data that can be used to determine appropriate grading and metalling cycles. It will also enable the determination of appropriate structural pavement thicknesses and tightly bound wearing courses to provide a long term treatment to improve the level of service and reduce maintenance costs and dust on the unsealed road network. These initiatives will be developed over the 2018/21 period and are expected to be implemented in the 2021/24 period.

The Council is also proposing to seal the remainder of the Wright Road forestry route to provide a consistent sealed road from the Pipiwai Road forest to the port. Currently there is 4km of road which needs sealing to complete the 77km route. This will have benefits to logging trucks due to reduce operating costs, reduce travel times and improve road safety.

During the 2018/21 programme, a programme of dust suppression is proposed to address PM_{10} dust on forestry routes with a dust risk assessment of 12 or more (using NZ Transport Agency's General Circular 16/04). This is expected to be a short term programme until such time as appropriate low maintenance/low dust wearing courses can be constructed on these forestry routes during the 2021/24 period.

The sealing of Wright Road, the introduction of a proactive maintenance regime and the application of a suitable wearing course is also expected to improve customer satisfaction with the unsealed road network and reduce the pressure on Council to carry out seal extensions.

7.5.3 Acquisition (Growth) Plan

The Roading Department does not create unsealed pavements, however some unsealed assets may be vested to Council as per the Councils Environmental Engineering Standards;

'Council may, by specific approval, allow rural roads to be unsealed. Approval will not normally be given where the road will service properties that are predominantly urban, lifestyle, horticultural or similar, or that extend or join a sealed road. Approval for unsealed roads shall be confirmed in writing at the time of resource consent application.'

Council also has the right to create paper roads, which are unsealed and generally unmaintained, however there are no plans to do create any within the timeframe of this plan.

7.5.4 Maintenance Plan

Unsealed maintenance consists of the following activities;

- Grading/ shape maintenance
- Maintenance metalling
- Drainage
- Pavement defect repairs

Maintenance activities will focus on the following aspects:

- Forestry roads – preparing roads based on logging info supplied by the forest managers. These roads will be strengthening by the addition of pavement aggregate to restore the structural strength and shape of the pavement; i.e. Heavy Metal Maintenance.
- Heavy trafficked roads – these are predominantly lifestyle residential, farming and timber haul routes. Roads will be maintained according to specification and metal applied where necessary. The level of service and response time will be adhered to, to minimise legitimate ratepayer complaints.
- Light trafficked roads - the balance of the rural roads. Grade and pothole patching as required.
- Black dot maintenance - Target reoccurring failure sites as identified by RoadRoid and carry out permanent repairs.
- Dust suppression – Carryout dust suppression on high risk forestry routes over summer when dust levels reach unacceptable levels.

We have trialled the use of 50/50 limerock/GAP40 blend on a number of roads. It appears to bind the surface and reduces the maintenance requirements and generation of dust. Going forward, the new maintenance contract will include provision for the use of blended material using the Paige/Green chart or similar to provide wearing courses that are less prone to unravelling and dust production..

The maintenance of unsealed pavements is based on intervention levels and response times set in the maintenance contract. The intervention levels are considered to be the level at which the defect becomes a hazard to property or safety and the response times are based on the ONRC hierarchy, the criticality of the road and the level of work required to repair the defect. There will be limited ability to react to unforeseen impact on any portion of the unsealed network.

The traffic use and loads on some roads, particularly those in coastal areas and those leading to production forests, will continue to be a problem due to the demand peaks experienced. The future expenditure on unsealed roads is expected to increase to meet the current impact from logging operations over the horizon of this plan.

The maintenance decision process, what level of defects requires repairs and in what time-frame, is shown in Volume 2-Appendix E. These processes are based on the requirements of the *Road Maintenance Contract*.

7.5.4.1 Dust Suppression

As described above, dust suppression is being proposed as a short term measure on high risk roads to reduce the health effects of PM_{10} dust on adjoining dwellings. This treatment would be required until such time as an appropriate pavement structure and wearing course can be applied. This is expected to reduce PM_{10} dust to acceptable levels in the long term. However, there is still a risk that dust suppression is required following this long term treatment.

An assessment of the costs of carrying out dust suppression on Council's highest risk unsealed roads was undertaken. This initially considered providing dust suppression for all unsealed roads with a Dust Risk Score of 12 or higher as determined using the NZ Transport Agency's General Circular 16/04. However, this would result in a substantial annual cost of approximately $2.85M per annum. A second option was considered for only carrying out dust suppression on forestry routes with a Dust Risk Score of 12 or higher. This resulted in estimated costs of $778,000 per annum for two application per year or $583,000 per annum for 1.5 applications per year. This is shown in the calculations below:

ASSESSMENT OF DUST MITIGATION COST

Note - All options exclude Wright/McCardle Route

Option 1 - All Houses within 100m of an Unsealed Road with a Dust Risk Score of 12 or More

Houses on Forestry Routes within 100m of Road with Dust Risk Score 12 or higher	297	
Average length of treatment (allowing for overlap between adjacent sites)	400	m
Overall Treatment Length	118,800	m
Average road width	6	m
Total Area of Treatment	712,800	sq.m
Cost of Treatment	$2	/sq.m
Cost per Treatment	$1,425,600	/treatment
Treatments required per year (average)	2	/year
Total Cost per Year	**$2,851,200**	**/year**

Option 2 - Houses on Forestry Routes within 100m of an Unsealed Road with a Dust Risk Score of 12 or More

Houses on Forestry Routes within 100m of Road with Dust Risk Score 12 or higher	81	
Average length of treatment (allowing for overlap between adjacent sites)	400	m
Overall Treatment Length	32,400	m
Average road width	6	m
Total Area of Treatment	194,400	sq.m
Cost of Treatment	$2	/sq.m
Cost per Treatment	$388,800	/treatment
Treatments required per year (average)	2	/year
Total Cost per Year	**$777,600**	**/year**

If some roads need 2 treatments and others 1 treatment per year

Treatments required per year (average)	1.5	/year
Total Cost per Year	**$583,200**	**/year**

On this basis, during the 2018/21 period Council is proposing a $500,000 per annum programme of dust suppression to be applied on forestry routes that have a Dust Risk Score of 12 or more. The following forestry roads have been identified that would require dust suppression treatment:

Road Name	Start Displac emer	End Displac emer	Lengt	No of houses witihn 100m	Houses per km	*Avg daily traffic (incl HV + cars)	**Avg daily heavies (incl logging)	Logging route	Longevity of HCV route	Overall Score
MILLBROOK RD (971)	2893	9100	6207	16	3	237	20	Y	2	14
OPOUTEKE RD (547)	4220	7900	3680	6	2	214	101	Y	1	14
HELMSDALE RD (928)	4626	7630	3004	12	4	170	20	Y	1	13
KARAKA RD (525)	22	1900	1878	4	2	120	48	Y	2	13
MOORE RD	20	5738	5718	5	1	140	10	Y	2	13
OWHIWA RD (788)	6809	9007	2198	11	5	250	25	Y	2	13
MAIN RD (1145)	945	1355	410	1	2	150	15	Y	1	12
PATUTAHI RD (650)	56	2064	2008	3	1	60	15	Y	1	12
PIGS HEAD RD (797)	117	5562	5445	16	3	117	11	Y	2	12
WAIMATENUI RD	30	10608	10578	7	1	100	14	Y	2	12

7.5.5 Renewals Plan

The renewals plan involves the strengthening of the pavement, by adding road aggregate to restore or improve the structural strength of the pavement. The most common method of strengthening the road is to add additional metal. Strengthening can also be achieved by adding a proprietary product, such as lime

or cement, to modify the metal, improving its properties. Drainage improvements and widening are usually carried out in conjunction with these strengthening operations.

There is a seasonal regime of adding clean GAP12 material when the moisture condition is just right to bind up with bony material. This generally occurs prior to winter when there is a programme of bringing metal onto the road.

With the development of the Forestry Road Management Strategy, the plan going forward is to proactively plan renewals on roads prior to logging commencing so that the pavement will be in an adequate condition to cope with the additional loading. This should prevent situations that have occurred in the past when an unplanned logging activity starts up which results in catastrophic failure of the road and requires significant metal to bring the road back to a trafficable condition.

The Regional Unsealed Road Strategy is recommending that unsealed roads have a proper pavement structure built with a capping of a wearing course. The wearing course will meet the Paige-Green Chart for material properties so that it will form a firm base that is resistant to unravelling and dust production. This should result less metal loss and reduced dust generation which will reduce the cost of managing these roads. This will be developed further in the 2018/21 period and will be incorporated into the maintenance contract for the 2021/24 period.

7.5.6 Improvement Plan

Unsealed pavements can be improved either through widening (which often also includes strengthening) or through seal extension. Both are discussed below.

7.5.6.1 Widening Plan

Widenings are undertaken based on a number of triggers such as increased maintenance, safety concerns and heavy vehicle loading. These triggers are as follows:

- Increase in use (heavy commercial, bus traffic, logging activities) – strengthening and widening
- Demand changes (Annual Daily Traffic, customer) – more grading (see renewals plan)
- Road starts to service key community facilities (schools) - seal extension.

7.5.6.2 Seal Extension Plan

The Council has for a number of years developed a *Strategic Seal Extension Programme* to manage the needs and funding for seal extensions across the District. The objective of the Council's *Strategic Seal Extension Programme* is

OBJECTIVE	To develop a sealed network over a reasonable planning period which meets the needs of the District at an affordable cost.

Criteria to be taken into account include:

- Completing the sealing of the arterial road network.
- Developing links between communities.

- Meeting the requirement for no ratepayer to be more than five kilometres from a sealed road.
- Sealing roads affected by significant heavy traffic, if that is the best solution for upgrading that particular section of road, such as the Wright Road/McCardle Road forestry route.
- Considering dust control sealing, if that fits as the best solution for upgrading a particular section of road.
- Maximising the level of NZTA subsidy and/or ratepayer contribution in the development of the annual seal extension programme.

It is accepted that a fairly high proportion of the district roads will remain unsealed into the foreseeable future. There are some road links which clearly need completion early in the programme and others which, although desirable, are less of a priority.

Wright Road/McCardle Road Seal Extension

Wright Road and McCardle Road form a forestry route that is used by logging trucks to cart logs from forests in the Pipiwai area to Northport at Marsden Point. This route carries on average 90 logging truck movements per day and is also a school bus route. Much of the route (6.46km) is unsealed and the logging trucks create significant dust plumes in dry weather which affects residents and other road users.

The local residents have been campaigning for many years to have this route sealed due to significant concerns about exposure to harmful PM10 dust particles and concerns about road safety due to plumes of dust blinding oncoming drivers as shown in the photos below. A group of concerned residents have formed the Pipiwai Titoki Advocacy for Community Health and Safety Group to lobby for the route to be sealed. Residents have closed the forestry route from Pipiwai several times in protest over the dust issues.

Voluntary speed limits have been imposed on the route to try and reduce dust impacts. In 2015, the Whangarei District Council (WDC) sealed 50m – 260m long dust coat seals in front of dwellings on the route to reduce the impacts of dust. Dust monitoring following the construction of these seals has indicated that they have not been entirely successful in reducing dust to the residents.

An assessment using the NZTA General Circular Investment No.16/04 was undertaken to determine the significance of the dust risk on the route. This assessment indicated that the Wright Road/McCardle Road route had a dust risk of Medium (16) and was the highest priority site in the Whangarei District.

Consultation with landowners, the forestry industry and other stakeholders has identified the following problems to be addressed:

1. To reduce health effects of dust to residents
2. To reduce the safety effects of clouds of dust blinding oncoming motorists, and in particular the local school bus driver.
3. To improve the productivity of the logging trucks on this freight route by reducing vehicle costs and improving travel speeds

On the basis of this, the Council developed a business case to extend the house frontage seals by a total of 2.5km to reduce the PM_{10} dust affecting dwellings on the route. This work was approved by NZTA and is currently underway with completion due by April 2018. A similar business case has been approved for the Far North District Council to extend the seal on Pipiwai Road by 2.4km and this work will also be completed in the 2017/18 financial year.

Once these works are completed, there will only be three sections of unsealed road on Wright Road totalling 3.93km in length on the overall 77km long forestry route from the Pipiwai forests to Northport. This is detailed on the map in Section 5.1.2.

The Council is proposing to seal this remaining 3.93km length of Wright Road to provide a consistent sealed route for logging trucks heading to the port. This will also have benefits of reducing truck operating costs by providing a smoother surface, improving travel times by removing the voluntary speed limits on Wright Road and improving road safety by providing a sealed surface.

Ratepayer Subsidised Seal Extension

The Council continues with a subsidised seal extension programme with the following criteria used as the basis for the acceptance of applications to participate in that programme.

- Applications to be made the year preceding the work to allow funding to be provided in Council's estimates.
- Applications in any one year to be prioritised, taking into account the degree they support Council's overall *Seal Extension Strategy* and programme.
- The prioritised list of applications to be submitted to the Infrastructure and Services Committee for approval.
- All applications to be supported by at least 80% of the landowners in the area of benefit.
- Council's contribution towards the cost of the work to be limited to its share of the initial widening and pavement strengthening therefore ratepayers to pay the full cost of sealing.

Bridge Approach and Traction Seals

Sealing of the approach to bridges is aimed at decreasing the maintenance involved with these sections as it decreases the rate at which potholes are created.

Traction seals are to be created on roads where the lack of traction due to the metalled surface is a safety issue (such as the approach to intersections or on steep hill sections).

7.6 Structures

7.6.1 Overall Strategy

7.6.1.1 Bridges

Bridge Replacements: The focus will be on trying to carry out lower cost heavy maintenance repairs or component replacements rather than replacing entire bridge structures. However, there are many steel Armco culverts which are rusting out under their concrete linings and will require replacement over the next 10 years.

HPMV/50Max: WDC has signed a MOU with NZTA to allow 50Max vehicles on the road network. There are 20 bridges on the network that have been assessed as not have the required strength to handle 50Max vehicles. Some of these bridges are on heavy vehicle routes or urban arterial roads and these will be considered for future detailed assessment and strengthening. The 62 tonne High Productivity Motor Vehicles (HPMV) utilise SH1 through Whangarei City but when the Kamo Bypass is closed due to an emergency or for maintenance these vehicles cannot use the detour route through Kamo which has two under-strength bridges for HPMVs. These bridges should also be assessed and strengthened if necessary to allow these HPMVs to use this detour route.

Seismic Capabilities: With the change in building requirements following the Christchurch earthquakes there may be a need to strengthen some of our structure to improve their seismic capabilities to preserve key lifelines.

Overweight/Dimension Vehicles: WDC currently manages this process through their bridge consultant, Opus. WDC will consider whether going forward we should align with NZTA processes which would mean that NZTA would administer this process.

Te Matau a Pohe Remote Operation: The Te Matau a Pohe bascule bridge is currently operated from a control room on site which requires this to be manned during daylight hours. WDC will improve CCTV camera and communication technologies at the bridge to allow this operation to be remotely operated which is likely to significantly reduce the operating costs.

7.6.1.2 Retaining Walls

Further work is required to assess the retaining walls on the network and develop a programme of maintenance and renewals. This process is currently underway with the high risk walls being assessed for potential works. It is proposed that the retaining walls be included into the normal annual bridge inspection regime to determine their maintenance and renewal requirements.

7.6.1.3 Guardrails

New guard rail sites are identified through crash reduction studies and prioritised through the High Risk Rural Roads and minor improvements programme. An inspection programme and rating system for guardrails will be developed targeting older assets and high risk roads first and from this replacement programme developed.

7.6.2 Asset Description

The assets that make up this activity are;

- 320 Bridges & Footbridges
- 186 Major Culverts (culvert area > 3.4m^2)
- 3 Fords
- 686 Retaining Walls and seawalls
- 24km of Rails and Barriers
- Structural Stairs
- Over Bridges – rail bridges over roads.
- Pedestrian Under/Overpasses – Council currently do not own any pedestrian under/overpasses.
- Stock Underpasses – These assets are not owned by Council, but are inspected by Council and recorded on the Councils database.

Volume 2 Appendices contains a breakdown of all the structures associated with this activity.

Figure 7-17, *Figure 7-18* and *Figure 7-19* below provide a breakdown of the bridge and major culvert assets.

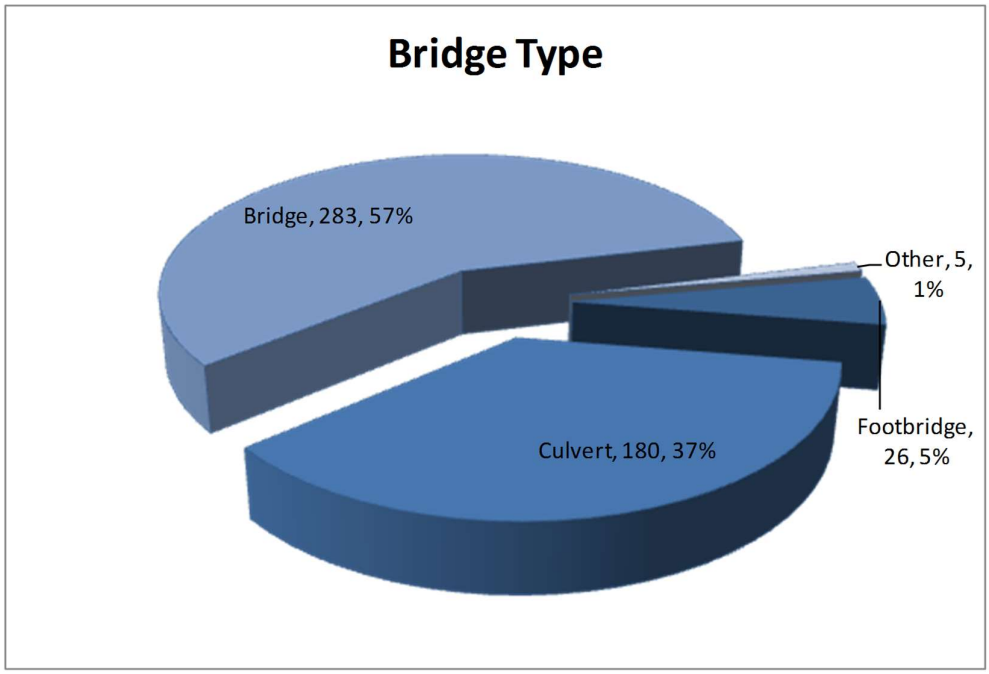
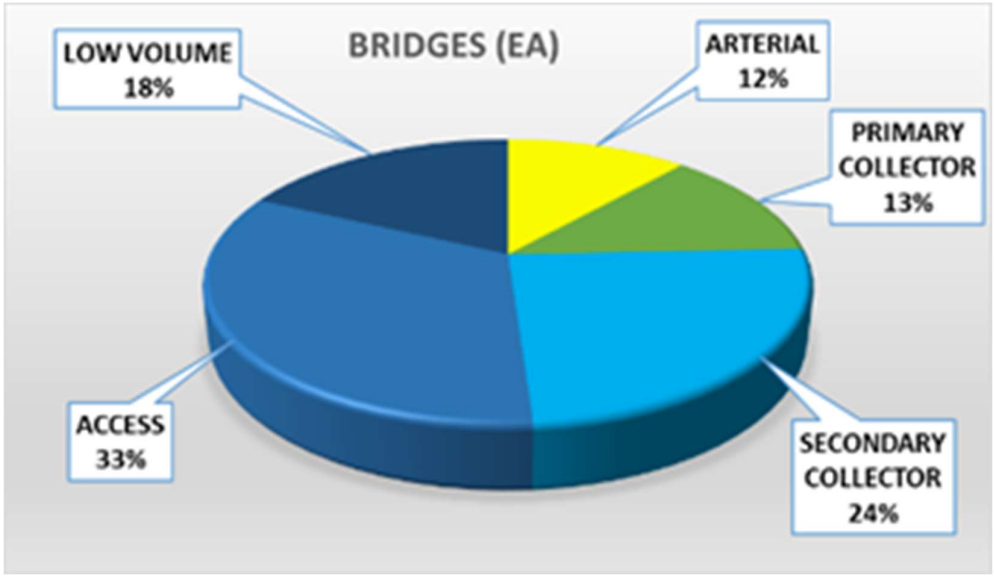
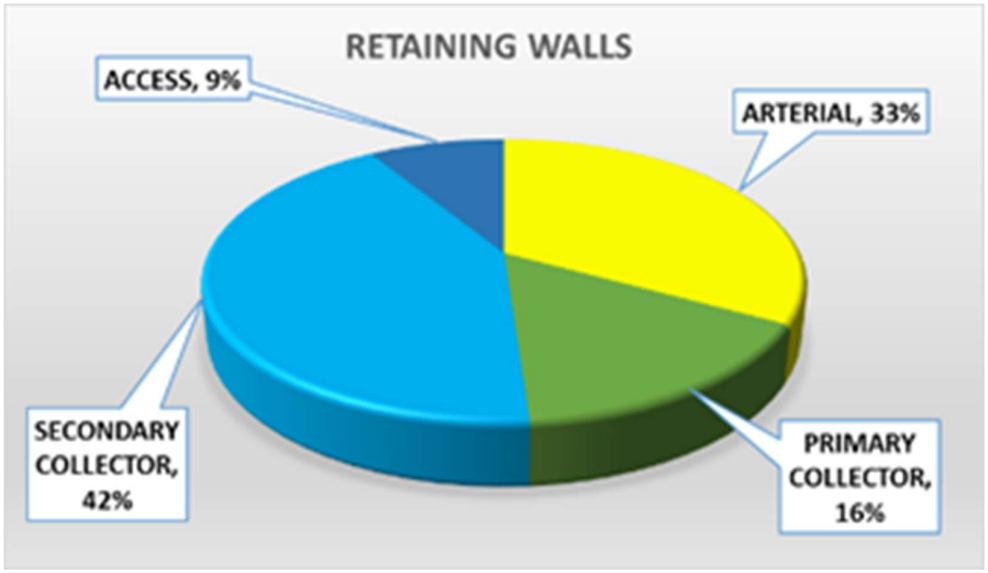


Figure 7-17 Bridges by Type

The ONRC hierarchy of the bridge and retaining wall assets is shown in the figures below:





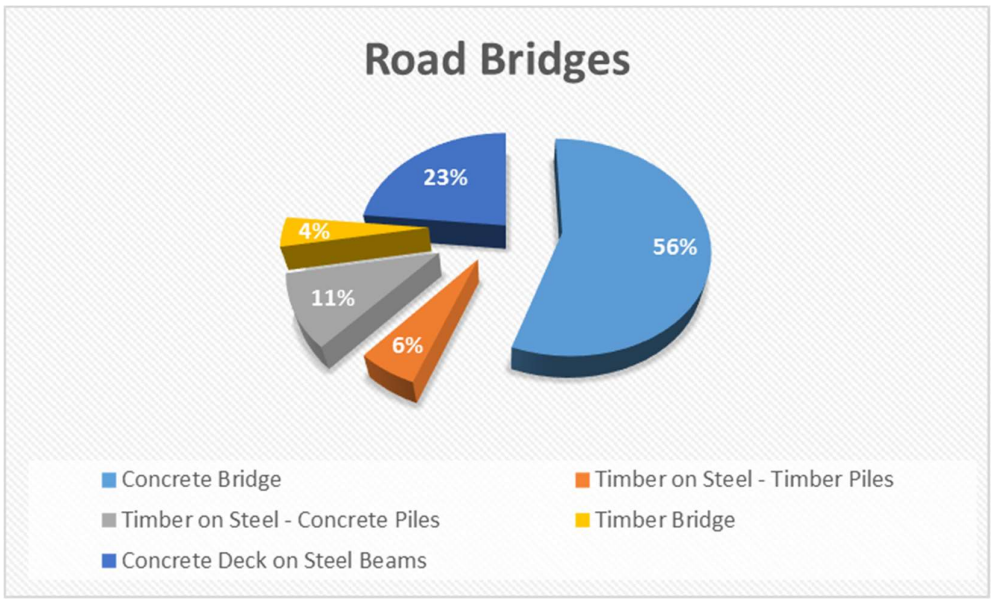


Figure 7-18 Road Bridges by Material Type

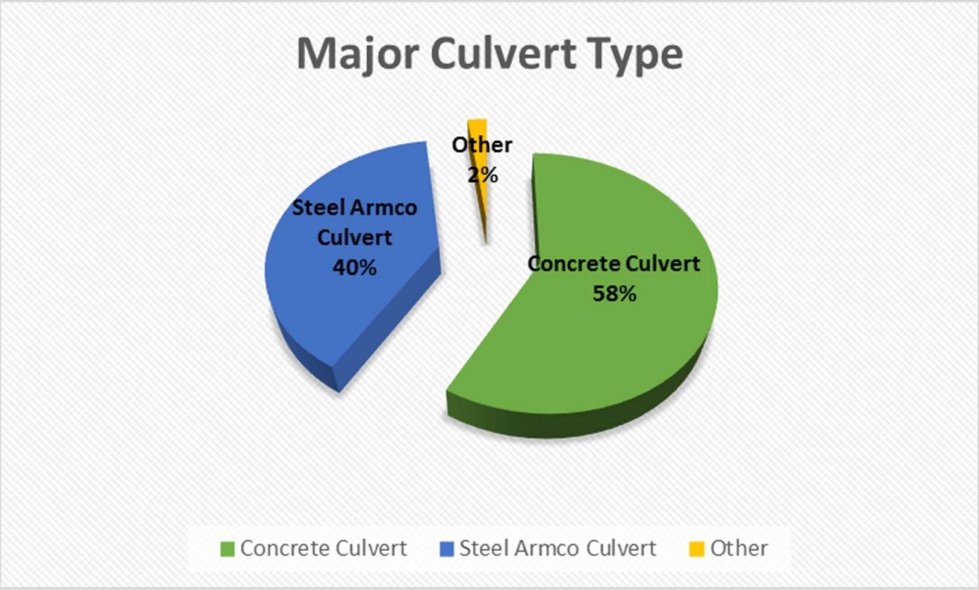


Figure 7-19 Major Culverts by Material Type

There are two unique structures on the network with moving sections to provide access for boat traffic. These bridges are described below:

7.6.2.1 Te Matau a Pohe

Te Matau a Pohe is a 265m long, 11 span bridge with a 25m long bascule section in the centre that rolls back on a rack and track system. It has two traffic lanes and a shared walking and cycle path on both sides of the bridge. Te Matau a Pohe is located on Dave Culham Drive and crosses the Hatea River.

The bridge is operated by a manned control room located at the north western corner of the bridge. Boats contact the control room either on marine radio or by phone to request a bridge lift. During daylight hours the bridge lifts on demand and is expected to open within 5 minutes of a request being received. After daylight hours the bridge is to open within 30 minutes of a request being received by the operator.

The bridge has a clearance over MHWS of 7.5m at the central span. Vessels under 6.5m can go under the bridge without it raising. Other vessels may require the bridge to be raised depending on the tidal state.

Te Matau a Pohe is an iconic structure that was Council's largest ever single contract. It has also attracted National and International attention. As such there is a high level of public and Council interest in this structure. Risks of failure reflecting poorly on Council. It could also affect traffic flows in town if the bridge is closed to traffic as it is currently taking 11,000 vpd.

Both the Te Matua a Pohe and the Kotuitui Whitinga Footbridge detailed in the following section are part of the popular Hatea Loop Walkway. Failures of any of these structures will prevent the use of this walkway.

Failure of the bridges could also affect marine businesses and in particular the failure of Te Matau a Pohe could adversely affect the Town Basin and Riverside Drive Marinas. This could be catastrophic in terms of the use of these marinas which predominantly cater for yachts which require Te Matau a Pohe to raise.

7.6.2.2 Kotuitui Whitinga Footbridge

The Kotuitui Whitinga Footbridge is a 100m long, 10 span walking and cycle bridge which spans the Waiarohia Stream from the Hihiaua peninsular to Port Road. The bridge has a 10m long opening section that swings sideways on a slew bearing. The width of the deck is 2.5m.

The Kotuitui Whitinga Footbridge is controlled by the bridge operator in the Te Matau a Pohe control room and has the same response times as Te Matau a Pohe.

The bridge has a clearance over MHWS of 3.0m at the central span. Vessels under 2.5m can go under the bridge without it opening. Other vessels may require the bridge to opening depending on the tidal state.

7.6.3 Management & Operations

7.6.3.1 Maintenance Contract

Most of the maintenance and operations associated with this activity are conducted by the maintenance contractors and governed by the *Road Maintenance Contract*. This allows for minor maintenance of the structures (such as minor repairs, painting, clearing deck drainage etc.) that is found as part of the carriageway inspections.

7.6.3.2 Renewal Works Contracts

Any structural replacement work found as a result of the inspections is packaged into one off contracts and tendered out.

7.6.3.3 Ownership

Some of these assets, mainly footbridges and seawalls, are located in parks and reserves which are owned and maintained by the Councils Parks Department. An agreement was made for the footbridges that divide the asset ownership and management responsibilities between the two departments.

A similar agreement is required for seawalls and this has been raised in the issues and opportunities register.

The ownership of other bridges are:

Rail Overbridges

These are owned, managed and maintained by the railway owner. The Roading Department is only responsible for the signage that is associated with the overbridges applicable to the road users.

Stock Underpasses

Although council inspects these assets, they are all owned by the property owners who are responsible for any maintenance and improvements required.

Road Overbridges and Underpasses

These are owned by NZTA if they are part of the State Highway network, otherwise they are owned by the Roading Department and are managed through the bridges, pavements and surfaces activities.

7.6.3.4 Te Matau a Pohe and Kotuitui Whitinga Bridge Operations

As described in Section 7.6.2, WDC has two opening bridges named Te Matau a Pohe and Kotuitui Whitinga. Resource consent conditions require WDC to open the bridges on a "on demand" basis, which requires a bridge operator to be on site full time during daylight hours and on-call during the night. The bridge is required to open 24 hours and 7 days a week.

The maintenance and operational costs of operating these bridges over is as follows:

Description	Annual Cost
Bridge Operator (Day to Day operations)	$220,000
Power Costs	$45,000
Hydraulic Maintenance	$80,000
Electrical Maintenance	$130,000
Structural Inspections	$10,000
Bridge Management	$60,000
Total Per Annum	**$545,000**

WDC has analysed the bridge openings for boat traffic over the last 3.5 years and this has determined that the hours that the bridge is manned can be reduced slightly without a significant impact on boaties or causing call out costs to increase significantly. This change is being implemented in December 2017 and will reduce operating cost by about $5,000 per annum.

WDC is proposing to remotely operate Te Matau a Pohe and the Kotuitui Whitinga Footbridge from a control room off site. Potential opportunities existing at the Auckland Transport Operations Centre (ATOC) or in Northpower's control room in Whangarei. Concerns with remote operations relate to pedestrian and cyclist safety. Internationally, most moving bridges have an operator based on site and only bridges in industrial areas, where there few pedestrian movements, are operated remotely.

To enable a remote operation to be considered upgrades to the bridge operating systems are required. This includes additional CCTV cameras, night time capable cameras, improved PA systems and fibre connection to the bridge will be necessary to improve the operation of these structures sufficiently for remote operations to be viable. These costs have been allowed for in the Low Cost/Low Risk Improvements for the 2018/21 period.

7.6.4 Monitoring & Condition

7.6.4.1 Inspections

Structural inspections of these assets are currently undertaken by Opus Consultants. Of the bridges, culverts, stairs and fords on the list, 60% are inspected once a year, while the other 30-40% are inspected once every two years. The inspections cover all assets associated with the bridges including railings and barriers.

As part of the *Road Maintenance Contract* the contractors inspect retaining walls as part of the entire network inspections they undertake. These inspections are not in-depth and are generally only conducted as a 'drive-by', unless an issue is noted or a request is received by a customer. Further inspections will be developed around critical walls that are likely to cause serious harm or significant damage if they fail. The inspections will follow the same process as the bridge inspections.

Inspection of all road safety barriers is undertaken as part of the *Road Maintenance Contract* and involves the inspection of the barriers, two weekly, or monthly, and thre monthly based on ONRC. This inspection only involves the identification of defects. It does not consider the overall structural integrity of the barrier.

Road safety barriers associated with bridges are inspected for structural integrity during the bridge inspections that are conducted every year or every two years based on the bridges criticality. These barriers are covered by the Bridge and Major Culvert Activity.

7.6.4.2 Condition

Bridges

During the 2010/11 inspections 117 of the 329 structures were found to be in good condition with no maintenance requirements. *Table 7-4* below shows the number and type of maintenance issues that were identified for the other structures. Some structures had more than one maintenance issue.

Table 7-4: Results of Bridge Inspections 2010/11

Maintenance Type	Number of Instances
Scour Protection Works	64
Minor Bridge Repairs	57
Steel Beam Repairs / Painting	3
Road Maintenance	63
Monitor	173
Recommendation or Further Investigations Required	16
Total	**376**

Retaining Walls

Figure 7-20 below shows the distribution of the condition ratings for the retaining walls. The percentages are based on the 202 walls that have been assigned ratings. The walls assigned condition ratings equate to nearly half the total walls identified in RAMM so the data can be assumed to be a good representative of the whole activity.

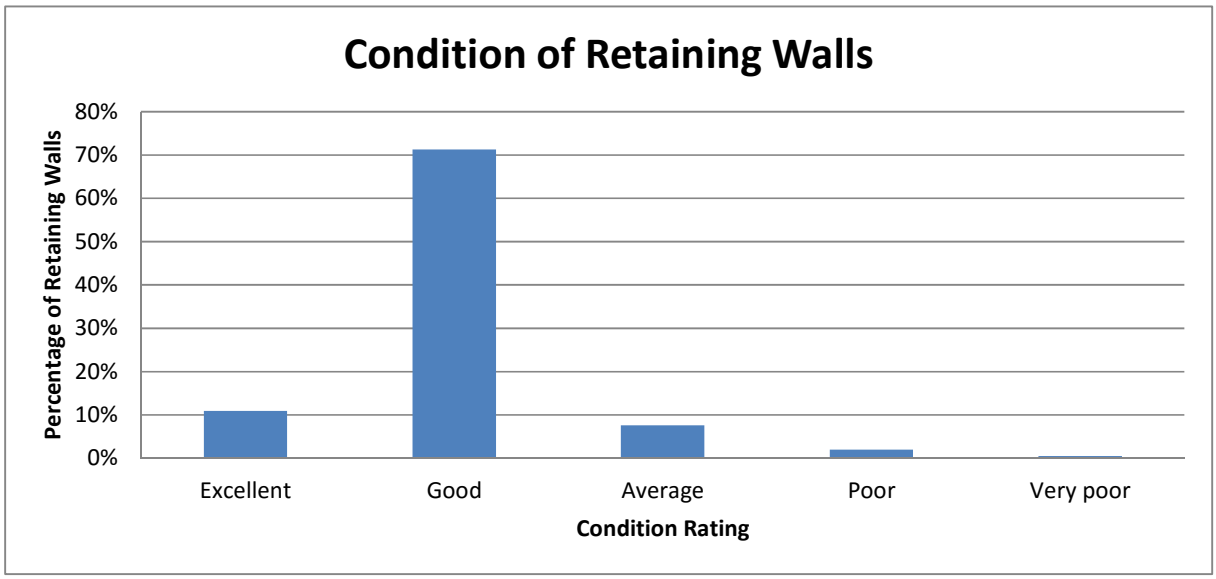


Figure 7-20: Condition of the Retaining Walls

As the figure shows, the majority of the walls are in a condition of 'good' or better, however, there are four walls in 'poor' condition and one in 'very poor' condition.

7.6.4.3 Age

Bridges

As Figure 7-21 below shows, the bridge age profile is typically distributed, with bridges ranging in age from new to almost 100 years old. However 105 bridges in the RAMM bridge table have no age data, (21.8%).

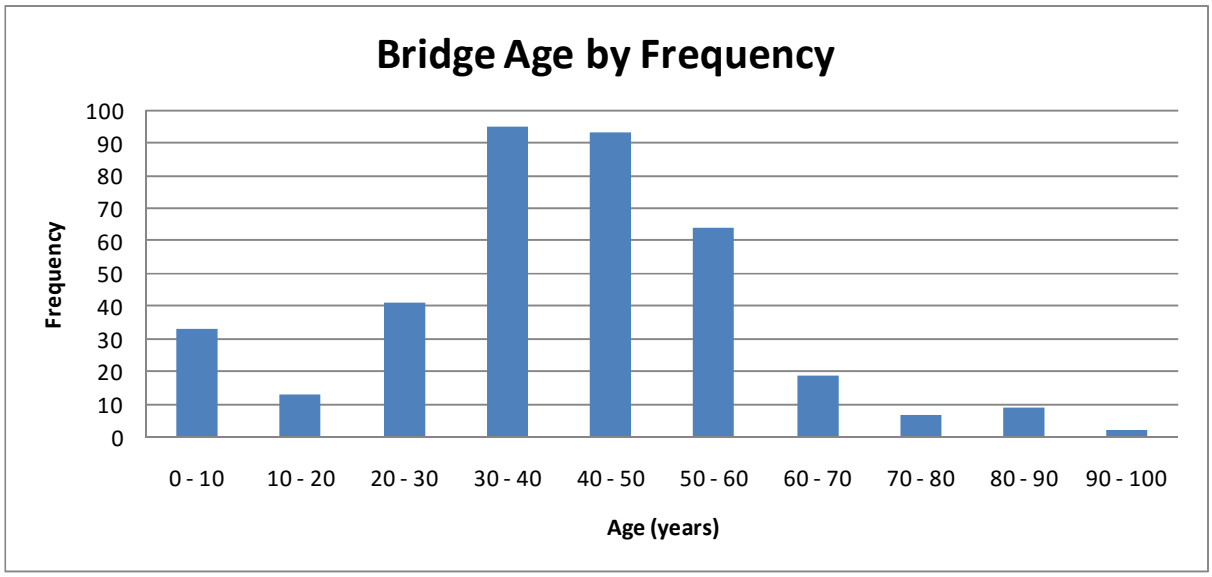


Figure 7-21: Age of Bridges and Major Culverts

Retaining Walls

83% of the age data is missing from the RAMM retaining wall table. *Figure 7-22* is drawn from 40 records of the total 235 retaining wall records in RAMM. These 40 retaining walls which we do have data for have ages that are widely distributed and some have values that are clearly errors e.g. 345 years old.

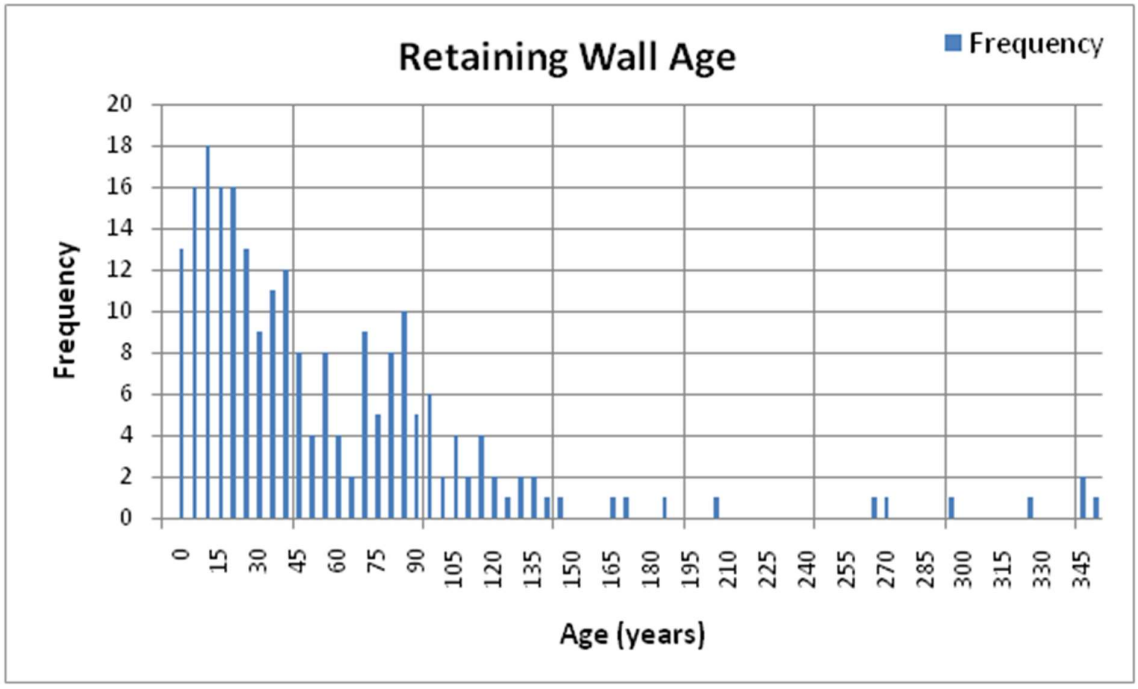


Figure 7-22: Age of Retaining Walls

7.6.5 Acquisition (Growth) Plan

Structures are created through new construction projects and through assets vested to Council from subdivisional developments. In addition:

- Retaining walls are also created through repairs to slips occurring either through emergency work repairs to storm damage or resilience improvements to long term instabilities.
- Road safety barriers are created through the minor improvements programme and can be identified through high risk rural road studies, crash reduction studies, the deficiency database or through network inspections.

Section 10.2.10 contains the major projects that are planned for the next 10 years and details those projects that include the creation or widening of a bridge or major culvert.

7.6.5.1 Stock Underpasses

Council does not construct stock underpasses and a land owner wishing to install these under public roads must seek approval from Council to do so. The approval process works through a number of issues to do with placement of the underpass and drainage, as this relates to the transport corridor, and on-going operation and maintenance agreements are as set out in the maintenance plan below.

7.6.6 Maintenance Plan

Structures maintenance is undertaken to ensure that the structural integrity of all structures is protected and that their load capacity is maintained.

7.6.6.1 Bridges and Major Culverts

Bridges and major culverts are inspected by two parties;

The Road Maintenance Contractors inspect the carriageway and deck surfaces least once a month. These inspections are tracked through RAMM contractor and where work is undertaken a job is raised. Additional culverts inspections are conducted after any high rainfall. Volume 2 Appendices contains the standards for the maintenance that is undertaken as part of these inspections.

The Roading Department also has bridge contractors, Opus, who inspect the structural integrity of all bridges and major culverts once every year or two.

Both these inspections include the associated railings and barriers.

The priorities concerning the maintenance requirements identified through the *Road Maintenance Contract* are shown in Volume 2 - Appendix E, while the structural inspections report splits the works required into four priorities based on when the works should be completed.

Both Te Matau a Pohe (opened July 2013) and the Kotuitui Whitinga Footbridge (opened September 2014) are recently constructed projects. As such the maintenance needs of both these structures are likely to be minor and renewals will only be of consumables (such as hydraulic oil, timber re-oiling etc.). However, issues with expansion have meant that remedial works have been required to ensure that a sufficient gap is maintained at the opening section and this has resulted in some early maintenance cost.

7.6.6.2 Stock Underpasses

The Roading Department does not own this asset although they are inspected as part of the structures inspection programme. Minor Maintenance is generally attended to by Council, but other maintenance issues are passed onto the owner to attend to. Where the maintenance issues are not attended to by the owner Council contractors undertake the repairs and pass costs onto the owner.

The justification for this process is that the stock underpasses are a critical component for the Transport Network and cannot fail for obvious reasons.

7.6.6.3 Retaining Walls

Retaining walls are being developed into routine inspection programmes similar to the existing programmes for the bridges and major culverts activity.

A programme was recently undertaken to locate and record a number of retaining walls that had not previously been identified. These walls, along with the walls that still have not been identified, are likely to contain numerous maintenance issues that have been deferred due to lack of knowledge of their existence.

Once the issue has been fully scoped a clear picture of the impact on maintenance can be established.

The inspection process will be focused on those structures that are on identified critical routes, with maintenance focused on those assets.

7.6.6.4 Road Safety Barriers

The inspection of all railings is undertaken as part of the entire network inspections that occur weekly, two weekly, or monthly depending on the road hierarchy through the roading maintenance contract. Further

inspection of railings is also undertaken as part of the night inspections that are required to be completed at twice a year for T1 – T5 roads, and once a year for other roads.

7.6.7 Renewals Plan

Structures requiring renewals will be prioritised based on their condition and the criticality of the route. They will then be renewed in priority order, with the volume of renewals based on the funding available.

Bridges are prioritised for renewal as part of the inspection process undertaken by the bridge consultant.

The majority of the Armco culverts are reaching the end of their life of 30 – 35 years. Of the 75 Armco in the district 8 don't have age data, while 59 are older than 30 years, 45 of these are over 35 years old and 15 are over 50 years. These culverts pose a significant risk and require renewal.

As for the maintenance plan, there are likely to be numerous retaining walls that have recently been identified, or are still to be identified, that require renewal.

The planned renewals are shown in Section 10.2.4.

7.6.8 Improvement Plan

The forms improvement are:

Increasing one lane bridge to two lanes – This is normally considered in conjunction with a bridge renewal.

There are still 223 one-lane bridges (51% of the total number);

- 22 on 'arterial' roads,
- 58 on 'collector' roads, and
- 143 on 'local' roads

Replacing bridge structure with large culvert structure - In some instances it is more efficient and effective to replace a bridge structure with a large culvert structure. This will be assessed at the design stage for bridge renewals.

Upgrading of ford to either a bridge or large drainage structure - In general fords provide a stable crossing point in flood prone streams. Fords are an historical structure and are generally in place on low volume unsealed roads where the expense of a bridge or culvert structure is not viable or justified. It is rare for a ford to be replaced with either a bridge or large culvert structure unless there was a major development that would require it. If this was the case then this would generally occur at the cost of the developer.

Increasing waterway capacity - There are a number of culverts that have insufficient waterway capacity to deal with conditions during periods of heavy rain fall. Consideration should be given to the development of a programme to increase the size of these structures to protect the pavement at these sites.

Replacing non-compliant terminal ends - It is recognised that there is a significant amount of non-compliant terminal ends on the network, especially associated with bridge safety railing, however there is no current or future programme to attend to this issue.

The planned improvements/replacements are shown in Section 10.2.5.

7.6.8.1 Bridge Strengthening for High Productivity Motor Vehicles (50Max & HPMV)

In 2010 the Vehicle Dimension and Mass Rule was introduced to allow the freight industry to move freight safely with fewer vehicles, within an appropriately regulated and permitted environment. This was proposed as part of the Government's direction to make the freight industry more efficient, free up capital for increased economic productivity, and create more jobs.

HPMV and 50Max means moving more freight with fewer trucks, reduced fuel consumption, vehicle operating costs and driver hours per unit of freight moved. Increased safety benefits from fewer truck trips means reduced crash risks, higher safety standards required on newer vehicles and advanced safety features like electronic stability control. The increased payloads of HPMV and 50Max can lead to economic benefits for producers, customers and our communities.

7.6.8.2 50Max (50 tonne vehicles)

The 50Max is a new generation of truck that is slightly longer than the standard 44 tonne truck and has an additional axle (9 in total). The modified design means that these trucks can carry more load, but they perform on the road in a similar way to a standard 44 tonne truck.

The 50Max trucks are designed to have no greater pavement wear than that of the current 44 tonne vehicle fleet, however existing restricted bridges and bridges with spans greater than 25-30m in length may be subject to load restrictions.

WDC has signed a MOU with NZTA to allow 50Max on their road network. This will release the economic efficiency available from 50Max to the District.

