

## 9.0 PROGRAMME BUSINESS CASE/LIFECYCLE MANAGEMENT

The Taupō District occupies a large proportion of the Central North Island Volcanic Plateau together with the complete catchment area of Lake Taupō and Upper Waikato River areas.

Whilst the majority of the District is situated within the Waikato Region, a small proportion also intrudes into the Bay of Plenty, Hawkes Bay and Manawatu-Wanganui regions. The District comprises 6354sqkm of land and 616sqkm of lake.

Prior to 1950, the District was largely undeveloped and sparsely populated. Since that time, population has increased rapidly to approximately 32,907 (Census data 2013). Urban growth has focused on Taupō Township and various lakeshore settlements, whilst rural land development has been dramatic with the conversion of scrub wastelands to productive farmlands and vast exotic forest plantations and future conversion to lifestyle properties.

Without a rail head or rail link passing through the District, Taupō District Council (TDC) has recognised the need to provide residents and associated industries as well as through traffic with an efficient and economic sealed road transportation network.

Lake Taupō and its surrounds have also become an important national and international tourist destination, renowned for its scenic attractions and wide ranging recreational activities.

This section contains the programme business case/life cycle management plans for the following nine key asset groups:

- Pavements
- Footpaths
- Drainage
- Street Lighting
- Bridges, Culverts & Structures – some are critical assets
- Formation
- Traffic Services (signs, markings and traffic controls)
- Cycle-ways
- Off Street Parking

This section also includes the programme business case for the activities:

- Network Asset and Management
- Emergency works
- Minor Improvements – including Road Safety
- Travel demand – passenger transport and total mobility scheme

Taupo District Council is responsible for managing a range of community owned assets such as the road network. To ensure all these assets are managed in an efficient and affordable way asset management plans are required.

## 9.1 Overarching Issues/Strategies for Transportation

While there is currently no formally adopted Transportation Strategy, it is still to be developed. Central Government's draft policy statement (GPS) identifies the national priorities. The focus is on economic growth and productivity and aligns with the Regional Land Transport Strategy (through an emphasis on strategic road corridors) and improvements to road safety. A large share of the transport funding comes from the New Zealand Transport Agency (NZTA) which funds currently 43% or more on some operations, maintenance, renewal, and capital projects. Within the lifecycle plan section there is some comment on the decision making for each asset type with the decision being based on the data produced from RAMM.

The ONRC (One Network Road Classification) is a joint initiative of Local Government NZ and the NZTA via the Road Efficiency Group (REG) which will attempt to provide a nationally consistent framework which helps to inform activity management planning and investment decisions. Whether this ONRC will have an impact on Financial Assistance Rate is still to be determined and/or confirmed.

To provide an effective, efficient, sustainable and safe transportation network which allows people to move around easily and is essential for the economic and social wellbeing of the community.

Alternative modes of transport are encouraged through the provision of the footpaths, cycleways and passenger transport. A Walking and Cycling strategy adopted in Council 2010 identifies the strategic direction for the future planning (including funding and management) of a transportation system