There are a total of 20 bridges on WDC's network which have been assessed as not currently capable of 50Max loading, generally due to having longer span lengths. Of these bridges, the following five bridges have been identified as being on a heavy vehicle or arterial road route that could be restrictive to freight:

- Reyburn Street Bridge 706 (aka Okara Drive Bridge) – Built in 1970, but previously assessed as limited capacity for overweight vehicles. Possibly will be OK to carry 50MAX and HPMV following assessment.
- Walton Street Bridge 712 - Structure widened in the 1990s. Widened northern section OK for HPMV. Original bridge (southern section is a segmental "I" beam structure) and unlikely to be HPMV capable. Assessment required and probable strengthening. Limited Drawings
- Pipiwai Road (Wairua) Bridge 257 (RP 14781) Currently 50MAX restriction. This bridge is a typical reinforced concrete T beam structure constructed in 1947. May prove 50MAX capable following detailed assessment, but highly likely to require strengthening. No drawings recorded.
- Kara Road Bridge No. 360 (RP 3917) – Could restrict 50MAX from Wood Road Quarry. Reputedly designed for Class 1, but constructed in 1983 with prestressed concrete U beams. May prove 50MAX and HPMV capable following assessment.
- Millbrook Road Bridge 78 (RP 770) – Long 27 m span. Superstructure 2 steel I beams with composite reinforced concrete deck. Built late 1950s so probably H20-S16-44 Design. Unlikely to support 50MAX or HPMV so assessment and probable strengthening required. Because of bridge type, strengthening to full HPMV may not be possible.

A detailed assessment of these bridges is being proposed in the AMP improvement plan.

7.6.8.3 HPMV (62 tonne vehicles)

Full HPMV (62 tonne) vehicles are only permitted to run on two specific WDC roads – Wilsonville Road and Portland Road which are part of the Wilsonville Quarry to Portland Cement Works route along SH1. HPMV vehicles are not currently permitted on other WDC roads.

SH1 through Whangarei is a designated HPMV route and the Kamo Bypass on SH1 is often closed due to maintenance works or due to a vehicle crash or other emergency. The detour route for this section of state highway is along Great North Road and onto Kamo Road through Kamo Village. However, there are two bridges on this route that cannot carry HPMV loads which result in HPMV vehicles having to park up whenever the Kamo Bypass is closed.

The Council is proposing to carry out a detailed structural assessment of these bridges in the 2018/21 period to determine whether they can carry HPMV loads and, if not, what works would be necessary to make them HPMV compliant.

7.6.8.4 Seismic Strengthening

An investigation into Seismic strength of bridges that form critical life lines should be undertaken to determine which bridges require strengthening. This has been included as an improvement plan activity in this AMP.

7.7 Road Drainage

7.7.1 Overall Strategy

A summary of the overall strategy for the next 5-10 years is:

- Watertable Maintenance: It is intended to carry out a programme of watertable maintenance to reinstate proper roadside drainage throughout the network. This is likely to reduce water ingress into pavement and extend pavement life.
- With the amount of new kerb and channel increasing as a result of new subdivisions, a review of existing street sweeping cycle times is being carried out to accommodate these within current budgets.
- Proactive repairs and maintenance of kerb and channel will still precede the reseal program of work.
- Culverts: An annual workload for culvert maintenance is derived from the annual inspection of all culverts. Updating the condition and culvert information is part of this process. In time the workload on this asset will stabilise after the first few rounds of inspection and maintenance. A heightened workload of culvert cleaning usually following storm events.
- Catchpits: The intention is to continue with the annual cleaning of all catchpits, and follow-up cleaning of those that accumulate detritus more rapidly.

7.7.2 Description

The drainage activity consists of the following categories;

- 56km of Dished Channel
- 512km of Kerb (with and without Channel)

- 1,841km of Water Tables
- 12,822 Culverts – only those not considered 'major culverts' as these are covered in the Bridges and Major Culverts Activity.
- 5,657 Catchpits and Sumps
- 22km of Subsoil Drains
- 385 Manholes

Figures *Figure 7-23* and *Figure 7-24* provide a summary of these assets.

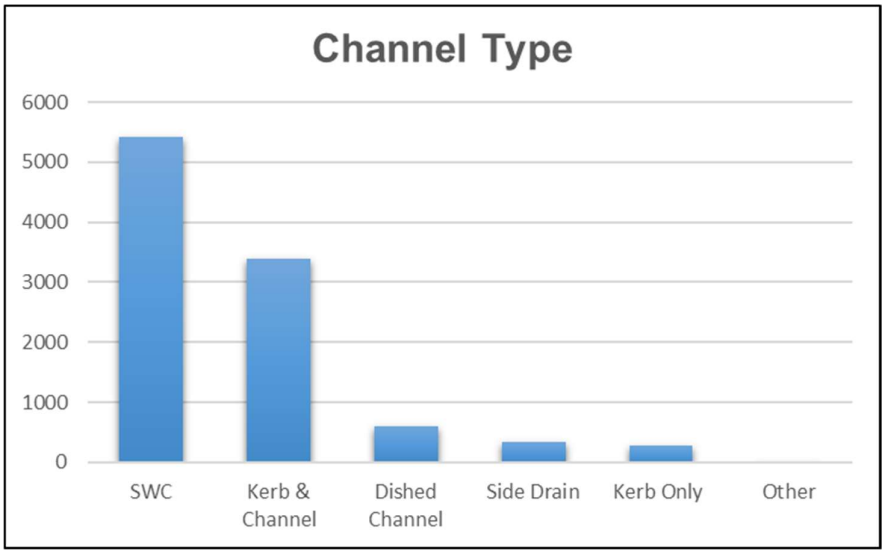


Figure 7-23 Drainage Channels by Type

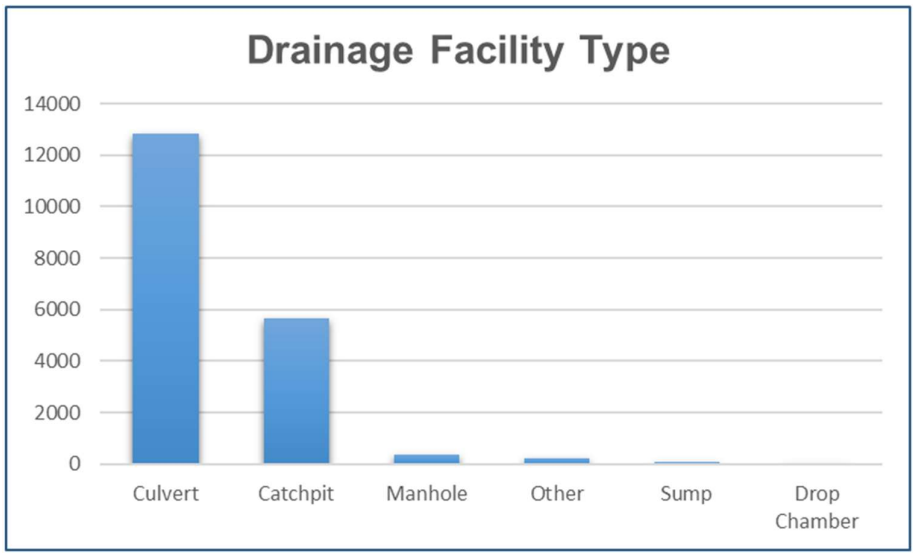
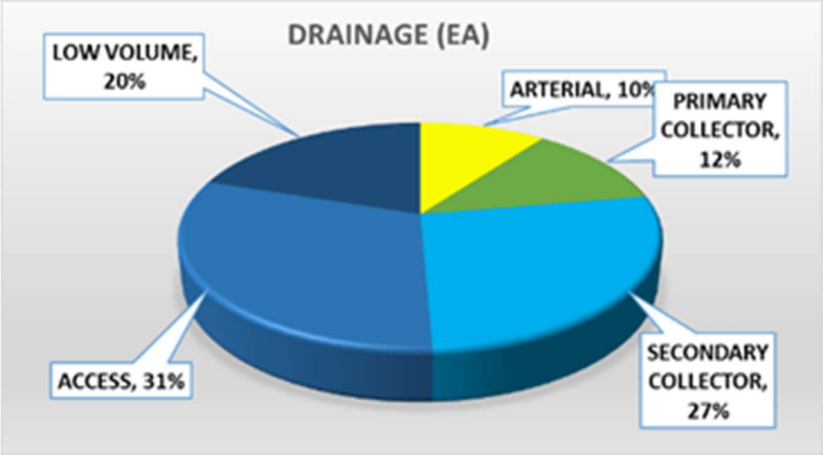


Figure 7-24 Drainage Facilities by Type

The ONRC hierarchy of the drainage assets is shown in the following figure:



A detailed description of these assets is shown in Volume 2 - Appendix A.

7.7.3 Management & Operations

7.7.3.1 Maintenance Contract

Most of the maintenance and operations associated with this activity are conducted by the maintenance contractors and governed by the *Road Maintenance Contract*. This contract only covers components such as kerb and channel, surface water channels, culverts, catchpits and manholes, it does not cover underground pipe networks as these are owned and maintained by the Councils Waste and Drainage Division.

7.7.3.2 Ownership

Both the Roading Department and the Waste and Drainage Department are responsible for drainage assets. In general the Roading Department is responsible for roadside drainage (kerb and channel etc.) while the Waste and Drainage Department are responsible for any under-ground assets. There is still some confusion around the specific responsibilities but a draft version of an agreement that may be developed between the two departments is shown in Volume 2 Appendices.

7.7.3.3 NZTA

As part of the MOU with NZTA, NZTA is responsible for all the drains in the state highway corridor other than land drains in the rural area and where they form part of the reticulation system in the urban area. WDC is responsible for channel cleaning of all urban state highways which is 30% funded from the State Highway Programme.

7.7.4 Monitoring & Condition

7.7.4.1 Inspection

Routine inspections are carried out through the maintenance contracts.

7.7.4.2 Condition

Condition rating is completed on surface water channels to identify maintenance issues. The items that are rated for condition are;

- % blocked,
- channel ineffective, and

- broken channel

This data is used in the Treatment Selection Analysis in RAMM to help define the maintenance requirement and identify where defective channels may be having a detrimental impact on the allowing the ingress of water into the pavement.

Only five of the sub-surface drainage assets have been assigned a condition rating, with two being 'average' and three being 'excellent'. There is no formal condition rating of culverts and catch pits, and drop structures. The routine inspections are relied upon to identify priority issues and report these accordingly.

7.7.5 Acquisition (Growth) Plan

Acquisition of drainage facilities is generally as part of new infrastructure through roads being vested with Council, major capital projects and road improvement projects such as rehabilitations and seal extensions.

7.7.6 Maintenance Plan

The maintenance of surface water channels is provided through the *Road Maintenance Contract*. The drainage facilities are inspected during the routine network inspections. Any minor maintenance requirements identified are undertaken as per Volume 2 - Appendix E, with major maintenance requirements becoming programmed work.

There is a pool of identified deficiency on the network related to drainage. These are continually being recorded as dispatches in RAMM Contractor and ranked accordingly.

Budget constraints continue to hinder the ability of the Roading Department to implement and treat the identified drainage deficiency on the network and therefore the deficiency continues to increase at rate greater than that which it is being treated. The proposed increase in the drainage budgets for 2018/21 will help to try and keep on top of the drainage works identified in RAMM Contractor. In particular, the focus will be on carrying out surface waterchannel maintenance on arterial and forestry roads on the network to minimise water ingress into pavements to extend the pavement life and reduce pavement maintenance.

A maintenance plan is also developed from the sealed condition ratings, undertaken annually for high traffic volume roads and once every two years for lower volume road, as it identifies the level of surface water fault on the network. This is based on the outcomes of the treatment selection algorithm in RAMM and the works required are generally completed as part of any associated pavement and surface renewal works.

In addition, the council has over the past few years implemented a maintenance strategy of allocating a portion of the kerb and channel maintenance budget to replace damaged kerb and channel in conjunction with the road resealing programme. Approximately 90 km of district roads are resealed annually and as each road is resealed, all kerb and channel defects are removed at the same time.

Road sweeping and cesspit cleaning is undertaken as routine maintenance. The district is split into three zones with zone one being swept/cleaned once a week, zone two once a month, and zone three every three months. *Figure 7-25* below shows the extent of zones one and two. All other roads in the district are zone three. All cesspit grates also require inspection and cleaning during heavy rainfall.

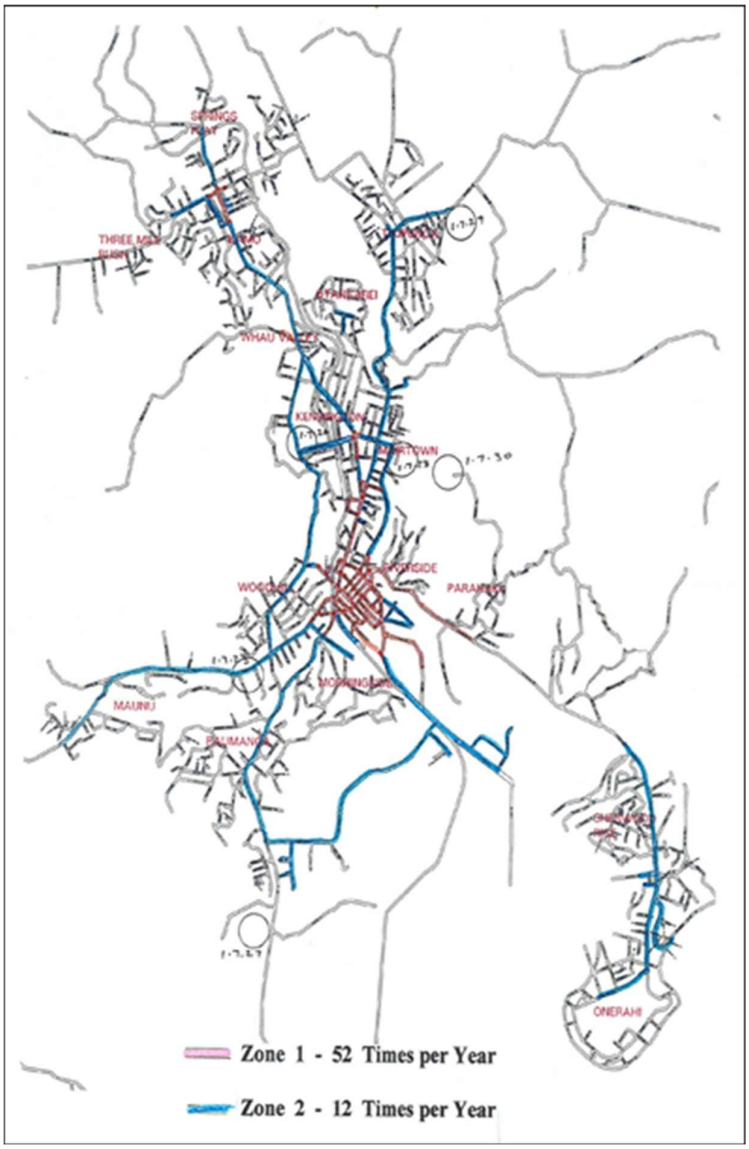


Figure 7-25: Channel Sweeping and Cleaning Zones

7.7.7 Renewals Plan

The failure modes and condition indicators that are used to determine the renewal of drainage facilities are shown in Volume 2 - Appendix E.

The bulk of all drainage renewals is associated with pavement and surface renewal works. At the time of design the effectiveness and condition of the related drainage is assessed and renewed where required. Surface water channel renewal works are identified through routine inspections and programmed maintenance. Where this is the case, the project is recorded as a dispatch in RAMM Contractor and prioritised based on risk and benefit.

Figure 7-26 shows that five drainage renewal programme. This programme is for the renewal of lined channel, regrading earth surface water channel and the installation of sub soil drains. This work is targeted at resurfacing renewal work and in conjunction with pavement renewal work. Key condition driver for this

work is pavement rutting and poorly shaped channel that are not carrying the water in efficient manner away from the pavement base.

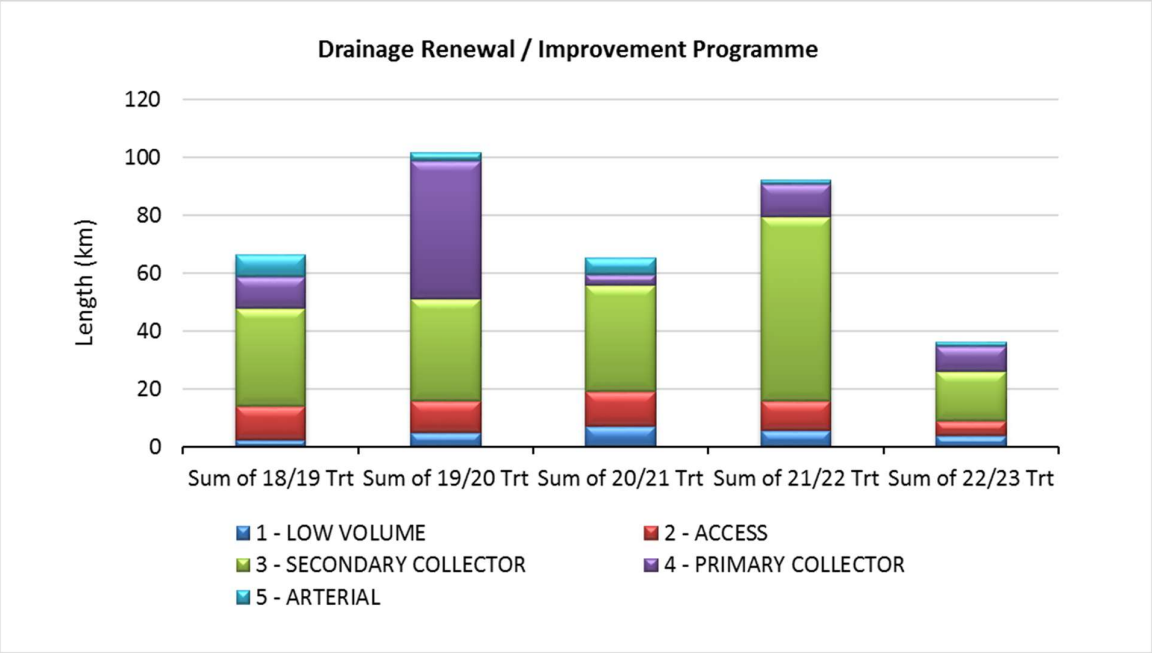


Figure 7-26: Five Year Drainage Renewal Programme

7.7.8 Improvement Plan

Minor Improvements generally consists of the up-sizing of specific culverts or the construction of drainage structures in relation to the restoration of a flood damage site. These improvements are to be considered at the time of undertaking renewals of the drainage system.

The Council is proposing to develop a Resilience Strategy in conjunction with the Northland Transport Alliance (NTA) in the 2018/21 period. This strategy is likely to identify critical culverts and overland flow paths that are at high risk of causing road washout or slips during heavy rain events. Drainage improvement identified through this strategy will be prioritised and undertaken as funding allows.

7.8 Traffic Facilities

7.8.1 Signs, Markings and Delineation Activity

7.8.1.1 Overall Strategy

Summary of the overall strategy for the next 5-10 years including:

- Maintenance & Operations
    - Signs: A small proportion of signage is replaced due to ageing. The bulk is due to accident damage and vandalism.
    - Sight-rails: These are either painted or cleaned annually. Sight rails which are higher than 0.5 x eye height shall be modified to meet this requirement.
    - Pavement markings: A funding increase has been requested for 2018/21 to carry out a full annual remark per annum and to provide continuous edglines will be provided on all arterial, collector and tourist routes. Long life products will be used on high wear sites where the payback period will be achieved.
    - Reflective Raised Pavement Markers (RRPMs) : A funding increase has been requested for 2018/21 to provide or maintain RRPMs to meet the NZTA standards for all arterial, collector and tourist routes.

- Edge Marker Posts (EMPs): A funding increase has been requested for 2018/21 to provide or maintain EMPs to meet the NZTA standards for all arterial, collector and tourist routes.

- Renewals - Usually done as part of reseals and rehabs.
- Improvements - All improvements are identified through dispatches raised through RAMM Contractor or road safety inspections. There is no set strategy for these improvements with the majority of improvements being implemented through the minor improvements programme.
- New Assets - Through capital works.

7.8.1.2 Description

The signs, markings and delineation activity includes;

- 20,182 Signs
- 7.4km of Sight Rails – does not include safety barriers, these are considered in the road safety barrier activity.
- Pavement Markings
- RRPMs (Reflective Raised Pavement Markers)
- Edge Marker Posts

Further breakdown of these assets is provided in Volume 2 - Appendix A.

7.8.1.3 Management & Operations

Maintenance Contract

Currently the *Road Maintenance Contract* governs the operation and maintenance of signs and edge marker posts, while the *Road Marking Contract* covers pavement markings and reflective raised pavement markers.

However, the two new *Road Maintenance Contracts*, which are currently being developed and commence on 1 July 2018, will incorporate all operation, maintenance and renewals of signs, sightrails, markings, raised reflectorised pavement markers and edge marker posts. The contract also covers the creation of new signage, markings and delineation as requested by the Engineer.

State Highways

As part of the MOU with NZTA the Roading Department is responsible for markings on the State Highway network such as parking bays, taxi stands, fire hydrants, bus bays and loading zones. All other markings are the responsibility of NZTA.

All marker posts are the responsibility of NZTA.

The Roading Department are responsible for certain signs on the state highways. These are;

- Road names
- Locality and services

- Some general information
- Tourist route
- School zone
- Parking
- Community facilities

7.8.1.4 Monitoring & Condition

Signs

Figure 7-27 below show the condition ratings of the road signs in the district. The graphs are populated from;

- 32.2% of the assets for the condition ratings, and

As this is all the data RAMM currently contains.

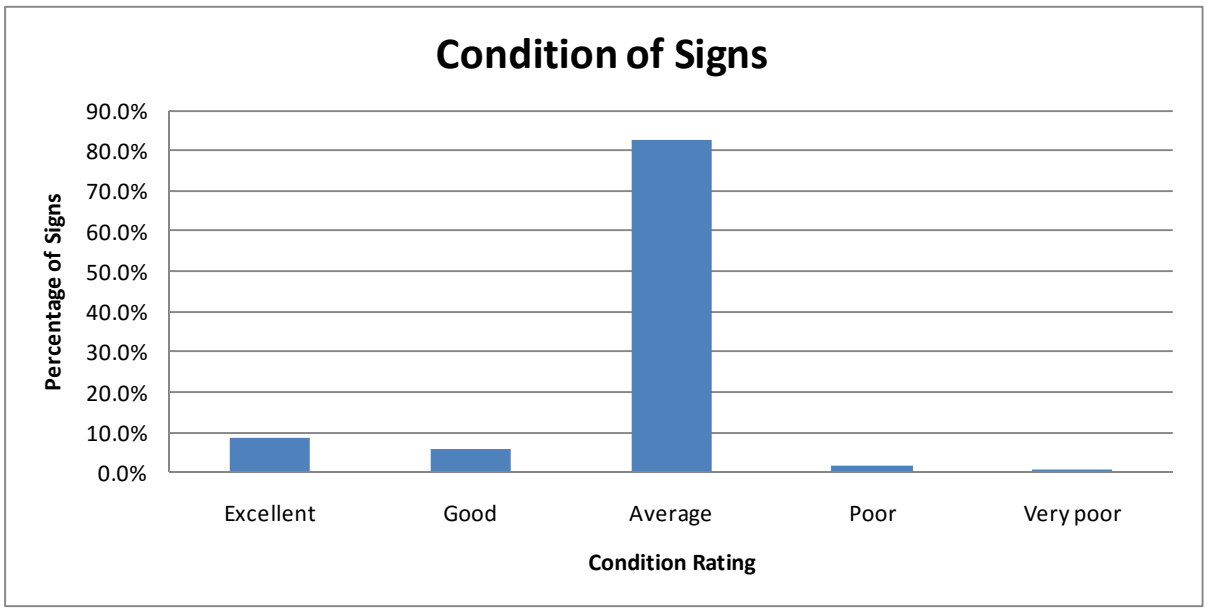


Figure 7-27: Condition Ratings of Road Signs

It can be seen from the condition ratings that the majority of the signs are in 'average' or above condition, however due to the small amount of data available on the age of the signs, the graph above is unlikely to be an accurate representation.

7.8.1.5 Acquisition (Growth) Plan

Creation of these assets is undertaken through minor improvement works as a result of any identified deficiencies or customer requests. New assets can also be created through major capital projects or roads being vested with council through subdivision development.

Sight rails are often installed due to storm damage. If any unsafe or major works cannot be repaired within a certain timeframe, a sight rail is installed as part of the minor safety works to advise road users of the hazard. Sight rails are not normally constructed from minor safety studies as there is a move to use signage rather than railings.

7.8.1.6 Maintenance Plan

The faults with these assets are identified in the following ways;

- CRMs
- client identifies
- patrol for specific reasons e.g. storm, strong winds, spate of vandalism
- changes requested WDC
- faults identified in the field by our team
- faults identified by our routine maintenance patrol

The maintenance plan is based on the routine inspections and planned and reactive maintenance. Night inspections are required to be completed twice a year for T1 – T5 roads and once a year for others. These inspections are to ensure that all signs and markings are clearly visible at night. The only planned maintenance for this activity is the cleaning of all edge marker posts which is to occur annually. All other maintenance is reactive and the standards for these are contained in Volume 2 - Appendix E.

Maintenance Decision Processes

The faults are prioritised by their function, the more relevant to safety and enforcement the higher the priority. Priority is assessed by field engineer and the area engineer. In practise the work is a flow from identification, to ordering, to supply, to installation. Usually this happens quite smoothly so the jobs are done in the order they are identified.

Routine and minor reactive maintenance is based on the intervention levels and response times set out in the maintenance contracts. Any large maintenance that is identified is prioritised based on the risks posed by the defect and the criticality of the asset or associated road.

Parking and Edgeline Policy

The current policy is that council does not remark edge lines and parking limit lines in the District's Urban areas (50kph or less) unless the edge lines form part of a formal marked cycleway.

Reinstatement of marking after repairs:

Apart from reseal sites as described below, all failure repairs are to have the markings reinstated within 5 working days irrespective of when the annual remarking is going to take place.

Repairs that are going to be resealed over in the current season may not have to marked ahead of the reseal. Temporary marking will be required if safety, compliance or regulatory issues are likely to arise and/or the time lapse between the repair and reseal is going to span a few weeks. Reinstating rural roads centre lines, edge lines etc. are less of an issue.

7.8.1.7 Renewals Plan

Volume 2 - Appendix E contains the failure modes and condition indicators used to determine if a sign requires renewing.

These failures are identified either through the regular inspections of the entire network or through the night inspections conducted that focus on signs, markings and delineation.

Volume 2 - Appendix E contains the standards for the renewal of signs, markings and delineation as set out in the maintenance contract.

7.8.1.8 Improvement Plan

It is proposed to carry out the following improvements over the 2018/21 period:

- Provide continuous edgelines on all arterial, collector and tourist routes
- Provide RRPMs and edge marker posts to NZTA standards on all arterial, collector and tourist routes.
- Long life pavement markings shall be used on major intersections where there is a positive payback period.
- Sight rails are to be progressive lowered where necessary so that they meet the 0.5 x eye height standard.

7.8.2 Traffic Island & Calming Device Activity

7.8.2.1 Overall Strategy

7.8.2.2 Description

The Traffic Island and Calming Devices Activity includes 246 of the following assets;

- Kea Crossings – marked crossings with foldout signs, generally outside schools (see *Figure 7-28*). These are temporary crossings that are only in operation for a limited period before and after school hours. Outside these hours vehicles are not required to give way to pedestrians.
- Pedestrian Crossings – permanent crossings where vehicles must always give way to pedestrians.
- Pedestrian Refuges (see *Figure 7-29*) – generally consist of islands in the road where pedestrians can wait for an opportunity to cross.
- Speed Control Devices (see *Figure 7-30*)
- Speed Humps / Tables
- Chicanes
- Traffic Islands – different configurations for different purposes

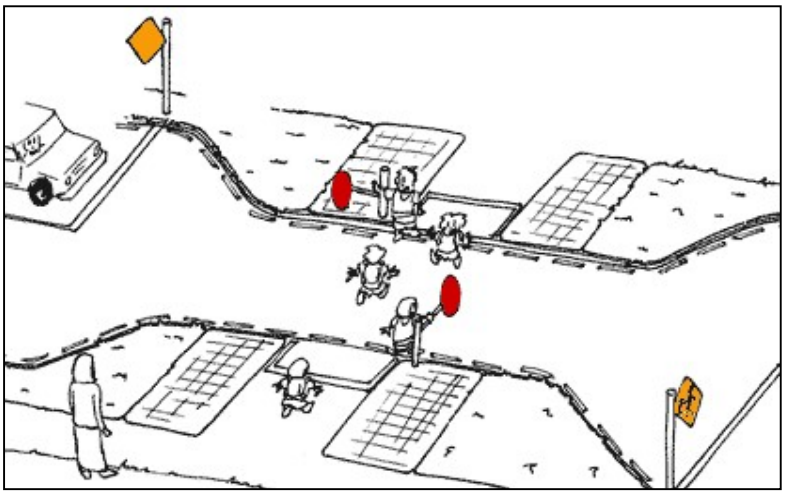


Figure 7-28: Typical Kea Crossing Configuration[1]

[1] From NZTA *Kea Crossings: School Crossing Points (Factsheet 26)*

Figure 7-29: Pedestrian Refuges[2]

Figure 7-30: Speed Control Devices – Speed Bump, Speed Table and Chicane[3]

7.8.2.3 Quantity of Assets

The majority of these assets are unknown in quantity as there is little information in RAMM and no records in regards to the creation of the majority of the assets. A program may be put in place to acquire this information.

7.8.2.4 Management & Operations

Maintenance Contract

The *Road Maintenance Contract* covers most of the maintenance of these devices. Although the contract does not mention them specifically, it does cover their components such as markings, signage, surfacing and pavements.

Parks Department

Garden in-fills on traffic islands, roundabouts etc. are the responsibility of the Councils Parks Department and maintained through their maintenance contracts.

7.8.2.5 Monitoring & Condition

The majority of these assets are inspected as part of the *Road Maintenance Contract* in terms of their markings, signs etc. However, no formal inspection or condition rating process is in place for these devices and very little is known about them in terms of type, age, location etc.

7.8.2.6 Acquisition (Growth) Plan

Selection Criteria and Formal Ranking Procedure

The creation of these assets is generally undertake either as part of a Major Project, such as the creation of a new road or a major seal renewal, or as Minor Improvement works through customer requests of identified Safety Deficiencies.

[2] From NZTA *Traffic Standards and Guidelines 2003/2004 Survey, RSS 21: Traffic Calming Devices*

[3] From NZTA *Traffic Standards and Guidelines 2003/2004 Survey, RSS 21: Traffic Calming Devices*

7.8.2.7 Maintenance Plan

As mentioned in the Management & Operations section, there is no maintenance contract or plan specific to these devices, however their components are covered by the *Road Maintenance Contract;*

- markings,
- signs,
- surfacing, and
- pavements

and the Parks Department maintenance contract for the maintenance of garden in-fills.

Any further detail on maintenance can be found in the relevant sections of this Life Cycle Management section.

7.8.2.8 Renewals Plan

The majority of these assets are unknown in terms of their condition, age etc. This means that the renewal of these assets generally only occurs as part of pavement or surface renewal projects or as Minor Improvement works identified through the Deficiency Database.

7.8.2.9 Improvement Plan

Improvements of these assets will only be undertaken as part of Capital Improvement Projects such as pavement or surface improvements.

7.8.3 Street Furniture & Bus Shelter Activity

7.8.3.1 Overall Strategy

Summary of the overall strategy for the next 5-10 years including:

- Maintenance & Operations - When a shelter is vandalised on a regular basis, it becomes too expensive to replace the glass – approximately $2,500 to re-glaze an entire shelter. The next step is

that when a more appropriate/deserving site is identified the vandalised shelter may be refurbished and relocated

- Renewals - The old steel shelters are becoming structurally unsafe. When these are removed, a decision on the replacement style of shelter will be made based on the track record of vandalism in the area.

- New Assets - This will be driven by customer requests and validated by the NRC. Some sites do not lend themselves to shelters due to the lack of space or resistance from property owners. Shelters are often perceived by locals to be venues of undesirable behaviour. New vandal proof shelters have been installed at some sites replacing glass sided shelters as they are relocated.

The capital expenditure has in the past been vulnerable to cost cutting. However, to achieve the proposed gains in public transport use that have been identified in the Whangarei Transportation Strategy, a budget increase is being proposed that enables five new shelters to be installed annually (up from the previous two per annum). An increase is also being proposed to provide additional seating.

7.8.3.2 Description

The street furniture and bus shelters activity consists of;

- 74 seats (all located in the CBD);
    - 7 bench seats with no backs
    - 67 bench seats with backs
- Seven timber fences at a total length of 607m,
- An unknown quantity of bollards, and
- Approximately 50 bus shelters (glass, concrete and steel).

7.8.3.3 Management & Operations

Public Bus Stops & Shelters

The Northland Regional Council tender and manage the bus service in Whangarei. Over recent time the Roading Department have started managing the associated bus service infrastructure on behalf of the NRC. This has been done on the basis that WDC Roading Department have the resources and physical works contractors to more effectively put this infrastructure in place. NRC provides some subsidies regarding the creation and maintenance of the bus shelters.

School Bus Stops & Shelters

Rural school bus shelters and stops are not funded by the Roading Department. The creation and maintenance of these shelters is generally undertaken and funded by community groups.

Ownership

Some clarification is required as to which Council department owns, and is responsible for some of the benches in the district. In generally any benches in the road reserve is owned by the Roading Department; however those in walkways/alleyways that link roads to parks or reserves could be deemed the property of either the Roading or the Parks Departments.

NZTA

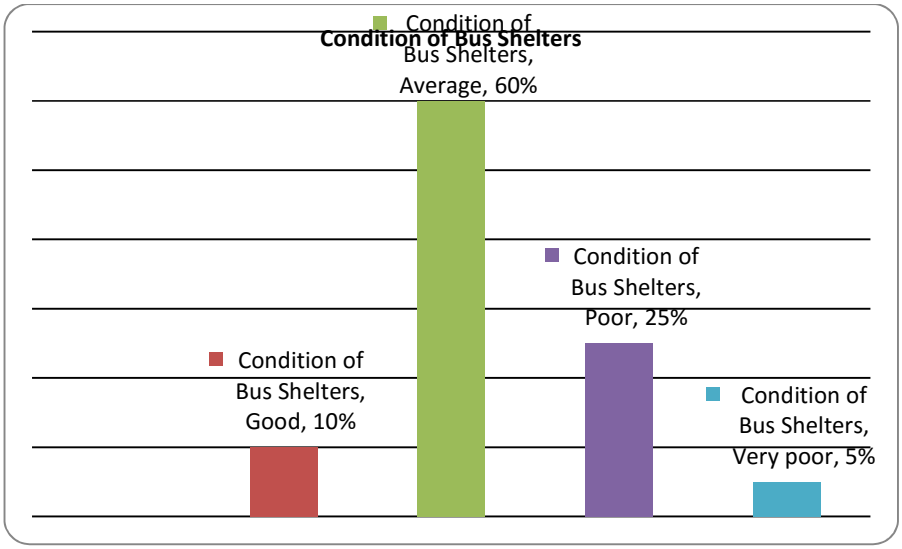
Street furniture on the urban highways is the responsibility of WDC, while NZTA looks after all furniture on the rural highways.

Maintenance Contract

The maintenance and operations associated with the districts street furniture are conducted by the maintenance contractors and governed by the *Road Maintenance Contract.* This excludes bus shelters which are maintained by small local operators.

7.8.3.4 *Monitoring & Condition*

Condition for bus shelters is shown below.



7.8.3.5 Acquisition (Growth) Plan

Street Furniture

Approximately five seats/benches per year are to be installed at a cost of around $10,000. These, along with bollards and fences are generally installed as part of street scaping projects.

Bus Shelters

The Northland Regional Council (NRC) operates the local buses in the district and works closely with the Roading Department to determine the most appropriate location for bus stops and shelters. During the 2018/21 period the Whangarei District Council in collaboration with the Northland Regional Council is planning on carrying out a Public Transport Infrastructure Strategy. This strategy will help determine the current and long term location of bus stops and their associated infrastructure (pull off bays, bus shelters, signage and seating).

The selection process for bus shelters is based upon a number of criteria:

- List of sites compiled from NRC, the bus company and the public. These sites can be influenced by changes in bus routes or extra routes being included.
- Passenger volumes are then considered – this can define the sort of shelter required.

- Pull off bays as part of the bus shelter – designed behind the whole bus pull off area.

7.8.3.6 Maintenance Plan

Maintenance of street furniture, including bus shelters, is conducted as part of the *Road Maintenance Contract*. The furniture is inspected during the inspections of the entire network and any reactive maintenance is undertaken as detailed in Volume 2 - Appendix E with any larger maintenance requirements becoming programmed work. Bus stop maintenance is reactive only.

All bus shelters are cleaned monthly small local operators.

Fence maintenance is all reactive and is generally driven by customer complaints.

A large part of the maintenance of street furniture and bus shelters is due to vandalism and tagging. The glass bus shelters are the most susceptible to vandalism,

7.8.3.7 Renewals Plan

Benches

Generally around two seats per year are refurbished at a cost of approximately $1,000 each.

Bus Shelters

All the old steel bus shelters in the district require renewing and the glass shelters are to be phased out due to their susceptibility to vandalism. These may be replaced by perforated steel shelters. These renewals will occur at a rate of two replacements per year.

The assets that require renewal are generally identified either by the maintenance contractors during their inspections or by the public. There are no set intervention levels of defects that are used.

The renewal of both the steel and glass shelters is being undertaken due to the steel shelters reaching the end of their life-spans, and the glass shelters requiring a high level of maintenance.

7.8.3.8 Improvement Plan

It is proposed that an accelerated programme of 5 new bus shelters and seats be provided on an annual basis to encourage uptake in public transport use.

7.9 Operational Traffic Management

7.9.1 Traffic Signals Activity

7.9.1.1 Overall Strategy

Detectors – Induction detector loops are quite an issue at some locations. Overall the main technical issue is detection. The quality of detection is very important and directly impacts the levels of service delivered. Waterproofing feeder cables at the joint with the loop wire tails in kerb junction (toby) boxes has been done at a number of sites and this has assisted, along with cable replacements where necessary. A rolling programme will be developed to address this issue going forward.

In addition, it is proposed to provide improved pedestrian and public transport detection technology at key intersections. The pedestrian detection will utilise CCTV cameras to confirm whether a pedestrian is still waiting to cross before activating a pedestrian phase to limit green time being wasted. This will improve the efficiency of intersections. Public transport detection will be provided using the PTIPS system which enables detection of approaching buses using in-board transmitters which are being fitted in the Northland Regional Council's bus service. This system will enable a phase to be called up to give bus approach leg of the intersection priority over other movements, increasing the efficiency of the bus service.

SCATS Master Computer – The main SCATS computer located at Forum North that controls the traffic signal network is 30 years old, obsolete and is becoming unreliable. There is also a significant risk that this old computer will fail which would result in all traffic signal sites reverting back to their default settings which would cause major congestion. It is proposed to replace this computer with a new modern computer with GSM communications. This should result in a more reliable and efficient management of the traffic signals.

The old SCATS computer also only has sufficient capacity to cater for 32 sites. Following the completion of the Kamo Cycleway and SH1/Tarewa Rd intersections projects there will be 30 sites, which will not allow for sufficient capacity to cater for future demand, particularly that resulting from the Whangarei to Te Hana

project which could introduce another 5 signal sites in Whangarei City. The new SCATS computer will also provide sufficient capacity to cater for future demands.

Communications - Telecom/Chorus has advised that the leased circuit point-to-point copper communications links we currently use are now regarded as a "legacy" product, i.e. there will be no new circuits and any we retire will not be able to be reactivated. This copper wire communication is becoming unreliable due to its age and lack of maintenance which can cause a site to "drop out" from the SCATS system and revert to its default greentime settings. Therefore we need a new communications solution for traffic signals. WDC is proposing to install a fibre connection to its signals using the cycleway network as the route for its fibre cables. Ducts for this fibre network are being installed as part of the Kamo Cycleway and can be retrofitted on the other cycleway corridors. Traffic signals that do not have WDC fibre connections will be connected to the Northpower fibre network, or will have WiFi communications. WiFi will also be used as a back up for the fibre communications should this service go down. This should make WDC's traffic signals more reliable and efficient.

CCTV Cameras – Currently the traffic signal network has no cameras, which means that issues that occur on site can only be addressed by someone visiting the site to determine what is causing the issue. This results in slower responses to issues that occur and increased delay to traffic flows. In conjunction with the proposed improvements to communications, the Council is proposing to install CCTV cameras on its traffic signal network to enable the traffic signals to be controlled remotely resulting in faster response times to issues and a more efficient service. It will also enable better monitoring or crashes and incidents resulting in easier identification of issues requiring upgrade works. Over the 2018/21 period, five intersections will be upgraded with CCTV cameras to trial this approach.

Remote Operations – Following the upgrade of the SCATS master computer, the improved fibre/WiFi communications and installation of CCTV Cameras, the Council will be able to control the traffic signal network remotely. It is also proposed to combine the streetlight CMS system being installed as part of the LED streetlight conversion project currently underway with the School Zone and other ITS signs as well as the Te Matau a Pohe bridge operations to create a true remote operations centre, similar to that of ATOC (Auckland Traffic Operations Centre). This system would include fault recognition which would generate an automatic text to maintenance staff to alert them to issues as they arise. This will enable faster response times to issues, efficiencies in operating costs and back up from ATOC or other providers when necessary.

Traffic Signal Controllers – Good progress has been made with replacing old obsolete traffic signal controllers and this programme needs to be completed. Two obsolete traffic signal controllers will be replaced in the 2018/21 period at the Riverside Dr signalised pedestrian crossing and at the Dent St/John ST pedestrian crossing.

Belisha Pedestrian Crossings - Many of the crossings have cable that is of the tough plastic sheathed (TPS) type. This is the type of cable normally used in internal electric "fixed wiring" and as such is not rated for use in an underground situation. All crossings in this situation require their wiring to be replaced for safety. Lighting on the crossings currently does not comply with the requirements of AS/NZS1158.4:2009 Lighting for Pedestrian Crossings and other aspects of the AS1158 Road Lighting series, however this issue will be addressed as part of the LED streetlight conversion which is currently underway.

7.9.1.2 Description

This group includes all components associated with traffic signals and level crossing lights;

- Signal Pole / Outreach Arm
- Signal Lantern
- Pedestrian Call Box
- Loops
- Cabling
- Control Cabinets
- SCATS Control System

There are a total of 27 traffic signals sites that are maintained and operated by WDC. Eights of these are on the State Highway network but are managed by the Roading Department as part of the network. There are also 17 pedestrian crossings which are electrically lit at night and which also operate Belisha beacons.

The tables in Volume 2 - Appendix A provide a breakdown of the traffic signal assets.

7.9.1.3 Management & Operations

The management and operations of traffic signals is conducted using SCATS.

The Council operates a programme called the Sydney Coordinated Adaptive Traffic System (SCATS). This programme provides the ability to;

- link intersections to effectively respond to changes in traffic flows,
- monitor intersections performance,
- collect and analyse fault and alarm data, and
- operate a fall-back system to allow intersections to operate in the event of communication breakdowns.

Maintenance Contract

The maintenance of traffic and pedestrian signals is governed by the *Traffic and Pedestrian Signal Maintenance Contract*. The contract covers 27 sets of traffic lights, 17 sets of pedestrian lights and 66 school zone signs and includes any installations necessary as well maintenance and inspections.

NZTA

The Roading Department manages and maintains the traffic signals on the districts state highways as part of an agreement with NZTA. NZTA reimburses all maintenance costs associated with these signals and includes an additional 9% of the overall expenditure as professional fees.

7.9.1.4 Monitoring & Condition

As part of the maintenance contract the signals are inspected every three months.

The main condition issues that have been identified are;

- On-going maintenance issues that are created due to repairs done under a constrained budget,
- Old controllers that are now technologically obsolete,

- Old SCATS master computer that is becoming less reliable;
- Old frames that are allowing water to seep into the load boards, and
- Corrosion issues around old poles, possibly rusting from the inside out.
- Aging communication equipment

7.9.1.5 Acquisition (Growth) Plan

Most new signals are created as part of a larger project where a major intersection realignment or new urban link is being planned. Therefore requirements for the traffic signal component are completed as part of the larger project. An example of this is the Kamo Cycleway project which is currently under construction and is adding 4 pedestrian traffic signals to the network.

Where a signalised control project is being completed as a standalone project, the planning issues revolve around property purchase negotiation and consultation with affected parties. Where the project is 'simple', issues are not generally significant so planning can be completed within the same year as the design and physical. Where the projects are more complex, planning and design is committed to the year prior to the physical works.

A complex project is defined as where a full intersection redesign is required that may include realignment of the intersection or an existing non signalised intersection has been identified for signalisation.

The following table details new traffic signals which may be added to the network managed by WDC.

Table 7-5: Traffic Signals Acquisition Projects

Project	New Assets	Indicative Timing
Kamo Cycleway	4 new pedestrian signal sites	2017-2019
SH1/Tarewa Road Intersection Upgrade	1 new traffic signal site	2018-2019
SH1 Whangarei to Te Hana Upgrade	Potentially 5 new traffic signal sites at the southern end of Whangarei City	2019-2028
SH1 Kawakawa Pedestrian Crossing Upgrade	1 new pedestrian signal sites	2018-2021?

7.9.1.6 Maintenance Plan

Traffic signals maintenance is tendered as a separate contract. Council also undertakes the maintenance of the state highway signals groups on behalf of NZTA.

The maintenance plan is based on the routine inspections conducted every 13 weeks. From these inspections any minor maintenance, under $1,000, is undertaken as per Volume 2 - Appendix E. Any major

maintenance, over $1,000, must first be authorised by the Councils engineer and then it becomes scheduled maintenance.

Over the past years the repairs on traffic signals have been undertaken with budget constraints. This has resulted in on-going long-term maintenance issues such as;

- Old frames that are allowing water to seep into the lantern heads.
- Corrosion issues around old poles, possibly rusting from the inside out.
- Detector failure due to poor pavement / surfacing and old cabling and ducting.

Reactive, unplanned and emergency works undertaken on traffic signals are based on the criticality of the signals with;

- Critical sites running 24/7 and attracting priority for repairs,
- Important sites operable within 4 hours of defect notification, and
- Non-critical sites operable as soon as possible but within 24 hours of defect notification.

A list of the criticality of each site is provided in Volume 2 Appendices and high priority sites given in *Table 8-4* criticality.

7.9.1.7 Renewals Plan

The detector loops at many sites are subject to water ingress and are unreliable or have failed. This results in inefficient allocation of green time due to poor or no vehicle detection which leads to increased delays and congestion.

The SCATS master computer is now 30 years old and is becoming unreliable. There is a significant risk of this computer failing which would result in all traffic signal sites reverting back to their default settings and would cause major congestion.

The network currently has two controllers that are now technologically obsolete. This means that it is no longer possible to acquire parts for these assets, leading to severe maintenance issues.

The aim of the renewals programme over the 2018/21 period is to have a rolling programme of detector renewals, replace the old SCATS computer and to replace the two obsolete traffic signal controllers.

The traffic signal renewal projects are shown in Section 10.2.6.

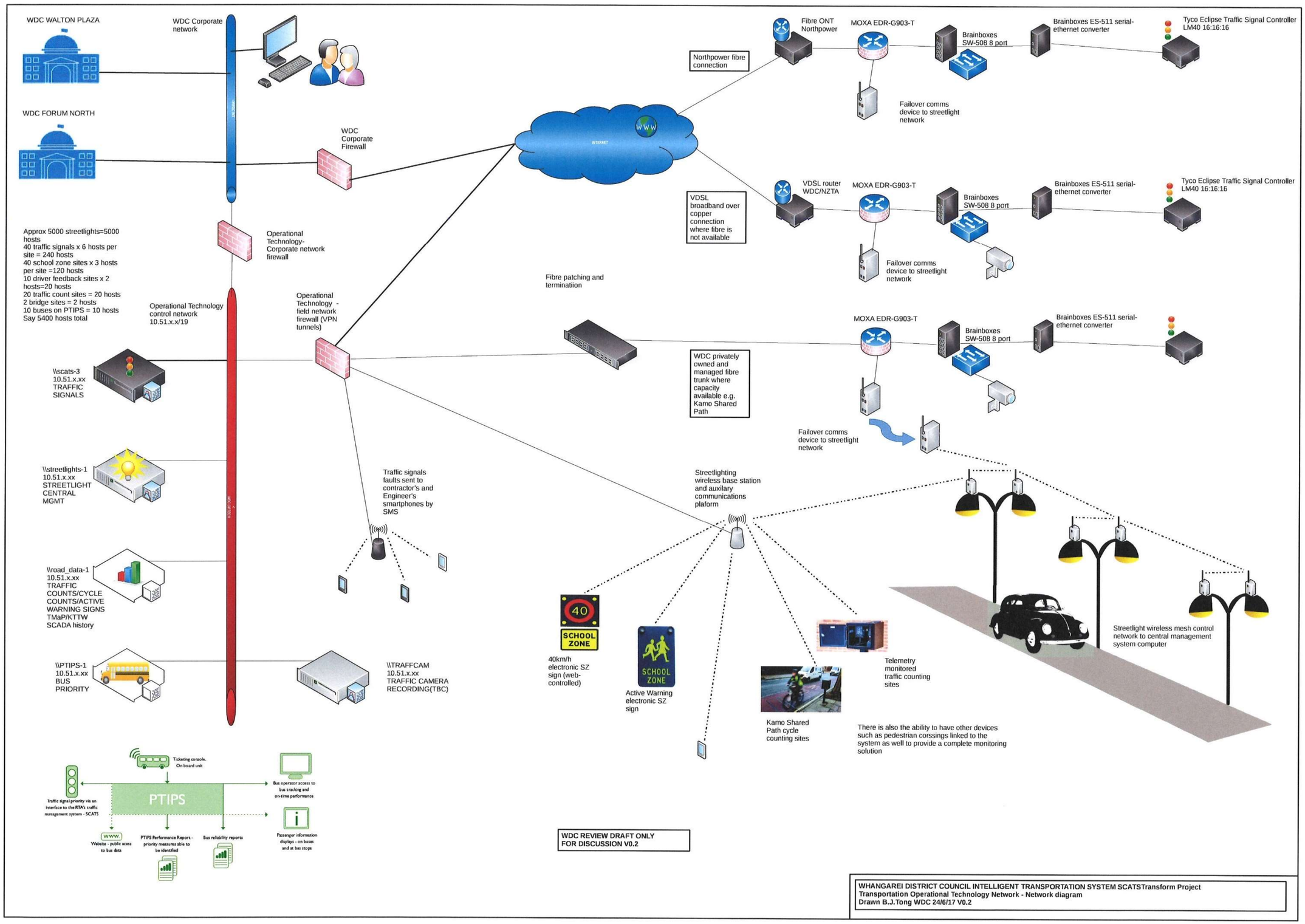
7.9.1.8 Improvement Plan

A substantial improvement of the traffic signal network is planned during the 2018/21 period. As described in Section 7.9.1.1 Overall Strategy, the improvement projects that are proposed include:

- Replace the obsolete copper wire communications with fibre optic/WiFi communications
- Install CCTV cameras, including pedestrian detection cameras and PTIPS for bus prioritisation
- Develop a remote operations control centre to control the traffic signal network, ITS devices, streetlight network and the Te Matau a Pohe and Kotuitui Whitinga opening bridges.

A schematic diagram of how this remote operation would be structured is provided on the following diagram.

The programme of improvement works for the 2018/21 period is detailed in Section 10.2.7


WDC WALTON PLAZA
WDC Corporate network
WDC FORUM NORTH
WDC Corporate Firewall
INTERNET
Northpower fibre connection
Fibre ONT Northpower
MOXA EDR-G903-T
Brainboxes SW-508 8 port
Brainboxes ES-511 serial-ethernet converter
Tyco Eclipse Traffic Signal Controller LM40 16:16:16
Failover comms device to streetlight network
VDSL broadband over copper connection where fibre is not available
VDSL router WDC/NZTA
Approx 5000 streetlights=5000 hosts
40 traffic signals x 6 hosts per site = 240 hosts
40 school zone sites x 3 hosts per site =120 hosts
10 driver feedback sites x 2 hosts=20 hosts
20 traffic count sites = 20 hosts
2 bridge sites = 2 hosts
10 buses on PTIPS = 10 hosts
Say 5400 hosts total
Operational Technology- Corporate network firewall
Operational Technology control network 10.51.x.x/19
Operational Technology - field network firewall (VPN tunnels)
Fibre patching and terminatiion
WDC privately owned and managed fibre trunk where capacity available e.g. Kamo Shared Path
\\scats-3 10.51.x.xx TRAFFIC SIGNALS
\\streetlights-1 10.51.x.xx STREETLIGHT CENTRAL MGMT
\\road_data-1 10.51.x.xx TRAFFIC COUNTS/CYCLE COUNTS/ACTIVE WARNING SIGNS TMaP/KTTW SCADA history
\\PTIPS-1 10.51.x.xx BUS PRIORITY
\\TRAFFCAM 10.51.x.xx TRAFFIC CAMERA RECORDING(TBC)
Traffic signals faults sent to contractor's and Engineer's smartphones by SMS
Failover comms device to streetlight network
Streetlighting wireless base station and auxilary communications plaform
40
SCHOOL ZONE
40km/h electronic SZ sign (web-controlled)
SCHOOL ZONE
Active Warning electronic SZ sign
Kamo Shared Path cycle counting sites
Telemetry monitored traffic counting sites
There is also the ability to have other devices such as pedestrian corssings linked to the system as well to provide a complete monitoring solution
Streetlight wireless mesh control network to central management system computer
Ticketing console. On board unit
PTIPS
Traffic signal priority via an interface to the RTA's traffic management system - SCATS
Bus operator access to bus tracking and on-time performance
Passenger information displays - on buses and at bus stops
WWW
Website - public acess to bus data
PTIPS Performance Report - priority measures able to be identified
Bus reliability reports
WDC REVIEW DRAFT ONLY FOR DISCUSSION V0.2
WHANGAREI DISTRICT COUNCIL INTELLIGENT TRANSPORTATION SYSTEM SCATSTransform Project
Transportation Operational Technology Network - Network diagram
Drawn B.J.Tong WDC 24/6/17 V0.2

7.9.2 Intelligent Traffic System Activity

7.9.2.1 Overall Strategy

- School Zone Signs - The maintenance cost for the SCZ40 type signs is much too high, in excess of $50k per annum. The key issue is that moisture enters the signs and the electronics deteriorate rapidly after a time in the field. We have attempted to resolve this with a retrofit sealant solution (magic rubber) but this only produced a partial cure.

  The preferred solution is to retire these signs and commence a replacement programme. A new type of sign the ASL SZS sign has been identified which has a much higher level of water resistance and with digital telemetry equipment to identify faults. There are some 35 SCZ40 signs in the network as outlined above. It is proposed to replace 9 sites over the 2018/21 period.

- Traffic Count Loops - Council's traffic counting is largely procured using contracted resources based on tube traffic counters. For higher volume routes and inner CBD areas this method is not suitable for reasons of wear and tear on equipment, Health & Safety for count staff, vandalism and accuracy. Where the traffic flow is greater than 10,000 ADT as the H&S and count reliability issues become difficult to manage we need to consider installing a permanent count site.

  Council is proposing to install telemetry traffic and cyclist/pedestrian counters in conjunction with the planned traffic signal upgrades and school zone signs which with the data being sent via WiFi to Council's traffic operations centre (TOC).

7.9.2.2 Description

The Intelligent Traffic Systems (ITS) Activity consists of;

- Driver Feed-Back Signs
- School Zone Signs HMI SCZ40 40km/h roundel – solar powered
- School Zone Active Warning Signs HMI SCZAFL – solar powered
- VMS signs associated with the Te Matau a Pohe bridge
- Inductive Loop Traffic Counting Sites – classification
- Inductive loop Traffic Counting Sites - vehicle count only

7.9.2.3 Quantity of Assets

The Council owns two driver feedback devices that are moved between seven sites. These are installed to provide driver awareness and feedback on speed in order to educate the driver to be aware of the speed limit in relation to their travelling speed. This is a joint campaign between Council and ACC and is directed at reducing speed in the urban areas.

Additional to this, there are also a number of schools which are now limited speed zones (40km/hr) during certain times during the school week. Council has 27 school variable speed zone sites. The hardware comprises of 35 SCZ40 40km/h roundel signs (HMI), 13 SZS 40km/h roundel signs (ASL), and 18 Active Warning Signs type SCZAFL (HMI).

The Active Warning signs are installed in rural environments with a 100km/h base speed limit as these locations do not meet the Traffic Note 37 requirements for a 40km/h variable speed limit to be imposed.

The sites in the district where school zone signs are installed are listed in Volume 2 - Appendix A.

There are 5 road VMS signs controlled via wireless communications via the Te Matau a Pohe bridge PLC. There are also 8 inductive loop traffic counting sites on the road network.

7.9.2.4 Management & Operations

The maintenance of ITS assets is completed under the *Traffic and Pedestrian Signal Maintenance Contract* and therefore is subject to similar maintenance, renewal and improvement plans.

7.9.2.5 Monitoring & Condition

No condition data is collected on this asset at this time. The asset operation is monitored through the maintenance contract.

Age

The age of the school zone signs are known and are shown in *Table 7-6* below.

Table 7-6: Age and Remaining Life of School Zone Signs

Age	Number of Signs	Remaining Sign Life	Remaining Battery Life
4	19	6	0
2	21	8	2
1	20	9	3
Average		**7.7**	**1.7**

7.9.2.6 Acquisition (Growth) Plan

There are no plans to create or acquire any ITS. The creation of these assets results from demands from customers or through finding from minor safety studies. All ITS are funded by the community or the Low Cost/Low Risk Improvements budget.

7.9.2.7 Maintenance Plan

As part of the *Traffic and Pedestrian Signals Maintenance Contract* the school zone signs are inspected before the start of each school term (four times per year). From these inspections any minor maintenance, under $1,000, is undertaken. Any major maintenance, over $1,000, must first be authorised by the Councils engineer and then it becomes scheduled maintenance.

Minor maintenance is based on the maintenance contract (the response times etc. are set out in Volume 2 Appendices) while major maintenance is prioritised based on the severity of the damage and the criticality of the asset.

7.9.2.8 Renewals Plan

The School Zone Signs 40km/h type SCZ40 are to be retired as Council's field experience with this particular unit has been poor. To keep the unit's operating has been a struggle and the ongoing poor reliability has produced significant amounts of negative feedback from our School stakeholders.

There is also an ongoing cost for providing the communications for the signs.

The replacement is the ASL type SZS. This sign has full IP55 rating which means that the moisture ingress problem that has caused ongoing faults due to corrosion and electrical deterioration will be resolved. The device also has remote monitoring via the GSM network and a proprietary web interface (Digital Telemetry Ltd).

These features (and good feedback from Hutt City and Nelson City who are current users) is expected to dramatically reduce maintenance costs on this asset type.

The new type will be rolled out progressively but it is envisaged that Schools will be prioritised based on the history of the equipment at each location.

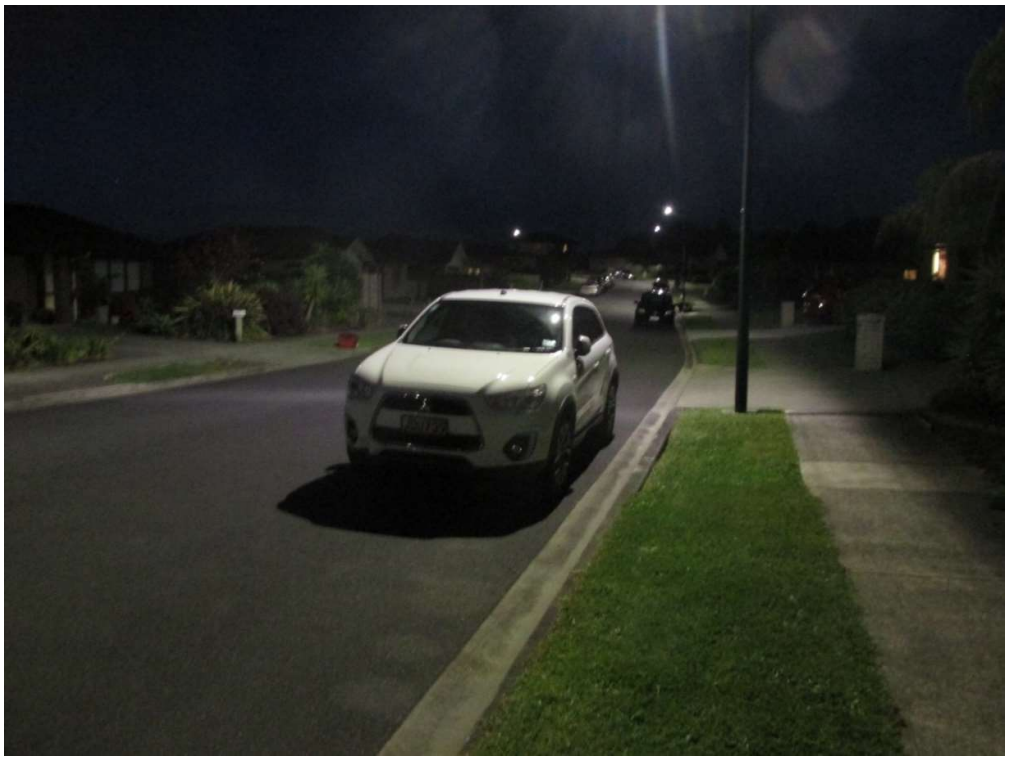
Volume 2 Appendix E contains the failure modes and condition indicators that are used to determine if an ITS requires renewal.

The renewals plan for the ITS systems are shown in Section 10.2.8.

7.9.2.9 Improvement Plan

Intelligent traffic systems are generally improved by replacing old assets with new technology, and this is incorporated in the Renewal Plan.

7.10 Network Lighting



7.10.1 Overall Strategy

LED Luminaires – Council is currently undertaking a replacement of all of its existing streetlights with LED streetlights. This work is being undertaken to achieve efficiency gains because LED luminaires have 30-60% less power consumption than traditional street lights and are expected to last 20 years which reduces maintenance costs. A business case prepared by Opus has indicated that the payback period for LED luminaires is about 8-10 years. Overseas research also indicates that white light of around 4000 K (kelvin) is superior in terms of reaction times for motorists and this translates into crash savings of up to 30%.

The LED replacement project is expected to be completed by 30 June 2018 to take up NZTA accelerated financial assistance rate (FAR) of 85% for this work.

Central Management System (CMS) – As part of the LED replacement project, a central management system (CMS) is also being installed. This consists of a light point controller (LPC) on each LED luminaire which sends a radio signal to a local gateway which then on sends this to a CMS via the internet using WiFi. This CMS will identify when a light is out and needs fixing and also will provide actual power usage for more accurate power billing. Council is also proposing to "piggy-back" off the CMS to provide telemetry for School Zone Signs and other ITS, as well as telemetry traffic and cyclist/pedestrian counters.

Infill Lighting - Council has recognized the AS/NZS1158 series of standards as the standards that the adequacy of road lighting will be assessed against. These standards provide for two main categories: Category V lighting, where the intent is to light the road carriageway for the benefit of road traffic (ie arterial roads) and category P lighting, where the intent is to light the road corridor as a whole for the benefit of all users – to deter crime and fear of crime (ie local roads).

As part of the LED replacement project, the V Category intersections and roads on the Twin Coast Discovery Highway will be upgraded with infill lighting as necessary to meet the V Category standards and remove dark areas. However, there will be midblock sections on the V Category roads in Whangarei City which will have infill lighting designed but not implemented. Following on from the LED conversion project, the 2018/21 programme will include for $500,000 per annum for completion of infill lighting on these V Category midblock roads.

Council will also undertake a HISLAT survey to identify any dark areas on the P Category (local) roads. Council will then prioritise the deficiencies based on proximity to schools, community safety, traffic flows and crash history. Where funding allows, some P Category infill lighting will be programme to address the worst of these dark areas. Details of costs and timing are not available at this stage.

Poles - Pole condition is a concern. There are quite a few concrete columns whose condition is unknown. Recently there were failures of Oclyte type columns at Riverside Dr and Bank St, and the discovery of acid soils and corrosion issues at Rewarewa Rd and also in the Marsden Point area means Council needs a means of non-destructively checking the condition of poles as a matter of priority.

A non-destructive measurement technique from PortaCAT Industries was used on a sample of 100 ground plant (not shear base) columns in the urban area. Of the 100 tests undertaken, 31 sites were recommended for replacement. Ongoing testing of streetlight poles is likely to require a regular replacement programme to be developed.

7.10.2 Description

Council has a network of some 5,089 lights which are road lights, and also deals with a significant number of other lights in areas such as carparks, amenity areas and toilet blocks. Also Roading maintains feature and decorative lighting for other elements of Council.

A summary of the network lights is provided in *Figure 7-31* below

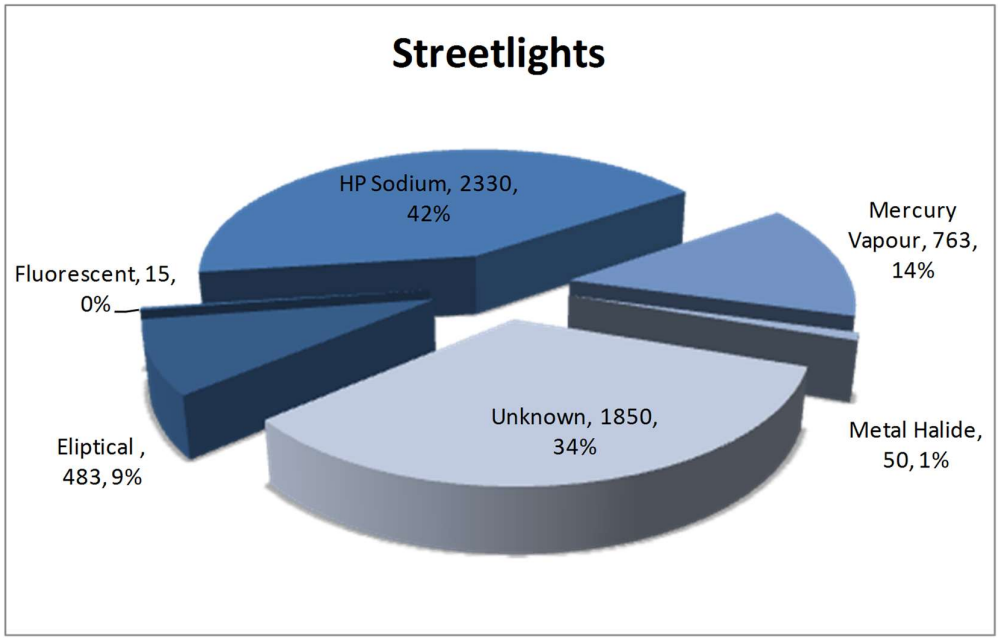


Figure 7-31 Streetlights by Type

The Network Lighting Activity includes all components associated with network lighting and is made up of the following asset categories;

7.10.2.1 Street Lighting

The street lighting is directly associated with the roads and streets to assist motorists with all necessary visual information (e.g. course of the road ahead, kerbs, footpaths, movement of pedestrians, cycles or other vehicles, etc.).

7.10.2.2 Amenity Lighting

Amenity lighting is associated with pedestrian areas to assist pedestrians with all visual information and personal security in hours of darkness.

7.10.3 Management & Operations

7.10.3.1 Maintenance Contract

The maintenance and operations of the networks light is governed by the *Streetlight Maintenance Contract*. It covers both street and amenity lighting in the urban and rural areas.

7.10.3.2 Ownership

There is some uncertainty around the ownership of some amenity lights. These uncertainties occur between the Roading Department and other Council departments around areas such as parks and public toilets.

7.10.4 Monitoring & Condition

As part of the maintenance contract every light is inspected at least once every five years.

There is currently no condition ratings in RAMM associated with either the poles or the lamps.

7.10.5 Acquisition (Growth) Plan

The requirement for capital street lighting programmes, inclusive of pedestrian lighting, is based on the deficiency identified on the network from lighting standards. In addition, capital lighting projects are requested by community groups to provide increased levels of lighting for safety reasons. These sites are assessed in terms of:

- community size
- safety issues being addressed
- related factors, such as police reports on theft in the area etc.
- impact on LoS and contribution to community outcomes
- budget constraints

These factors are then used to assess and prioritise one project against another. All projects are managed and maintained within the deficiency database.

Capital lighting projects can also be associated with new road construction and vested assets through subdivision development.

The capital works programme for the 2018/21 period will focus on infill lighting on the V Category (arterial) road network in Whangarei City. This work is detailed in the programme below.

Table 7-7: Capital Works Programme

Location	Project	Year	Value
Whangarei City	Infill lighting on V Category (arterial) road midblocks to achieve AS/NZS 1158	2018/19	$500,000
Whangarei City	Infill lighting on V Category (arterial) road midblocks to achieve AS/NZS 1158	2019/20	$500,000
Whangarei City	Infill lighting on V Category (arterial) road midblocks to achieve AS/NZS 1158	2020/21	$500,000

Where funding allows, infill lighting of the worst dark areas on P Category (local) roads may also be considered.

7.10.6 Maintenance Plan

The maintenance of the network lighting activity is delivered through the *Streetlight Maintenance Contract*. The maintenance plan is based on the routine inspections, some planned maintenance and reactive maintenance. The contract requires night-time inspections of arterial roads, car parks and recreational areas to be conducted at least four times per year.

The intervention levels and response times set by the contract are shown in Volume 2 - Appendix E.

Following the LED conversion project, the maintenance plan will be revised through the next version of the *Streetlight Maintenance Contract* to be tendered in 2018 to reflect the much reduced maintenance needs of the LED luminaires and the improved response times following the implementation of the central management system (CMS).

7.10.7 Renewals Plan

A key current focus area is the introduction of Light Emitting Diode (LED) streetlight lamps to replace the older less power efficient lamps on our network. LED lights are providing the same light output for about half the power demand. The power costs for WDC's streetlights are about $0.6M/yr so the savings would be significant. In addition, LED lights have long lives of approximately 20 years compared to a replacement cycle of 5 years for High Pressure Sodium lights which will reduce bulb replacement costs.

LED streetlights are currently providing between 30-60% power savings. Modelling by Opus shows that the pay-back period for LED lights on the Whangarei network is in the order of 8-10 years.

Following the completion of the LED replacement project in June 2018, it is expected that there will be minimal lighting renewal required apart from as required to replace the aging streetlight poles. Pole replacement will be the focus area for 2018/21 as shown in the table below:

Table 7-8: Capital Works Programme

Location	Project	Year	Value
Whangarei City	Streetlight pole replacement	2018/19	$100,000
Whangarei City	Streetlight pole replacement	2019/20	$100,000

Location	Project	Year	Value
Whangarei City	Streetlight pole replacement	2020/21	$100,000

There may also be some amenity lighting that requires replacement, and this is likely to be replaced with an equivalent LED luminaire.

The failure modes and indicators used to determine if and when a light, or any of its components, needs renewing is shown in Volume 2 - Appendix E.

7.10.8 Improvement Plan

The improvement of network lighting involves the replacement of old lamps with new, more efficient technologies and is therefore incorporated into the renewals plan. Occasionally infill programmes are completed for safety reasons. These are generally driven by customers concerns for personal safety.

Amenity Lighting

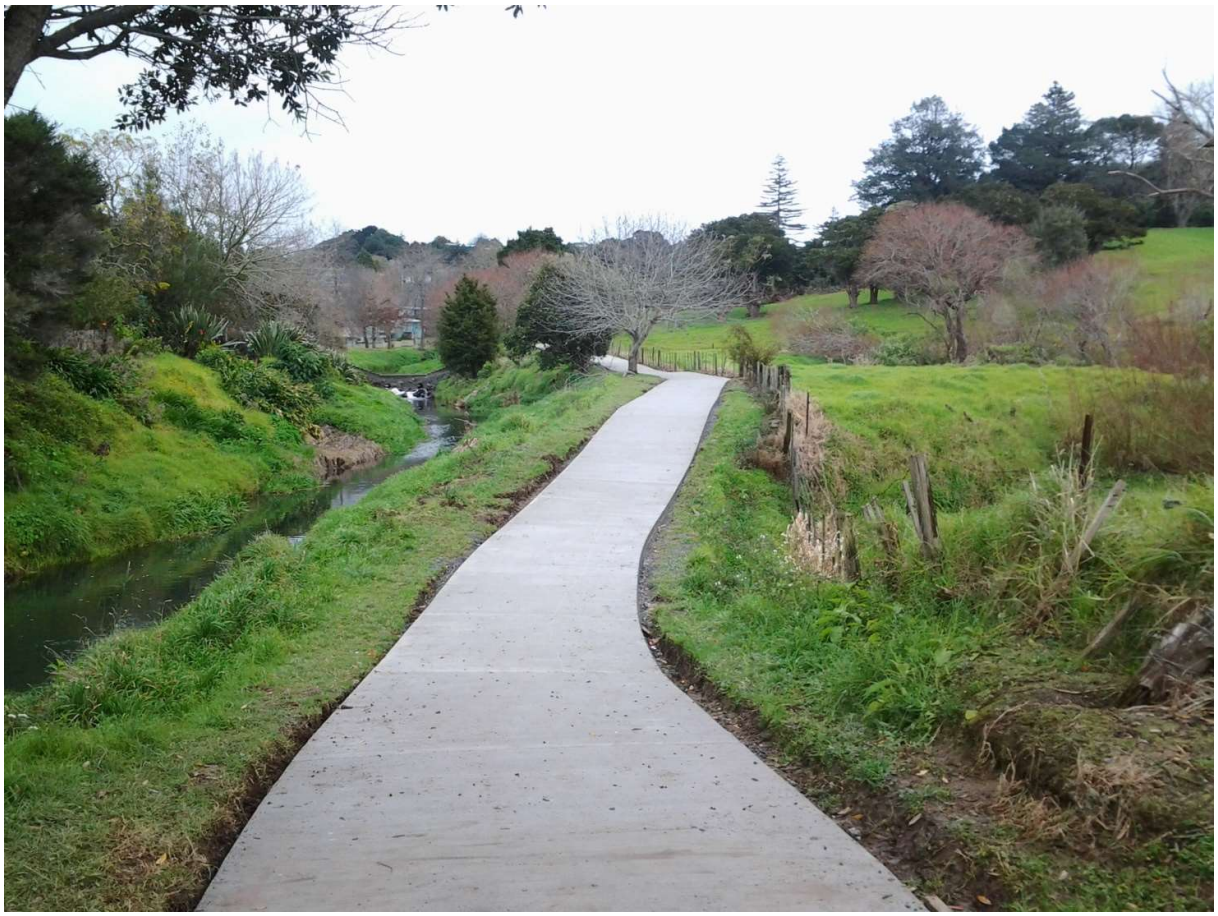
The Council is proposing to reintroduce a $80,000/annum programme of amenity lighting upgrades to provide new lights to illuminate Council and community assets that are not associated with the transport network.

- To cater for community requests for improved lighting that is not subsidised by NZTA.
- The provision of this lighting creates a safer environment at night.
- All requests for additional lighting are held in the deficiency database, currently to the value of $2.703 million.
- Lighting is installed based on the priority.
- Upgrades are carried out by increasing the number of lights or light fittings.

Amenity lighting includes the lighting of:

- buildings
- property and reserves
- under-veranda lighting
- festive lighting
- any other lighting not directly related to the operation of a road.

7.11 Footpaths and Cycleways



7.11.1 Overall Strategy

The Whangarei District Council developed its first Walking and Cycling Strategy in 2007. This strategy was updated and adopted by council in 2012. The strategy has the aim to create a district where walking or cycling are easy, safe and enjoyable everywhere in the public domain, are the preferred means of access and are a lifestyle or tourist attraction.

The goals of the strategy are:

1. Community environments and transport systems that support and encourage walking and cycling.
2. More people choosing to walk and cycle, more often.
3. A street environment that is similar for pedestrians and cyclists, in safety terms, as that of Whangarei's peer group of local authorities. Specifically: that, by 2016, Whangarei's rate of pedestrian and cyclist casualties be no higher than the average of its peer local authorities.

There are three streams for the implementation of the strategy.

The Implementation Plan covers a ten year time period from 2011/2012 to 2021/2022 and is split into 3 key implementation streams to run concurrently.

7.11.1.1 Implementation Stream 1 – Urban Whangarei Network

The focus of Implementation Stream 1 is to provide a comprehensive and safe network of cycleways and walkways linking Whangarei City with its urban growth nodes – Kamo, Maunu, Otaika, Onerahi and Tikipunga. Some of the linkages will also have a relationship with Implementation Stream 2 – Strategic District-wide Developments.

Implementation Stream 1 projects have been prioritised based on linkages with other major infrastructure projects, such as the Lower Hatea crossing and State Highway 1 improvements, connecting projects and completing full routes where possible. The full urban network plan itself remains largely as that which was developed through the 2007 Strategy. Connecting lower socio-economic communities including Otangarei (through the Kamo Route), Raumanga and Otaika, schools and key community facilities is a key outcome of Implementation Stream 1.

This includes the construction of significant off road paths on the following routes:

- Raumanga/Maunu
- Onerahi
- Kamo
- Tikipunga/Glenbervie

These routes connect residential areas to schools, recreational facilities and workplaces. It also connects to existing walking and cycle paths created as part of road construction projects such as Lower Hatea River Crossing, Porowini Ave Extension and Kamo Bypass/Spedding Road Extension.

Of these key routes, work has already commenced on the Raumanga/Maunu route and NZTA funding has been secured to complete this route as well as the Onerahi route. WDC has also completed the construction of the Hatea Loop walkway which connects the routes together.

7.11.1.2 Implementation Stream 2 – District-wide Strategic Development Programme

The focus of Implementation Stream 2 is on developing the Whangarei District District-wide Strategic vision and the NZ Cycle Trail network. This implementation stream also aligns with the Whangarei District Growth Strategy – Sustainable Futures 30/50 and connects many of our rural and coastal villages, urban growth nodes, Whangarei City and Marsden Point/Ruakaka.

The District-wide network will be developed primarily with the local communities who will benefit most from its provision. Implementation Stream 2 will enable Council to work with communities as opportunities arise to achieve its long-term strategic outcomes. On-road improvements are included in this implementation stream to develop safe routes over time, contributing to the NZ Cycle Trail route and the District-wide Strategy. It is anticipated that off-road routes will be developed through a range of funding sources and potentially community-based resources. Ecologically sensitive areas and natural hazards should be considered at the design stage of routes, particularly in the coastal environment. Co-ordination with Far North and Kaipara District Councils will be necessary to realise the full tourism potential of the District-wide Strategic vision.

7.11.1.3 Implementation Stream 3 – Safety & Participation Programme

The focus of Implementation Stream 3 is on increasing participation rates in walking and cycling specifically to address Goal 2 of the Strategy. This Stream provides for Council to work with partner organisations,

such as Bike Northland, to develop a comprehensive community-led approach to improving participation rates to deliver economic, social and environmental wellbeing benefits for all.

Implementation Stream 3 will implement both capital and non-capital projects promoting skills development, safety programmes and recreation opportunities. It promotes a holistic approach to improving walking and cycling participation focused on providing lifestyle choices for all and fulfilling the opportunities provided by recreation facilities alongside commuter facilities. Pohe Island will be the key physical focal point for Implementation Stream 3 as this will provide a safe park environment for recreation and cycle skills development, particularly for young children.

Implementation Stream 3 provides the main opportunity for engagement with children and youth. Youth, as a main user group of the facilities, could become involved in the design of facilities such as at Pohe Island, promotion of walking and cycling around the City and working with partner organisations to improve their cycle skills and physical activity. Implementation Stream 3 includes a Specific-purpose Community Grant administered through the Community Services Team to promote walking and cycling through community activities, events and skills programmes. As with other Community Grants administered by Council, funding may also be provided by other agencies.

The indicative costs included in Implementation Stream 3 does not include other potential funding sources and more funding, should this become available, would undoubtedly improve its effectiveness.

Work is currently underway to update the Council's Walking and Cycling Strategy and this will tie in with the Northland Regional Walking and Cycling Strategy which is also being developed. It is expected that they key themes of the new strategy will be similar to the current strategy.

7.11.1.4 Footpaths not Identified in Strategy

For existing footpaths the strategy is to:

- Review all available data to determine what we have
- Produce a list of all footpaths with a rating of high / medium or low usage.
- Carry out a video survey of all footpaths in July 2018 and use this to identify defects and develop condition ratings. Undertake a walk over of the high usage areas to start with to determine what repairs / renewals are required. Document this and rate the priority based on the extent of repairs.
- Form a 10 year programme with costings
- Allocate funding to allow approximately 3km of renewals each year.

For new assets – We have several million dollars' worth of requests for new footpaths recorded on the deficiency database. Any works have been prioritised to address high risk areas, around schools, where people are currently walking on the road. This is not a formal strategy but has been used following uncertainty from the prioritisation of sites in the deficiency database. A formal strategy should be adopted going forward and a ten year programme developed. Needs to be determined what the priority should be, high risk areas, safety, possible usage, urban or rural areas,

Dangerous defects in the footpath are attended to immediately on a temporary basis, and a permanent repair programmed. A portion of the footpath maintenance budget is allocated to replace damaged footpaths in conjunction with the road resealing programme.

7.11.2 Description

This activity consists of assets relating to walking and cycling including;

- Shared cycleways
- Footpaths and walkways attached to the roading network, including kerb dropdowns and crossing places
- Pedestrian barriers

The Whangarei District Council maintains 373 km of footpaths, 56 km of off-road walkways and 4.6 km of on and off road cycleways.

Figures below provide a summary of footpaths and cycleways on the WDC's network.

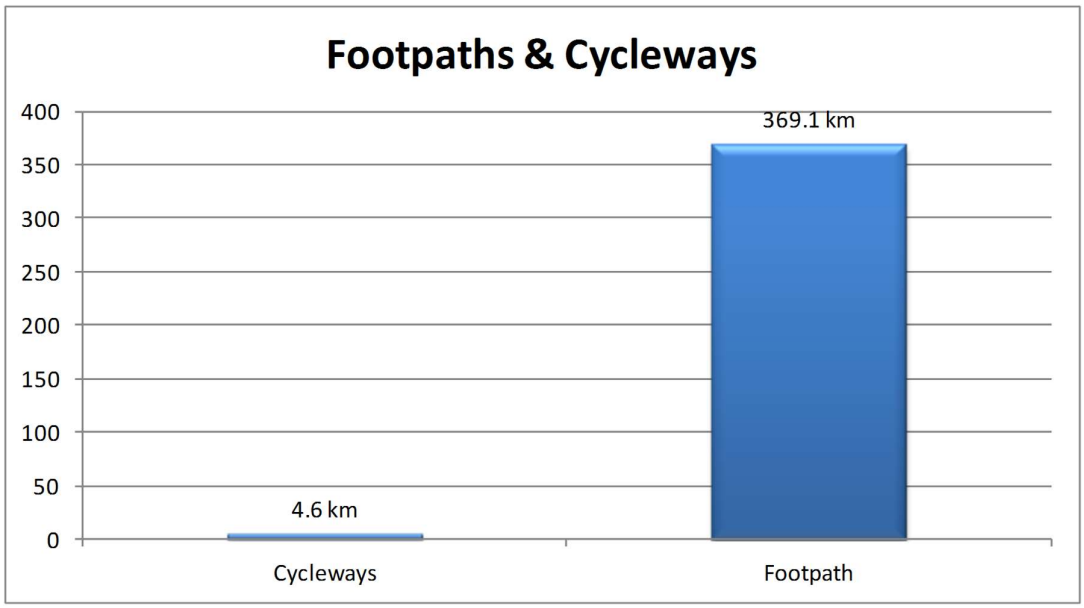


Figure 7-32 Footpath and Cycleway Lengths

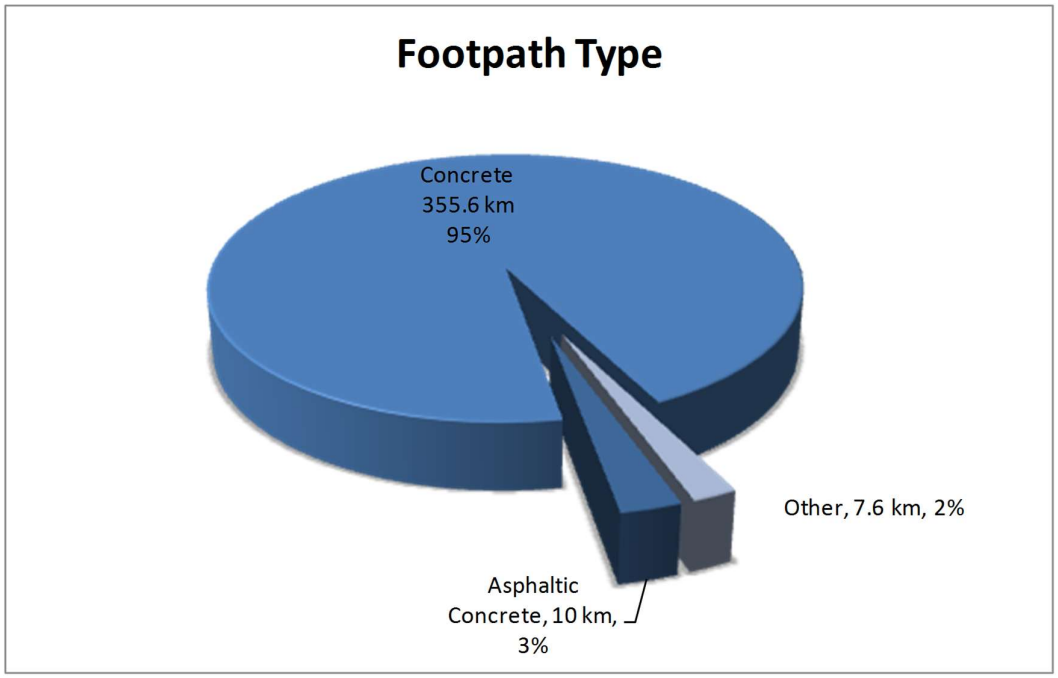
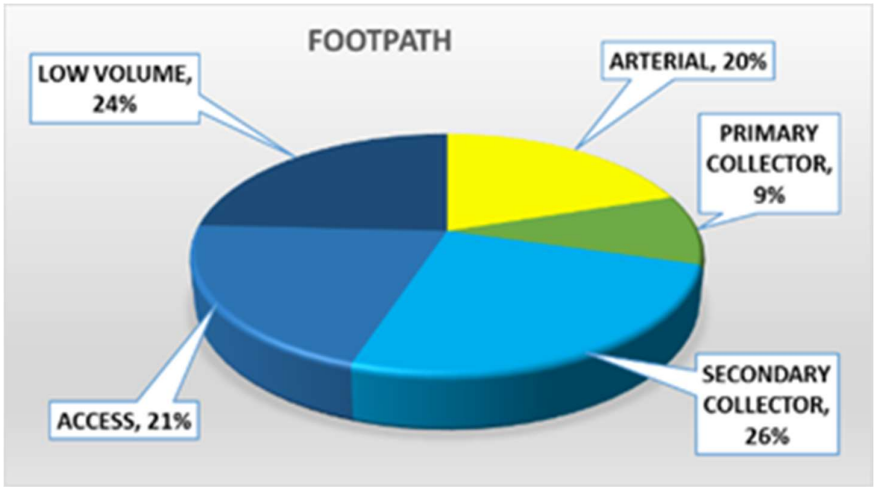


Figure 7-33 Footpaths by Material Type

The ONRC hierarchy of the footpath network is shown in the figure below:



7.11.3 Management & Operations

7.11.3.1 Maintenance Contract

Most of the maintenance and operations associated with this activity are conducted by the maintenance contractors and governed by the *Road Maintenance Contract*.

7.11.3.2 Ownership

Some clarification is required as to which Council department owns, and is responsible for, some of the walkways and alleyways in the district. In generally any walkway/alleyway that links two roads is owned by the Roading Department; however walkways/alleyways that link roads to parks or reserves could be deemed the property of either the Roading or the Parks Departments.

7.11.3.3 NZTA

As part of the MOU with NZTA the WDC is responsible for all school crossing controls, while NZTA is responsible for all other pedestrian crossing assets on State Highways.

All footpath maintenance is the responsibility of WDC, NZTA only reinstates the footpaths and only when they have been removed as part of State Highway works.

Cycleways are jointly funded by NZTA and WDC where these are part of Council's approved Walking and Cycling strategy.

7.11.3.4 Vehicle Crossing Applications

All new vehicle crossings require consent from the Council to ensure that they are constructed to the appropriate standards and cause as little disruption as possible to roadside drainage and neighbouring properties.

The maintenance of driveways from the road edge to the property boundary is the responsibility of the property owner.

7.11.3.5 Cycle Paths

On-road cycle paths are managed as part of the carriageway so are covered by the sealed pavement and sealed surface activities.

7.11.4 Monitoring & Condition

7.11.4.1 Condition

The last rating for footpath condition was done in 2011. This data is held within RAMM footpath condition rating table and is used to programme footpath maintenance programmes.

A video survey of all existing footpaths is being undertaken in July 2018 to determine the footpath condition and to rate each section of footpath. This data should be available in August 2018 and will be used to develop a 3 year and 10 year footpath maintenance and renewal programme. In addition, the new maintenance contracts will require the contractor to pick up defects on footpaths on a regular basis which would be used to update the condition rating of the footpath network going forward.

There is currently no specific inspection programme for cycleways, however facilities on or joined to the carriageway would be included in the *Road Maintenance Contract* Inspections that occur.

There is also no condition data for cycleways and there is no formal condition rating programme.

7.11.4.2 Age

The age distribution shown in the graph below has come from a total of 9% of the footpaths in RAMM as these are the only footpaths with associated age data. Due to such a limited amount of information it is unlikely that the graph represents the true age distribution for all the footpaths in the network.

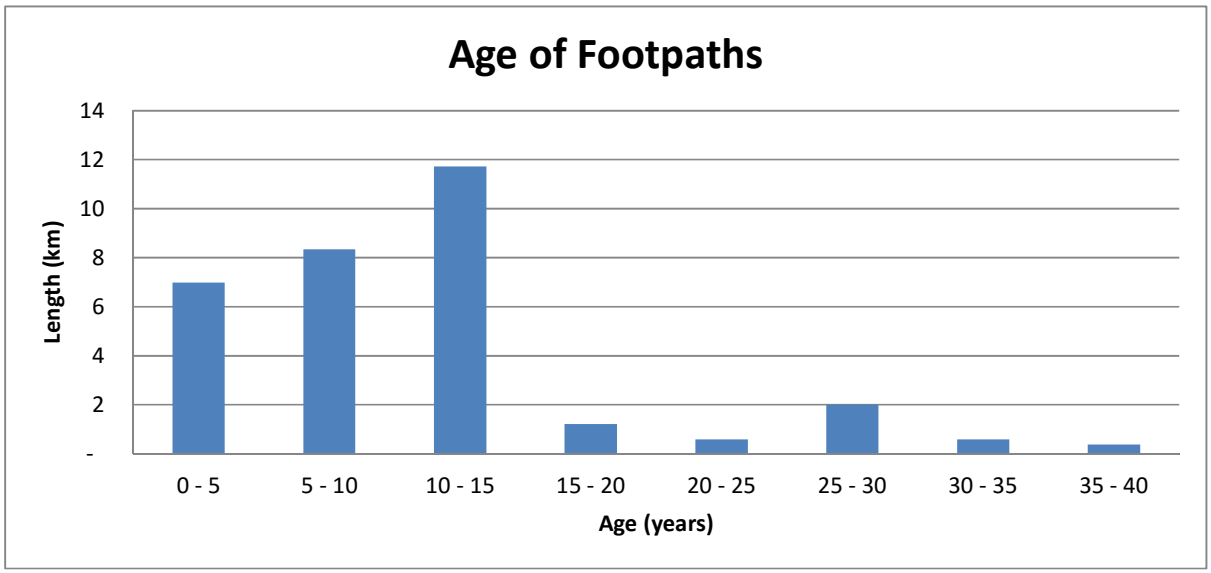


Figure 7-34: Age Distribution of Footpaths

There is currently no accurate data on the age of the hand railings.

7.11.5 Acquisition (Growth) Plan

Along with creating footpaths, the council also takes ownership of footpaths created by others. These acquisitions are generally aligned with the creation of new roads, either by Council, or by other parties such as developers creating a new subdivision. All assets vested to Council must comply with the EES.

The Deficiency Database and Prioritisation (DDP) holds the footpath requirements of the network, which have been identified from a number of sources. As noted earlier the DDP uses risk and benefit outcomes to determine the highest priority works to be completed.

Due to funding constraints and the fact the identified work far exceeds Councils ability to implement all the required footpaths, a strategy has been developed to gain the maximum benefit from any footpath work undertaken. The strategy recognises the importance of the link as set out in the following:

Footpath projects are assessed through the DDP selection process which allows assessment of risk benefits.

The top priority sites are then reviewed in terms of the importance of the link. This focuses on those links, in priority order, that:

- link schools to neighbouring communities
- link hospitals and health care centres with communities
- create access to neighbouring parks and recreation facilities
- provide general community to community links

Once priority order is established a programme of footpath capital creation is developed to suit the funding available.

There are also certain issues regarding the type of assets vested to Council. For assets to be vested to Council they must comply with the EES. However, for footpaths and walkways there is no requirements regarding the materials that must be used to create these paths. This can / has resulted in the Roading Department acquiring assets that require higher levels of maintenance than most footpaths the department creates. An example of this is the recent acquisition of a footpath at Langs Cove that has been created using pebbles and hence requires significantly higher levels of maintenance compared to other footpaths in the area.

The footpath project list, based on the strategy above, is currently held within the DDP. Included in this programme is the development of Pedestrian Crossing points, Cycle Facilities and Pedestrian Facilities.

Part of the new Lower Harbour Bridge crossing included provisions for both pedestrians and cyclists. This has then been linked to the Riverside Dr and Hatea River routes, creating a loop around the lower harbour known as the Hatea Loop. This is aimed at increasing resident satisfaction with the cycling network and encouraging more residents and visitors to use alternative transport.

As part of the Council's Walking and Cycling Strategy, several routes were identified for future walking and cycleway routes. These identified routes are:

- Raumanga/Maunu
- Onerahi
- Kamo
- Tikipunga
- Ngunguru
- Waipu

The first four of these routes are within Whangarei City and are shown in *Figure 7-35*. The Raumanga/Maunu and Onerahi paths are largely complete and the Kamo cyclepath is currently under construction.

The 2018/21 programme is shown in Section 10.2.9.

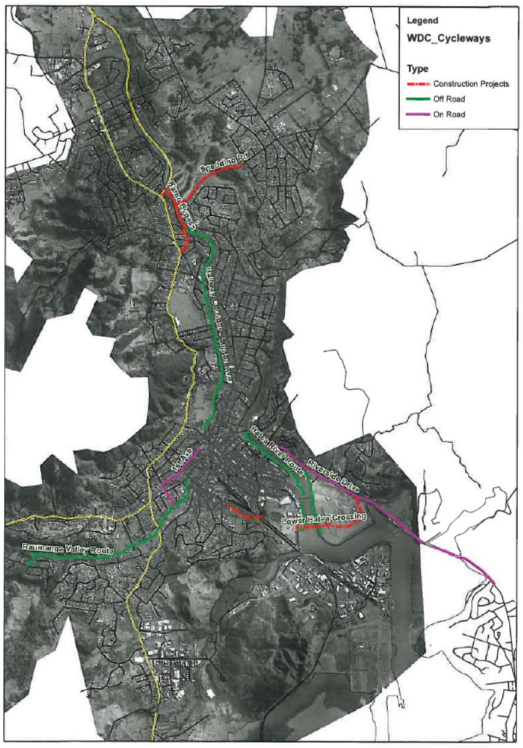


Figure 7-35: Existing and Planned Cycle Lanes

7.11.6 Maintenance Plan

Footpath and off-road cycleway maintenance is completed as part of the *Road Maintenance Contract*. As part of the contract they are inspected at least once a month to determine if any maintenance is required.

Cyclepaths in the road-way are maintained as part of the carriageway and hence are covered by the *Road Maintenance Contract*. See the sealed pavements and surfaces maintenance plan for further details.

Carriageways where detritus collects on the cycle ways require occasional sweeping.

Our road maintenance contractors are required to inspect the 373 kilometres of footpaths to identify hazardous defects whilst undertaking monthly inspections of the road. In the event of the council being notified by the public of a dangerous defect in the footpath, this is attended to immediately by restoring an even surface on a temporary basis. The contractor then programs the permanent repair for the following month.

In addition, the council has over the past few years implemented a maintenance strategy of allocating a portion of the footpath maintenance budget to replace damaged footpaths in conjunction with the road resealing programme. Approximately 90 km of district roads are resealed annually and as each road is resealed, all footpaths defects are removed at the same time.

As described above, a video survey of all existing footpaths is being undertaken in July 2018 to determine the footpath condition and to rate each section of footpath. This data should be available in August 2018 and will be used to develop a 3 year and 10 year footpath maintenance and renewal programme.

Routine and minor reactive maintenance is based on the intervention levels and response times set out in the maintenance contracts. Any large maintenance that is identified is prioritised based on the risks posed by the defect and the criticality of the section of footpath or walkway. Volume 2 - Appendix E contains both the intervention levels and the associated response times.

7.11.7 Renewals Plan

The majority of the footpaths in the district are assumed to have a useful life of 25 - 55 years depending on its material type. However it has been found that many of the older assets were constructed to a lower standard than that is currently accepted. Due to these low standard footpaths the majority of the plan is focused on the renewal of these sections of footpaths.

Footpaths will be renewed based on the levels of funding, with priority going to the footpaths that are in worst condition and are considered critical links it community facilities such as schools and hospitals.

The shared cycleways are relatively new so there is no immediate requirement for their renewal.

As described above, a video survey of all existing footpaths is being undertaken in July 2018 to determine the footpath condition and to rate each section of footpath. This data should be available in August 2018 and will be used to develop a 3 year and 10 year footpath maintenance and renewal programme.

The decision process for the renewal of existing pedestrian facilities is based on the asset use and purpose. Pedestrian facilities that link key community areas and access to community services, such as hospitals and schools are considered priority routes. Coupled with this are high volume areas, such as the CBD. Included then are mobility issues with appropriate widths and facilities to assist the physically disadvantaged portion of the community to have the same level of access on the network.

These projects are identified and managed through DDP system and prioritised accordingly.

7.11.7.1 Improvement Plan

Footpaths and cycleways can be improved in the following ways;

7.11.7.2 Path Widening

The widening of both footpaths and cycleways is based on the level of demand (the quantity of people using the path) and the type of demand (pushbikes, prams, scooters etc.).

7.11.7.3 Kerb Drop-Downs and Crossing

Some kerb drop-downs and crossing places in the district are not adequate for use by mobility scooters and prams etc. The current programme is to retro-fit five crossing / drop-downs per year at a cost of approximately $15,000 each. The programme will be developed based on complaints / requests by residents.

7.11.7.4 Hand Rails

Hand rails may be improved based on any safety deficiencies identified. These will be prioritised based on the criticality of the route and the severity of the issue.

7.11.7.5 Cycle Facilities

Cycle facilities such as cycle parking spaces, lean rails and signage may be provided based on any deficiencies identified. These will be prioritised based on the criticality of the route and the severity of the issue.

7.12 Car Parking

7.12.1 Overall Strategy

As discussed in Section 4.12 Parking Strategy, the Council has undertaken a review of its parking strategy in 2017. The results of this review are to charge for previously free parking, increase charges at high occupancy car parks and lower charges on under utilised car parks. The Council has approved changes to the parking in the CDB as a result of this strategy.

A summary of the overall strategy for the next 5-10 years is as follows:

Maintenance & Operations

- Due to the lack of replacement parts the maintenance of the old generation pay & display machines has become problematic. Some cascading of parts has been taking place as newer machines are commissioned.
- The meter heads can still function well until they eventually get phased out.
- As a result of high pedestrian use of footpaths around carparks, there will be a greater focus on these areas.
- A number of carparks are considered as temporary, and a lower standard of surface on these are accepted.

- Markings are allowed to deteriorate extensively before remarking.

Renewals

- Replacement parts for the Classic pay and display machine are increasingly more difficult to obtain. With some parts (printers) no longer being available. It is proposed to phase out the old classic machines over several years replacing approximately 10 machines a year. Following on from this the Global machines will be replaced in a similar fashion. The exact programme will be dependent on the availability of parts and possibly changes in technology.
- No plan exists for the replacement of the metre heads at this time. It is envisaged these will continue to remain in use until parts are discontinued.
- Replacement of car park signs will be undertaken to replace old parking station and charging signs with new signs reflecting the new parking charges.

Improvements

- Improvements will be achieved through the Renewals. Additional improvements will be considered with the development of new technologies and new machines. For example Tap n Go payment facilities will be installed in the new Metro machines.

New Assets

- New assets will only occur as new parking areas are developed. At this time no new parking facilities are known to be planned.

7.12.2 Description

The car park activity consists of the following categories;

- Parking Meters:
  Pay and Display Units – of which there are two types;
  - Classics – 1st generation green units
  - Globals – 2nd generation silver units
  - Metropolis – silver units with credit card slots

  Single Head Machines – service a single parking spot
- Car Park Surfaces
- Car Park Footpaths
- Car Park Pavements
- Car Park Drainage
- Car Park Markings
- Car Park Amenity Lighting
- Car Park Structures

There are a total of 27 off street carparking sites throughout the district. The maintenance, renewals and improvements associated with the Carparking Activity are generally undertaken as part of other activities as listed in Volume 2 - Appendix A.

The Whangarei District Council currently operates 71 Pay and Display Units and 128 Electronic Head Machines in and around the CBD.

7.12.3 Management & Operations

7.12.3.1 Maintenance Contract

The maintenance and operations associated with the car parking is governed by the *Parking Meter Maintenance Contract*, *Road Maintenance Contract*, *Streetlight Maintenance Contract* and *Road Marking Contract*.

7.12.3.2 Parking Fees Collection

The collection of parking fees from the machines is completed under a separate money collection contract administer directly by the Roading Department.

7.12.3.3 Funding

The Parking Meters and Car Parking Activities have their own 'ring-fenced' account. This means that all funding for the activities comes from the fees collected by the meters and the fines given to customers that over-stay or do not pay.

7.12.4 Monitoring & Condition

7.12.4.1 Condition

All the parking meters in the district have been assigned a condition rating. As seen from *Figure 7-36* below, the majority of the meters are in either 'good' or excellent' condition. Only 1.5% of the meters are in 'poor' condition, indicating the need for replacement of renewal in the near future.

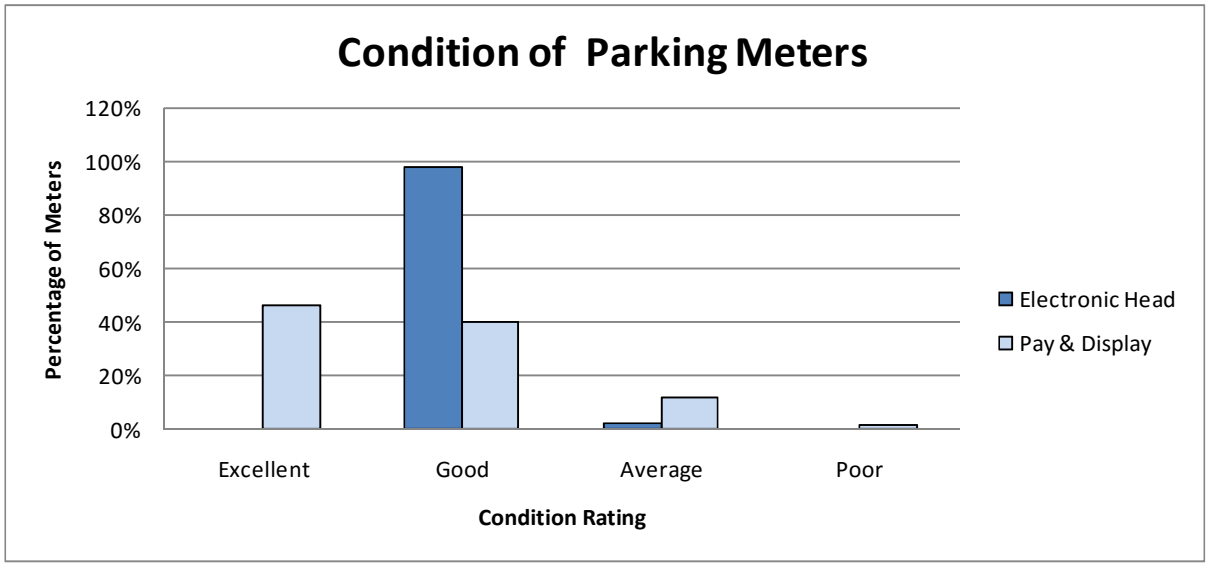


Figure 7-36: Condition Ratings of Parking Meter Assets

Condition and age data associated with the other components of carparks (e.g. pavement, surfacing, lighting etc.) can be found in the sections relevant to that activity.

7.12.4.2 Age

There is currently no age data for any of the parking meters recorded in RAMM.

New metro machines purchased in 2011 and 2012

Classic machines bought second hand and have been in use for many years.

7.12.5 Acquisition (Growth) Plan

As a result of regular attempts to break into the meter heads, these were all replaced with older cast-iron heads that are more robust. The original heads are held in the Roading store room. An exercise to dispose of these units needs to be undertaken.

The replacement of old machines provides additional spare parts to keep the existing stock operational. All useful parts are stored and the remaining parts are usually just sold for scrap.

The provision of parking is planned, programmed and implemented by the Roading Department. A review of the CBD parking was completed in 2017 to assess;

- the availability of parking at desirable sites
- whether the spaces are in the right place, and
- whether the time limits and charges were appropriate

It was concluded that there were a few minor changes to be undertaken. These were:

- charge for previously free parking
- increase charges at high occupancy sites
- lower charges at under utilised carparks

This was expected to result in better usage of the existing carparks. In 2017, the Council has entered into a 5 year lease of a section of the old Pacific Motor Group property at the corner of Reyburn St and Carruth St. The intention of this new carpark is to provide temporary parking for the development of the Town Basin area including the construction of the Hundertwasser Arts Centre.

No other new carparks are intended on being constructed or purchased in the next 10 years.

7.12.6 Maintenance Plan

Car park pavement and surfacing maintenance is completed as part of the *Road Maintenance Contract* for each area. The maintenance plan is based on routine inspections and programmed maintenance. In general the maintenance requirement for these facilities is identified as part of the pre-seal repair contract. This includes any concrete works that might be required.

The maintenance plan is based on routine inspections conducted daily by the contractors and reactive maintenance undertaken when a member of the public informs the Roading Department that a meter requires work.

Many of the current pay and display meters are based on old technology which is now obsolete. This is an identified issue and the funding is being provided to continue to replace these old meters.

Any minor maintenance is undertaken as per Volume 2 - Appendix E, while any other maintenance over and above these defect levels is termed 'major maintenance' and becomes programmed work. The programme is based on the severity of the fault and the criticality of the meter.

7.12.6.1 Repercussions of meters being out of order

Using the average monthly calls logged, the number of motorists inconvenienced as a result of meters being out of order was at least 90 people. One can assume that at least triple that amount experienced the problem, i.e. 270. Some of these faults results in money paid but no ticket issued.

The costs to council as a result of meters being out of order include the lost revenue due to machines not working & motorist not paying for parking and the lost revenue due to inability to impose fines if the time had been exceeded on the meter.

7.12.6.2 Alternatives if a P&D machine is not working

In all our larger carparks there are at least two units at each location that provides an alternative if one is not working.

In most of the CBD there are other units in the vicinity, either on the opposite side of the road further along the road.

7.12.7 Renewals Plan

The parking meter renewal plan covers the replacement of old pay and display meters, as well as the replacement of any meters that are no longer functional.

A small selection of parking meters will be replaced based on the network performance measures and the priority of the meter. The Roading Department manages the renewal of these assets through a stock of old meters that have been sourced from other Councils, as WDC is running older parking meter technology compared to some other Councils.

Within the next five years the plan has identified that a technology upgrade is required as the current stocks of technology are either receding or are no longer supported in terms of hardware manufacture. This has been allowed for within the renewal plan.

When funding is available we will try and replace the oldest machines first and try to undertake an replacements in a whole area rather than spread this out over the city. The identification of these replacements is completed in discussion with the parking metre maintenance contractor.

7.12.8 Improvement Plan

7.12.8.1 Pay & Display Units

Replacing all the machines with the latest state of the art machines will not necessarily eliminate all faults. The maintenance contractor advises that there is not much difference between the older and the newer machines, regarding the vulnerability to faults. The majority of the faults relate to vandalism, faulty or incorrect coins and the manner in which coins are fed into the machines.

The current issue is that the smaller coins (10c and 20c) are very light weight and with a little moisture or dirt they will hold up inside the coin race. This suggestion is given weight by the fact that very seldom does the heavier $1 and $2 coins give this problem.

Ideally if we could install machines that have the ability to communicate their status to a central point then a proactive response can be made to faults.

7.12.8.2 Parking Meter Heads

Currently there are 152 single head machines of which some are vulnerable to vandalism & theft. Most of these have been replaced by older versions that cannot be broken into. These meters are in low usage areas or parking bays that are remote. There is no intention to replace these in the near future.

7.12.8.3 Replacement Machines

The latest P&D unit that has become available since late 2006 is the Metro.

These machines offer various options for payment and service, pay by plate, pay by space, credit card payments and texting.

New metro machines will have payment options of credit card, coin and Tap n Go Eftpos payment. Text parking was not invested in as the Council has developed Mpark for electronic payments.

These smart parking meters provide a selection of user-friendly features such as remote programming of tariff parking fees and display messages and a choice of secure on-line payment methods such as payment by credit card & texting. There are costs involved with this that will have to be passed onto the user i.e. a $1/hr fee increase to $2/hr.

These units are designed to be managed from a remote location using the EZiCom system.

7.12.8.4 Central Management System

EziCom is a communications and management system (CMS) available for parking meter fleet management with remote monitoring in real time via a dual GPRS/GSM Modem fitted to CHS Pay and Display Parking Meters.

Text messages or email notifications automatically notify the meter technicians of machines with errors or warnings allowing them to respond immediately.

A variety of reports are available. Revenue, Audits, Cash Clearances, Maintenance and Asset Management information can be viewed easily from the simple to read screen layouts.

7.12.8.5 VMS Signs

VMS signs to advise motorists of the number of carparks available were installed at the Forum North carpark off Rust Ave, Vine St carpark and Farmers Carpark off Robert St. These have had several teething problems with not accurately picking up car numbers. It is not proposed to install more of these VMS signs until these signs have proved successful.

VMS signs on the main arterials leading into the City to advise motorists of each carpark and the number of available parks may also be considered in the future.

7.12.8.6 Suggested Program of Improvements

The Roading Department manages the upgrade of these assets through a stock of old meters that have been sourced from other Councils, as WDC is running older parking meter technology compared to some other Councils.

Within the next five years the plan has identified that a technology upgrade is required as the stocks of current technology are either receding or are no longer supported in terms of hardware manufacture. This has been accounted for the following proposed programme:

- Year 1: Replace the 16 Classic machines that are 11 years old now with Metros at a cost of $144,000.
- Year 2: Retrofit EziCom communications in all the existing 28 Global machines at a cost of $43,000 (At this point manage the 39 units with EziCom)
- Year 3: Replace the 19 Classics in high use areas with Metros at a cost of $171,000
- Year 4: Replace the rest of the other 14 Classics in low usage areas with Metros at a cost of $126,000.
- Year 5: Review the replacement of the single head parking meters.

7.12.9 Disposal Plan

The development of the Town Basin area will see the removal of the current temporary car park at the corner of Dent St and Riverside Dr.

7.13 Environmental

7.13.1 Overall Strategy

The overall strategy for this activity for the next 5-10 years is:

- Vegetation: to undertake vegetation control in the road corridor to maintain the integrity of its roading assets and ensure public safety and to fulfil its obligations under the Regional Pest Management Strategy.
- Stormwater Quality Devices: to maintain existing devices so that they operate effectively.
- Cleanfill sites: to ensure that contractors manage their clean-fill sites in a way that minimises any actual or potential adverse effects on the environment.

7.13.2 Description

7.13.2.1 Vegetation

The Vegetation category includes the function of maintaining the vegetation within the road corridor. These functions include;

- Verge Mowing – Undertaken in urban areas using a ride-on mower
- Hydro Mowing – Undertaken in rural areas that require this type of mowing for visibility reasons
- Surface Channel Spraying – Spraying behind the kerb and channel to prevent vegetation from encroaching into the kerb and channel
- Deep Drain Spraying – Spraying deep drains to prevent vegetation build-up
- Roadside Spraying – Preferred method of vegetation control in rural areas as an alternative to mowing
- Noxious Weed Spraying – Driven by NRC as a means of eradicating noxious weeds
- Tree Trimming – Trimming of self-sown trees within the road corridor
- Tree Removal – Removal of trees that are identified as a safety hazard

7.13.2.2 Special Storm Water Devices

Rain Gardens

Storm Water Quality Devices

7.13.2.3 Stock Effluent Disposal Sites

Sites that allow stock trucks to dispose of their effluent

7.13.2.4 Dump Sites

- Cleanfill
- Concrete
- Landfills

7.13.3 Quantity of Assets

7.13.3.1 Vegetation

The majority of this function is only quantifiable through standards and specifications set by council or through standards that exist within the *Road Maintenance Contract*.

7.13.3.2 Special Storm Water Devices

The Roading Department owns a selection of Enviropods which are filters that fit into catchpits.

The Council also maintains three Downstream Defenders which are hydrocarbon traps located within manhole type structures. These were constructed as part of the recently completed Lower Hatea River Crossing project.

7.13.3.3 Stock Effluent

There is one stock effluent disposal facility within the Whangarei District. This is located on Saleyards Road in Kauri and was constructed in 2012. The operations and maintenance of the site is the responsibility of Council.

7.13.3.4 Dump Sites

There are 35 clean fill dumpsites that are managed by the Roading Department. The locations of these are described in Volume 2 Appendices.

7.13.4 Management & Operations

7.13.4.1 Maintenance Contract

The vegetation maintenance and dump site management are conducted by the maintenance contractors and governed by the *Road Maintenance Contracts*.

7.13.4.2 Subcontracts

Hydro mowing is required in some areas where a high degree of visibility is important. All this type of mowing is subcontracted out on a planned basis.

7.13.4.3 State Highways

The MOU with NZTA requires the Roading Department to maintain all vegetation beyond the surface water channels and berms in the urban areas, while NZTA does all rural areas, verges and carriageways (e.g. median strips, roundabouts).

NZTA is responsible for all litter on rural state highways and the carriageways of urban highways and WDC is responsible for litter in the berm areas of urban highways.

7.13.4.4 Parks Department

The Parks Department of the Infrastructure and Services Group is involved in the mowing of certain urban areas that require a high standard of mowing. Most of these areas are adjacent to where the Park Division mow as part of the maintenance of their assets. This mowing is generally for amenity value, as this high standard is not required for safety reasons.

The Parks Department is also responsible for the maintenance of all the gardens in traffic islands, roundabouts etc.

7.13.5 Monitoring & Condition

The only condition measures used are the Operational Performance Measures set in the maintenance contracts.

7.13.6 Acquisition (Growth) Plan

There is no plan to create or acquire any storm water devices within the next ten years, although stormwater treatment devices may be vested to Council through land developments.

7.13.7 Maintenance Plan

Environmental maintenance is made up of the following activities;

- Berms and shoulders (vegetation control)
- Trees, maintenance of protection planting
- Graffiti removal
- Stock effluent maintenance and removal
- Specialised storm water devices
- Clean fill site

Vegetation maintenance shall be based on a routine plan consisting of mowing and spraying. Storm water device maintenance occurs once a defect has been identified, usually by the public (e.g. catchpit overflowing)

Reactive maintenance is based on requests received from residents and any defects found during corridor inspections. Volume 2 - Appendix E contains details on all the reactive maintenance undertaken as part of the maintenance contracts. Reactive maintenance also includes any maintenance associated with the dump sites. Each of the clean fill sites are inspected annually, with the only exception being the site at Helena Bay that is inspected every six months. Any maintenance requirements identified from these inspections are undertaken as reactive maintenance.

Any large maintenance that is identified, such as tree removal, is prioritised based on the risks posed by the defect and the criticality of the section of road corridor.

The stock effluent disposal system may have an impact on the maintenance requirements and costs associated with this activity. Until the design stage is complete the maintenance requirements for the system cannot be known.

7.13.7.1 Dumpsite Maintenance

Historically, the Whangarei District Council's policy was to make it the contractor's responsibility to dispose of spoil from slips, water channel cleaning and similar activities. The maintenance contractor normally disposed of this material in farmer's paddocks without the need for consents and expensive silt control measures.

However, a recent Environment Court ruling has made WDC responsible for providing proper consented dumpsites for the disposal of this material. As a result of this ruling WDC now operate about 40 clean fill dumpsites throughout the District. These dump sites are used by roading operations to dispose of spoil from slips, water channel cleaning and similar activities. These dump sites are consented and include significant environmental controls to ensure compliance with the consent conditions. The photo below shows a typical clean fill dumpsite being constructed.

The additional cost to Council in developing and maintaining these clean fill dumpsites is in the order of $300,000 per annum and has been included in the maintenance programme.

7.13.8 Renewals Plan

The stock effluent site and the majority of the storm water devices are reasonably new and therefore are not likely to require renewal in the near future.

7.13.9 Improvement Plan

There is no plan to improve any of these assets as the majority are reasonably new.

7.14 Network and Asset Management

7.14.1 Introduction

This section is primarily about the people, processes, systems, tools and management activities that the Roading Department uses to provide a safe, efficient and effective Transport Network. Table 7.14.1.1 below defines all activities detailed in this section. Note that the activities associated with each individual asset type are covered in Section 7 (Lifecycle Management) of this plan.

Table 7.14.1 1: Network Management and Administration Activities

Section	Activity	Sub – Activities
7.14.2	Department Operations & Quality Control	Human resource management Financial management and monitoring - Funding acquisition - Budget control Processes to ensure quality of work and assets Stakeholder liaison
7.14.3	Asset & Information Management	Life Cycle management and planning for all assets - Creation - Maintenance - Renewal - Improvement - Disposal Acquisition, storage and analysis of asset information
7.14.4	Transportation Planning	Traffic Modes Transport / Network Strategy Studies Projects Identification & Prioritisation Developer / Subdivision Liaison
7.14.6	Safety Management	Strategies Plans Community Programmes
7.14.7	Corridor Management	Corridor Access Requests Temporary Traffic Management Other Corridor Permits
7.14.7	Customer Management	Customer Requests
7.14.8	Major Projects	Project development Project prioritisation Project management
7.14.9	Maintenance Management	Maintenance of all assets - Decision process - Management of works
7.14.10	Renewals Management	Renewal of all assets - Decision process - Management of works
7.14.11	Emergency Management	Flood Damage Lifelines Group Contractor call out Response Civil Defence

7.14.2 Department Operations

7.14.2.1 Roading Department

The activities described in this Transportation Activity Management Plan are delivered by the Roading Department, as part of the Council's Infrastructure and Services Group. The Roading Department is

supported by a number of contractors and consultants through a range of contracts to help deliver these activities. These transportation services represent the Council's largest single expenditure activity.

(a) Team Structure & Management

The Roading Department currently comprises the Roading Manager and 12 full time equivalent staff and one vacant positions.

The management and operations of the network are mostly undertaken by the in house staff with some professional services being contracted in where these skill sets are required.

Figure 7.14.2.1 then shows the responsibilities of the various roles within the Roading Department.

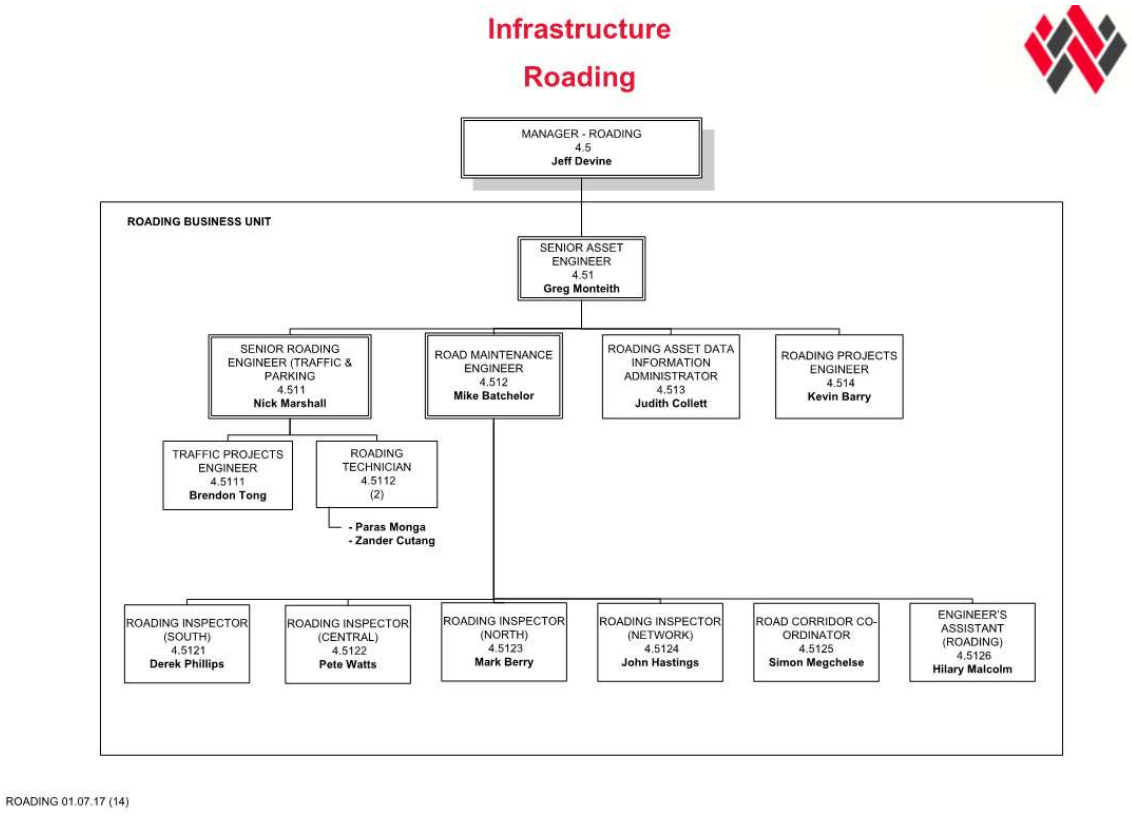


Figure 7.14.2.1: Current Roading Team Structure

Table 7.14.2 1: Roading Department Roles & Responsibilities

Role	Responsibilities
Roading Manager	Manage the overall direction and performance of the Roading Department.
Senior Roading Engineer (Asset Management)	Manage the overall direction, performance & delivery of the Business Unit. Manage the Roading Department's assets based on the funding available
Roading Asset Systems Engineer	Manage the Roading Department's asset information and information storage systems.
Roading Maintenance Engineer	Manage the maintenance of the roading assets while maintaining the asset database.
Roading Inspector (North)	Providing CRM/stakeholder assistance, QA on maintenance works and CAR works, H&S Audits, Dump site inspections, traffic management audits, routine day and night time inspections, bridge inspections and contractor supervision.

Role	Responsibilities
Roading Inspector (Central)	(as above)
Roading Inspector (South)	(as above)
Roading Inspector (Network)	Providing routine inspections and collection of dispatch/defect data, assists with maintenance programming, inventory asset audits as well as asset condition inspections, asset data capture and night time audits.
Roading Engineer's Assistant	Act as a customer liaison first point of contract for all roading issues.
Road Corridor Co-ordinator	Process and manage Road Opening Notices (RONs), Temporary Traffic Management Plans (TTMPs) and Road Closure Notices (RCNs).
Roading Projects Engineer	Manage Roading projects that are beyond the scope of the other roles and responsibilities. This currently includes management of the reseals, pavement rehabilitation, bridge renewals and seal extension programmes.
Senior Roading Engineer	Contribute to planning, policy, standards and strategies. Lead the traffic safety and management programmes and provide strategic developments and operational management for the traffic signals network.
Traffic Projects Engineer	Manage traffic flow and the traffic signals and intelligent traffic signal (ITS) network throughout the district.

(b) Business Unit

The Council delivers the majority of the professional services required for this TAMP with in-house resources. To conform with NZTA rules this has been done in a business unit with a formal agreement setting out what the business unit will deliver and the costs based on outputs where possible.

The business unit includes all of the Roading Team, other than the Roading Manager, and is led by the Roading Assets Engineer (who also acts as the Business Unit Manager). This structure enables the business unit to carry out the day to day running of the roading operations, and frees the Roading Manager up to focus on the strategic direction of the Roading Department and to liaise with the Council's Leadership Team and Councillors. This structure has been in place since 1 July 2012.

(c) Training & Development

The Roading team (including those in the business unit) participate in the Council's wider training and development processes including; performance reviews, IT training, inductions, health and safety etc.

More specifically to the Roading Team the following has been budgeted annually for staff training and development:

- Management (including Team Leaders); attendance to one multi-day conference, attendance to one major training course (up to two days) and support for attending single day training sessions as appropriate and especially if hosted locally.
- Technical staff: attendance to one major training course (up to two days) and support for attending single day training sessions as appropriate and especially if hosted locally.

In addition to the above formal training and development, staff are supported to participate in working groups within the Council or NTA and industry groups external to Council as appropriate to their role.

(d) Accounting / Financial Processes

Financial Management processes are carried out through the Council's Financial Management and job costing systems. The Council records costs against specific funding categories, such as being incurred through external contractual arrangements or through Council's internal payroll structure.

The accounting system Council uses is an Accrual Accounting System, which backdates the expenditure to the financial year in which it is undertaken even if payment occurs in the next financial year.

For asset management purposes, expenditure on maintaining the transport asset is divided into the categories listed in Table 7.14.2.2 below.

Table 7.14.2 2: Expenditure Categories

Category	Description
Operational	Activities which have no effect on asset condition but are necessary to keep the asset utilised appropriately (e.g. power costs, overhead cost, etc.)
Maintenance	The on-going day-to-day work required to keep assets operating at required service levels, i.e. repairs and minor maintenance.
Renewal	Significant work that restores or replaces an existing asset towards its original size, condition or capacity.
New work (also called development, capital works)	Works to create a new asset, or to upgrade or improve an existing asset beyond its original capacity or performance, in response to changes in usage, customer expectation, or anticipated future need.
Disposal	Any cost associated with the disposal of a decommissioned asset.

Council have developed protocols for the categorisation of expenditure to satisfy NZTA's and Council financial systems. This is driven by activity as set out in the NZTA Planning & Investment Knowledge Base. Identified work is flagged at the point of creation whether this work is operational maintenance or capital renewal. This is revised each month with payment claims and any adjustments to expenditure category undertaken at that stage.

Financial Software – "TechOne"

TechOne Enterprise Software is used to administer the financial activities of the Council.

The Works and Assets module in TechOne is used to manage contracts and projects that run across multiple financial years. All other financial management is done in accordance with Council policy and procedures.

The category of expenditure needs to be determined as the physical work is completed and paid for.

For accounting purposes, expenditure is divided into two categories:

- Operational (OPEX) - combines operational and maintenance costs
- Capital (CAPEX) - renewal and new works

(e) Issues & Opportunities

The Roading Department keeps a register that contains all the current issues and opportunities for improvement associated with the Transport Network.

Each issue / opportunity is assigned a priority (high, medium or low). The focus is then on the high priority issues/opportunities that go through a process of scoping to ensure that the exact context of the issue or opportunity is understood and the desired outcome is defined. Once this is achieved, the process continues to determine the resources and costs that would be required to achieve the desired outcome.

All the information for viable issues/opportunities is then moved to the Improvement Plan, where it is prioritised against the other improvements.

Volume 2, Appendices, contains the Issues and Opportunities Register, and also the Improvement Plan.

7.14.3 Funding Management

Funding for the roading programme is managed by the Roading Department through applications to NZTA to mirror the share of funds available through Counci's LTP. These applications are made through NZTA's Transport Investment Online (TIO) website.

The Land Transport Management Act 2003 requires Council to prepare a three-year Land Transport Programme. The programme is a summary of the work required to provide an effective Transport Network. It is prepared by the Roading Department, approved by Council, and then forwarded to NZTA to gain funding through the National Land Transport Programme (NLTP). As of 2014, the Roading Department was also required to submit its justification for a tri-annual funding block in the form a 'Business Case' document.

NZTA provides funding assistance to Council for works that comply with NZTA's policies. Currently NZTA provides financial assistance rates (FAR) of 53% for all activities. NZTA has advised that these FAR rates will be fixed for the 2018/21 period.

The sources of funding and required budgets for Council's Roading Programme are described in Section 9.

7.14.4 Asset & Information Management

7.14.4.1 Description

The transportation network has a vast amount of asset data and information which relates directly to the asset (e.g. Road Asset Management and Maintenance data, or RAMM data) as well as information from within the corporate business and from customers and stakeholders (such as public requests etc).

RAMM Contractor/ Pocket RAMM has been implemented to manage the maintenance, operations and renewal works, and for compiling claims. The introduction of RAMM Contractor has significantly improved the quality and timeliness of data available for asset maintenance decisions and management.

The core data systems that are relevant to operating and delivering the transport activity are the RAMM database, as well as the following:

- Forward Work Programme
- TechOne Customer Request Management (CRM) Module
- TechOne Corporate Management System (Finance)
- Trim Document Management System
- Trifecta T3 for Road Corridor Management
- Balanced Score Card Performance Measure Management System
- Transportation Activity Management Plan

- Transportation Deficiency Database
- Bridge Database

Figure 7.14.4.1 below outlines the information flow and how each system within Council fits together.

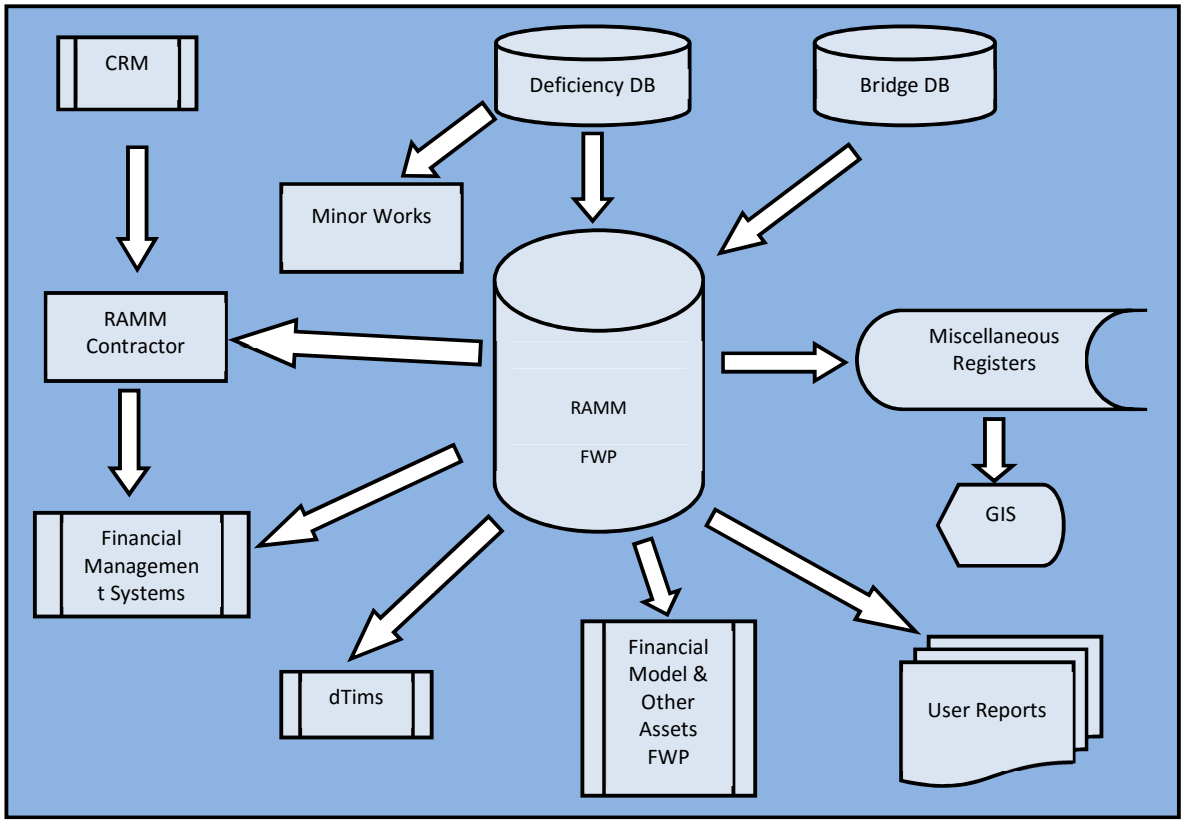


Figure 7.14.4.1: Information Flow between Council Systems

7.14.4.2 Management & Operations

(a) Information Storage & Analysis

Table 7.14.4.1 below summaries how the Roading Department records and stores all the information associated with the Transport Network.

Table 7.14.4 1: Data Information

Data Type	Location/System	Comments
Asset Inventory	RAMM Asset Register	Maintained through professional service contract. Provides data for LoS measures. Also used by NZTA for national benchmarking
Scheme Descriptions	Hardcopy/As-Built/RAMM (attributes and condition)	Plan copies held in council trim system. As built stripped and loaded to RAMM
Condition	RAMM	Condition Assessments, roughness, rating
	External Service Providers	Performance Records
Operations Data	RAMM	Historical maintenance cost data
	Contract Management System	Current approved programmes of work. Tracking and management of tasks on the network
	SCATS	Stores operational information.

Data Type	Location/System	Comments
Customer Enquiries	Service Requests Register	Held in TechOne system, also used as input to LoS measures
	Asset Managers Files Finance and Records (Historical)	Hard copies all work orders and invoices raised through TechOne
Asset Valuations	RAMM Valuation Module	Data integration with asset inventory and condition
Finances Economics	Council financial systems	TechOne
Development Data	RAMM – NOMAD Forward Planning Tool	Data integration with asset inventory and condition data
Forward Forecast	Urban Traffic Model	Provides future demand and capacity modelling allowing the identification of future works
	dTims Pavement Performance Model	Allows the performance of the pavement and surfacing assets to be modelled providing a tool on which to determine future renewal and maintenance programmes
Levels of Service	Transportation Activity Management Plan – Bulk of source data for LoS held in RAMM system and TechOne.	Also held in Balanced score card system

The Department has created a Road Asset Database Operations Manual that provides clear guidelines on how the asset data is managed.

7.14.4.3 Community Consultation

The LGA 2002 requires Council to consult with affected and interested parties in making decisions. Before implementing level of service changes, options analysis and the selection of the best practicable and preferred options must be done using a coherent and transparent process.

Council recognises there is a wide range of customers and stakeholders with an interest in how the land transport activity is managed, including road users, the resident community, visitors, specific interest groups within the community and regional and central government agencies.

The procedure for all consultation is set out in Council's Consultation Toolkit (Refer to TRIM 07/74888).

7.14.4.4 LTP and Annual Plan

The majority of the Roading Department's public consultation is undertaken during Council's consultative process integral to development of the Long Term Plans and Annual Plans. This process also includes consultation with local authority elected members.

7.14.4.5 Council Meetings

The Roading Department Manager attends community meetings that are applicable to roading. Other relevant staff members are also asked to attend when appropriate (e.g. Safety Engineer if the topic is road safety).

7.14.4.6 General Public

The Local Government Act requires that the Council must consult the public in regards to the Long Term Plan and the Annual Plan, and sets the procedures for the consultation process that must be followed. This process covers all aspects of the plans, including roading, and is the main process used by the Roading Department to inform the public of the works they are planning to undertake.

The Roading Department also informs the public of significant upcoming works through press-releases in the Council News section of the Whangarei Leader local newspaper and on the Council's websites, Facebook page and Twitter account. Prior to commencing construction works, roading contractors are required to notify residents of the works via letter drops.

7.14.4.7 Iwi

The Act states that a local authority must 'establish and maintain processes to provide opportunities for Māori to contribute to the decision-making processes'. Council has established a Maori Liaison Committee to notifiy iwi of upcoming projects including roading works. The Roading Department also consults with iwi on projects that require resource consents.

7.14.4.8 Communitrak Surveys

Council also undertakes surveys of the community via Versus Research Ltd Communitrak Surveys. These surveys are undertaken annually and provide a benchmark of how Council is performing on a range of areas including transport. Council uses this information to set appropriate Levels of Service.

7.14.5 Corridor Management

Corridor management involves the management of any person or party that wishes to occupy the road in such a way that the normal usage will be disrupted. This includes road inspections and work or events that will involve road closures or traffic flow disruption.

7.14.5.1 Corridor Access Requests (CAR) & Traffic Management Plans (TMP)

Any party that wish to occupy or work on a Council owned road must have approval from the Roading Department before commencing. The applicant must submit a Corridor Request Form accompanied by:

- Hazard Management Plan
- Traffic Management Plan
- Works Plan
- Copy of any public notification, if applicable

The application process is based on the National Code of Practice for Utility Operators' Access to Transport Corridors.

The Roading Department has acquired a programme called 'Trifecta T3' that was designed by Global Infrastructure Solutions. The module is used to automate the process for Corridor Access Requests (CARs) and Traffic Management Plans (TMPs) and is based on the National Code for Practice for Utilities' Access to the Transport Corridor and covers all steps of the process.

7.14.5.2 Stock Control

The Council Compliance Department is responsible for all wandering stock on the districts roads as well as on the State Highway network in the district. All wandering stock requirements are dealt with by the Road Maintenance Contractors. The Parking and Traffic Bylaw 2017 details how the Council manages livestock in terms of road crossing permits.

7.14.5.3 Vehicle Crossings

The maintenance of vehicle crossings from the road edge to the property boundary is the responsibility of the property owner. All new crossings require consent from the Councils Building Department to ensure that they are built to the Councils requirements, as set out in the Environmental Engineering Standards (EES).

7.14.6 Customer Management

Customer management involves recording, managing and responding to requests received by members of the public. The Council terms these requests 'Customer Request Memos' (CRMs), and uses TechOne to manage each individual request.

7.14.6.1 Receiving and Logging the Request

All customer requests are immediately recorded in TechOne as a CRM. This CRM includes the name of the customer, full details on the requests and its location.

Each CRM is also identified by a set 'Department' and 'Type'. 'Department' being one of the Council departments (Roading, Waste and Drainage etc.) and the 'Type' relating to the type of asset or service involved (Bridges, Corridor Access Request etc.).

Once all other information fields are completed, the job position that is responsible for dealing with that type of request is identified and the CRM is sent to the appropriate person.

7.14.6.2 Response Times

Once the person responsible for the request has received it, they have two working days to respond to the customer, and then a further 15 days to resolve the issue and officially close the CRM.

Further details on how Council and the Roading Department manage service requests and customer communications can be found in Section 5.5.4 of the Activity Management Planning – Practice and Policy document.

7.14.7 Procurement Management

7.14.7.1 Procurement Strategy 2010 – 2017

The strategy was developed in conjunction with Far North District and Northland Regional Councils to best utilise the funding available from NZTA. The strategy states the procurement methods to be used and the procurement programme. The strategy was initially developed for the three year period 2010 – 2013 and was subsequently extended to 2017 and then to 2017 with NZTA's approval. This strategy was developed in accordance with NZTA requirements in order to gain NZTA funding.

A Northland Regional Procurement Strategy has been developed in 2017 to replace the current strategy. This has been developed by the NTA and has been adopted by the Whangarei, Far North and Kaipara district councils. A key component of this new procurement strategy is the regional approach to procuring the maintenance contracts which include up to an 8 year term (4+2+1+1) and a fence to fence approach which incorporates reseals, pavement marking and some pavement rehabilitations. It is currently with NZTA for endorsement.

Through the Procurement Strategy, Council has a range of physical works procurement approaches at its disposal, such as Measure & Value, Lump Sum, Design and Construct. Various levels of external professional services may support these options. Council selects the approach it determines most appropriate based on a prudent assessment of factors like project risk, timeline and state of the market at the time.

7.14.7.2 Term Contracts

The Council currently has several term contracts for carry out maintenance, operations and renewals on the road network. These contracts and their current status are shown in Table 7.14.7.1 below:

Table 7.14.7.1: Term Contracts

Contract	Description	Term[4]	Start Date
12001 Road Maintenance North Area	Maintenance and operations management for the road network for the northern part of district. This contracts include: pavements and surfaces, bridges and culverts, retaining walls, road safety barriers, signs, ddge marker posts, footpaths and street furniture, street cleaning, vegetation control	3 + 1 + 1	July 2012
12002 Road Maintenance South Area	Maintenance and operations management for the road network for the southern part of district. Includes the same activities as for 12001 above.	3 + 1 + 1	July 2012
12003 Road Maintenance Central Area	Maintenance and operations management for the road network for the Whangarei City area. Includes the same activities as for 12001 above.	3 + 1 + 1	July 2012
12004 Road Marking	This contract covers the inspection and maintenance of road markings and reflective raised pavement markers.	3 + 2	Oct 2012
12006 Chipseal & Asphaltic Resurfacing	This contract covers the resurfacing of chip seals and asphaltic concrete surfacings.	3 + 1 + 1	Jul 2012
15071 Traffic & Pedestrian Signal Maintenance	The contract covers all aspects of the traffic signals, pedestrian crossings and school zone signs.	2 + 3	Feb 2016
15001 Streetlight Maintenance	The contract covers all aspects of both street and amenity lighting owned by the Roading Department	3 + 2	Jul 2015
07041 Parking Meter Maintenance	This contract covers the inspection and maintenance of all the Roading Department's parking meters as well as the collection of money from the meters.	3 + 2 *	Aug 2007
13017 Lower Hatea River Crossing – Bridge Operations	This contract covers the general operation of the Te Matau a Pohe and Kotuitui Whitinga bridges as well as inspections and maintenance of the electrical systems.	1 + 1	Jul 2013
17037 Te Matau a Pohe & Kotuitui Whitinga – Hydraulic & Mechanical Maintenance	This contract covers the inspection and maintenance of the hydraulic and mechanical systems associated with the Te Matau a Pohe and Kotuitui Whitinga opening bridge.	2 + 3	Oct 2017

The road maintenance contracts (12001, 12002 and 12002) are currently being tendered as two packages which also include road marking, chip sealing and asphaltic resurfacing (current contracts 12004 and 12006). These new contracts will commence in July 2018 and will have 4+2+1+1 year terms.

The electrical maintenance (contract 17038) and bridge operations (contract 17039) for the Te Matau a Pohe and Kotuitui Whitinga bridges are also currently out to tender. Each of these contracts will have a 2 + 3 year term.

7.14.8 Maintenance Management

Maintenance management covers the inspection of assets and the prioritisation, budgeting and completion of the maintenance required for all assets within the network.

[4] It should be noted that the term of these contracts has been extended beyond the term described in the contract.

Asset renewal is the process of restoring the level of service delivered by an asset to its original design level, or close to it, by repairing or replacing the worn components. The purpose of the renewal strategy is to maintain the levels of service by identifying the most cost-effective time to renew the asset.

7.14.8.1 Management & Operations

(a) Maintenance Intervention Strategy (aka Corridor Management Strategy)

This strategy is used to assist in the development of maintenance programmes for different assets. The strategy was developed as a way to ensure that the maintenance programmes are an effective, co-ordinated approach to maintenance over time.

Maintenance strategies determine how the local transportation network will be operated and maintained on a day-to-day basis in order to achieve the optimum use of the asset.

The lifecycle management work categories identified in Table 7.14.10.1 are defined as follows:

Table 7.14.10 1: Maintenance Categories

Maintenance Activity	Description
Routine Maintenance	Routine maintenance is the regular ongoing day-to-day work that is necessary to keep assets operating, including instances where portions of the asset fail and need immediate repair to make the asset operational again. This work falls into two broad categories as follows:
Proactive	Proactive inspection and maintenance works planned to prevent asset failure.
Reactive	Reactive action to correct asset malfunctions and failures on an as required basis.

A key element of asset management planning is determining the most cost-effective blend of planned and unplanned maintenance as illustrated in Figure 7.14.10.1.

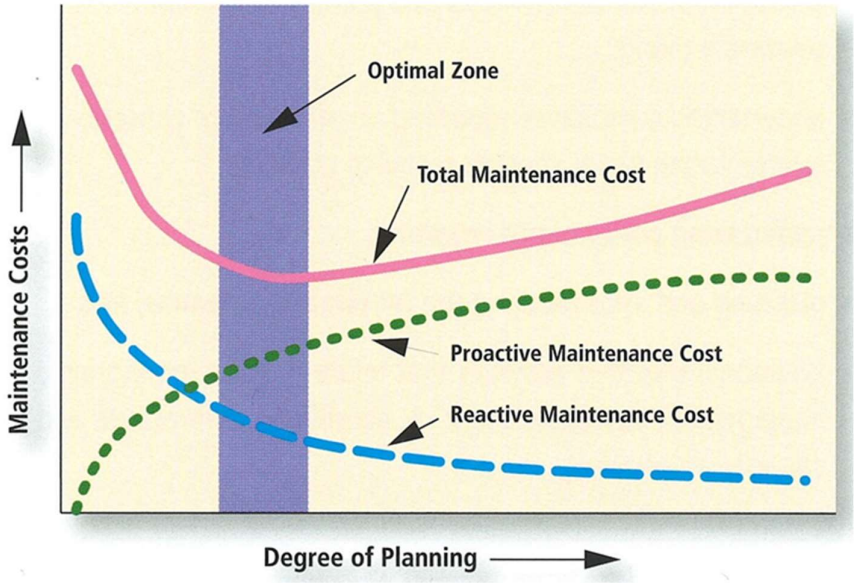


Figure 7.14.10.1: Maintenance Decision Making Process

(b) Pavement Deterioration Modelling (dTIMS)

dTIMS is a pavement modelling system used to predict pavement deterioration and thus develop forward expenditure profiles for various user defined scenarios. This system has been adopted by the National Roading Information Management System (RIMS) group.

Council has been running the dTIMS model since 2008 and uses this to optimise its pavement maintenance and renewal programmes. This information is then validated by site inspections to refine the programmes before they are entered in the Forward Work Programmes.

(c) Forward Work Programmes

The forward work programs contain all the required renewals that have been identified. The plan is used to prioritise the renewals, with the volume of works undertaken being based on the funding available.

(d) Life Cycle Management Plan (LCMP)

This plan contain details on the volume of maintenance and renewal activities to be undertaken. The Life Cycle Management Plan is included in Section 7. It covers the next 30 years and is reasonably flexible in terms of the type and volume of maintenance that will actually be undertaken.

(e) MOU with NZTA

The Memorandum of Understanding (MOU) between the Roading Department and NZTA sets the Roading Department's maintenance responsibilities in regards to assets associated with the state highways in the district. The current MOU was produced in June 2009, and replaces the older version that was signed in October 2000. The maintenance associated with each asset group is detailed in the relevant section of the Life Cycle Management part of this plan.

Through the NTA, a new regional MOU is to be developed and adopted.

(f) Cost Recording

The system of maintenance cost recording is specified within the maintenance contracts. The maintenance contractors record this data directly in to RAMM Contractor. At the end of each month the payment to the contract is made on value that is present to WDC from RAMM Contractor. The following process outlines how this is managed.

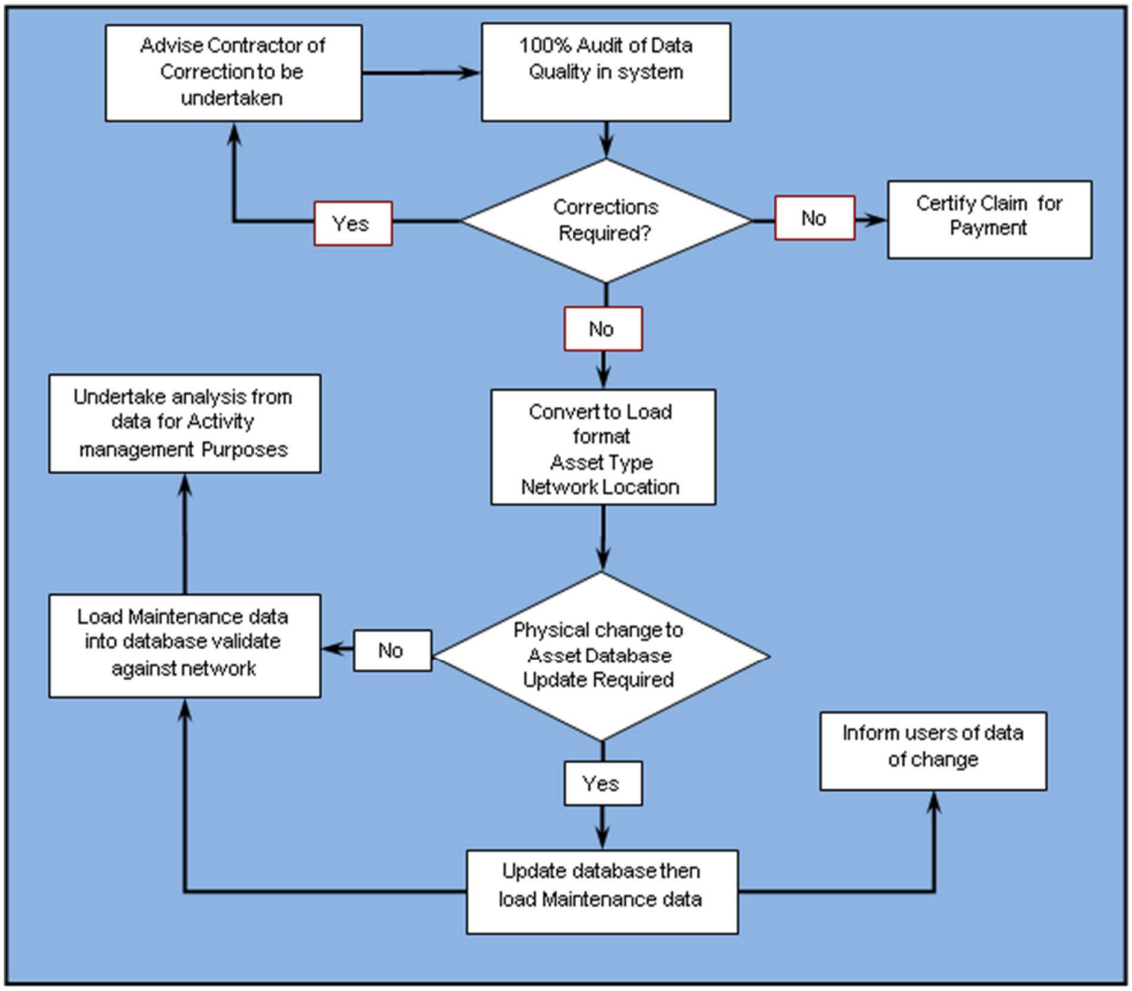


Figure 7.14.10.2: Maintenance Cost Flow Process

7.14.9 Emergency Management

An emergency event is a risk that is inherent with the management of all infrastructure networks. It is therefore a requirement of the plan to identify this as a risk, and to plan accordingly. Management and plans are based on recognition of triggers that indicate the broad nature of event occurring, and in turn which process to follow as the event unfolds.

There are a number of levels within emergency management framework and these are defined in Table 7.14.11.1 below.

Table 7.14.11 1: Emergency Management Framework

Scale	Description	Responsibility/Plan
Internally Coordinated Emergency Events	Managed by Whangarei District Council operations team with little co-ordination with external authorities apart from advising of current status of the event. This might take the form of storms events, road closures etc.	WDC Maintenance Contracts Manager, Storm Management Plan (WORKING DRAFT – Improvement item for further development)

Scale	Description	Responsibility/Plan
Externally Coordinated Emergency Events	These are events that require co-ordination with external authority to manage the event, e.g. a crash on the state highway where a local roads detour route is required	WDC Maintenance Contracts Manager, Maintenance Contract documents and Quality Assurance Plans State Highway Detour Maps etc.
Civil Defence Emergency	These are events where Civil Defence Emergency Management Plans are enacted. At this stage the Whangarei District Council operation teams work to these plans to support the district or region in the state of emergency	Regional Civil Defence Co-ordinator WDC - EOP 6 Lifeline Utility Coordination Protocols, Responsibility and Recovery. A sub plan of the Northland Civil Defence Emergency Plan 2010

POLICY

WDC operations team will act in accordance with the stated plans when emergency events occur.

7.14.9.1 Management & Operations

(a) Draft Roading Business Continuity Plan 2013

The Draft Roading Business Continuity Plan (Refer to TRIM 14/52) identifies hazards and sets out readiness and response framework to a crisis which results in a disruption to the roading network.

It identifies the key road services and then ranks the impact of a disruption over time on each of those services. The impact rankings range from 1 - Insignificant to 5 – Catastrophic.

The most critical road services are identified as arterial roads with decreasing order of criticality as the road volume decrease in size of population served. The financial and operational impact of a disruption to those road services for a period of one day ranges from 5 - Catastrophic for loss of service to the Whangarei area to 3 – Moderate to 2 – Minor for the other public roads in the district.

Minimum resource requirements required to respond effectively to the disruption to roading network are identified and include key internal and external staff, suppliers, contractors and contacts; vital records (both hardcopy and electronic) and IT/Communications infrastructure, as well as the need to identify alternate service providers, locations and/or procedures in the event of failure of key road services.

A preliminary Response/Recovery procedure is outlined which describes a range of strategies to deal with loss of critical resources such as loss of key human resources (both internal and external) and loss of key facilities.

(b) Northland Civil Defence Emergency Plan 2010 (NCDEM)

The Northland Civil Defence Emergency Plan 2010 sets out the required responsibilities and procedures in the event of a civil defence emergency. This plan provides guidance on all aspects of the civil emergency inclusive of identifying essential infrastructure that provides essential life lines in the event of an emergency.

Lifelines are the essential infrastructure and services that support the life of our community – utility services such as water, wastewater and storm water, electricity, gas, telecommunications, and transportation networks including road, rail, airports and ports.

A Life Lines study for Northland has been completed and is reviewed every two years by Northland Life Lines Group (NLG). The lifelines group consists of all the Councils in Northland as well as the Ministry of Civil Defence and Emergency Management, NZTA and major utility operators in Northland such as The New Zealand Refining Company, Transpower etc. The Roading Departments representative in this group is the Roading Maintenance Engineer.

The Life Lines study focused on setting regional priorities on recovering from a natural disaster. From this the critical issues associated with bringing these services back on line were then defined. As set in the NLG study the Key Service Areas were used in the transport criticality study. This allowed for a full assessment of all the network issues in association with Key Service Areas. This then translated into a priority order of routes to be addressed in terms of future management to complement the objectives of the NLG, as set in the Northland Civil Defence Emergency Plan 2010, Section 4: Readiness. This section also sets out how the NLG and its member organisations work within the Northland Civil Defence Emergency Plan.

(c) State Highway Detour Plans

The State Highway Detours plans set out in detail the responsibilities and procedures that are involved to close a section of the state highway and implement a detour route on to Whangarei District roads.

As part of the Memorandum of Understanding between Council and NZTA:

'WDC must notify NZTA and are responsible for providing information regarding changes in capability and maintenance programmes on detour routes.'

NZTA liaise with WDC to agree on diversion routes and will repair damages to these routes that NZTA agree were caused by the diversion of traffic by emergency services or NZTA.

(d) WDC Storm Management Plan

The WDC Storm Management Plan (Refer to TRIM 12/43660) sets out stages and procedures to be followed in a storm event. These procedures set out the stages from Imminent Stage; a trigger has occurred that warns of a storm approach; through to the recovery, inclusive of working with contractor and consultants.

(e) General Maintenance Contracts

As part of all the maintenance contracts (road, parking meter, street light) the contractors are required to:

'have prepared emergency plans for possible emergencies that may arise during the contract and demonstrate that the Contractors employees have received information on these.'

The contractors must have staff available for emergency response 24 hours, seven days a week. All necessary equipment and materials must be obtainable throughout the district and staff must be able to immediately mobilise labour, equipment and materials as necessary and be on the site within one hour of notification.

If any emergency works are undertaken, the contractor must notify the engineer within two hours, during normal working hours, or within six hours if outside normal working hours.

NEXT STEP	The maintenance team will take the main elements from the contractors response plans to create a WDC Roading Emergency Procedures Manual.

The NZTA Northland Emergency Procedures Manual will likely be used as a template.

7.15 Safety Management

Ensuring that the road network is safe and efficient is a key role of Council and supports the Ministry of Transport's Safer Journeys and GPS objectives of reducing fatal and serious injury crashes. Whangarei District Council has a process to identify safety issues and to mitigate these through road improvements, maintenance activities or education.

Further details on safety issues is provided in Sections 5.1.5 and 6.11.

7.15.1 Safety Hazard Identification

Table 7.15.1 sets out the systems, tools and resources used to identify safety issues on the road network

Table 7.15.1: Safety Systems, Tools and Resources

Resource	Description
Crash Reduction Studies	WDC carries out Crash Reduction Studies (CRS) on regular cycle. CRS use the CAS database (see below) to identify high risk roads and intersections and to identify possible treatments. It is desirable to complete a CRS on a 3 yearly cycle to pick up on any change in crash trends. The last CRS was in 2008 and one is currently programmed for 2015.
CAS Database	The Crash Analysis System (CAS) is an NZTA-administered database which provides crash records that can be used to identify crash trends.
SafetyNet	A GIS-based system that enables the easy identification of high risk roads and intersections. The system uses
NZTA Road Safety Reports	Annual reports on crash trends in each district and identifies crash types that are over-represented.
NZTA Communities at Risk Register	A register that identifies which causal crash factors (such as speed, alcohol, young drivers etc) are over-represented in each district.
Safety Audits	Audits of new projects to identify any safety issues and recommend treatments that can be undertaken in conjunction with the project.
Deficiency Database	Repository of untreated safety deficiencies identified previously through CRS, safety audits or through and Council staff and public feedback. Although this database is still maintained, its usefulness in addressing fatal and serious crashes is questionable.
Safety Management System	Provides a central reference of safety standards and processes to be consulted when undertaking works.
Public Feedback	Safety issues identified through public feedback.

7.15.2 Safety Assessment

The following diagrams are screenshots from the 2016 SafetyNet risk mapping system which identifies high risk roads and intersections which should be investigated further for possible safety improvements.

The above diagram shows the Collective Risk (eg crash density) of the rural road network. Apart from the State Highway network, the only High or Medium High collective risk rural road in the Whangarei District is Whangarei Heads Road between Waikaraka and Parua Bay (Medium High risk).

This diagram shows the Personal Risk (eg crash rate) of the rural road network. This shows that there are several roads with High and Medium High personal crash rates in the Whangarei District.

The most significant of these roads are detailed as follows:

- Russell Road (Medium High), Matapouri Road (Medium High), Whareora Road (High), Whangarei Heads Road (Medium High) and Pataua North Road (Medium High) - provide access to the coastal communities of Whangaruru, Matapouri, Parua Bay, Pataua North and Whangarei Heads.
- Hukerenui Road, King Street, George Street, Tauraroa Road, Waiotira Road and Mangapai Road (all Medium High risk) - provide access to the rural communities of Hukerenui, Hikurangi, Maungakaramea, Mangapai and Waiotira
- Waipu Gorge Road, Mountfield Road and Shoemaker Road (all High risk) – provides rural connections in the Waipu area.
- Vinegar Hill Road (High risk) – connects Tikipunga to Kauri
- Kokopu Road (Medium High) – connects Pipiwai Road to Mangakahia Road
- Abbey Caves Road, Old Parua Bay Road and Konini Street (all High risk) – connects Riverside to Whareora

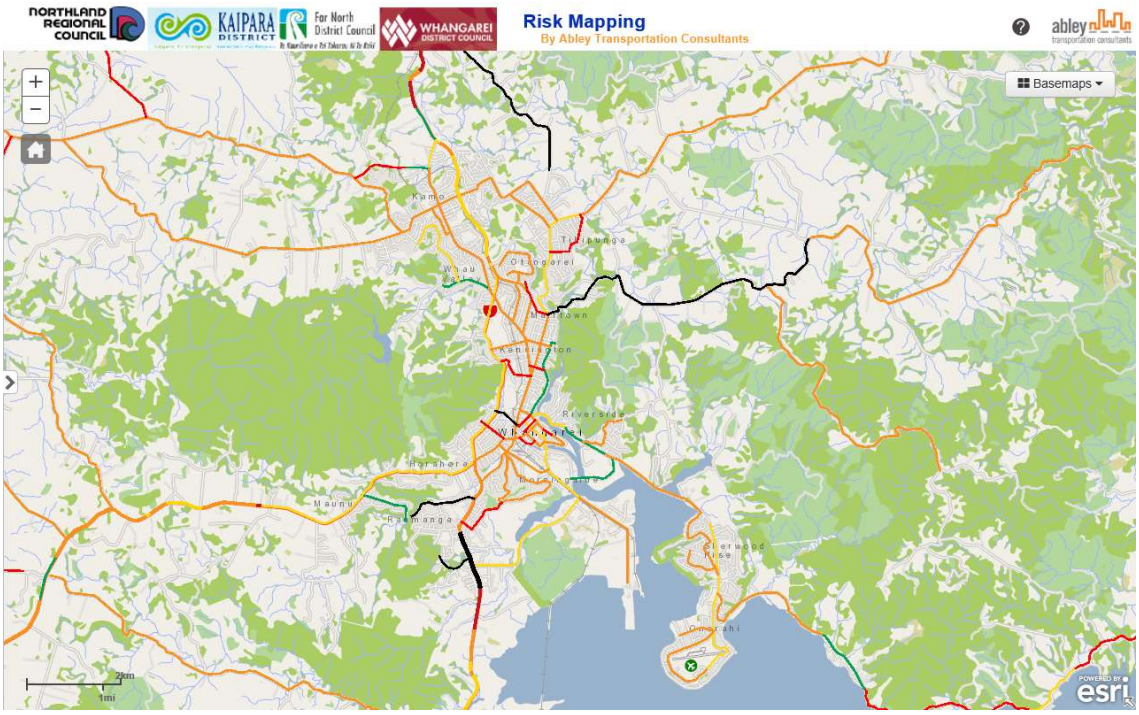
These roads will be targeted for future Low Cost/Low Risk Improvement programmes.

The Collective Risk diagram for the Whangarei urban area above shows that there are some key urban arterials which have High or Medium High ratings. These are:

- Riverside Drive (High) – provides access to Onerahi and the Whangarei Heads area.
- Kamo Road (Medium High) – provides access to the suburbs of Kensington, Whau Valley, Otangarei and Kamo.
- Mill Road (Medium High)– provides access to the suburbs of Kensington, Otangarei, Whareora and Tikipunga.

The recently completed Mill Road/Nixon Street Upgrades project will address an intersection on both the Kamo Road and Mill Road routes and will have a positive effect on the crash rates on these routes.

A project to upgrade Riverside Drive to 4 lanes is planned, but this is not currently programmed within the next 10 years. In the meantime, minor intersection improvements on this route are planned through a package of Urban Intersection upgrades.



There are many roads identified as having High or Medium High Personal risk in the Whangarei Urban area as shown in the diagram above. The most significant of these roads are detailed below:

- High Risk – Paranui Valley Road (Mairtown), Whareora Road (Mairtown), Selwyn Ave (CBD), Rust Ave (CBD), Raumanga Valley Road (Raumanga) and Tauroa Street (Otaika).
- Medium High Risk – Boundary Road (Tikipunga), Korau Road (Tikipunga), Cairnfield Road (Kensington), Deveron Street (Regent), Manse Street (Regent), Central Ave (CBD), Rathbone Street (CBD), John Street (CBD), Albert Street (CBD), Fairburn Street (Raumanga), High Street (Morningside), Mt Pleasant Road (Morningside) and Beach Road (Onerahi).

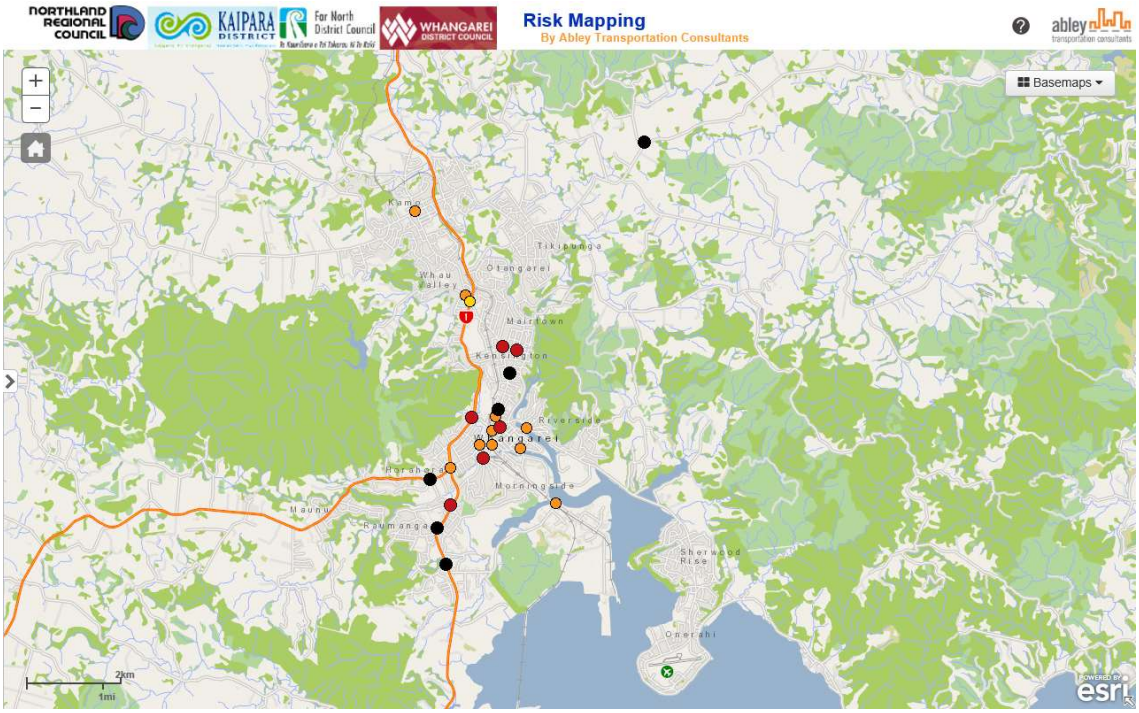
Speed management treatments such as speed platforms have recently been installed on Boundary Road and Raumanga Valley Road. These treatments are expected to reduce the crash risk on these roads.

These roads will be investigated for possible future Low Cost/Low Risk Improvement programmes.

There are three Medium High Collective risk intersection identified for the Whangarei District Council's road network as follows:

- Ngunguru Road/Maruata Road
- Mill Road/Nixon Street – intersection improvements completed in 2015/16.
- Kamo Road/Nixon Street/Kensington Ave – intersection improvements completed in 2016/17.

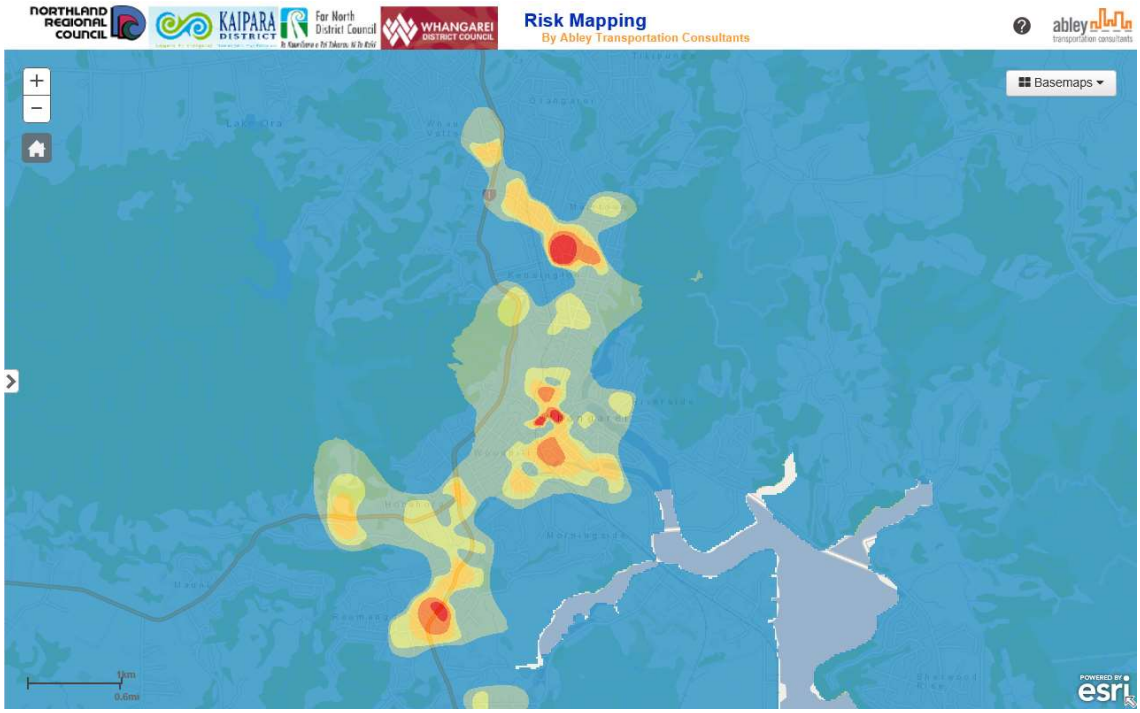
For intersections with no planned improvements, these will be investigated as potential future Low Cost/Low Risk Improvements works.



There are several intersections identified as having High or Medium High Personal risk as shown in the diagram above. These are all located on key intersections in the Whangarei urban area and include:

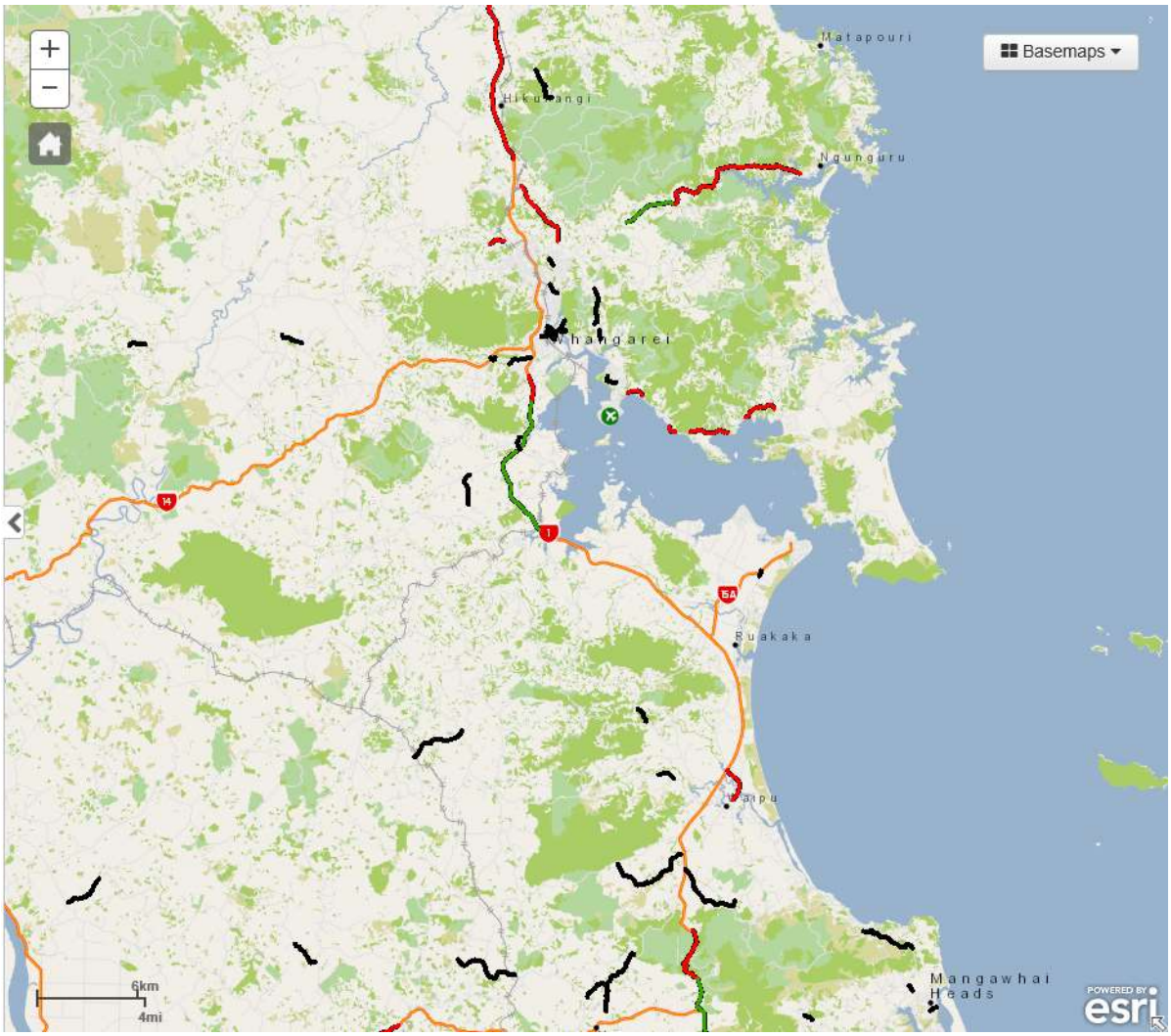
- Bank Street/Deverson Street (High) – crashes due to short term detour route during Mill/Nixon intersection upgrade project.
- Bank Street/Grey Street/Mansfield Terrace (High)
- Ngunguru Road/Maruata Road (High)
- Mill Road/Nixon Street (Medium High) – intersection improvements completed in 2015/16.
- Kamo Road/Nixon Street/Kensington Ave (Medium High) – intersection improvements completed in 2016/17.
- Rathbone Street/Robert Street (Medium High)
- Tarewa Road/Porowini Ave (Medium High) – urban intersection upgrade proposed in 2016/17.

For intersections with no planned improvements, these will be investigated as potential future Low Cost/Low Risk Improvements works.



The diagram above is a heat map showing active user crashes involving pedestrians and cyclist in Whangarei City. This map shows that the High and Medium High risk areas are:

- Kamo Road/Nixon Street/Kensington Ave intersection – upgraded in 2016/17.
- Mill Road/Nixon Street – upgraded in 2015/16.
- The Whangarei CBD and in particular at the following intersections: Bank Street/Cameron Street, Rathbone Street/Robert Street, Bank Street/Dent Street/Vinery Lane roundabout, Walton Street/Bank Street roundabout, Walton Street/Albert Street and Walton Street/Vine Street.
- Otaika shops – recent upgrades to the pedestrian crossing on SH1 may have helped to address these crashes.



The map above shows areas identified for speed management interventions from the 2016 NZTA Speed Management Framework mapping. This identifies indicative treatments for the following routes:

- Engineer Up (Green) – Ngunguru Road (west from Ngunguru Ford Road towards Maruata Road)
- Challenge Conversations (Red) – Ngunguru Road Road (Ngunguru Ford Road to Ngunguru Village), Vinegar Hill Road, Pipiwai Road (East from Dip Road), Whangarei Heads (several sections from Onerahi to Parua Bay), Nova Scotia Drive (Waipu).
- Self Explaining – Reduce Speed Limit (Black) – Gomez Road, Johnson Road, Blagrove Road, Houto Road, Abbey Caves Road, Konini Street, Whangarei City (Denby Cres, Cairnfield Road, Walton Street, Robert Street, Rathbone Street, Dent Street, Cameron Street, Dundas Road, Punga Grove, Tui Cres, Raumanga Valley Road, Ross Street), Loop Road (South), Jobe Road, Neville Road, Ormiston Road, Millbrook Road, Brooks Road, Glenmohr Road, Cove Road (between Langs Beach and the KDC boundary).

These roads need to be reviewed to determine whether an intervention is necessary and what the appropriate treatment should be. Where appropriate, these roads shall be considered for speed

management treatments through changes to the speed limit in consultation with the local community. The section of Ngunguru Road west from Ngunguru Ford Road towards Maruata Road will be considered for engineering upgrade to make the road standard appropriate for the operating speed.

7.15.3 Safety Programmes

7.15.3.1 Low Cost/Low Risk Improvements Programme

The Roading Department carries out numerous safety improvement projects to assist in improving the safety of the network through their annual Low Cost/Low Risk Improvements programme. Typical Low Cost/Low Risk Improvement projects are listed in Table 7.15.2 below.

Table 7.15.2: Assets and their Contribution to Safety

Asset	Contribution to Safety
Road Safety Barriers	Barriers provide delineation to help drivers recognise road edges as well as offering protection in the event of an accident
Signs, Markings and Delineation	Signs are used to warn drivers of dangerous sections of road and to help control vehicle speed. Marking and delineation provide guidance to drivers by clearly indicating centrelines and road edges.[1]
Driver Feed-Back Signs	These signs are used to promote driver awareness and encourage drivers to be more aware of their speed and the speed limits.
School Zone Signs	These signs are used to encourage drivers to aware of school children and encourage drivers to limit their speed and be extra vigilant in school areas.
Lighting	Lighting improves driver's vision at night and also offers protection to pedestrians by increasing the safety of the areas they use.
Vegetation Control & Sight Benching	Vegetation control is important in ensuring that signs and markings are visible and that driver's sightlines are clear, particularly at intersections. Sight benching helps keep sightlines clear, particularly on blind corners.
Traffic Calming Devices	These devices are used to control the speed of drivers and encourage focus on the road in areas with vulnerable users such as pedestrians.
Traffic Signals	Controls the flow of traffic at intersections, reducing conflicts between traffic streams, hence reducing the likelihood of an accident.
Road Widening	Widening the carriageway provides more wander space for drivers before they enter the road should where they may lose control of their vehicle. This work is often undertaken in conjunction with pavement rehabilitation work.
Speed Limits	With the release of the NZTA Speed Management Guide, opportunities to change speed limits to better reflect the safe and appropriate speed of a road will be investigated and implemented where appropriate.

For further details on these assets see the relevant section of Section 7 – Lifecycle Management Plan.

7.15.3.2 Road Safety Promotions

As the Road Controlling Authority, WDC is responsible for the delivery of Road Safety Promotion within the Whangarei District.

WDC has engaged Northland Road Safety Trust (through RoadSafe Northland) to undertake this work on its behalf. This partnership has been in place for many years and allows WDC to promote many road safety programmes for a relatively small investment by way of NZTA subsidies and utilising contributions from the community (local share)

The plan was developed by 'RoadSafe' Northland in conjunction with the 'Road Safety Action Plan Group' for the Whangarei District. This group that includes representatives from:

- the Whangarei District Council's Roading Department,
- NZTA,
- RoadSafe Northland,
- The Police, and
- ACC.
- Northland Regional Council
- Northland District Health Board

The plan sets out areas to be targeted and activities to promote road safety, and ultimately reduce fatal and serious injury crashes on Whangarei's transport network. This group develops a plan of safety initiatives across the district to focus on high risk issues that have been identified through the Communities-at-Risk Register;

- Young Driver Education
- Alcohol and/or drugs
- Speed
- Rural road loss of control/head on
- Intersections
- Inattention and Fatigue
- Restraints (child restraints)

The plan is updated every three years, with a full review undertaken every six years.

7.16 Major Capital Programme

The major capital works projects that have been identified through the Whangarei Transportation Network Strategy over the next 30 years (2018-2048) are shown in the table below. These projects are to provide for growth in Whangarei City which is a high growth urban area and for the rapidly growing Ruakaka/Marsden Point area.

The capital programme over the next 10 years is shown in detail in Section 10.2.10.

Major capital expenditure								
Description	2018 / 23	2023 / 28	2028 / 33	2033 / 38	2038 / 43	2043 / 48	Key Driver	Uninflated Cost ($m)
Springs Flat Roundabout							Growth	4.0
One Tree Point Road upgrades							Growth	7.58
Marsden Point Road upgrades							Growth	21.96
Kamo route bus priority lanes/4-laning							Growth	12.0
Riverside Drive/Onerahi Road							Growth	20.0
Port/Kioreroa RAB and bridge 4-laning							Growth	7.0
Reyburn St/Okara Dr/Port Rd bus priority lanes/4-laning							Growth	15.0
SH1 to SH14 Maunu Link Road							Growth	15.0
Hatea Dr 4-laning							Growth	12.0
Park N Ride facilities							Growth	16.0
Tikipunga route bus priority lanes/4-laning							Growth	18.0
Maunu Rd/Water St bus priority lanes							Growth	15.0
Tarewa Rd Intersection //Walton 4-laning							Growth	11.0

8 Risk Management & Criticality

The Infrastructure and Services Group use risk management to assist with the identification of possible works and the prioritisation and programme development of these works. Appendix B of Councils *Activity Management Planning - Policy and Practice* document contains the framework for how the groups within Infrastructure and Services manage risk, the process is also illustrated in *Figure 8-1*.

The following outlines the purpose and scope of the risk management processes and procedures established and the parameters within which risks have been identified and analysed within the Roading Department. It also sets the way in which the identified risks will be managed.

The procedure is based on the Guidelines in *AS/NZS 4360:2004 Risk Management*. In this case WDC have adopted the definition of risk management presented in Standards New Zealand Handbook, *Risk Management for Local Government (SNZ HB 4360:2000 A1)* as set out below:

DEFINITION	"The systematic applications of management policies, procedures and practices to the task of identifying, analysing, evaluating, treating and monitoring those risks that could prevent a Local Authority from achieving its strategic or operational objectives or plans or from complying with its legal obligations".

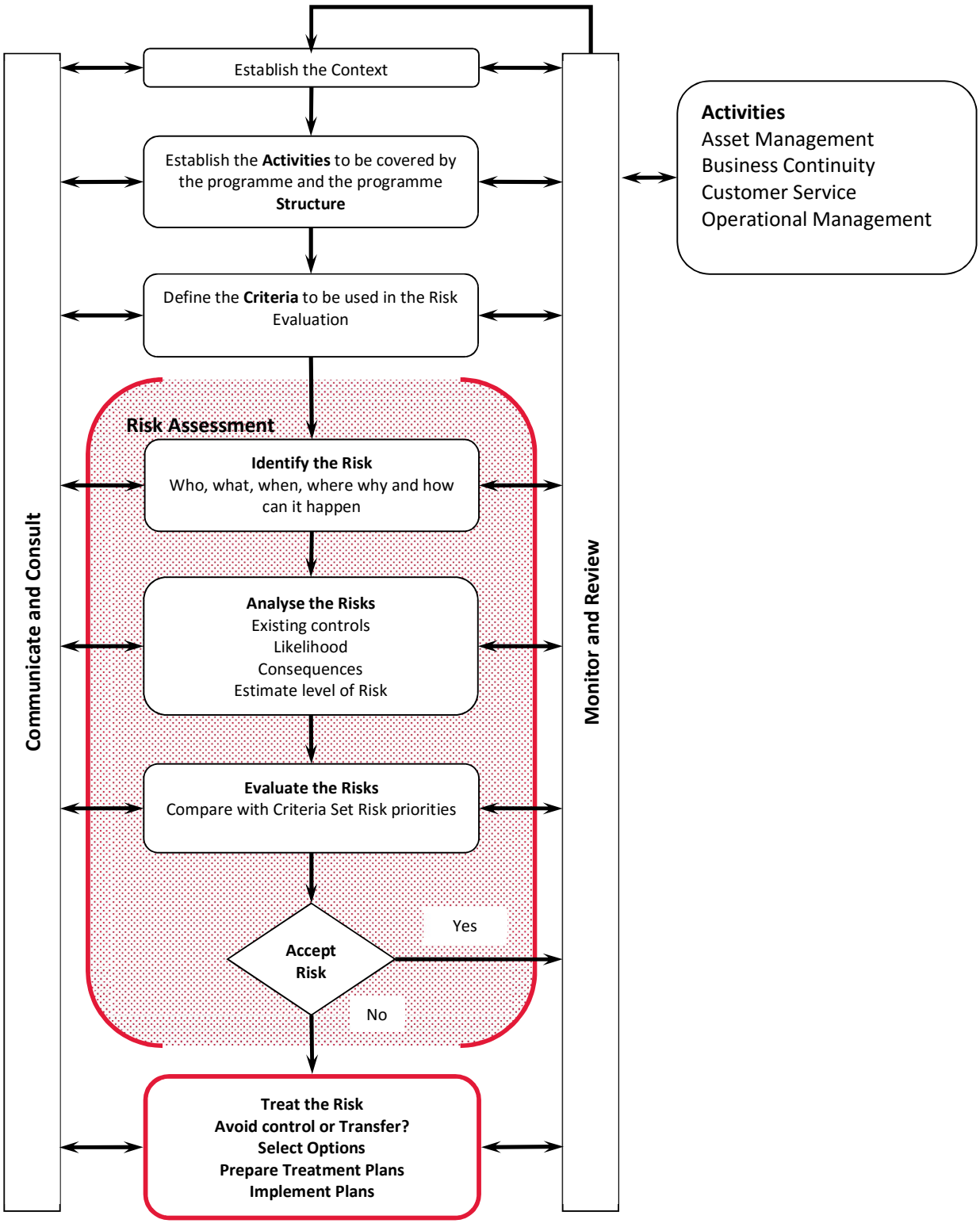


Figure 8-1: Risk Management Process

8.1 Context

The issue of risk is considered and managed as an integral part of Council's Roading Asset Management work for many good reasons such as 'Business Continuity', so that stakeholders experience uninterrupted services in line with target 'Customer Outcomes' and 'Levels of Service'. Risk is also a significant influence on programme prioritisation and budget planning.

Some further commentary on context is provided below:

8.1.1 Risk Management Context - Roading

The Risk Management context is in relation to the activities set out within this plan. Tools include a Risk Assessment Matrix to assess the likelihood and consequence of a risk, a Risk Register and Risk Treatment Plans. We reference Levels of Service to guide our consideration of risk to ensure that it is appropriate and balanced. This is because the identification, analysis and treatment of risk issues impacts at all levels in the management of the assets.

8.1.2 Strategic Context- Wider Council & Beyond

The strategic context is the relationship of this Activity Management Plan to the Risk Management framework set out in the *Activity Management Planning – Policy and Practice* document, which provides a consistent framework for the analysis of risk across the Infrastructure and Services Group. The risk framework allows each identified risk to be weighed against the intent of the Council Mission Statement, the Community Outcome goals, and Levels of Service goals. Where practical, risk management work gives due regard to other key plans and strategies within this local authority and the region.

8.1.3 Relationship of Risk & the Asset Management Plan

Table 1.2 of Appendix B in the *Activity Management Planning - Policy and Practice* contains the relationship of risk management to the different asset management plan sections.

As identified in Section 5.3 of the *Activity Management Planning – Policy and Practice* document, risk applies across the processes in the management of the asset. The risk register holds core information about the identified risks, and indicates which activity and related function the risk impacts upon.

8.1.4 Importance of Transportation Network to 'Lifelines'

What are Lifelines?

Lifelines are the essential infrastructure and services that support our community – utility services such as water, wastewater and stormwater, electricity, gas, telecommunications and transportation networks including road, rail, airports and ports.

What is Lifelines Engineering?

Lifelines Engineering is a process whereby people from these organisations work together to make sure they are well prepared for an emergency. The objectives of Lifelines Engineering are to:

- reduce damage following a major disaster; and
- reduce the time lifeline utilities will take to restore their usual level of service after such an event.

The Civil Defence Emergency Management Act 2002 requires organisations managing lifelines to work together with the Civil Defence Emergency Management group in their region.

Northland Lifelines Group

Northland has a Lifelines Utility Group comprising representatives from most utilities in the transport, energy, water and communications sectors.

The group aims to co-ordinate efforts to reduce the vulnerability of Northland's lifelines to hazard events and to make sure they can recover as quickly as possible after a disaster.

Lifelines (Study & Plan)

The Northland Lifelines Group undertook a study of the risk exposure to the life links in the event of a major disaster (e.g. Common threats in Northland being earthquake, flood and tsunami). The study considers a number of outcomes and the associated risks for the Transport Network and its assets.

This study resulted in the development of the Northland Lifelines Group Infrastructure Resilience Plan. This plan is used specifically to develop our understanding of the critical links in our network through the criticality assessment. This is then used as an input to our prioritisation of work programmes.

Outputs from the Northland Lifelines Group Infrastructure Resilience Plan that relate to transport are shown in Section 11.3.

8.2 Analysis Criteria

Appendix B of the *Activity Management Planning - Policy and Practice*, document contains details of the criteria to be referenced when assessing likelihood and consequence of risks. These are summarised in the tables below:

Table 8-1: Risk rating Criteria

Rating	Descriptor
Low Risk	Operational risk, record, mitigate if possible or work around
Medium Risk	Mitigation plans in AMPS
Significant Risk	High priority to mitigate through AMPs
Unacceptable Risk	Mitigation top priority

Table 8-2: Likelihood Scale

Score	Descriptor	Description	Indicative Frequency	Probability of at least one occurrence in 10 years
5	Probable	The threat is expected to occur frequently	> 1 year	>99.9
4	Common	The threat will occur commonly	1 to 5 years	90% to 99.9%

Score	Descriptor	Description	Indicative Frequency	Probability of at least one occurrence in 10 years
3	Possible	The threat occurs occasionally	5 to 10 years	65% to 90%
2	Unlikely	The threat could occur infrequently	10 to 50 years	20% to 65%
1	Rare	The threat may occur in exceptional circumstances	>50	<20%

Volume 2 Appendices contains details of the criticality criteria.

8.3 Analysis & Treatment

8.3.1 Risk Analysis

The risk management process involves the development of a comprehensive list of risks and the evaluation of each one against the assessment criteria, (refer Activity Management Planning - Policy and Practice document for further details). The risks are entered into a Risk Register. Ideally, a risk should be identified in the following terms:

[Something happens] leading to [negative outcome]. The description should include additional information, such as:

- what is the source of the risk?
- what is the inherent risk (without any controls)?
- what are the existing controls or influences on the risk?
- what (specifically) are the consequences?
- What is it dependent on other risks or conditions?

The risk may trigger several categories of potential consequence, or if it has a range of likelihood and consequence, it should be rated according to the combination that gives the highest risk rating.

POLICY

Risk analysis will be completed in terms of the Planning – Policy and Practice document.

The Risk Register will be reviewed on a yearly basis with the confirmation of annual plans and budgets.

Risk Management Plans will be developed for risks rated HIGH or greater. These plans will have owners, and be reviewed every six months.

Where HIGH or greater rated risks cannot be managed through the recommended mitigation action set out in the risk management plan, these will be referred to the I&S Manager.

The full risk register and related analysis is provided in Volume 2 Appendices.

8.3.2 Risk Outcomes

8.3.2.1 Identified Risks

POLICY	Any actions, improvements or identified gaps in terms of risk management will be put into the Opportunities & Issues Register for review.

Currently there are over a hundred identified risks on the transportation risk register. These are of varying priority level. (Apart from these risks there are the corporate risks as identified through the LTP which have not been considered in this framework.)

The full risk register and related analysis is provided in Volume 2 Appendices.

Risks rated as "High"

As of December 2017, the risk register holds 23 HIGH level risks associated directly with the Transport Network, with all identified HIGH risks having mitigation options in place. Figure 8.2, at the end of this section, holds a summary of all the high level risks.

Risk rated as "MEDIUM"

As of December 2017, there are 81 MEDIUM risks identified, all with mitigation options identified.

8.3.3 Risk Treatment

A risk treatment plan is prepared for those risks that are considered HIGH or greater. These treatments plan are based on *Figure 8-2* with detailed plans held in Volume 2 Appendices.

Risk No:	Activity:	Identified Risk:	Ref:
Summary			
Existing Control Measures			
Improved Control Measures			
Resource Requirements			
Responsibility			
Timing			
Reporting and Monitoring			
Compiled By:	Date:	Reviewed By:	Date:

Figure 8-2: Risk Treatment Plan

Risk No.	Activity	Risks	Controls and Changes that Influence Risk	Management of the Risk	Review Frequency	Affected Activity
1010	Demand Change	Local Industry growth and exceptional Demand on portion of the network- eg Northport Growth (Ports of Auckland change), Airport Relocation.	Roading AMP Demand management Plan. Improvement process required to understand current and future demand	Incorporate planned changes into TRACKS traffic model, urban growth strategy data feeds AMP rewrite, improved forecasting	6 monthly	Capital Programme
1012	Demand Change	Emergency Detour Routes State Highway to Local Roads - higher crash risk or severe congestion on LA side due to geometry, width, speed environment	Detour routes identified, maintenance plans in place, capital improvement programme identified Knowledge of occurrence but no procedure for understanding impact, possible to use CAS but need sufficient data	Develop Regional Resilience Strategy Plan. Direct funding to resilience and safety improvements through Low Cost/ Low Risk improvements	6 monthly	Emergency Management
1014-1017	Funding Provision	Reduction in Pavement, Surfacing and Bridge Renewal funding from that advised in the TAMP and DLTP and as forecasted for expenditure in the LTP as agreed to with LoS option	Presentation of Roading Budget to Council outlining the basis of the programme and the expected outcomes of under funding; Supporting information in AMP to deal with consequences in robust fashion	RAMM Improvement programme and AMP rewrite	6 monthly	Pavements, Surfacings and Bridges
1023	Human Resources	Staff turn over due to job dissatisfaction or NTA workload/restructure	Staff survey creating reasonable work environment. Corporate level initiatives	Succession planning, work environment	6 monthly	Department Operations
1044	Routine Inspection	Road subsidence and slips	Professional service contracts and Routine Maintenance contracts. Levels of Service. Clearing of blocked culverts and crack sealing	Develop Regional Resilience Strategy, Criticality studies identify routes affected, identify resilience works to mitigate	6 monthly	Emergency Management
1065	Emergency Management	Russell Road - Road closures due to slips and/or flooding	Routine maintenance contracts, emergency management processes and plans	Develop Regional Resilience Strategy, Criticality studies identify routes affected, identify resilience works to mitigate	6 monthly	Emergency Management
1085	Network Operations	All signalised intersections are supplied with power from the Northpower network. Should this network fail signalised intersections could be left without power and unable to operate.	NZ law requires that normal STOP/GIVE WAY rules apply to an intersection which is blacked out or in the flashing amber fault state.	All category 1 sites should ideally be considered for some sort of UPS treatment to flash amber for a defined period in the event of mains failure, together with an LED upgrade to minimise power consumption.	6 monthly	Operational Traffic Management
1088	Network Operations	Loss of SCATS region (master) computer or associated hardware	Hardware: New server installed in 2007 with redundant network cards, power supplies, mirrored hard drives(RAID), server health checking and management software. Software: Current version of SCATS 6.5.2, current OS Windows 2003 with necessary patches, virus protection and firewalls as part of the WDC corporate network. Also security measures for internet access per WDC corporate network. Access is restricted to server itself and only holders of SCATS security keys can alter the SCATS system. Backups of the server are taken each evening.	The proposed Corridor Management Plan for traffic signals (CMP) will require all sites under coordination to have flexilink data included as part of their PROM. The plan further suggests a regular updating cycle for the data to ensure its relevance. These updates will be stored in the intersection's RAM which is battery backed, and also the data is held on SCATS to ensure it is not lost. Upgrade SCATS Master computer to reduce likelihood of failure.	6 monthly	Operational Traffic Management
1090	Network Operations	Network Operations Management - Rust Ave. Vehicles striking low overhead rail bridge on route from SH1 into CBD	Structure is less than 4.4m and signed with PW45 and PW46 signs per the Manual of Traffic Signs and Markings (MOTSAM). There are advance warning signs on Bank St and SH1 at Western Hills/ Selwyn Ave. Also a special set of signals are operated to detect and warn drivers of over-height vehicles approaching the bridge from either direction.	Existing controls	6 monthly	Operational Traffic Management
1091	Funding Provision	SPM database for generating DC charge, relies on district growth strategy also sensitivity of the model inputs and development of the projects into renewal/backlog/growth. Challenges to DC charge leading to legal action against council	Workshops with developers of the DC programme, department guidance on best practice, process management document compiled to track how DC have been developed for Transport	Existing controls	6 monthly	Financial Management
1092	Emergency Management	Emergency Detour Routes State Highway to Local Roads - lack of resilience results in detour routes not being available when SH closed	Detour routes identified, maintenance plans in place, capital improvement programme identified Knowledge of occurrence but no procedure for understanding impact, possible to use RAMM but need sufficient data. Resilience Strategy required.	Develop Resilience Strategy. Provide adequate funding for resilience improvement works.	6 monthly	Emergency Management
1093	Level of Service	Few arterial routes in Whangarei City combined with high population growth leading to excessive congestion.	Transportation and growth modelling to identify levels of service and programme forward works.	Continue to invest in walking and cycling. Fund investment in PT infrastructure. Carry out capacity improvements where necessary.	6 monthly	Capital Programme
1094	Renewal Works	Sealed road network is vulnerable to HCV damage, particularly due to soft subgrades and block cracking issues. Thin pavements and lack of drainage are also impacting on roughness and maintenance costs	Programme of reseals, rehabilitations and maintenance on HCV routes. Identification of high risk routes.	Identify and strengthen high risk routes as necessary. Rehab designs to avoid creating pavements susceptible to block cracking	6 monthly	Pavements and Surfacing
1095	Safety Implementation	Increasing trend in fatal and serious injury crashes	Minor improvement programme of $1M/pa to focus improvements to sites/routes identified through CRS, HRRR or Deficiency Database	Increase funding form safety works. Focus on improved delineation and high skid resistance surfacings. Implement speed management.	6 monthly	Safety Management
1097	Funding Provision	Reduction in transport budgets to fund the emergency works after a major event	None	Provide resilience budget sufficiently large to reduce the risk of budget cuts and reduce the number of high risk sites	6 monthly	Financial Management

Risk No.	Activity	Risks	Controls and Changes that Influence Risk	Management of the Risk	Review Frequency	Affected Activity
1099	Human Resources	Only have one traffic systems engineer with no succession planning.	Back up limited to Auckland based consultant	Provide succession planning for this role. Provide remote operation which enables back up by ATOC etc.	6 monthly	Operational Traffic Management
1102	Emergency Management	Road closure due to flooding, crash etc. Note not WDC asset but affects WDC network	Routine maintenance contracts, emergency management processes and plans	Criticality studies identify routes affected, id preventative works to mitigate	6 monthly	Emergency Management
1103	Emergency Management	Road closure due to flooding, slip, crash etc to a road that serves an isolated community with no other means of access. Eg Whangarei Heads Rd past Parua Bay, Pataua North and South Rds etc	Routine maintenance contracts, emergency management processes and plans	Criticality studies identify routes affected, id preventative works to mitigate. Develop Resilience Strategy	6 monthly	Emergency Management
1104	Legislation Compliance	PM10 Dust on HCV routes, particularly forestry routes, above the national health standard resulting in road closures due to protest action by local residents	Routine maintenance contracts, limited dust suppression, sealing sections of the Wright/McCardle route	Dust suppression on forestry routes. Seal extensions	6 monthly	Capital Programme
1116	Capital/Renewal Works	Services within the road corridor are often shallow, require relocation/repair/ protection and can cause early failure of pavements. Uneven service lids create bumps which are hazards for cyclists/motorcyclists.	EES standards control depth and location of services. Legislation	Ensure services are at correct depth and are adequate quality. Raise service lids.	6 monthly	Pavements
1117	Capital/Renewal Works	Old voidfill seals and TAC are allowing water to ingress into sealed pavements and are causing premature failure and increased maintenance costs	FWP developed to address backlog of voidfills and TAC	Carry out programme to address backlog of voidfills and TAC	6 monthly	Surfacings
1124	Legislation Compliance	KiwiRail require an increasingly high standard for road crossings over railway lines	Routine maintenance contract.	Liaise with KiwiRail about required standards	6 monthly	Renewals
1125	Service Provision Purchasing	The new maintenance contract may result in cost increases or decreased levels of service	Maintenance contract being developed and procured in a manner that should drive cost efficiency	Develop contract to drive cost efficiency and maintain service levels	6 monthly	Financial Management

8.3.4 Criticality Analysis

POLICY	
	Criticality analysis will be completed in terms of the Volume 2 Appendices. A review of the Criticality Register will be completed on a yearly basis with the confirmation of annual plans and budgets. Criticality will be used as is an integral decision factor in the programme prioritisation matrix.

8.3.4.1 Key Strategic Risks and Issues

Key strategic risks and issues have been identified through the development of the Infrastructure Strategy as follows:

Issue	Options	Implications
Whangarei is geographically constrained, reducing options to grow the road network and address congestion	Do nothing	• Increased traffic congestion and loss of amenity • Loss of productivity for the community • Reduction in Level of Service
	Road upgrades only	• Constrained network limits road upgrade options • Does not address increased volume of traffic over time • Requires major investment
	Promote alternative transport alongside road upgrades	• Extends lifecycle of existing constrained road network • Slows the rate of rising congestion • Community health and amenity benefits • Environmental benefits, particularly in relation to emissions.
Commentary and Anticipated Response: Whangarei is geographically constrained, restricting the ability to grow the urban road network along already built up routes. This constraint is compounded by high traffic growth, reliance on private vehicle use and an ageing traffic signal system. Council prefers to take a multi-pronged, co-ordinated approach to managing congestion by upgrading key intersections and roads, as well as promoting alternative transport options. To address this issue Council will: • Identify and promote alternative mass transport options, including bus lanes, park and ride facilities and light rail • Promote walking and cycling, and in particular, develop safe cycle routes along main transport routes.		

Issue	Options	Implications
Our sealed road network is vulnerable to heavy vehicle traffic which is expected to grow in volume and intensity	Do nothing	• Sealed pavements on freight routes will deteriorate and no longer be fit for purpose • Loss of District and Regional economic benefits • Increased bow-wave of renewals • Potential loss of NZTA subsidies

Issue	Options	Implications
	Continue with existing funding levels	• Maintain economic benefits of getting local goods to market • Less funding available for non-freight route renewals
	Even funding across all roads	• Reduces renewals on heavily used roads resulting in pavement deterioration • Potential loss of funding under NZTA's ONRC funding model.
Commentary and Anticipated Response: Sealed roads are vulnerable to damage (particularly from heavy vehicles) due to thin/narrow pavements, poor geology, a semi-tropical climate, over-stabilisation and historical under-investment in renewals. Council prefers to work with NZTA, industry and neighbouring districts to take a region-wide approach to this issue and identify alternative freight routes to reduce the overall impact. To address this issue Council will: • Continue a programme of pavement renewals to maintain sealed pavements on freight routes in a 'fit for purpose' condition while optimising the long-term maintenance costs • Continue the forestry road programme • Identify and maintain other freight routes to a higher standard to cope with the increasing freight loads over time • Prioritise maintenance, including drainage.		

Issue	Options	Implications
Poor network resilience results in closures	Repair road damage and clear slips as they occur	• Unreliable transport routes, particularly important for commercial and freight routes • Reduces funding for renewal and capital works • Increased community isolation
	Increase resilience through pro-active management of risks	• Reduced closures over time • Renewal and capital projects are maintained • Improved overall road condition • Reduced impact on Council's overall funds
Commentary and Anticipated Response: Poor geology and a subtropical climate make our roads susceptible to slips and flooding during heavy rain events. Climate change is expected to increase the intensity of major rain events, over time. Where slips and other road damage occurs, funding is often diverted from other renewals and capital programmes to re-instate the affected road. Council prefers to proactively manage slip mitigation by undertaking preventative works where practicable and ensuring there are detours available. To address this issue Council will: • Address slips and flood mitigation in a proactive manner • Provide 'fit for purpose' detour routes • Consider the impacts of climate change in low lying / coastal areas.		

Issue	Options	Implications
The introduction of ONRC (One Network Road Classification) may see reduced subsidised funding	Do nothing	• ONRC will be implemented without Council input • Greater potential for loss of subsidy funding

Issue	Options	Implications
for some activities on certain classes of roads		• Reduction in Levels of Service over a wider part of the road network
	Liaise with NZTA and respond	• Opportunity to influence implementation of the ONRC system • Maintain maximum available funding • Potential changes in Level of Service over a small area of the road network.
Commentary and Anticipated Response: NZTA is implementing a new One Network Road Classification (ONRC) system for assessing subsidy levels. This may take up to seven years to bed in and has the potential to affect when roads are eligible for funding. Council prefers to work closely with NZTA as the new system is developed. To address this issue Council will: • Continue to work closely with NZTA in the development and implementation of the ONRC funding model • Review and revise Levels of Service to align with ONRC requirements as the develop • Educate the community on any potential changes to Levels of Service.		

Issue	Options	Implications
The number of fatal and serious injury crashes on our roads is high and continues to trend upward	Do nothing	• Continuing upward trend in high severity road crashes • Increasing social and economic impact on the community
	Improve road design	• Severity of road crashes can be reduced • Does not address driver behaviour and other contributors to crashes
	Co-ordinated all-agency road safety approach, including design solutions	• Severity of road crashes can be reduced • Reduced social cost • All contributors to crashes targeted.
Commentary and Anticipated Response: Council recognises that there are often a range of factors that contribute to serious crashes, including road design and condition. To reduce the number of serious crashes, Council prefers to take a co-ordinated, inter-agency approach to provide a safe road system targeting safer speeds, safe road use, safe vehicles and roadsides. To address this issue Council will: • Prioritise treatments to evidence-based high risk areas • Continue to work with road partners and develop road safety promotions targeting key risk areas • Create a more forgiving road system, by developing a safe system approach.		

Issue	Options	Implications
Future transport technologies, including electric vehicles and autonomous vehicles will have an impact on the roading infrastructure	Do nothing	• Potential loss of economic opportunity • Long term cost associated with upgrades needed to “catch-up” with technology
	Watching brief	• A need to keep up to speed with developing technologies • A need to future proof infrastructure we install today

Issue	Options	Implications
	Future proof network	• Additional electric charge facilities • Lower costs of installing new technology as provision has already been made.
Commentary and Anticipated Response: Transport technologies are evolving rapidly, with increasing numbers of electric cars on the road requiring charge points and autonomous vehicles being tested on New Zealand roads. New technology has the potential to reduce emissions and improve safety. However, new technology may also present new challenges that we do not fully understand today. Council prefers to maintain a "watching brief" on emerging technologies and incorporate future proofing into design and development work, where practicable. To address this issue Council will: • Ensure we keep up to speed with developing technologies • Consider future technologies and how we can future proof infrastructure we install today.		

Issue	Options	Implications
The proposed relocation of the Whangarei Airport may require upgrades to roads and new transport routes	Watching brief	• Provides a long lead-in time for expenditure • Cost estimates and funding based on a fully developed project
	Budget for a potential road upgrade	• Funding would be for an unknown project with unknown costs • Potential reduction in funding available for other capital projects.
Commentary and Anticipated Response: Depending on the proposed location and planned size of the Airport, there may be a requirement to upgrade road infrastructure to enable the construction and ongoing operation. Council prefers to retain the cost of any upgrade as an unprovisioned risk until the proposal is further developed, on the basis that a road upgrade will be within the overall cost of any Airport proposal. To address this issue Council will: • Undertake a needs assessment once the proposed Airport location and size is known • Incorporate the cost of access road upgrades into the overall costing of the project.		

8.3.4.2 Critical Assets

An analysis has been completed to identify the most critical routes in the Whangarei District. The processes and procedures developed for the criticality analysis are contained within Volume 2 Appendices. In summary, the assessment framework is based around recognising the priority of Key Service Areas, as defined through the Lifelines Study. The need for reliable access to these areas in turn attaches importance to certain routes, which is reflected in the roading network hierarchy.

OBJECTIVE	Recognise the critical routes/links within the district to allow for the application of different management strategies. This will then assist in the resilience and recovery of the network during and after an emergency event.

The criticality analysis table thus developed values the importance of a route and its associated transport asset components, and gives due regard to the consequences of them failing or becoming damaged. Criticality plans for the road(s) that are identified as critical are being developed so that financial planning

to manage these important routes is considered in terms of likely increased expenditure necessary to protect them.

There are many component assets associated with the routes in question, and many associated risks. Some of these have much less risk than others and do not directly affect the route; hence, some components are adjudged 'not critical' in the terms risk to route, whilst the route itself remains of critical importance.

The critical asset table below summarises the function of a route, and identifies specific issues that could cause the route to become critical.

Table 8-3: Criticality and Associated Risk of Each Asset

Asset Group	Asset Type	Functional Issues	Critical Yes/No	Specific Issue	Associated Risk
Roads	All	Access to CBD, Small communities	Yes	Storm event, collapse	Yes
Structures	Bridges includes Over-bridge	Access carries services	Yes	Collapse, earthquake service broken. Over-bridge if it affects access to critical routes	Yes
	Structures	Retaining Wall Stability, retaining	Yes	Collapse, earth quake service broken, affects access, becomes a critical issue, roads full blown condition and performance monitoring.	Yes
	Guardrail	Safety, guides and delineates	No		Yes
Drainage	All	Associated with roads	Yes	Associated with roads	Yes
Traffic Control Devices	Traffic Signals	Manage traffic	Yes	Maintain control, hierarchy of sites, network issues	Yes
	Sign/Marking/ Delineation	Safety, guides and delineates	No		
	Intelligent Traffic Systems		No		Yes
Walking & Cycling	All	Pedestrian access	No		Yes
Street Scape	All	Personnel safety and security	No		Yes
Non Asset Specific	All	Communications, emergency plans	Yes	Maintaining communications, roles and responsibilities in emergency events	Yes

8.3.4.3 Critical Routes

The criticality analysis Table was created to identify the issues if certain infrastructure on a route were to fail. The asset is identified and in turn its functions, potential failure mode(s) specific sites on the asset, specific issues and owners are noted. Once information on these factors is collated, a criticality score is assigned to the asset; this helps identify the most critical items on a route that should be improved upon, or closely monitored.

Consequently, a number of arterial and strategic routes have been identified as being of heightened importance, and will now be further analysed to ascertain appropriate future management action by way of physical improvement to reduce the risk or other mitigation.

The Department has thus formed the view that the following are the top 'critical' routes:

Table 8-4: Top Ten Critical Routes/Sites

Site	Road Name/ Street Address	Notes	High Score Areas	Critical Route Score
Maunu Rd to Kamo Rd	State Highway 1	Western Bypass is prone to weather problems	• Traffic Signal Hub • Traffic Volume • Public Health and Safety • Vulnerable Users(Schools) • Life Line Utilities • Commercial Producers	50
Whangarei	Bank St	Rust Ave/Cameron St Intersection - large surface flows due to minimal collection systems	• Traffic Signal Hub • Traffic Volume • Public Health and Safety • Vulnerable Users(Schools) • Emergency Management	42
Whangarei	Kamo Rd		• Traffic Signal Hub • Traffic Volume • Vulnerable Users(Schools) • Emergency Management	40
State Highway 14	State Highway 14		• Traffic Signal Hub • Traffic Volume • Public Health and Safety • Vulnerable Users(Schools)	36
Whangarei	Riverside Dr	Prone to weather problems	• Flooding • Traffic Signal Hub • Traffic Volume • Vulnerable Users(Schools) • Commercial Producers • Isolated Communities	32
Marsden Point	Marsden Point Rd		• Traffic Volume • Life Line Utilities • Vulnerable Users(Schools) • Commercial Producers	30
Whangarei	Onerahi Rd	Strategic Link, Risk issue	• Traffic Volume • Public Health and Safety • Emergency Management • Vulnerable Users(Schools) • Commercial Producers • Isolated Communities	30
Whangarei Heads split town to Parua Bay to end	Whangarei Heads Rd	Prone to weather problems	• Flooding • Traffic Volume • Unstable Conditions • Emergency Management • Isolated Communities	29

Site	Road Name/ Street Address	Notes	High Score Areas	Critical Route Score
Port Rd	Port Rd	Prone to weather problems split into lower and upper Port Road for this exercise	• Traffic Volume • Life Line Utilities • Commercial Producers	28
Whangarei	Tarewa Rd	Prone to weather problems	• Flooding • Traffic Signals Hub • Traffic Volume • Detour Route • Life Lines	28

Two of these critical routes/sites are part of the State Highway network which is maintained by the NZ Transport Agency. We have included these routes in the criticality assessment because they are an integral part of Whangarei's road network.

The Whangarei maintained roads that have been identified as critical and the proposed mitigation plans have been summarised into the following table:

Site	Resilience Strategy
Road to Whangarei Heads	The road network provides critical connections in the event of a widespread emergency, providing connections for emergency response, as well as ongoing recovery. The critical roads identified include connections to communities where there are little or no alternative routes available, or the road provides an arterial route. Ranking of criticality and responses is set out in a hierarchy of plans that include: • Roading Business Continuity Plan • Northland Civil Defence Emergency Plan • State Highway Detour Plans • WDC Storm Management Plans
Road to Marsden Point	
Bank St	
Kamo Road	
Tawera Rd	
Port Rd	
Road to Airport – Riverside Dr / Onerahi / Church St	

Funding has been made available in the form of resilience improvements to commence the process of managing these routes and any immediate issues. Further refining of the criticality analysis and defining of a programme in relation to the network and the assets is an improvement process and will be worked through over the next three years.

8.3.4.4 Further Actions

For risk and criticality a number of further actions are required. These are:

- Funding allowance made in relation to all HIGH and VERY HIGH level risks. Under the best practice plan this has been allowed for to some extent, but requires further recognition.
- There are a number of risks that are shared between the Roading Department Management and Corporate Management. These risks will need to be elevated through the current framework to agree how they are to be addressed.
- The HIGH risks identified need be more tightly integrated to the level of service delivery strategy under which this plans works.

- Roading Department risks need to be considered against risks identified in the other 'Infrastructure and Services Group' departments. The priorities and balancing that should result from that exercise would then need to be fed back into each department's plan.

9 Financials

This section details what the Roading Department is forecasted to spend, on what and how the department will acquire these funds.

9.1 Funding Sources

The Council has developed policies around how projects and other activities are to be funded. These policies are set out in *Table 9-1* and further information on each of these policies can be found in the *Long Term Plan*.

Table 9-1: Councils Funding and Financial Policies

Policy	Description	Relationship to the Roading Department
Development Contribution Policy	The policy sets out what the value of the contributions will be and who is required to pay.	Capital projects are undertaken based on demand and the required funding for the growth portion which is acquired from these contributions.
Revenue and Financing Policy	The policy outlines how operating and capital expenditure for each activity will be funded, what funding sources are available to Council and how spending contributes to the Community Outcomes	The Roading Department complies with this policy.

The recognised funding sources for the transport activity are:

- General Rates – usually used to fund maintenance and operations and renewal
- Targeted Rates – used to fund specific works (e.g. ratepayer contribution for a seal extension)
- NZTA Subsidy – contributes to the funding of approved NZTA operations and maintenance, renewal and capital works (in accordance with the NZTA *Programme and Funding Manual*)
- Development Contribution – to fund the growth portion of capital works
- Fees and Charges – to fund activities that fees and charges are taken for (e.g. car parking)
- Loans – to fund the balance of capital works
- Cost Share Agreements – agreements between the Roading Department and other parties to share the costs of operations (e.g. forestry industry contributing to road maintenance)
- Private Developer Agreements - agreement between the Roading Department and developers to share costs as opposed to collecting development contributions for that specific development
- Petroleum Tax – WDC share of the Central Governments petroleum tax that contributes to maintenance

These are accessed in priority order as follows;

Table 9-2: Funding Sources

Expenditure Area	Funding Source
Operations and Maintenance	NZTA subsidy

Expenditure Area	Funding Source
	General Rates Petroleum Tax
Renewals	NZTA subsidy, General Rates (depreciation fund)
Capital New and Improvement	NZTA subsidy, Development Contribution, Targeted Rates Debt funded General Rates

9.1.1 Government Funding

The Councils policy around acquiring funding is;

POLICY	The Council aims to optimise the subsidies available from NZTA for the provision of infrastructure while balancing the need for unsubsidised work and the overall Council funds available.

With the change in the vehicle dimension mass rule this issue is more relevant in terms of the heavy industry routes and who should pay.

Continued lobbying of central government for such monies continues to ensure that the rate payers of Whangarei are not unfairly carrying the cost of maintaining the roads when the benefit derived is a regional or national one.

9.1.2 Development Contributions

Section 3.2.4 of the *Activity Management Planning - Policy and Practice* contains information on growth funding (development contributions).

With the enactment of the *Local Government Act 2002*, Council has the power to levy new developments where costs to the community could arise.

Council has adopted a *Development Contributions Policy* under the *Local Government Act 2002*. A copy can be obtained from Council on request. Under the revised Local Government Act the application of Development Contribution (DC) to the transport activity had to be revised. This revision required that the roading network was broken into Localities and the application of DC tested in terms of placing the cost of growth with the area of growth. On this basis the Roading network now consist of 5 Localities with DC charge related to each of these Localities based upon the growth community and either the number of projects or the percentage of any given programme of works occurring in these Localities.

Development Contributions have been calculated using SPM Development Contribution (DC) systems, into which Council have loaded the District Growth Model. The development contribution income is based on the portion of the project expenditure that is required due to growth. This is assessed through developing a cost allocation for each project as this relates to a level of service e.g. Peak Traffic might be used for a project that is looking to alleviate traffic congestion that is being created by the growth community. The model then

calculates what portion of the population, in terms of Household Equivalent Units (HUE) is community growth. This then determines the income required per HUE that will be charged when development in the district is undertaken, whether this be a new house or a major industrial/residential subdivision.

The approved Development Contribution (DC) for transport, per Household Unit Equipment (HUE) excluding GST has been set at $7,111.

Capacity projects for the purposes of determining DC for land transportation activity are developed in the following manner;

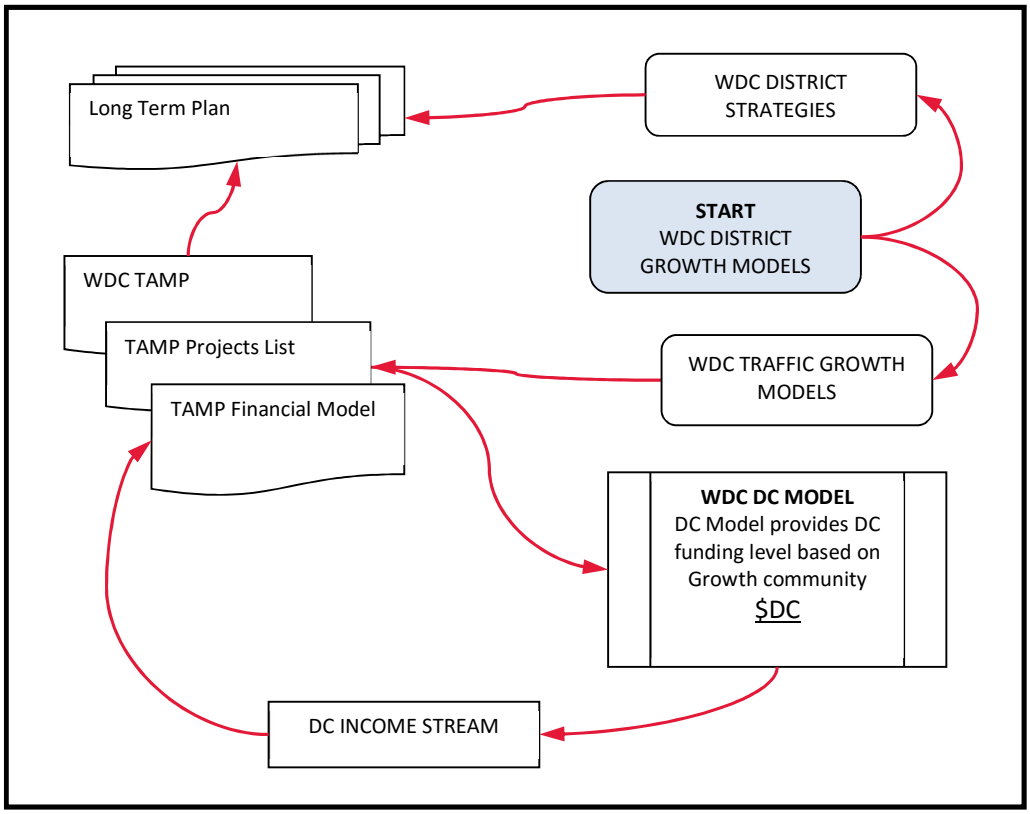


Figure 9-1: Development Contribution Relationship

9.1.3 Funding of Parking

Council's current policy for the funding of parking is to apply user charges for operating costs to the users of parking space and to fine over-stayers. The *Parking Management Strategy* sets out a number of fee structures for short term, long term and all day parking to encourage users to park in such a way that occupancy rates for parking can be lifted to meet targets of 75 - 90%.

All parking fines are issued and collected by the Council's Compliance Department and used to offset Parking Warden costs. Income from parking fees is used to fund maintenance, renewal and development of the car park asset.

9.2 Operational Funding

9.2.1 Historical Expenditure Trends

The roading department historically record and track a number of key investment measures, these are:

- Depreciation vs Renewal spend
- Historical spend vs. Budget, *Figure 9-3*
- Flood damage Expenditure,

These measures provide an understanding of how renewal investment has occurred in the past, what impacts from major storm events have had and budget vs. Actual spend. From this, informed decisions can be made on how we have to invest into the future.

During the period 2002/03 to 2011/12, the Whangarei District Council had access to the 100% NZTA funded Regional Development programme to help alleviate the impact of heavy forestry traffic on local roads. This funding recognising that the burden of maintaining and renewing forestry roads could not be afforded by the local community. This investment happened over a 10 year period and was focused on 5% of the total sealed network. During this period Global Financial Crisis occurred and Council was focused on new infrastructure and improvement projects to manage other critical issues within the district; including roading and waste water treatment. This had resulted in a gradual reduction in renewal investment on the sealed pavements. However, from 2015 onwards global economics picked up, Council revised its position on renewal funding in light of revised LGA2002. Council respond with an increase in renewals expenditure which in turn rebalanced the long-term renewal vs. depreciation. Profile. funding vs. depreciation investment with a current investment gap of $8M as illustrated in *Figure 9-2*.

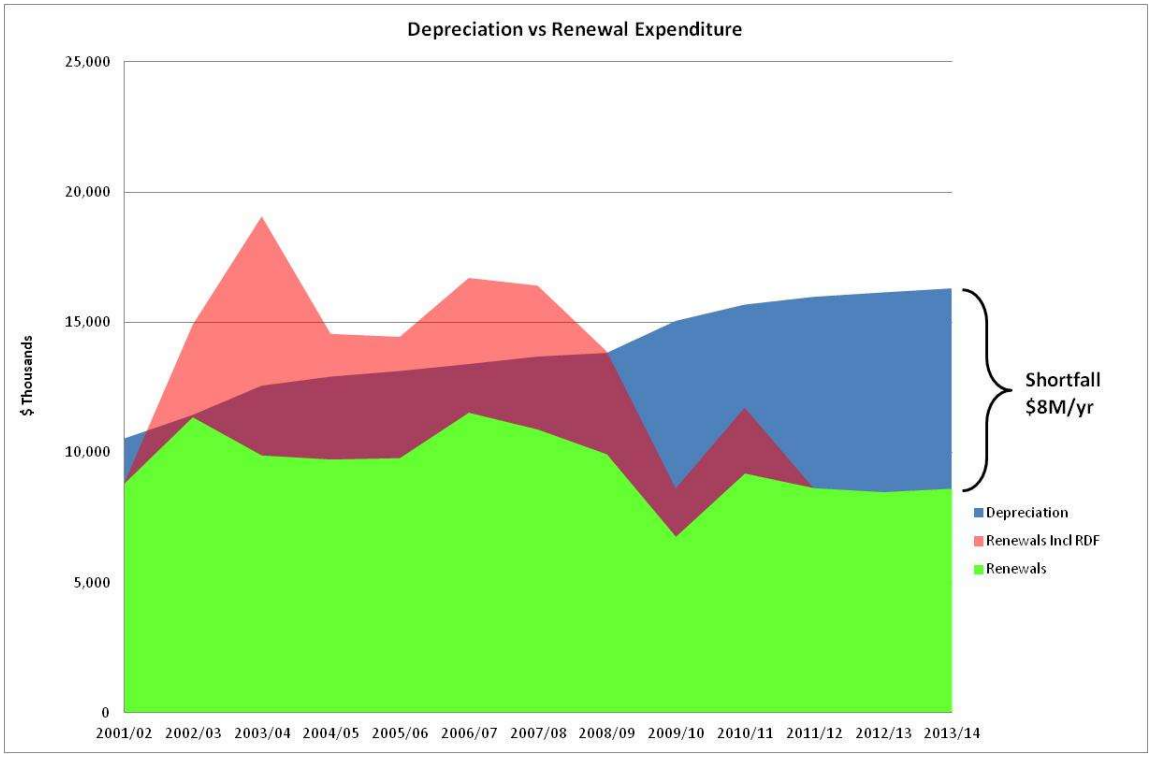


Figure 9-2: Historical Depreciation vs. Renewal

Figure 9-3 illustrates the historical expenditure for the transport activity in relation to the approved budget.

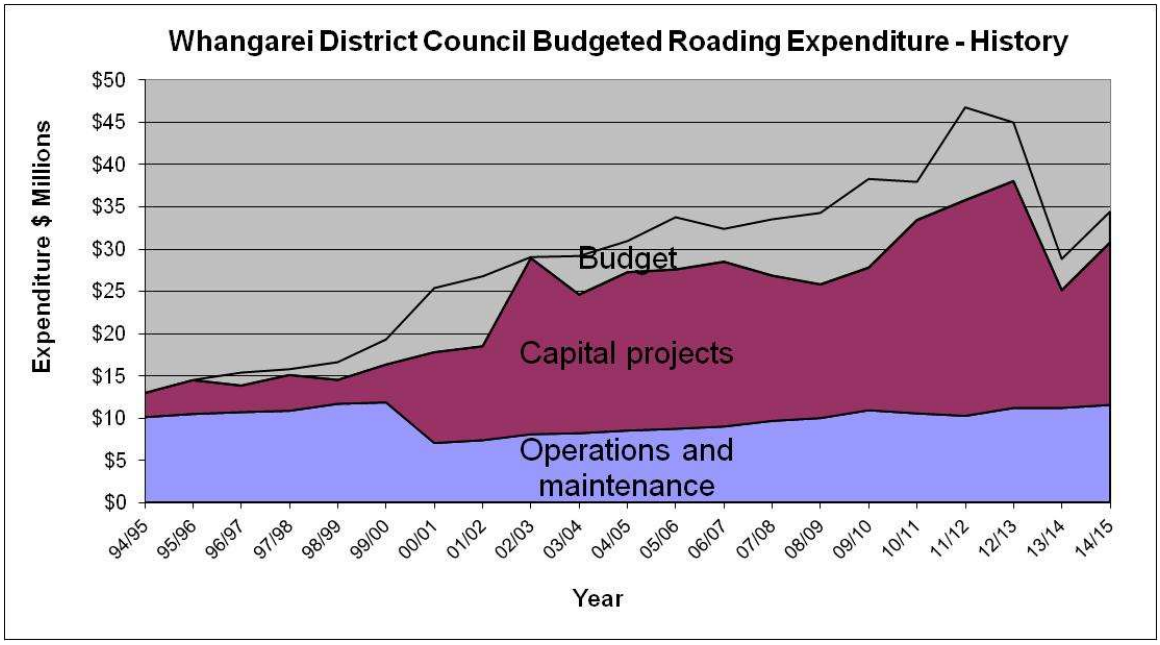


Figure 9-3: Historical Expenditure

Over the years the Roading Department has not been able to spend the allocated budget. This is due to funding storm damage from existing maintenance budgets, requested budget cuts from Council to fund other projects during the year or financial constraints. This illustrates that over the last 5 years roading have only had access to approximately 70% of the allocated budget. This effectively impacts on the condition and service levels that can be delivered.

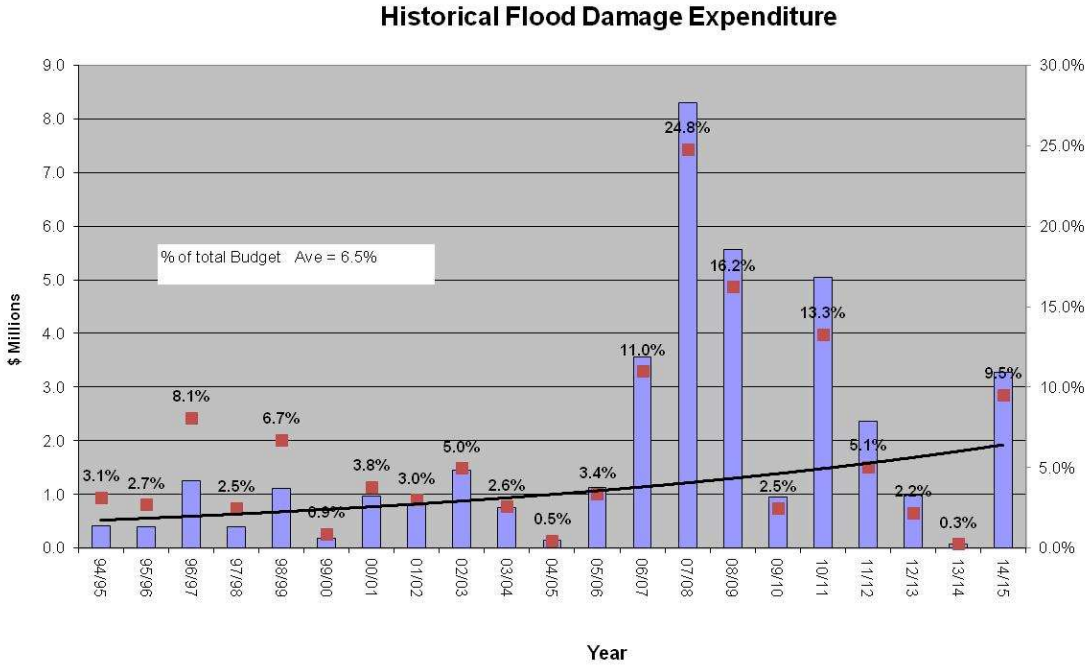


Figure 9-4: Flood Damage Expenditure Trends

Figure 9-4 illustrates the growing value of treating flood damage on the network. This value is growing and has a significant impact on available spend on network maintenance in the absence of a dedicated Emergency Flood damage budget.

9.2.2 Routine & Planned Maintenance

The routine and planned maintenance plan expenditure supports the overall life cycle management strategy. This strategy looks to invest in pavement renewal and technology upgrades with long term savings being realised through reduction in escalating pre-seal repair maintenance, power costs and reduction in the long-term resurfacing of the sealed pavements.

Table 9-3 and *Figure 9-5* shows in detail the routine and planned maintenance expenditure for the transport activity. This is shown in un-inflated dollars and excludes income, improvement and capital.

Table 9-3: Routine and Planned Maintenance Expenditure

		Values									
Asset Group Desc	Asset Type Desc	Sum of 2018/19	Sum of 2019/20	Sum of 2020/21	Sum of 2021/22	Sum of 2022/23	Sum of 2023/24	Sum of 2024/25	Sum of 2025/26	Sum of 2026/27	Sum of 2027/28
Drainage	Sub Surface Drainage	$955,000	$959,775	$964,550	$969,325	$974,100	$978,875	$983,650	$988,425	$993,200	$1,003,705
	Surface Water Channel	$225,000	$226,125	$227,250	$228,375	$229,500	$230,625	$231,750	$232,875	$234,000	$236,475
Emergency Works	Emergency Works	$150,000	$150,750	$151,500	$152,250	$153,000	$153,750	$154,500	$155,250	$156,000	$157,650
Parking (On & Off Street)	Carpark Assets	$130,000	$130,650	$131,300	$131,950	$132,600	$133,250	$133,900	$134,550	$135,200	$136,630
	Carpark Meters	$126,000	$126,630	$127,260	$127,890	$128,520	$129,150	$129,780	$130,410	$131,040	$132,426
	Electricity	$11,200	$11,256	$11,312	$11,368	$11,424	$11,480	$11,536	$11,592	$11,648	$11,771
Pavement	Pavement Sealed	$4,050,000	$4,118,850	$4,187,700	$4,256,550	$4,325,400	$4,340,000	$4,408,000	$4,476,000	$4,544,000	$4,652,000
	Unsealed Pavement	$1,450,000	$1,460,150	$1,470,300	$1,480,450	$1,490,600	$1,500,750	$1,510,900	$1,521,050	$1,531,200	$1,541,350
Street Scaping	Amenity Lighting	$35,000	$35,175	$35,350	$35,525	$35,700	$35,875	$36,050	$36,225	$36,400	$36,785
	Bus Shelters	$30,000	$40,200	$50,500	$50,750	$51,000	$51,250	$51,500	$51,750	$52,000	$52,550
	Environmental Management	$250,000	$251,250	$252,500	$253,750	$255,000	$256,250	$257,500	$258,750	$260,000	$262,750
	Street Furniture	$10,000	$10,050	$10,100	$10,150	$10,200	$10,250	$10,300	$10,350	$10,400	$10,510
	Street Lights	$500,000	$502,500	$505,000	$507,500	$510,000	$512,500	$515,000	$517,500	$520,000	$525,500
	Vegetation Management	$1,080,000	$1,085,400	$1,090,800	$1,096,200	$1,101,600	$1,107,000	$1,112,400	$1,117,800	$1,123,200	$1,135,080
Structures	Bridges & Major Culverts	$300,000	$301,500	$303,000	$304,500	$306,000	$307,500	$309,000	$310,500	$312,000	$315,300
	Lower Harbour Bridge	$370,000	$371,850	$373,700	$375,550	$377,400	$379,250	$381,100	$382,950	$384,800	$388,870
Traffic Control Devices	Intellignet Traffic Systems	$60,000	$60,300	$60,600	$60,900	$61,200	$61,500	$61,800	$62,100	$62,400	$63,060
	Level X-ings	$50,000	$50,250	$50,500	$50,750	$51,000	$51,250	$51,500	$51,750	$52,000	$52,550
	Pavement Marking	$600,000	$603,000	$606,000	$609,000	$612,000	$615,000	$618,000	$621,000	$624,000	$630,600
	Pedestrian Crossings	$15,000	$15,075	$15,150	$15,225	$15,300	$15,375	$15,450	$15,525	$15,600	$15,765
	Signs	$125,000	$125,625	$126,250	$126,875	$127,500	$128,125	$128,750	$129,375	$130,000	$131,375
	Traffic Signal	$225,000	$226,125	$227,250	$228,375	$229,500	$230,625	$231,750	$232,875	$234,000	$236,475
Walking & Cycleways	Foot Path	$400,000	$402,000	$404,000	$406,000	$408,000	$410,000	$412,000	$414,000	$416,000	$420,400
	Walk Ways (Unsub)	$140,000	$140,700	$141,400	$142,100	$142,800	$143,500	$144,200	$144,900	$145,600	$147,140
	Walking & Cycling	$20,000	$30,000	$40,000	$50,000	$60,000	$70,000	$80,000	$90,000	$100,000	$110,000
Grand Total		**$11,307,200**	**$11,435,186**	**$11,563,272**	**$11,681,308**	**$11,799,344**	**$11,863,130**	**$11,980,316**	**$12,097,502**	**$12,214,688**	**$12,406,717**

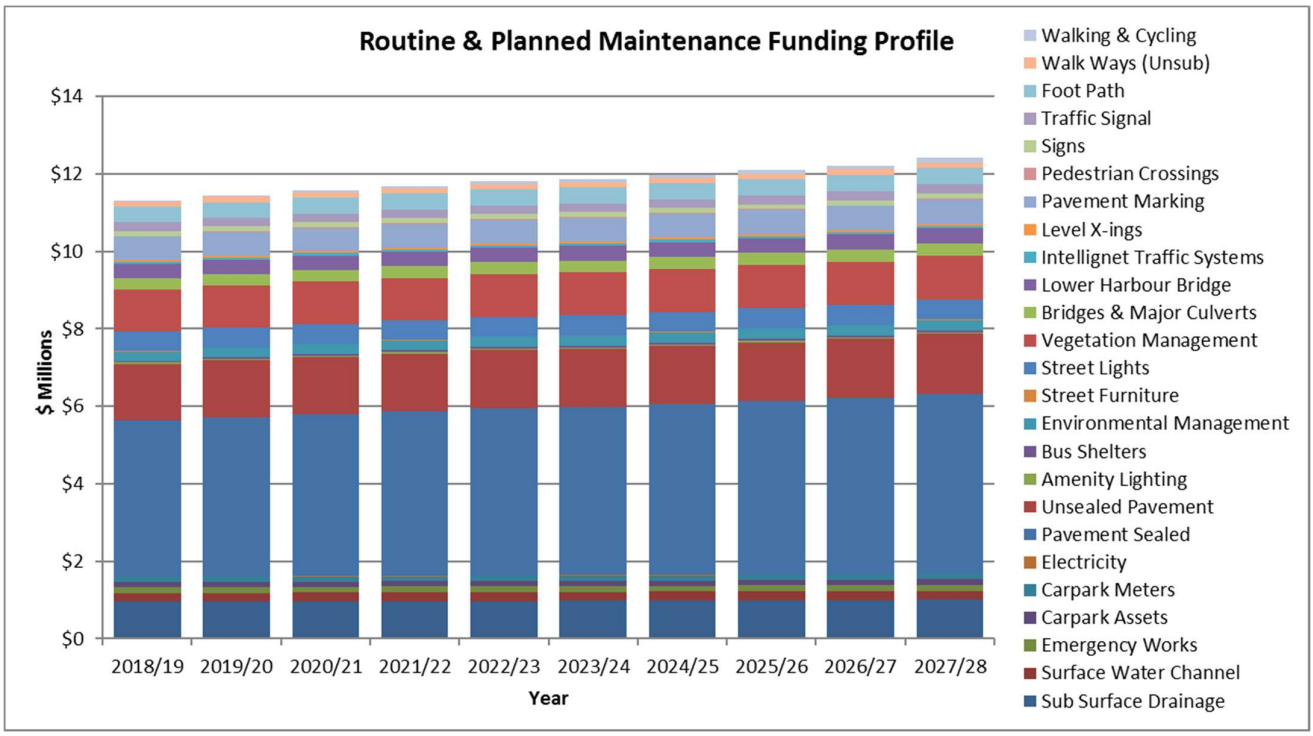


Figure 9-5: Routine & Planned Maintenance Expenditure

9.2.3 Renewal & Replacement

The renewals plan is based around the strategy of maintaining the investment in sealed pavement rehabilitations in order to reduce the escalating maintenance costs, close the gap on the current depreciation profile and deliver long term savings.

The renewals and replacement plan is shown in *Table 9-4* and

.

The renewals and maintenance plans are related. Any funding changes made in either area will require a review of the overall network strategy to deliver the required service levels.

Table 9-4: Renewals Expenditure

Project Description	Values Sum of 2018/19	Sum of 2019/20	Sum of 2020/21	Sum of 2021/22	Sum of 2022/23	Sum of 2023/24	Sum of 2024/25	Sum of 2025/26	Sum of 2026/27	Sum of 2027/28
Amenity Lighting	$ -	$ -	$ 90,900.00	$ 91,350.00	$ 91,800.00	$ 92,250.00	$ 92,700.00	$ 93,150.00	$ 93,600.00	$ 94,590.00
Replacement of Bridges & Other Structures	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Unsealed Road Metalling	$ 800,000.00	$ 805,600.00	$ 811,200.00	$ 1,799,150.00	$ 1,922,400.00	$ 1,928,000.00	$ 1,933,600.00	$ 1,938,600.00	$ 1,942,000.00	$ 1,947,400.00
Structures - Coastal Protection Structures	$ 80,000.00	$ 80,400.00	$ 80,800.00	$ 81,200.00	$ 81,600.00	$ 82,000.00	$ 82,400.00	$ 82,800.00	$ 83,200.00	$ 84,080.00
Drainage - Structures New & Renewals	$ 60,000.00	$ 60,300.00	$ 60,600.00	$ 60,900.00	$ 61,200.00	$ 61,500.00	$ 61,800.00	$ 62,100.00	$ 62,400.00	$ 63,060.00
Drainage - Maint Gen K&C	$ 600,000.00	$ 603,000.00	$ 606,000.00	$ 609,000.00	$ 612,000.00	$ 615,000.00	$ 618,000.00	$ 621,000.00	$ 624,000.00	$ 630,600.00
Drainage - Sealed Rehab	$ 400,000.00	$ 402,000.00	$ 404,000.00	$ 406,000.00	$ 408,000.00	$ 410,000.00	$ 412,000.00	$ 414,000.00	$ 416,000.00	$ 420,400.00
Footpath - Renewals	$ 318,000.00	$ 326,850.00	$ 335,700.00	$ 346,550.00	$ 357,400.00	$ 369,250.00	$ 382,100.00	$ 381,950.00	$ 381,800.00	$ 381,470.00
Footpath - Renewals Others	$ 30,000.00	$ 30,150.00	$ 30,300.00	$ 30,450.00	$ 30,600.00	$ 30,750.00	$ 30,900.00	$ 31,050.00	$ 31,200.00	$ 31,530.00
Parking Off Street - Pavement Renewals	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Parking Off Street - Meters New & Renewal	$ 120,000.00	$ 120,600.00	$ 121,200.00	$ 121,800.00	$ 122,400.00	$ 123,000.00	$ 123,600.00	$ 124,200.00	$ 124,800.00	$ 126,120.00
Parking Off Street - Resurface	$ 100,000.00	$ 100,500.00	$ 101,000.00	$ 101,500.00	$ 102,000.00	$ 102,500.00	$ 103,000.00	$ 103,500.00	$ 104,000.00	$ 105,100.00
Sealed Pavement - Design MSQA	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Sealed Pavement - AWPT (Mini Rehab)	$ 400,000.00	$ 406,800.00	$ 413,600.00	$ 420,400.00	$ 427,200.00	$ 434,000.00	$ 440,800.00	$ 447,600.00	$ 454,400.00	$ 465,200.00
Sealed Pavement - Rehabilitation	$ 3,500,000.00	$ 3,559,500.00	$ 3,619,000.00	$ 3,678,500.00	$ 3,738,000.00	$ 3,797,500.00	$ 3,857,000.00	$ 3,916,500.00	$ 3,976,000.00	$ 4,070,500.00
MI - Rehab Associated Improvements	$ 400,000.00	$ 402,000.00	$ 404,000.00	$ 406,000.00	$ 408,000.00	$ 410,000.00	$ 412,000.00	$ 414,000.00	$ 416,000.00	$ 420,400.00
Sealed Road Resurfacing - Line Marking	$ 100,000.00	$ 101,700.00	$ 103,400.00	$ 105,100.00	$ 106,800.00	$ 108,500.00	$ 110,200.00	$ 111,900.00	$ 113,600.00	$ 116,300.00
Sealed Road Resurfacing - Chip Seal	$ 2,900,000.00	$ 2,949,300.00	$ 2,998,600.00	$ 3,047,900.00	$ 3,097,200.00	$ 3,146,500.00	$ 3,195,800.00	$ 3,245,100.00	$ 3,294,400.00	$ 3,372,700.00
Sealed Road Resurfacing - Management	$ 100,000.00	$ 101,700.00	$ 103,400.00	$ 105,100.00	$ 106,800.00	$ 108,500.00	$ 110,200.00	$ 111,900.00	$ 113,600.00	$ 116,300.00
Sealed Road Resurfacing - Thin Asphalt	$ 1,000,000.00	$ 1,017,000.00	$ 1,034,000.00	$ 1,051,000.00	$ 1,068,000.00	$ 1,085,000.00	$ 1,102,000.00	$ 1,119,000.00	$ 1,136,000.00	$ 1,163,000.00
Sealed Road Resurfacing - SCRIM Seals	$ 300,000.00	$ 301,500.00	$ 303,000.00	$ 304,500.00	$ 306,000.00	$ 307,500.00	$ 309,000.00	$ 310,500.00	$ 312,000.00	$ 315,300.00
Structures - General Repair	$ 150,000.00	$ 150,750.00	$ 151,500.00	$ 152,250.00	$ 153,000.00	$ 153,750.00	$ 154,500.00	$ 155,250.00	$ 156,000.00	$ 157,650.00
Structures - Hvy Maint Bridges	$ 200,000.00	$ 201,000.00	$ 202,000.00	$ 203,000.00	$ 204,000.00	$ 205,000.00	$ 206,000.00	$ 207,000.00	$ 208,000.00	$ 210,200.00
Structures - Scour Protection	$ 150,000.00	$ 150,750.00	$ 151,500.00	$ 152,250.00	$ 153,000.00	$ 153,750.00	$ 154,500.00	$ 155,250.00	$ 156,000.00	$ 157,650.00
Structures - Ret Wall upgrade Replacement	$ 500,000.00	$ 502,500.00	$ 505,000.00	$ 507,500.00	$ 510,000.00	$ 512,500.00	$ 515,000.00	$ 517,500.00	$ 520,000.00	$ 525,500.00
Lighting Renewals	$ 200,000.00	$ 201,000.00	$ 202,000.00	$ 203,000.00	$ 204,000.00	$ 205,000.00	$ 206,000.00	$ 207,000.00	$ 208,000.00	$ 210,200.00
Signs Railings & facilities - Renewals	$ 150,000.00	$ 150,750.00	$ 151,500.00	$ 152,250.00	$ 153,000.00	$ 153,750.00	$ 154,500.00	$ 155,250.00	$ 156,000.00	$ 157,650.00
Railings	$ 100,000.00	$ 100,500.00	$ 101,000.00	$ 101,500.00	$ 102,000.00	$ 102,500.00	$ 103,000.00	$ 103,500.00	$ 104,000.00	$ 105,100.00
Traffic Signal - Renewals	$ 300,000.00	$ 301,500.00	$ 303,000.00	$ 304,500.00	$ 306,000.00	$ 307,500.00	$ 309,000.00	$ 310,500.00	$ 312,000.00	$ 315,300.00
ITS - Renewals	$ 100,000.00	$ 100,500.00	$ 101,000.00	$ 101,500.00	$ 102,000.00	$ 102,500.00	$ 103,000.00	$ 103,500.00	$ 104,000.00	$ 105,100.00
Grand Total	**$ 13,058,000.00**	**$ 13,228,150.00**	**$ 13,489,200.00**	**$ 14,644,150.00**	**$ 14,934,400.00**	**$ 15,108,000.00**	**$ 15,282,600.00**	**$ 15,443,600.00**	**$ 15,603,000.00**	**$ 15,868,400.00**

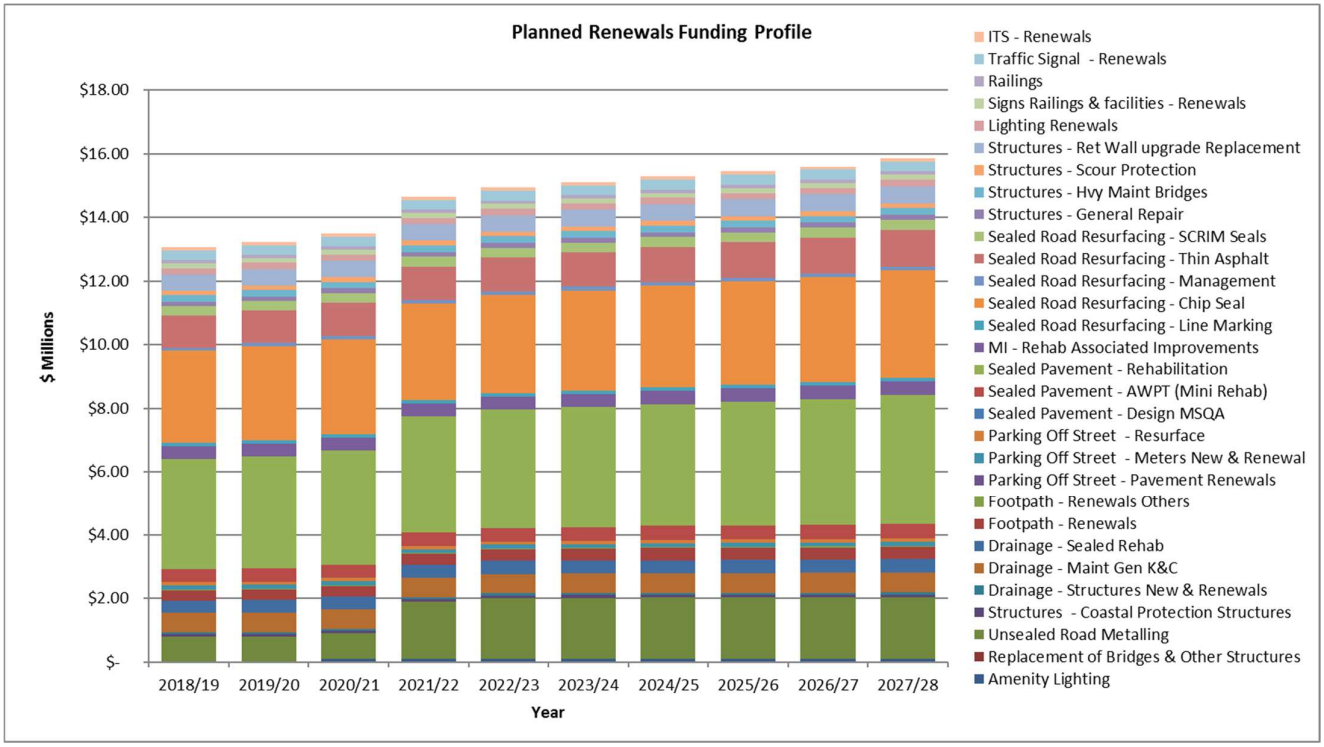


Figure 9-6: Renewals Expenditure

9.2.4 Capital New & Improvement Expenditure

Most of the major capital projects to address demand and provide future capacity for growth have been completed over the past 8 years.

Over the next 10 years the traffic growth model has not identified any major demand issues on the network and therefore most of the growth projects are outside of the 10 year the horizon. However, there are some medium intersection upgrades that are now programmed over the next 10 years to reduce congestion at pinch point and to maximise the benefits of the previous investment in major capital works such as the Lower Hatea River Crossing and Porowini Avenue Extension projects.

Significant investment is programmed to continue for the Shared Path (Cycleway Strategy) over the term of this plan. In relation to this invest is being sought for Passenger Transport (PT) development and upgrade. these two investment strategies look to reduce the demand on the road network and encourage modal transport shift to Walking /cycling and PT.

Council have indicated that they wish to continue a programme of seal extension on the network. This plan is addressing this issue in a number of ways:

- The sealing of the Wright Road/McCardle Road forestry route is being sought with NZTA funding.
- Where houses have been identified as being close to an unsealed road and there is safety/health issues related to dust nuisance from heavy commercial vehicles then the sealing of 100m strips is being programmed.
- Where there is continuing request from the community to seal roads, a rate payer subsidy for the construction of the seal extension is required to certain value which council will then consider funding the balance. No other funding avenues are currently available for seal extension.

Table 9-5 and *Figure 9-7* detail the funding for the planned new and improvement programme.

Table 9-5: Capital Improvement Expenditure

Work Type	Primary Drivers	Project Description	Sum of 2018/19	Sum of 2019/20	Sum of 2020/21	Sum of 2021/22	Sum of 2022/23	Sum of 2023/24	Sum of 2024/25	Sum of 2025/26	Sum of 2026/27	Sum of 2027/28
Improvement	**Growth**	Mill Rd/Nixon St/Kamo Rd	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
		Subdivision Works Contribution	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000
		Tranportation Planning Studies & Strategies	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
		PT - Bus Shelters New & Renewal	$ 80,000	$ 80,000	$ 80,000	$ 80,000	$ 80,000	$ 80,000	$ 80,000	$ 80,000	$ 80,000	$ 80,000
		NI - Network Improvements (Other TBD)	$ -	$ -	$ 1,500,000	$ 1,500,000	$ 1,500,000	$ 1,500,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000
		MI - High Risk Roads / intersections / CRS	$ 1,000,000	$ 1,005,000	$ 1,010,000	$ 1,015,000	$ 1,020,000	$ 1,025,000	$ 1,030,000	$ 1,035,000	$ 1,040,000	$ 1,051,000
		NI - Tarewa Rd Intersection Upgrade and Tarewa/Walt	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
		NI - Riverside Drive Upgrades - 4 Laning	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,000,000	$ 3,000,000	$ 7,000,000	$ 8,000,000
		NI - One Tree Point Road Upgrades	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 840,000	$ -	$ -
		NI - McEwan Road Upgrades	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,064,000	$ -	$ -
		NI - Ruakaka Beach Road Upgrades	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,568,000	$ -	$ -
		NI - Port Nikau/Kioreroa RAB and Bridge 4-laning	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,000,000	$ 3,000,000
		MI - Intersection improvements	$ 1,000,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
		MI - Minor Improvements - Prog Management	$ 100,000	$ 100,500	$ 101,000	$ 101,500	$ 102,000	$ 102,500	$ 103,000	$ 103,500	$ 104,000	$ 105,100
		MI - Misc works (sight benching and new parking signs	$ 80,000	$ 80,400	$ 80,800	$ 81,200	$ 81,600	$ 82,000	$ 82,400	$ 82,800	$ 83,200	$ 84,080
		SOP - Kamo Business District Upgrade	$ -	$ -	$ 279,000	$ 287,000	$ -	$ -	$ -	$ -	$ -	$ -
	Growth Total		**$ 2,310,000**	**$ 1,315,900**	**$ 3,100,800**	**$ 3,114,700**	**$ 2,833,600**	**$ 2,839,500**	**$ 4,345,400**	**$ 8,823,300**	**$ 13,357,200**	**$ 13,370,180**
		Seal Extensions - Unsubsidised	$ 800,000	$ 800,000	$ -	$ -	$ 800,000	$ -	$ 800,000	$ -	$ 800,000	$ 400,000
		Seal Extensions - House Frontage Sealing	$ 212,000	$ 218,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
		MI - Streetlight Upgrades	$ 500,000	$ 502,500	$ 505,000	$ 507,500	$ 510,000	$ 512,500	$ 515,000	$ 517,500	$ 520,000	$ 525,500
		MI - Preventative Maintenance	$ 1,000,000	$ 1,005,000	$ 1,010,000	$ 1,015,000	$ 1,020,000	$ 1,025,000	$ 1,030,000	$ 1,035,000	$ 1,040,000	$ 1,051,000
		NI - Int Imp - Water / Central upgrade	$ -	$ 2,000,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
		TP - CRS Study	$ -	$ -	$ 50,000	$ -	$ -	$ 50,000	$ -	$ -	$ -	$ -
		TP - WDC model update	$ -	$ 100,000	$ -	$ -	$ -	$ -	$ 100,000	$ -	$ -	$ -
		AMP - ONRC	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000
		TP - Urban Corridor Management Plans	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ -	$ -	$ -	$ -	$ -
		PT - Infrastructure Strategy	$ 100,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
		PT - Bus Seats	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000
		PT - Rose Street Terminal	$ -	$ 300,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
		MI - Pedestrian safety	$ 200,000	$ 201,000	$ 202,000	$ 203,000	$ 204,000	$ 205,000	$ 206,000	$ 207,000	$ 208,000	$ 210,200
		MI - Speed Management	$ 300,000	$ 301,500	$ 303,000	$ 304,500	$ 306,000	$ 307,500	$ 309,000	$ 310,500	$ 312,000	$ 315,300
		MI - Traffic signals	$ 500,000	$ 502,500	$ 505,000	$ 101,500	$ 102,000	$ 102,500	$ 103,000	$ 103,500	$ 104,000	$ 105,100
		MI - Te Matau a Pohe CCTV Upgrade and Remote Oper	$ 500,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Level of Service Total		**$ 4,272,000**	**$ 6,090,500**	**$ 2,735,000**	**$ 2,291,500**	**$ 3,102,000**	**$ 2,262,500**	**$ 3,123,000**	**$ 2,233,500**	**$ 3,044,000**	**$ 2,667,100**
	Renewal	MI - School Zones and driver feed back	$ 100,000	$ 100,500	$ 101,000	$ 101,500	$ 102,000	$ 102,500	$ 103,000	$ 103,500	$ 104,000	$ 105,100
		MI - Bridge replacements	$ 500,000	$ 502,500	$ 505,000	$ 507,500	$ 510,000	$ 512,500	$ 515,000	$ 517,500	$ 520,000	$ 525,500
	Renewal Total		**$ 600,000**	**$ 603,000**	**$ 606,000**	**$ 609,000**	**$ 612,000**	**$ 615,000**	**$ 618,000**	**$ 621,000**	**$ 624,000**	**$ 630,600**
Improvement Total			**$ 7,182,000**	**$ 8,009,400**	**$ 6,441,800**	**$ 6,015,200**	**$ 6,547,600**	**$ 5,717,000**	**$ 8,086,400**	**$ 11,677,800**	**$ 17,025,200**	**$ 16,667,880**
New	**Growth**	Footpaths - New	$ 400,000	$ 400,000	$ 400,000	$ 400,000	$ 400,000	$ 400,000	$ 400,000	$ 400,000	$ 400,000	$ 400,000
	Growth Total		**$ 400,000**	**$ 400,000**	**$ 400,000**	**$ 400,000**	**$ 400,000**	**$ 400,000**	**$ 400,000**	**$ 400,000**	**$ 400,000**	**$ 400,000**
	Level of Service	Cycleways - CAPEX Programmed Work	$ 2,718,000	$ 3,053,000	$ 2,013,000	$ 1,968,000	$ 1,507,000	$ 1,280,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000
		Cycleways - Tikipunga	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Level of Service Total		**$ 2,718,000**	**$ 3,053,000**	**$ 2,013,000**	**$ 1,968,000**	**$ 1,507,000**	**$ 1,280,000**	**$ 500,000**	**$ 500,000**	**$ 500,000**	**$ 500,000**
New Total			**$ 3,118,000**	**$ 3,453,000**	**$ 2,413,000**	**$ 2,368,000**	**$ 1,907,000**	**$ 1,680,000**	**$ 900,000**	**$ 900,000**	**$ 900,000**	**$ 900,000**
Grand Total			**$ 10,300,000**	**$ 11,462,400**	**$ 8,854,800**	**$ 8,383,200**	**$ 8,454,600**	**$ 7,397,000**	**$ 8,986,400**	**$ 12,577,800**	**$ 17,925,200**	**$ 17,567,880**

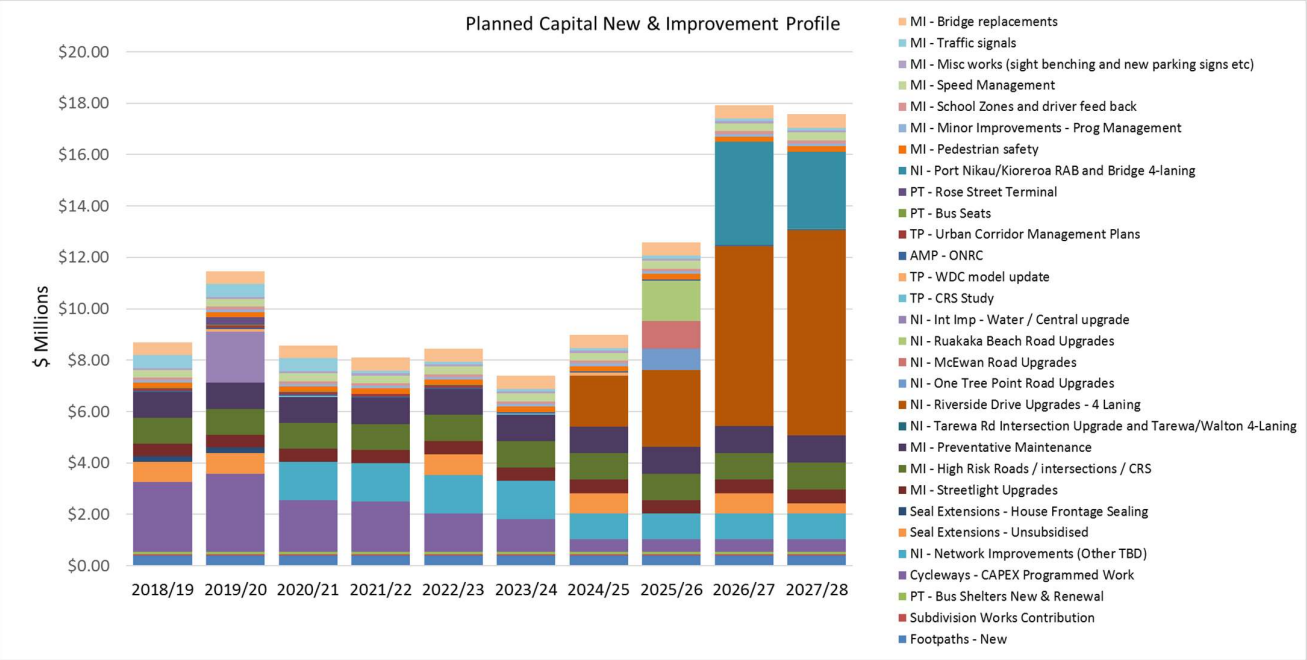


Figure 9-7: Capital Improvement Expenditure

There are a number of Service level projects planned such as Sense of Place projects. These are not generally capacity or renewal projects and therefore will be consider in terms of the overall service delivery council consider important to the district as a whole.

9.2.5 Department Operations Expenditure & Revenue

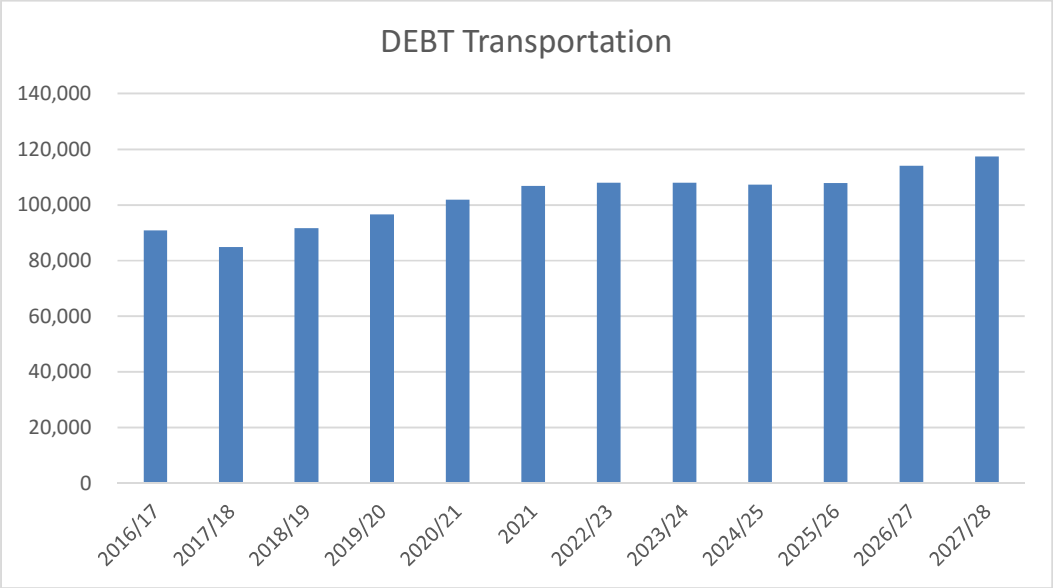
It is assumed that all the revenue for operations and maintenance is sourced from NZTA subsidy and general rates. Table 9-6 below shows the revenue streams for operations and maintenance. Note that the General Rates information was not available at the time of preparing this version of the plan so could not be included in the table.

Table 9-6: Operations and Maintenance Revenue

Asset Group Desc	Asset Type Desc	Values Sum of 2018/19	Sum of 2019/20	Sum of 2020/21	Sum of 2021/22	Sum of 2022/23	Sum of 2023/24	Sum of 2024/25	Sum of 2025/26	Sum of 2026/27	Sum of 2027/28
Business Unit	Charges	$2,340	$2,340	$2,340	$2,340	$2,340	$2,340	$2,340	$2,340	$2,340	$2,340
Business Unit Total		**$2,340**	**$2,340**	**$2,340**	**$2,340**	**$2,340**	**$2,340**	**$2,340**	**$2,340**	**$2,340**	**$2,340**
Community Safety Progs	Community Rd Safe	$100,000	$251,250	$404,000	$406,000	$408,000	$410,000	$412,000	$414,000	$416,000	$420,400
	High Strategic Fit Road Safe	$299,250	$310,950	$312,650	$314,350	$316,050	$317,750	$319,450	$321,150	$322,850	$326,590
	Medium Strategic Fit Road Safe	$10,000	$10,050	$10,100	$10,150	$10,200	$10,250	$10,300	$10,350	$10,400	$10,510
Community Safety Progs Total		**$409,250**	**$572,250**	**$726,750**	**$730,500**	**$734,250**	**$738,000**	**$741,750**	**$745,500**	**$749,250**	**$757,500**
Department Operations	ADMIN	$15,000	$15,075	$15,150	$15,225	$15,300	$15,375	$15,450	$15,525	$15,600	$15,765
	Charges	$230,838	$231,563	$168,658	$169,068	$169,478	$169,888	$170,298	$170,708	$171,118	$172,020
	LEGAL	$5,000	$5,025	$5,050	$5,075	$5,100	$5,125	$5,150	$5,175	$5,200	$5,255
	Recoveries	$135,608	$135,608	$135,608	$135,608	$135,608	$135,608	$135,608	$135,608	$135,608	$135,608
	User Fees	$8,200	$8,200	$13,000	$13,000	$13,000	$13,000	$13,000	$13,000	$13,000	$13,000
Department Operations Total		**$107,030**	**$107,855**	**$40,250**	**$40,760**	**$41,270**	**$41,780**	**$42,290**	**$42,800**	**$43,310**	**$44,432**
Network & Asset Manageme	Asset Management	$1,430,000	$1,437,150	$1,444,300	$1,451,450	$1,458,600	$1,465,750	$1,472,900	$1,480,050	$1,487,200	$1,502,930
	Bridges & Major Culverts	$91,550	$92,100	$92,650	$93,200	$93,750	$94,300	$94,850	$95,400	$95,950	$97,160
	Corridor Co-ordination	$135,000	$135,675	$136,350	$137,025	$137,700	$138,375	$139,050	$139,725	$140,400	$141,885
	Data Collection & Condition Survey	$330,000	$331,650	$333,300	$334,950	$336,600	$338,250	$339,900	$341,550	$343,200	$346,830
	Land & Leglisation	$25,000	$25,125	$25,250	$25,375	$25,500	$25,625	$25,750	$25,875	$26,000	$26,275
	Traffic Counting	$100,000	$100,500	$101,000	$101,500	$102,000	$102,500	$103,000	$103,500	$104,000	$105,100
Network & Asset Management Total		**$2,111,550**	**$2,122,200**	**$2,132,850**	**$2,143,500**	**$2,154,150**	**$2,164,800**	**$2,175,450**	**$2,186,100**	**$2,196,750**	**$2,220,180**
NZTA	ADMIN	$80,000	$80,400	$80,800	$81,200	$81,600	$82,000	$82,400	$82,800	$83,200	$84,080
NZTA Total		**$80,000**	**$80,400**	**$80,800**	**$81,200**	**$81,600**	**$82,000**	**$82,400**	**$82,800**	**$83,200**	**$84,080**
Parking (On & Off Street)	Electricity	$4,850	$4,864	$4,878	$4,892	$4,906	$4,920	$4,934	$4,948	$4,962	$4,993
	User Fees	$1,340,000	$1,346,700	$1,353,400	$1,360,100	$1,366,800	$1,373,500	$1,380,200	$1,386,900	$1,393,600	$1,408,340
Parking (On & Off Street) Total		**$1,335,150**	**$1,341,836**	**$1,348,522**	**$1,355,208**	**$1,361,894**	**$1,368,580**	**$1,375,266**	**$1,381,952**	**$1,388,638**	**$1,403,347**
Street Scaping	Amenity Lighting	$15,000	$15,075	$15,150	$15,225	$15,300	$15,375	$15,450	$15,525	$15,600	$15,765
Street Scaping Total		**$15,000**	**$15,075**	**$15,150**	**$15,225**	**$15,300**	**$15,375**	**$15,450**	**$15,525**	**$15,600**	**$15,765**
SUBOPEX	SUBOPEX	$6,923,525	$7,078,692	$7,229,252	$7,298,118	$7,366,983	$7,406,448	$7,474,853	$7,543,257	$7,611,662	$7,726,504
SUBOPEX Total		**$6,923,525**	**$7,078,692**	**$7,229,252**	**$7,298,118**	**$7,366,983**	**$7,406,448**	**$7,474,853**	**$7,543,257**	**$7,611,662**	**$7,726,504**
Walking & Cycleways	Electricity	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Walking & Cycleways Total		**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
Grand Total		**$5,533,505**	**$5,520,408**	**$5,579,634**	**$5,639,801**	**$5,699,967**	**$5,730,733**	**$5,790,439**	**$5,850,144**	**$5,909,850**	**$6,005,554**

9.3 Debt Profile

The overall debt profile for the transport activity has been provided by finance and is shown in *Figure* 9-8 below. This debt profile is based on the "Approved LTP funding".



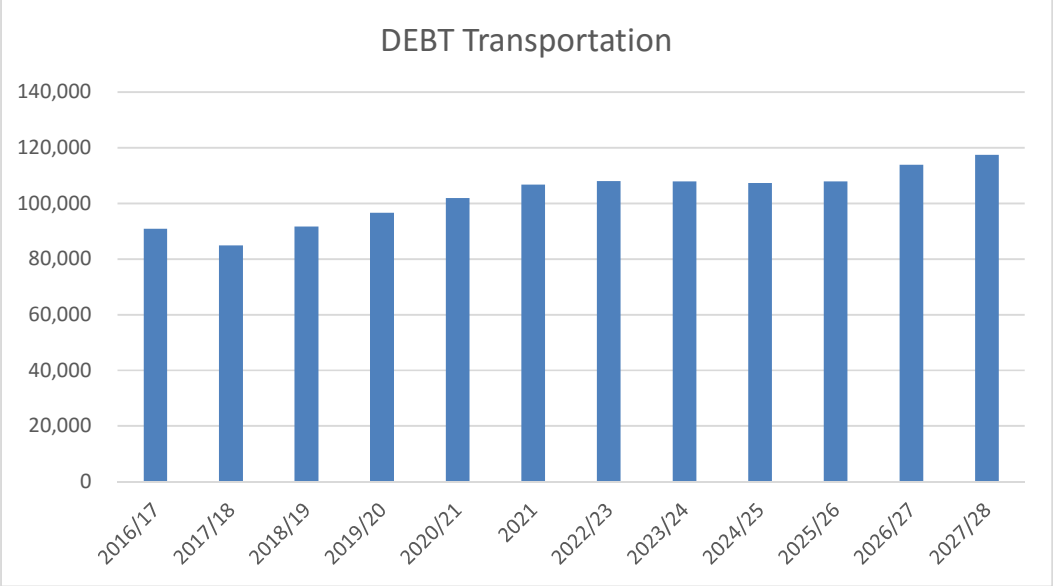


Figure 9-8: Council Debt Profile – as provided by Finance

9.4 Transportation Asset Valuation

The valuation was completed in August 2017 and includes the replacement costs of the assets, depreciated value as well as the forecasted value over the term of this plan.

The Roading Department completes a valuation every year. This is undertaken using the RAMM valuation module. Each valuation update is reported to the finance team with the key data being the capital additions, vested assets, write-offs and disposals. The valuation from RAMM is then compared to the finance updated valuation with the difference tracked and reported.

Every third year a revaluation is completed in alignment with Council's financial policy. This is then taken as the new opening valuation for the next three year period.

OBJECTIVE	The objective of the valuation is to; set the replacement costs of the assets, the depreciated replacement costs and the annual depreciated investment value at the component level in regards to the asset management practices undertaken in this plan. This provides the link between the financial investment and the management of the assets and provides the opportunity to communicate with decision makers on the investment levels and the losses in service potential over time. to set the intergenerational equity in how the asset replacement should be funded. comply with financial reporting requirements and legislation

POLICY	The valuation module will be run each year, reporting the current renewal profiles with the required depreciation investment. Updated figures will also be reported to the finance team using the RAMM valuation module for the vested asset values and write-off/disposal value.

9.4.1 Valuation Methodology

Figure 9-9 provides an over-view of the valuation process used to value the transport assets.

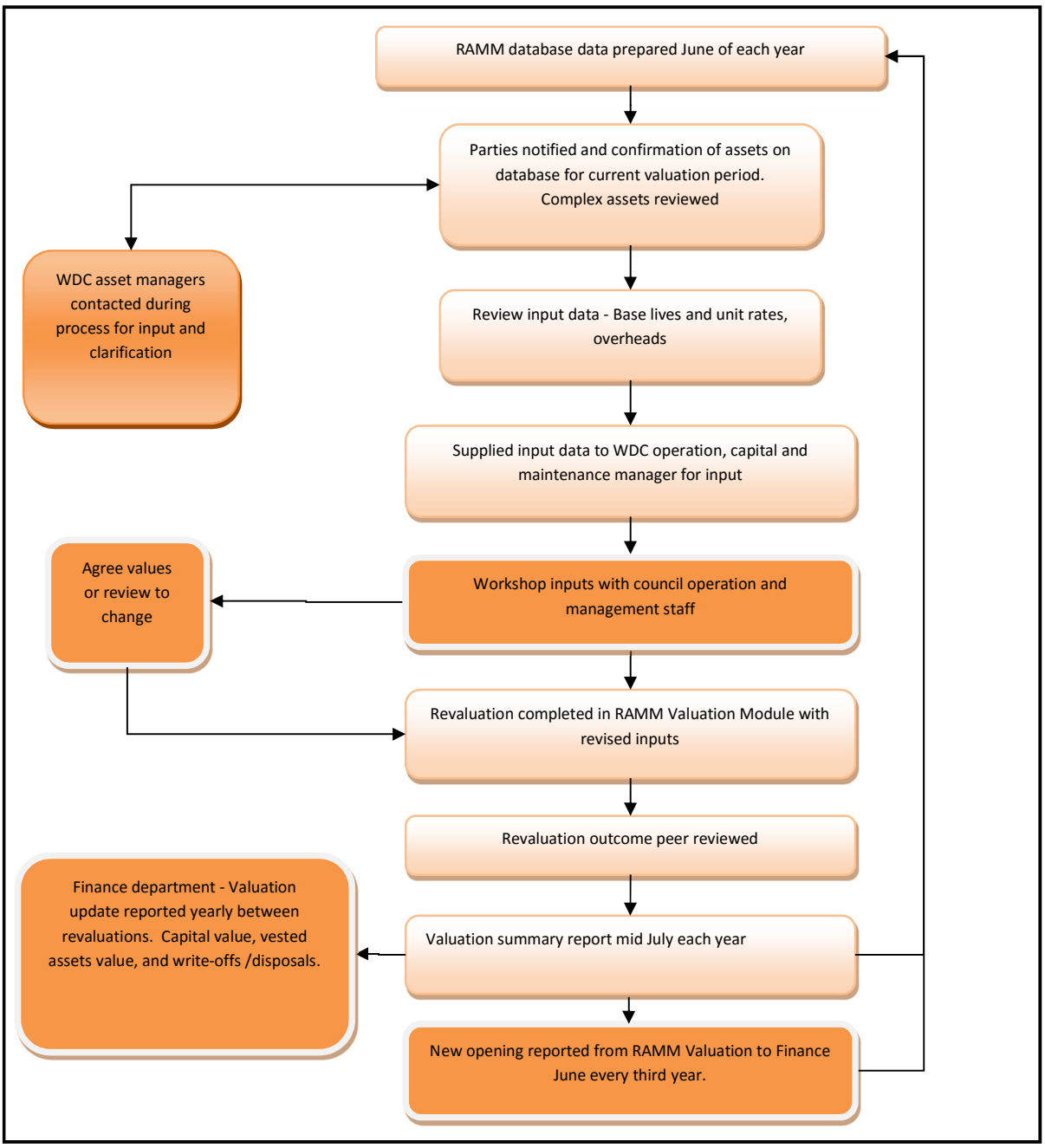


Figure 9-9: Transport Asset Valuation Process

9.4.2 Asset Lives

The key inputs to the valuations are the expected useful lives, unit replacement costs and the form of depreciation chosen. The asset components that have the greatest effect on the outcome, in terms of the key inputs, are the pavement base-course (sealed and unsealed) and the pavement surface.

Currently the expected lives of the base-course are set by hierarchy to recognise that these pavements differ in the forms of loss of service potential due to the differing impacts from traffic mix and loading. The following sets out the expected useful lives for each of the asset groups:

Table 9-7: Asset Valuation Lives

Asset Type Description	Asset Component	Asset Sub Component	Useful Life
Bridge	Bridge (Deck)	Bridge Routine Multi Span	100
		Bridge Routine Single Span	100
		Te Matau Pohe Bridge	100
	Bridge (Mechanical Electrical Plant)	Te Matau Pohe - MEP	30
	Bridge (Superstructure)	Footbridge	90
Drainage	Drainage	Concrete Culverts and drop structures	80
		Armco Culverts	35
		Catchpit/Sump Rural (only)	50
		Large Culvert (Steel)	30
		Subsoil Drain	50
Parking Meters	Parking Meters	Parking Meter - Electronic Heads	20
		Parking Meter - Pay and Display	15
Footpath	Footpath	Asphaltic Concrete (Black)	25
		Clay Paving Brick	30
		Concrete	55
		Metal (Under Construction)	10
		Other Types	35
Intelligent Transport Systems	Intelligent Transport Systems	Perm Traffic Counter - Classifier 5810	20
		Perm Traffic Counter - Counter 5805	20
Railing	Railing	Barrier	20
		Sight Rail	15
Retaining Wall	Retaining Wall	Gabion Wall	30
		Rock Wall (Placed loose)	50
		Sea Wall - Conc Mortar & Rock	85
		Sea Wall - Gabion Wall	30

Asset Type Description	Asset Component	Asset Sub Component	Useful Life
		Sea Wall - Reinforced Conc Wall	90
		Sea Wall - Tyre Timber Pile	80
		Timber Post Wall	50
Sign	Sign	All Signs	15
Street Light	Street Light (Bracket)	Outreach ALL Types Multi	40
	Street Light (Light)	All Lanterns	5
	Street Light (Pole)	Coastal Steel	25
		Concrete, Steel Inland	40
SW Channel	SW Channel	All Lined Surface Water Channel	50
Traffic Signal	Traffic Signal (Cabling)	Cabling	20
	Traffic Signal (Controller)	Cabinet Only	20
	Traffic Signal (Detector Card)	Detector Card and SCATS	15
	Traffic Signal (Lantern)	200 Incand / 200 Quartz / Ped 200	5
		LED 200/300mm	8
		Ped Push Button (Lamps)	5
	Traffic Signal (Loop)	Loop	15
	Traffic Signal (Ped Call Box)	Pedestrian Call Box	15
	Traffic Signal (Pole)	Pole	10
Pavements and Surfacing	Basecourse (Rural)	Basecourse (Arterial)	30
		Basecourse (Collector)	35
		Basecourse (Distributor)	35
		Basecourse (Local)	50
	Basecourse (Urban)	Basecourse (Arterial)	35
		Basecourse (Collector)	40
		Basecourse (Distributor)	40

Asset Type Description	Asset Component	Asset Sub Component	Useful Life
		Basecourse (Local)	70
	Carpark Basecourse	Carpark Basecourse	30
	Carpark Formation	Carpark Formation	Infinite
	Carpark Surfacing	Carpark AC	18
		Carpark Chipseal	13
	Formation	Formation	Infinite
	Subbase	Subbase	Infinite
	Surface Structure	1CHIP BIG	13
		1CHIP SMALL	7
		1ST COAT	4
		2CHIP	14
		Asphaltic Concrete (Rural)	18
		Asphaltic Concrete (Urban High >500ADT)	15
		Asphaltic Concrete (Urban Low <500ADT)	28
	Unsealed Basecourse	Unsealed Strengthening & Renewal	12

The roading assets that are valued are summarised in *Table 9-8* below.

Table 9-8: Roading Assets Valued

Asset Group	Asset	Asset Description
Roads	Formation	The formed platform upon which the road is constructed
	Pavement	The pavement granular layers (base-course, sub-base) used to form the road carriageway.
	Surface	The surface material (chipseal, asphalt cement) that forms the running surface on the road
Structures	Bridges/Culverts	Bridges including pedestrian bridges and culverts.
	Other	Structures that require structural inspections e.g. stairs, over/under passes.
	Retaining Walls	All retaining walls owned by the Roading Department
Drainage	SW Channels	Includes dish channels, kerbs and channels, mountable kerbs and channels
	Other Drainage	Includes all other roadside drainage e.g. sumps, leads and circular and box-shaped culverts.
Traffic Control	Traffic Signals	Traffic signals for the management of traffic at high volume intersections.
	Signs & Markings	Road signs, poles and markings, intelligent traffic systems
	Calming Devices	Traffic islands, chicanes, speed tables etc.
	Railings	Guardrails, handrails & sight-rails of various materials.
Parking		Meters, car park pavements, surfaces, markings etc.
Street Scaping	Street Furniture	Seats, shelters etc.
	Street Lighting	Carriageway lighting includes poles, lanterns, lamps, cables & outreach arms.
	Services	Cleaning, mowing, spraying etc.
Walking & Cycling	Footpaths	Roadside footpaths and walkways between roads
	Cycling Facilities	Cycle lanes on roads

9.4.3 Valuation Summary

The valuation report completed for the 2014 revaluation (TRIM document 14/83784) holds the detail in regards to the revaluation outcome. The following is an extract from the key areas of the report.

Excluding the non-depreciable assets (Formation, Subbase), the depreciation rate is approximately 2.7%. This is not out of place with other local authority roading departments.

In summary the Optimised Replacement Cost (ORC) of the roading asset at $1,066.3M, the Optimised Depreciated Replacement Cost (ODRC) at $740.1M and the Annual Depreciation (AD) at $16.4M. The total depreciated value is $326.1M.

The detailed breakdown of the valuation by asset type is provided in *Table 9-9* below.

Table 9-9: Summary Revaluation Data

Asset Type	Optimised Replacement Costs	Optimised Depreciated Replacement Cost	Annual Depreciation
Bridge	$132,436,254.86	$76,747,301.24	$1,500,773.47
Drainage	$40,520,237.91	$26,608,728.02	$563,956.14
Feature	$1,085,676.50	$542,838.24	$69,860.92
Footpath	$44,705,538.63	$17,848,695.00	$843,614.34
Intelligent Transport Systems	$31,036.00	$14,273.15	$1,480.53
Railing	$3,416,026.77	$1,708,013.40	$182,803.78
Retaining Wall	$35,665,480.66	$19,766,300.76	$625,648.89
Sign	$2,887,593.41	$1,410,154.60	$192,393.92
Street Light	$9,136,729.59	$4,308,653.54	$316,281.00
SW Channel	$50,922,370.32	$23,382,151.25	$848,675.40
Traffic Signal	$3,016,526.95	$1,154,669.60	$232,811.13
Treatment Length	$742,547,702.25	$566,688,346.63	$11,034,903.24
Grand Total	**$1,066,371,173.85**	**$740,180,125.45**	**$16,413,202.76**

The current approved renewal investment for 2018/19 is $15.2M. The annual depreciation from the 2017 revaluation would indicate that there is a renewals investment shortfall of less than a $1M. This means that that there is a fairly balanced budget.

9.4.4 Confidence Ratings

Confidence ratings were assigned to the source data, unit cost rates and other items as appropriate. Data from the RAMM database, lives, replacement cost and depreciated value. The overall confidence rating given to the valuation is **"A"**, which means the revaluation figures given may be with +/-5%. Considering the confidence rating of each of the asset groups above the valuation can be given a high degree of reliability.

The confidence ratings used are summarised in *Table 9-10* below and the ratings for each asset type are shown in *Table 9-11*.

Table 9-10: Data Confidence Rating Definitions

Grade	Label	Description	Accuracy
1	Accurate	Data based on reliable documents	100%
2	Minor inaccuracies	Data based on some supporting documentation	+/-5%
3	50% data estimated	Data based on limited documentation rest base on local knowledge	+/-20%

Grade	Label	Description	Accuracy
4	Significant data estimated	Data based on local knowledge	+/-30%
5	All data estimated	Data based on best guess of experienced person	+/-40%

Grade	Label	Description	Accuracy
A	Highly reliable	Data based on sound records, procedure, investigations and analysis, documented properly and recognized as the best method of assessment.	100%
B	Reliable	Data based on sound records, procedures, investigations and analysis, documented properly but has minor shortcomings, for example the data are old, some documentation is missing, and reliance is placed on unconfirmed reports or some extrapolation.	+/-5%
C	Uncertain	Data based on sound records, procedures, investigations and analysis which is incomplete or unsupported, or extrapolated from a limited sample for which grade A or B data is available.	+/-20%
D	Very uncertain	Data based on unconfirmed verbal reports and/or cursory inspection and analysis.	+/-30%

Table 9-11: Data Confidence Ratings for Assets

Asset Type	Asset Quantity	Unit Rates	Base Lives	ORC	ODRC
Bridge	1	B	B	+/-7%	+/-7%
Drainage	1	A	B	< 5%	+/- 5%
Feature (Parking Meters)	1	A	A	< 5%	< 5%
Footpath	2	A	A	+/- 5%	+/- 5%
Intelligent Transport Systems	1	A	A	< 5%	< 5%
Railing	2	A	B	+/-7%	+/-7%
Retaining Wall	1	B	A	+/-7%	+/-7%
SW Channel	2	A	A	+/- 5%	+/- 5%

Asset Type	Asset Quantity	Unit Rates	Base Lives	ORC	ODRC
Sign	1	A	A-	< 5%	< 5%
Street Light	1	A	B	< 5%	< 5%
Traffic Signal	1	B	B	+/- 5%	+/- 5%
Pavement Basecourse	2	B	B+	+/-8%	+/-8%
Carpark	2	B	B	+/-10%	+/-10%
Formation	1	A	A	< 5%	< 5%
Subbase	1	A	A	< 5%	< 5%
Surface Structure	1	A	A-	+/- 5%	+/- 5%
Unsealed Basecourse	2	B	B	+/-10%	+/-10%

9.5 Forecast Asset Value

9.5.1 Replacement Value

Under the current plan the asset value is $1,068.5M (2018/19), rising to over approximately $1,163.3M after 10 years (based on the un-inflated funding profiles), with the highest component value being the pavement and surfacing asset.

At the end of year 30 the forecasted value will be approximately $1,374.9M. Total 30yr forecasted value is given in *Figure 9-10*.

This plan (10 years) will add approximately $94M in value to the asset.

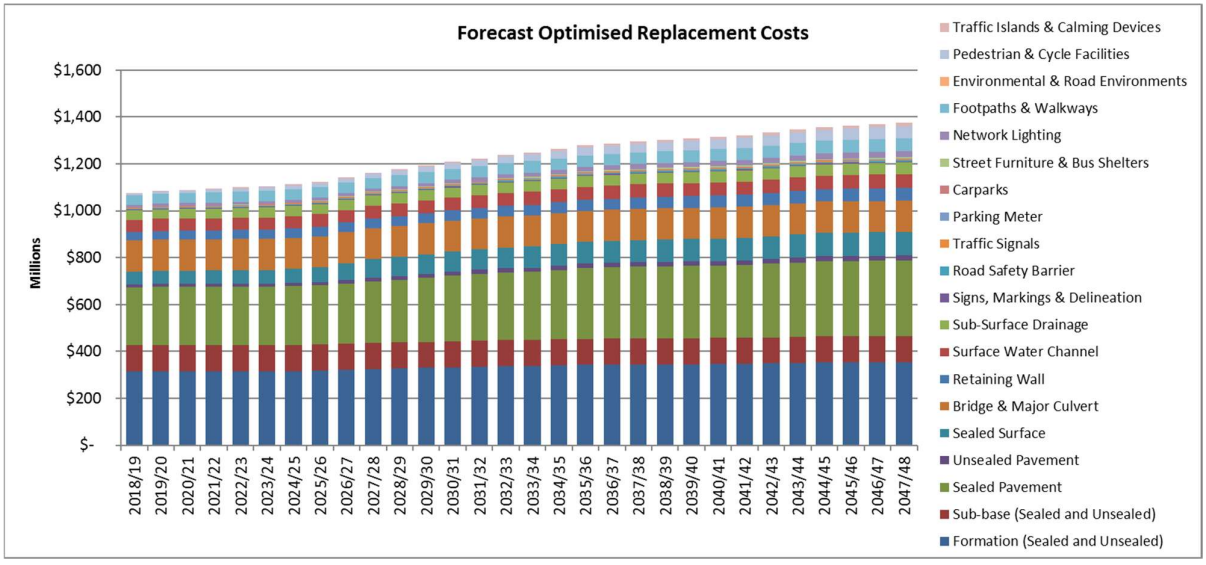


Figure 9-10: Forecast Replacement Costs

9.5.2 Depreciated Value

The current depreciated replacement costs is $740.1M. Under Approved Funding this is expected to increase to approximately $799.7.3M (based on the un-inflated funding profiles) after 10 years. Over the 30 year period this value increase to $964M as capital and renewals continues to occur.

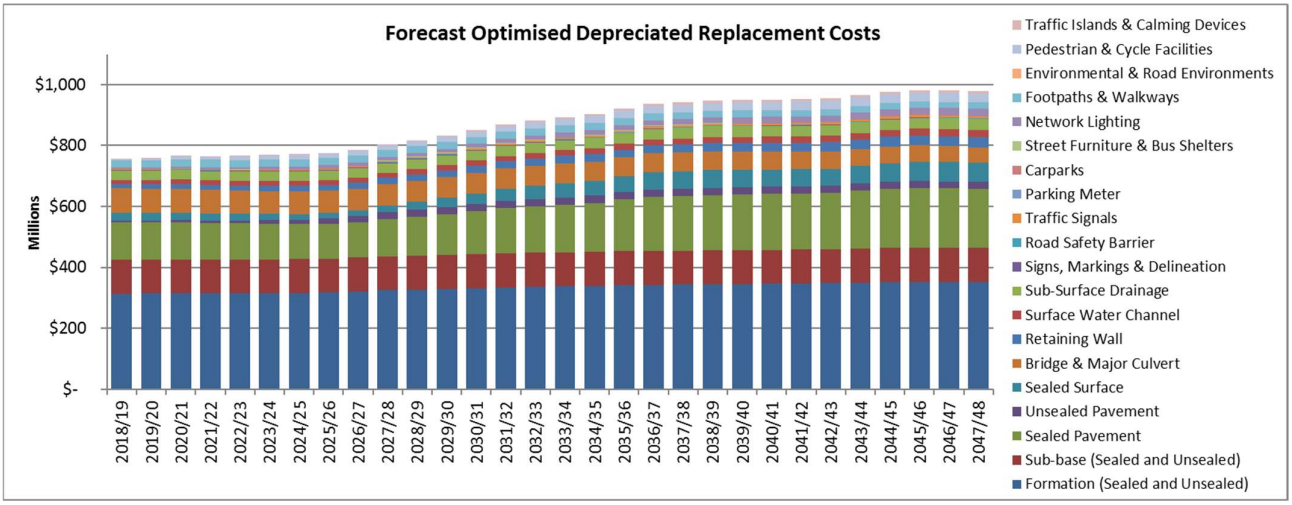


Figure 9-11: Forecast Depreciated Replacement Costs

On this basis, the projected annual depreciation by year 10 is expected to be $21.6M. This indicates that the renewal investment should be at a similar rate. The renewals investment is on average $19.7M per annum on average.

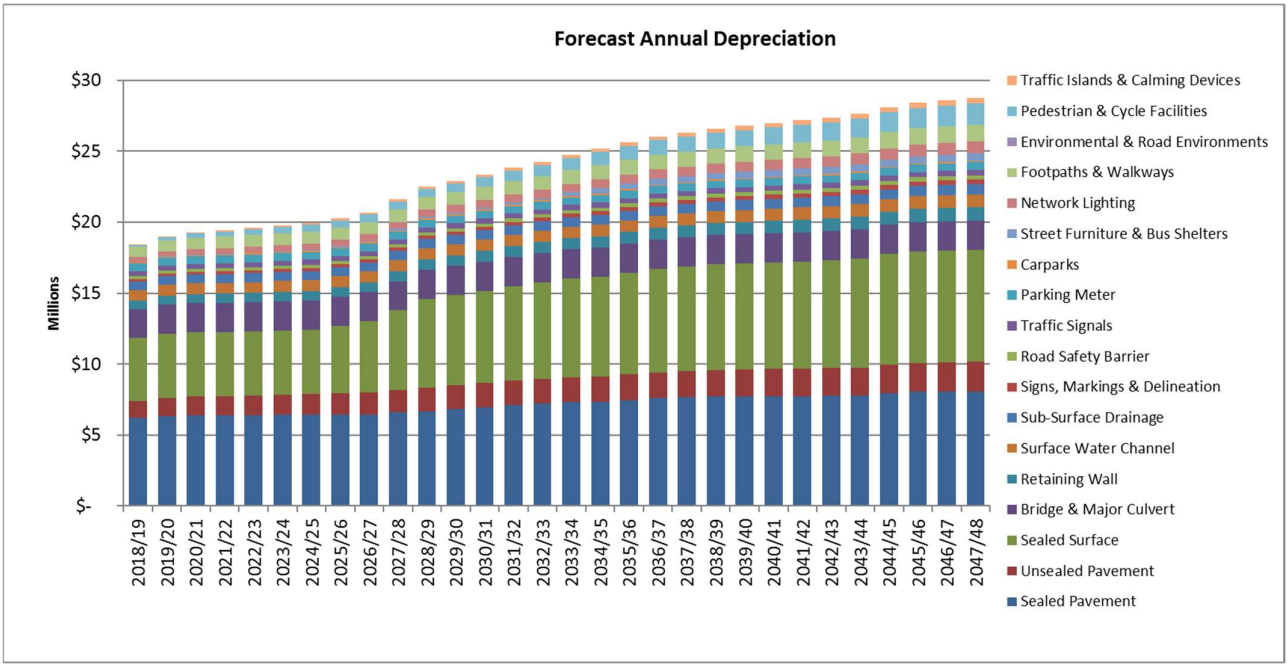


Figure 9-12: Forecast Annual Depreciation

This change in investment is best reflected in the Net Annual Change in asset value (service potential) *Figure 9-13*.

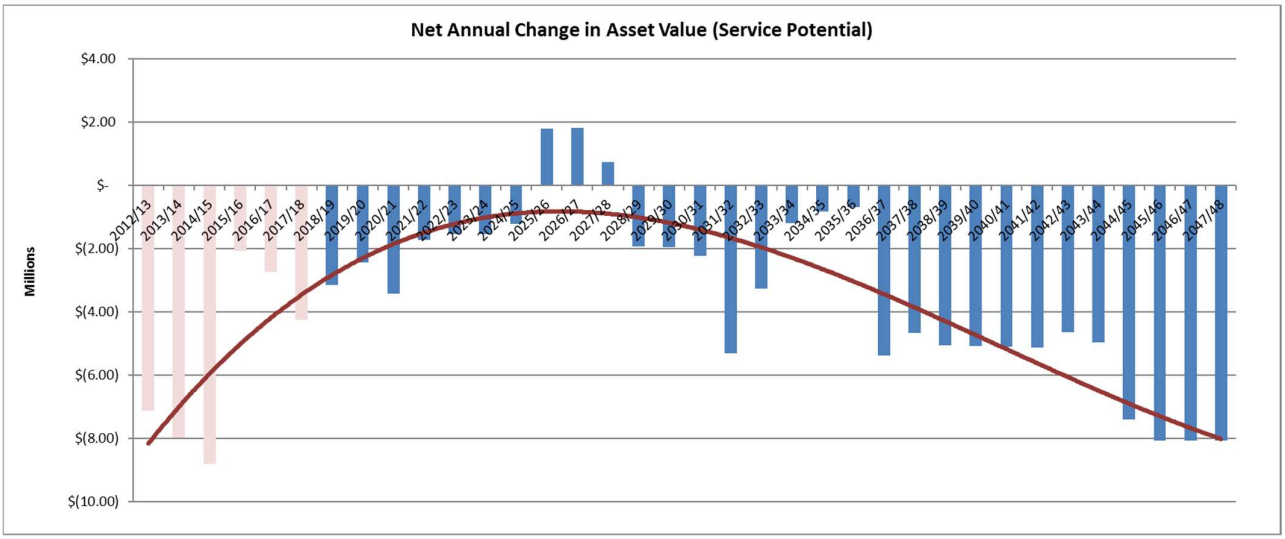


Figure 9-13: Service Potential (Net Annual Change in Asset Value)

Figure 9-13 illustrates that over the 30 year period the delivery strategies set out in this plan will return the service potential back to the transport assets.

9.6 Funding Impacts Statement

Table 9-12 and *Table 9-13* sets out the full 10 year Funding Impact Statement, inflated, for the Transportation activity.

Table 9-12 – Funding Impact Statement Years 1-5

Transportation	Annual Plan 2017 - 18 $000	Year 1 2018 - 19 $000	Year 2 2019 - 20 $000	Year 3 2020 - 21 $000	Year 4 2021 - 22 $000	Year 5 2022 - 23 $000	Year 6 2023 - 24 $000	Year 7 2024 - 25 $000	Year 8 2025 - 26 $000	Year 9 2026 - 27 $000	Year 10 2027 - 28 $000
Sources of Operating Funding											
General rates, uniform annual general charges, rates penalties	14,903	15,161	16,728	17,343	17,588	22,287	23,641	25,010	26,283	28,384	30,367
Targeted rates	35	34	34	34	34	34	34	34	34	34	34
Subsidies and grants for operating purposes	6,569	6,933	7,244	7,560	7,799	8,053	8,282	8,559	8,853	9,156	9,536
Fees and charges	2,540	1,883	1,930	2,085	2,028	2,081	2,249	2,193	2,255	2,441	2,395
Internal charges and overheads recovered	-	-	-	-	-	-	-	-	-	-	-
Local authorities fuel tax, fines, infringement fees and other receipts	3,145	2,849	2,901	2,953	3,007	3,064	3,123	3,186	3,253	3,322	3,399
Total Operating Funding	**27,193**	**26,860**	**28,837**	**29,974**	**30,456**	**35,519**	**37,329**	**38,981**	**40,677**	**43,337**	**45,731**
Applications of Operating Funding											
Payments to staff and suppliers	16,114	16,717	17,250	17,821	18,350	18,922	19,520	20,028	20,687	21,494	22,199
Finance Costs	4,164	4,673	4,616	4,308	4,390	4,431	4,434	4,392	4,285	4,439	4,529
Internal charges and overheads applied	1,603	1,155	1,275	1,293	1,406	1,456	1,499	1,524	1,548	1,574	1,608
Other operating funding applications	-	-	-	-	-	-	-	-	-	-	-
Total Applications of Operating Funding	**21,882**	**22,545**	**23,141**	**23,422**	**24,146**	**24,809**	**25,453**	**25,944**	**26,520**	**27,507**	**28,336**
Surplus / (Deficit) of Operating Funding	**5,311**	**4,315**	**5,695**	**6,552**	**6,310**	**10,710**	**11,875**	**13,037**	**14,156**	**15,830**	**17,395**
Sources of Capital Funding											
Subsidies and grants for capital expenditure	13,312	11,672	12,493	12,009	12,492	12,681	12,914	13,811	17,041	17,925	19,261
Development and financial contributions	1,277	1,957	2,022	2,089	2,157	2,114	2,163	2,214	2,270	2,327	2,387
Increase / (decrease) in debt	4,340	6,703	10,073	4,890	6,196	1,173	350	3,108	724	5,402	2,663
Gross proceeds from sale of assets	-	-	-	-	-	-	-	-	-	-	-
Other dedicated capital funding	-	-	-	-	-	-	-	-	-	-	-
Lump sum contributions	-	-	-	-	-	-	-	-	-	-	-
Total Sources of Capital Funding	**18,929**	**20,332**	**24,587**	**18,987**	**20,845**	**15,968**	**15,427**	**19,133**	**20,035**	**25,653**	**24,311**
Applications of Capital Funding											
Capital expenditure											
to meet additional demand	4,341	3,227	3,897	3,235	3,322	3,478	3,283	4,733	7,302	14,075	13,975
to improve levels of service	5,799	3,820	4,764	3,448	3,116	3,512	2,681	3,299	4,757	5,126	5,231
to replace existing assets	15,800	16,778	16,764	17,439	18,632	19,057	19,675	20,280	21,448	21,894	22,844
Increase / (decrease) in reserves	(1,700)	821	4,858	1,416	2,085	630	1,662	3,858	683	387	(343)
Increase / (decrease) of investments	-	-	-	-	-	-	-	-	-	-	-
Total Applications of Capital Funding	**24,240**	**24,646**	**30,283**	**25,539**	**27,155**	**26,677**	**27,302**	**32,170**	**34,191**	**41,483**	**41,706**
Surplus / (Deficit) of Capital Funding	**(5,311)**	**(4,315)**	**(5,695)**	**(6,552)**	**(6,310)**	**(10,710)**	**(11,875)**	**(13,037)**	**(14,156)**	**(15,830)**	**(17,395)**
Funding Balance	**(0)**	**0**	**(0)**	**0**	**0**	**-**	**-**	**-**	**-**	**-**	**-**

Table 9-13 – Funding Impact Statement Years 6-10

9.7 Key Financial Assumptions & Uncertainties

The follow key financial assumptions have been made:

- That Council will continue to deliver the activity for the foreseeable future
- NZTA financial assistance rates will remain unchanged for the planning horizon of this plan

- Outcomes of the Pavement Performance Model and Urban Traffic Model are reliable and correct in providing inputs to the Forward Work Programmes
- The District Growth Model, as used within the Development Contribution Database, is accurate enough to set development contribution income.
- That NZTA will fund the "Approved LTP Funding" envelope to meet the local share.
- Council Finance Models in regards to debt profiles and subsidy incomes are correct.

10 Supporting Information

10.1 Regional Stakeholder Engagement Workshops

The workshops were broken into a series of sessions which focused on specific topics.

Summary – Main Issues
Pre-engagement • NZTA will support actions arising from the Tai Tokerau Action Plan, Safer Journeys Action Plan and REG findings. • Government Policy Statement (GPS) should have same focus as previous (ie Economic Growth, Safety and Value for Money). • Business Case AMP about exploring options and considering consequences/benefits.
Session 1 – Freight / Forestry / Resilience • Connectivity / Reliability of journey times. Resilience • Good quality connection on SH1 to Auckland critical – Connecting the Golden triangle to Northland • Understanding what the effects are if the roads go down or prolong road works occurring • Sharing of information with Public Stakeholders • Forestry currently at peak production (4.5m tonnes/yr) and will stay at that level until 2026, then drop to half until 2040 when it ramps back to 4m tonnes/yr. • Rail being wound down – not likely to be a significant transport mode. • SH detour routes not to standard suitable for 50Max/HPMV vehicles and have one lane bridges. • Road works on freight routes leading to excessive delays and unreliable travel times. • Same day delivery & lack of warehousing makes transport reliability critical. • More truck stops, rest areas, services on freight routes required.
Session 2 – Safety • Network is too narrow and unforgiving. • Fatal Five issues – Young Drivers, Alcohol and/or Drugs, Speed, Rural Loss of Control Head-ons, Intersections • Travel planning required. • Funding for Road safety promotions. Local share more difficult to get. • Old vehicle fleet contributing to higher severity crashes. • Speed management an issue.
Session 3 – Tourism & Economic Development • Significant growth in tourism numbers. More attractions planned Hundertwasser etc. Do we understand this sufficiently? • Transport network must facilitate growth in these areas. Are we planning sufficiently for this growth? • Twin Coast Discovery route to be improved - issues are ease of travel, visual prompts, fatigue/rest areas etc. • Electric vehicle uptake. • Transport needs for Whangarei Regional Airport potential change of location
Session 4 - Public Transport / School Buses • Rose Street bus terminal in Whangarei – Needs relocating to Vine Street. Must be pleasant and welcoming

- Reliability – providing a bus that arrives at the same time every day.
- Planning for public transport needs to be included at the consent stage.
- Parking restrictions an enabler for public transport.
- Future consideration of rural commuter bus services.

Session 5 – Walking and Cycling

- Good quality infrastructure connecting areas – if we make it attractive people will use it.
- Travel planning – Targeting school to get kids back to walking and cycling.
- Education and training – Level 2 training and training facilities required.
- Local and regional strategies to align.
- Need to provide for mobility scooters/less physically-abled people due to aging population.
- National cycleway extension – loop from Horeke to Dargaville to Whangarei & up east coast to Okaihau.

10.2 Work Programme Lists

10.2.1 Three Year Pavement Renewal Programmes (W/C 214)

Programme 2018/19

Road Name	Start (m)	End (m)	Length (m)	Width (m)	Area (m2)	Hierarchy (ONRC)	18/19 Trt	Estimate Costs
KOKOPU BLOCK RD	2440	3030	590	7	4130	PRIMARY COLLECTOR	RHAB	$338,247
PIPIWAI RD NTH	15177	16105	464	6.9	3202	SECONDARY COLLECTOR	RHAB	$262,211
PIPIWAI RD NTH	16105	16720	615	6.9	4244	SECONDARY COLLECTOR	RHAB	$347,543
PIPIWAI RD NTH	37100	38005	905	6.7	6064	ACCESS	RHAB	$496,601
TAIPUHA RD	900	1847	236	6.2	1463	ACCESS	RHAB	$119,836
TAIPUHA RD	1847	2598	187	6.2	1159	ACCESS	RHAB	$94,955
TAIPUHA RD	2598	2963	365	6.21	2267	ACCESS	RHAB	$185,639
TAURAROA RD	766	1649	883	6.2	5475	PRIMARY COLLECTOR	RHAB	$448,370
URETITI RD	1460	1992	532	7.6	4043	SECONDARY COLLECTOR	RHAB	$331,138
WAIOTIRA RD	4490	5838	1348	6.2	8358	SECONDARY COLLECTOR	RHAB	$684,487
WAIOTIRA RD	5857	6206	349	6.2	2164	SECONDARY COLLECTOR	RHAB	$177,215
WHATITIRI RD	3023	4856	1833	6.39	11713	ACCESS	RHAB	$959,284

Programme 2019/20

Road Name	Start (m)	End (m)	Length (m)	Width (m)	Area (m2)	Hierarchy (ONRC)	19/20 Trt	Estimate Costs
MATARAU RD	0	1106	1106	6.5	7189	SECONDARY COLLECTOR	RHAB	$588,779.10
MATARAU RD	3670	4530	860	6	5160	SECONDARY COLLECTOR	RHAB	$422,604.00
MCCARDLE RD	1336	2995	1659	6.3	10451.7	SECONDARY COLLECTOR	RHAB	$855,994.23
MILL RD	852	1317	465	12.6	5859	ARTERIAL	RHABAM	$649,645.92
MILL RD	1317	1390	73	12.6	919.8	ARTERIAL	RHABAM	$101,987.42
PIPIWAI RD CTRL	867	1675	808	8.1	6544.8	ARTERIAL	RHAB	$536,019.12
PIPIWAI RD NTH	1724	1781	57	7.5	427.5	ARTERIAL	RHABAM	$47,401.20
PIPIWAI RD NTH	1781	1865	84	7.5	630	ARTERIAL	RHAB	$51,597.00
TANGIHUA RD	352	1450	1098	6.09	6686.82	SECONDARY COLLECTOR	RHAB	$547,650.56
WAIOTIRA RD	8015	9188	1173	6.2	7272.6	SECONDARY COLLECTOR	RHAB	$595,625.94

Programme 2020/21

Road Name	Start (m)	End (m)	Length (m)	Width (m)	Area (m2)	Hierarchy (ONRC)	20/21 Trt	Estimate Costs
KIOREROA RD	1142	1890	748	12.9	9649.2	ARTERIAL	UR-RHAB	$992,902.68
KIOREROA RD	1890	2274	384	12.9	4953.6	ARTERIAL	UR-RHAB	$509,725.44
MAUNU RD	236	433	197	12.4	2442.8	ARTERIAL	RHABAM	$225,714.72
MAUNU RD	433	537	104	12.5	1300	ARTERIAL	RHABAM	$120,120.00
MAUNU RD	537	662	125	12.75	1593.75	ARTERIAL	RHABAM	$147,262.50
MAUNU RD	662	720	58	12.4	719.2	ARTERIAL	RHABAM	$66,454.08
MAUNU RD	720	820	100	12.4	1240	ARTERIAL	RHABAM	$114,576.00
MILL RD	42	395	353	12.2	4306.6	ARTERIAL	RHABAM	$397,929.84
MILL RD	395	615	220	12.2	2684	ARTERIAL	RHABAM	$248,001.60
MORNINGSIDE RD	515	834	319	9.65	3078.35	SECONDARY COLLECTOR	RHAB	$210,097.39
MORNINGSIDE RD	834	998	164	8.7	1426.8	SECONDARY COLLECTOR	RHAB	$97,379.10
MORNINGSIDE RD	998	1317	319	9.1	2902.9	SECONDARY COLLECTOR	RHAB	$198,122.93
PIPIWAI RD NTH	1865	3257	1392	7.47	10398.24	ARTERIAL	RHAB	$709,679.88
REWA REWA RD	23	627	604	12.1	7308.4	ARTERIAL	RHABAM	$675,296.16
RIVERSIDE DR SOUTH	1288	1646	358	12.26	4389.08	ARTERIAL	UR-RHAB	$451,636.33
RIVERSIDE DR SOUTH	1646	1932	286	13.92	3981.12	ARTERIAL	UR-RHAB	$409,657.25
TAURAROA RD	4470	4974	504	6	3024	PRIMARY COLLECTOR	RHAB	$206,388.00
WAIOTIRA RD	7000	7597	597	6.2	3701.4	SECONDARY COLLECTOR	RHAB	$252,620.55

10.2.2 Three Year Asphalt Concrete Renewal Programmes (W/C 212)

Programme 2018/19

Road Name	Start (m)	End (m)	Length (m)	Width (m)	Area (m2)	Hierarchy (ONRC)	18/19 Trt
ANZAC RD	0	38	38	9.5	361	SECONDARY COLLECTOR	TAC
CARRUTH ST	0	180	180	12	2160	PRIMARY COLLECTOR	TAC
CORKS RD	0	37	37	11.6	429.2	ARTERIAL	TAC
CORKS RD	2177	2200	23	12	276	ARTERIAL	TAC
COVE RD	788	799	11	7.7	84.7	PRIMARY COLLECTOR	TAC
GUMDIGGER PL	441	456	15	12.5	187.5	SECONDARY COLLECTOR	TAC
HEWLETT ST	26	242	216	12	2592	PRIMARY COLLECTOR	TAC
KAKA ST	304	335	31	12.1	375.1	PRIMARY COLLECTOR	TAC
KIRIPAKA RD	50	196	146	12	1752	ARTERIAL	TAC
KIRIPAKA RD	196	973	777	11.9	9246.3	ARTERIAL	TAC
KIRIPAKA RD	1016	1136	120	12.4	1488	ARTERIAL	TAC
KIRIPAKA RD	1136	1550	414	12.5	5177.2	ARTERIAL	TAC
LOWER TAREWA RD	292	313	21	13	273	ARTERIAL	PROJ,TAC
MANAIA RD	286	424	138	8.5	1173	SECONDARY COLLECTOR	TAC
MARSDEN POINT RD	3439	3484	45	11	495	ARTERIAL	TAC
MARUA RD	3530	3568	38	6	228	PRIMARY COLLECTOR	TAC
MORNINGSIDE RD	0	31	31	8.3	257.3	SECONDARY COLLECTOR	TAC
OKARA DR	0	60	60	8	480	ARTERIAL	TAC
OKARA DR	60	106	46	8	368	ARTERIAL	TAC
OKARA DR	106	137	31	8	248	ARTERIAL	TAC
OKARA DR	137	151	14	8	112	ARTERIAL	TAC
RAB RAURIMU AVE/BEACH RD/PAH RD	0	70	70	5.6	392	PRIMARY COLLECTOR	TAC

Road Name	Start (m)	End (m)	Length (m)	Width (m)	Area (m2)	Hierarchy (ONRC)	18/19 Trt
RIVERSIDE DR NORTH	0	130	130	7	910	ARTERIAL	TAC
ROBERT ST	200	262	62	12.8	793.6	ARTERIAL	TAC
ROBERT ST	282	310	28	12.8	358.4	ARTERIAL	TAC
TAREWA RD	0	63	63	12.2	768.6	ARTERIAL	TAC
THE CENTRE	0	39	39	13.3	518.7	PRIMARY COLLECTOR	TAC
VINE ST	0	192	192	12.1	2323.2	PRIMARY COLLECTOR	TAC

Programme 2019/20

Road Name	Start (m)	End (m)	Length (m)	Width (m)	Area (m2)	Hierarchy (ONRC)	19/20 Trt
ALBERT ST	0	29	29	12.2	353.8	PRIMARY COLLECTOR	TAC
CARPARK FORUM NORTH (RUST AVE)	0	194	194	27.4	5315.6	CARPARK	TAC
CARPARK LOWER CAMERON ST (CORNER OF REYBURN S	0	51	51	16.1	821.1	CARPARK	TAC
CARPARK LOWER DENT ST (WOADS)	0	50	50	18.2	910	CARPARK	TAC
CARPARK THE CENTRE (WAIPU)	0	51	51	54	2754	CARPARK	TAC
CARPARK WOLFE ST	0	36	36	16	576	CARPARK	TAC
CARRUTH ST	180	309	129	12	1548	PRIMARY COLLECTOR	TAC
CORKS RD	1002	1080	78	8.4	655.2	ARTERIAL	TAC
GUMDIGGER PL	310	330	20	12.4	248	SECONDARY COLLECTOR	TAC
JAMES ST	70	152	82	12.9	1057.8	ARTERIAL	TAC
JAMES ST	168	170	2	12.9	25.8	ARTERIAL	TAC
JAMES ST	170	337	167	12.9	2154.3	ARTERIAL	TAC
JOHN ST	0	152	152	12.4	1884.8	PRIMARY COLLECTOR	TAC
KIRIPAKA RD	973	1016	43	12.4	533.2	ARTERIAL	TAC
KIRIPAKA RD	1550	1664	114	13	1482	ARTERIAL	TAC
KIRIPAKA RD	1920	2152	232	12.1	2807.2	ARTERIAL	TAC
KIRIPAKA RD	2152	2399	247	13.1	3235.7	ARTERIAL	TAC
LAURIE HALL LANE	0	92	92	6.8	625.6	SECONDARY COLLECTOR	TAC
LOWER TAREWA RD	0	35	35	13	455	ARTERIAL	TAC
MCGILL RD	0	24	24	7.4	177.6	ACCESS	TAC
NGUNGURU RD CTRL	0	28	28	10.4	291.2	ARTERIAL	TAC
PARK AVE	678	694	16	8.8	140.8	SECONDARY COLLECTOR	TAC

Road Name	Start (m)	End (m)	Length (m)	Width (m)	Area (m2)	Hierarchy (ONRC)	19/20 Trt
PIPIWAI RD NTH	35194	35241	47	7.7	361.9	ACCESS	TAC
POROWINI AVE	0	32	32	12	384	ARTERIAL	TAC
PUNGA GROVE	0	23	23	5.6	128.8	ACCESS	TAC
RAB KIRIPAKA RD/SPEDDING RD/PARAMOUNT PDE	0	76	76	6.8	516.8	ARTERIAL	TAC
RAB PIPIWAI RD/DIP RD	0	82	82	6	492	ARTERIAL	TAC
RAB WALTON ST/LOWER TAREWA RD/BANK ST/RAILWAY	0	12	12	9	108	ARTERIAL	TAC
RAB WALTON ST/LOWER TAREWA RD/BANK ST/RAILWAY	12	127	115	9	1035	ARTERIAL	TAC
RUSSELL RD (CTL)	14416	14595	179	6.3	1127.7	SECONDARY COLLECTOR	TAC
RUSSELL RD (CTL)	16557	16593	36	6.3	226.8	SECONDARY COLLECTOR	TAC
SOUTH END AVE	25	56	31	11.99	371.8	SECONDARY COLLECTOR	TAC
TAUROA ST (BOTTOM)	0	36	36	11.9	428.4	SECONDARY COLLECTOR	TAC
TAUROA ST (BOTTOM)	36	76	40	11.9	476	SECONDARY COLLECTOR	TAC
TE WAIITI PL	0	25	25	10	250	ACCESS	TAC
WALTON ST	148	199	51	12.7	647.7	ARTERIAL	TAC
WATER ST	43	171	128	12.1	1548.8	ARTERIAL	TAC
WATER ST	171	186	15	12.1	181.5	ARTERIAL	TAC
WATER ST	186	260	74	12.1	895.4	ARTERIAL	TAC

Programme 2020/21

Road Name	Start (m)	End (m)	Length (m)	Width (m)	Area (m2)	Hierarchy (ONRC)	20/21 Trt
ALBERT ST SERVICE LANE	0	120	120	4.8	576	LOW VOLUME	TAC
ARCUS ST	0	33	33	10.2	336.6	SECONDARY COLLECTOR	TAC
BANK ST	0	42	42	15.7	659.4	ARTERIAL	TAC
CAIRNFIELD RD	490	506	16	11.1	177.6	SECONDARY COLLECTOR	TAC
CARPARK LAURIE HALL PARK	0	120	120	14.6	1752	CARPARK	TAC
CLARK RD SERVICE LANE NO. 1	0	258	258	6.3	1625.4	ACCESS	TAC
DENT ST	12	117	105	15	1575	ARTERIAL	TAC
DENT ST	117	441	324	13.01	4217.8	ARTERIAL	TAC
GREAT NORTH RD	603	648	45	9.8	441	ARTERIAL	TAC
HATEA DR	0	265	265	12.1	3206.5	ARTERIAL	TAC
HATEA DR	265	743	478	12.1	5783.8	ARTERIAL	TAC
HEREKINO ST SERVICE LANE NO.2	0	40	40	6.2	248	LOW VOLUME	TAC
HOME CENTRE SERVICE LANE	0	44	44	6.7	294.8	LOW VOLUME	TAC
KIRIPAKA RD	2399	2491	92	12	1104	ARTERIAL	TAC
MAINS AVE	732	764	32	11.8	377.6	SECONDARY COLLECTOR	TAC
MCGILL RD	124	182	58	7.4	429.2	ACCESS	TAC
MILL RD	0	42	42	12.2	512.4	ARTERIAL	TAC
MURDOCH CRES	0	65	65	7.6	494	SECONDARY COLLECTOR	TAC
NGUNGURU RD NTH	8599	8688	89	7	623	ARTERIAL	TAC
NGUNGURU RD NTH	8809	8904	95	7	665	ARTERIAL	TAC
PAH RD	257	282	25	10.3	257.5	ACCESS	TAC
PAH RD	310	330	20	6.6	132	LOW VOLUME	TAC
PORT RD	0	25	25	15.2	380	ARTERIAL	TAC

Road Name	Start (m)	End (m)	Length (m)	Width (m)	Area (m2)	Hierarchy (ONRC)	20/21 Trt
RAB JAMES ST/ROBERT ST	0	30	30	5	150	ARTERIAL	TAC
RAB JOHN ST/ROBERT ST	0	30	30	5	150	ARTERIAL	TAC
RAB ONE TREE POINT RD /PYLE RD EAST/PYLE RD W	0	37	37	9	333	PRIMARY COLLECTOR	TAC
RAB THREE MILE BUSH RD/CRAWFORD CRES/TUATARA	0	53	53	6.7	355.1	PRIMARY COLLECTOR	TAC
REYBURN ST	200	261	61	13.67	834	ARTERIAL	TAC
UNION EAST ST	272	321	49	12.44	609.7	PRIMARY COLLECTOR	TAC
VINERY LANE	0	124	124	6.45	800	ACCESS	TAC
WALTON ST	26	148	122	12.7	1549.4	ARTERIAL	TAC
WALTON ST	199	224	25	12.7	317.5	ARTERIAL	TAC
WALTON ST	224	236	12	12.7	152.4	ARTERIAL	TAC
WALTON ST	280	325	45	12	540	ARTERIAL	TAC
WALTON ST	325	800	475	12.16	5777.2	ARTERIAL	TAC
WALTON ST	800	853	53	12.2	646.6	ARTERIAL	TAC
WINSTONES SERVICE LANE	0	70	70	8	560	LOW VOLUME	TAC
WRIGHT RD	0	45	45	6.8	306	SECONDARY COLLECTOR	TAC
WRIGHT RD	2913	2972	59	7.1	418.9	SECONDARY COLLECTOR	TAC

10.2.3 Three Year Chip Seal Renewal Programmes (W/C 212)

Held within the FWP system. Can be supplied on Request.

10.2.4 Three Year Structural Component Replacement Programme (W/C 215)

Programme 2018/19

Location	Project	Hierarchy (ONRC)	Value
UMUWHAWHA ROAD	Upgrade timber abutments and piers	LOW VOLUME	$150,000
LOVELL ROAD	Upgrade abutment/wingwalls and beams. New concrete deck	ACCESS	$150,000
MCALLISTER ROAD	Pier replacements	ACCESS	$75,000
HILFORD ROAD	Pier replacements	LOW VOLUME	$75,000
MINE ROAD	Steel beam painting	ACCESS	$50,000
NGUNGURU ROAD	Diaphragm replacement and steel beam refurbishment/painting	ARTERIAL	$50,000
TAHERE ROAD	Implement bank stabilisation measures	ACCESS	$40,000
WAIPU GORGE ROAD (X 4 BRIDGES)	Diaphragm upgrade and beam repairs.	ACCESS	$150,000
WAIOTOI ROAD	Deck replacement and beam upgrade	SECONDARY COLLECTOR	$200,000
RETAINING WALL	Replacement	VARIOUS	$60,000
TOTAL			**$1,000,000**

Programme 2019/20

Location	Project	Hierarchy (ONRC)	Value
TAIHARURU ROAD	Steel beam painting	SECONDARY COLLECTOR	$50,000
NOVA SCOTIA DRIVE	Steel beam painting	PRIMARY COLLECTOR	$200,000
MCBREEN ROAD	Abutment/wingwalls & beam upgrade & new concrete deck	ACCESS	$175,000
MITITAI ROAD	Superstructure upgrade. Treat corroded beam flanges, replace diaphragms	ACCESS	$200,000
SANDFORD ROAD	Abutment/wingwalls & beam upgrade	SECONDARY COLLECTOR	$100,000
TIMPERLEY ROAD	Abutment/wingwalls & beam upgrade & new concrete deck	ACCESS	$125,000

Location	Project	Hierarchy (ONRC)	Value
RETAINING WALL	Replacement	VARIOUS	$150,000
TOTAL			**$1,000,000**

Programme 2020/21

Location	Project	Hierarchy (ONRC)	Value
BUSHBY ROAD	Abutment/wingwalls & beam upgrade & new concrete deck	LOW VOLUME	$150,000
OMANA ROAD	Major deck repairs	ACCESS	$200,000
MCBETH ROAD	Deck replacement	ACCESS	$75,000
WAIPU GORGE ROAD (X4 BRIDGES)	Handrail replacement	ACCESS	$75,000
HAYWARD ROAD	Deck replacement	ACCESS	$50,000
THORBURN ROAD	Abutment/wingwalls & beam upgrade & new concrete deck	ACCESS	$125,000
OMANA ROAD	Steel beam painting	ACCESS	$125,000
RETAINING WALL	Replacement	VARIOUS	$200,000
TOTAL			**$1,000,000**

10.2.5 Three Year Structural Improvement/Replacement Programme (W/C 341)

Programme 2018/19

Location	Project	Hierarchy (ONRC)	Value
GRAHAMTOWN ROAD	Culvert steel shell corroding under lining. Replace with concrete box culvert.	LOW VOLUME	$100,000
WHANGAREI HEADS ROAD	Culvert steel shell corroding under lining. Replace with concrete box culvert.	ARTERIAL	$200,000
TOTAL			**$300,000**

Programme 2019/20

Location	Project	Hierarchy (ONRC)	Value
MANGAPAI ROAD	Culvert steel shell corroding under lining. Replace one barrel with a box culvert or both barrels with a bridge.	PRIMARY COLLECTOR	$400,000
HARRIS ROAD	Culvert steel shell corroding under lining. Replace with concrete box culvert.	PRIMARY COLLECTOR	$250,000
TOTAL			**$650,000**

Programme 2020/21

Location	Project	Hierarchy (ONRC)	Value
PAPAROA ROAD	Culvert steel shell corroding under lining. Replace with concrete box culvert.	PRIMARY COLLECTOR	$300,000
BINT ROAD	Culvert steel shell corroding under lining. Replace with concrete box culvert.	ACCESS	$200,000
TOTAL			**$500,000**

10.2.6 Three Year Traffic Signal Renewal Programme (W/C 222)

Programme 2018/19

Location	Project	Hierarchy (ONRC)	Value
WDC FORUM NORTH OFFICE	Replace old SCATS master computer	N/A	$50,000
KAMO RD/WHAU VALLEY RD	Detector loop renewal – replace kerb junction boxes and cable joins	ARTERIAL	$25,000
DENT ST/WALTON ST	Detector loop renewal – replace kerb junction boxes, cable joins and cables	ARTERIAL	$50,000
DENT ST/HATEA DR	Detector loop renewal – replace feeder cables	ARTERIAL	$15,000
BANK ST/KAMO RD/ MANSE ST	Detector loop renewal – replace kerb junction boxes, cable joins and cables	ARTERIAL	$40,000
KAMO RD/WHAU VALLEY RD	Replace displays	ARTERIAL	$30,000
BANK ST/DENT ST	Replace displays	ARTERIAL	$10,000
TOTAL			**$220,000**

Programme 2019/20

Location	Project	Hierarchy (ONRC)	Value
RIVERSIDE DR	Detector loop renewal – replace kerb junction boxes, cable joins and cables	ARTERIAL	$25,000
DENT ST/JOHN ST	Detector loop renewal – replace kerb junction boxes, cable joins and cables	ARTERIAL	$25,000
VARIOUS	Pedestrian belisha crossing safety upgrades	ARTERIAL	$130,000
TOTAL			**$180,000**

Programme 2020/21

Location	Project	Hierarchy (ONRC)	Value
RIVERSIDE DR	Replace obsolete traffic signal controller	ARTERIAL	$50,000
DENT ST/JOHN ST	Replace obsolete traffic signal controller	ARTERIAL	$50,000
WALTON ST/CAMERON RD	Detector loop renewal – replace kerb junction boxes, cable joins and cables	ARTERIAL	$25,000
VARIOUS	Pedestrian belisha crossing safety upgrades	ARTERIAL	$55,000
TOTAL			**$180,000**

10.2.7 Three Year Traffic Signal Improvement Programme (W/C 341)

Programme 2018/19

Location	Project	Hierarchy (ONRC)	Value
RATHBONE ST/ ROBERT ST	Introduce "Barnes dance" pedestrian phase, pedestrian detection cameras and software, pedestrian countdown timers	ARTERIAL	$125,000
VARIOUS	ITS upgrade to deliver a range of back-end functions to allow a TOC to operate, e.g. recording of traffic camera feeds, SCADA data from Te Matau a Pohe bridge, data collection from traffic counting sites. It also includes the communications links for them.	N/A	$200,000
TOTAL			**$325,000**

Programme 2019/20

Location	Project	Hierarchy (ONRC)	Value
VARIOUS	Traffic signal communications upgrade to provide fibre/WiFi communications	ARTERIAL	$180,000
BANK ST/CAMERON ST	Introduce pedestrian detection cameras and software, pedestrian countdown timers	ARTERIAL	$105,000
BANK ST/WATER ST	Introduce pedestrian detection cameras and software, pedestrian countdown timers	ARTERIAL	$105,000
BANK ST	Upgrade pedestrian signals to PUFFIN crossing, introduce pedestrian detector cameras.	ARTERIAL	$50,000
VARIOUS	ITS upgrade to deliver a range of back-end functions to allow a TOC to operate	N/A	$250,000
TOTAL			**$690,000**

Programme 2020/21

Location	Project	Hierarchy (ONRC)	Value
VARIOUS	PTIPS – Implement PTIPS, to enable bus priority and information to customers	ARTERIAL	$350,000
VARIOUS	Traffic signal communications upgrade to provide fibre/WiFi communications	ARTERIAL	$70,000
VARIOUS	CCTV traffic cameras to be installed at 5 sites	ARTERIAL	$250,000
RIVERSIDE DR	Upgrade pedestrian signals to PUFFIN crossing, introduce pedestrian detector cameras.	ARTERIAL	$50,000
VARIOUS	Software reviews and phasing reviews at intersection sites	ARTERIAL	$75,000
VARIOUS	ITS upgrade to deliver a range of back-end functions to allow a TOC to operate	N/A	$235,000
TOTAL			**$1,050,000**

10.2.8 Three Year ITS Renewal Programme (W/C 222)

Programme 2018/19

Location	Project	Hierarchy (ONRC)	Value
TIKIPUNGA PRIMARY SCHOOL	Replace existing School Zone Sign with ASL SZS signs with digital telemetry	ARTERIAL	$52,000
WHAU VALLEY PRIMARY SCHOOL	Replace existing School Zone Sign with ASL SZS signs with digital telemetry	ARTERIAL	$30,000
GLENBERVIE SCHOOL	Replace existing School Zone Sign with ASL SZS signs with digital telemetry	ARTERIAL	$16,000
TOTAL			**$98,000**

Programme 2019/20

Location	Project	Hierarchy (ONRC)	Value
RAURIMU SCHOOL	Replace existing School Zone Sign with ASL SZS signs with digital telemetry	SECONDARY COLLECTOR	$30,000
MANAIA VIEW SCHOOL	Replace existing School Zone Sign with ASL SZS signs with digital telemetry	SECONDARY COLLECTOR	$50,000
MAUNU SCHOOL	Replace existing School Zone Sign with ASL SZS signs with digital telemetry	PRIMARY COLLECTOR	$30,000
TOTAL			**$110,000**

Programme 2020/21

Location	Project	Hierarchy (ONRC)	Value
WHANGAREI BOYS & GIRLS HIGH SCHOOL	Replace existing School Zone Sign with ASL SZS signs with digital telemetry	PRIMARY COLLECTOR	$60,000
WHANGAREI INTERMEDIATE SCHOOL	Replace existing School Zone Sign with ASL SZS signs with digital telemetry	ARTERIAL	$30,000
KOKOPU SCHOOL	Upgrade of existing active warning sign to digital telemetry	SECONDARY COLLECTOR	$20,000
TOTAL			**$110,000**

10.2.9 Three Year Cycleway Programme (W/C 452)

Programme 2018/19

Location	Project	Hierarchy (ONRC)	Value
KAMO PATH	Complete main trunk path to Kamo Village.	N/A	$2,500,000
RAUMANGA/MAUNU PATH	Bernard to Maunu	N/A	$600,000
ONERAHI PATH	Pohe Island direct path linking Riverside Dr to Te Matau a Pohe bridge.	N/A	$1,000,000
ONERAHI PATH	Waiarohia Stream connection to Cafler Park	N/A	$750,000
WHANGAREI CITY	Travel planning/Behaviour change	N/A	$300,000
TOTAL			**$5,150,000**

Programme 2019/20

Location	Project	Hierarchy (ONRC)	Value
KAMO PATH	Jack St improvements, links to Whangarei Falls, Denby Heights, Totara Parklands and Cafler Park	N/A	$3,750,000
RAUMANGA/MAUNU PATH	Link to SH1/Tarewa underpass	N/A	$300,000
ONERAHI PATH	Waiarohia Stream connection to Cafler Park.	N/A	$750,000
WHANGAREI CITY	Travel planning/Behaviour change	N/A	$300,000
TOTAL			**$5,100,000**

Programme 2020/21

Location	Project	Hierarchy (ONRC)	Value
RAUMANGA/MAUNU PATH	Lighting SH1 to First Ave	N/A	$500,000
ONERAHI PATH	Waiarohia Stream connection to Cafler Park.	N/A	$500,000
ONERAHI PATH	Riverside Dr – Dave Culham Dr roundabout to Acquatic Centre	N/A	$1,000,000
TIKIPUNGA PATH	Town Basin to A H Reed Park	N/A	$2,500,000
WHANGAREI CITY	Travel planning/Behaviour change	N/A	$300,000
WHANGAREI DISTRICT	Heartland Rides – Assessment & Design for Whangarei to Opua, Whangarei to Matakana routes	N/A	$250,000
TOTAL			**$5,050,000**

10.2.10 Ten Year Capital Project Programme (W/C 324)

Location	Project	Hierarchy (ONRC)	Timing	Value
Springs Flat Rd/SH1 Roundabout	Construct new roundabout on SH1 and extend Springs Flat Road and Pearce Drive. To provide direct access from SH1 to high growth housing areas in Kamo and Tikipunga areas	REGIONAL	2018/19-2020/21	$4,153,540
Riverside Drive/ Onerahi Road	Four laning, bridge widening and intersection upgrades to address congestion, safety issues and provide for growth in the Whangarei Heads Area	ARTERIAL	2024/25-2027/28	$23,220,000
Port Road/Kioreroa Road	Intersection upgrade, bridge widening and 4-laning to address safety issues and provide for growth in the Port Nikau area (old port)	ARTERIAL	2026/27-2027/28	$8,180,000
Various in Whangarei City	Urban intersection upgrades to address congestion, safety issues and to provide for growth in Whangarei City.	ARTERIAL / PRIMARY COLLECTOR	2019/20-2027/28	$15,360,000
One Tree Point Rd	Road widening to provide for growth in the One Tree Pt/ Marsden Pt / Ruakaka area	PRIMARY COLLECTOR	2025/26	$957,600
Ruakaka Beach Rd	Road widening & bridge upgrade to provide for growth in the One Tree Pt/ Marsden Pt / Ruakaka area	PRIMARY COLLECTOR	2025/26	$1,212,960
McEwan Rd	Road widening to provide for growth in the One Tree Pt/ Marsden Pt / Ruakaka area	SECONDARY COLLECTOR	2025/26	$1,787,520
TOTAL				**$54,871,620**

10.3 Northland Life Lines Maps


Northland Lifelines Project
Whangarei Map
1:25,000
Legend
Airports
Public Health Facilities
Electricity Towers
Ambulance
EOC
Fire Service
Police
Welfare Centre
Railway
Natural Gas Sites
Kordia Transmission Towers
Telecom. Sites_Telecom
Telecom. Sites_Vodafone
WDC Waste Water Sites
WDC Waste Water Network
WDC Water Sites
Electricity Sites -Northpower
TransPower Network
State Highways
PriorityRoads
Rivers
Railway Stations
Natural Gas Network
Whangarei POI (Telstra)
WHANGAREI
Whau Valley WTP
Kensington
Whangarei Ambulance
Whangarei District Welfare Centre
KENSINGTON
Hatea PS
Parahaki Transmission
KMO
Whangarei Fire Station
PTD
WHA
Punga PS
Punga Grove
WGC
WHAN
Whangarei Station
WNH
Kioreroa Rd PS
Otaika PS
WID
063
069
090
071
060
070
067
096
241
Rewa Rewa Road
South End Avenue
Maunu Road
MAUNU ROAD
HATEA DRIVE
QUAYSIDE
PORT ROAD
Port Road
Kamo Road
Mill Road
Morningside Road
NORTHLAND REGIONAL COUNCIL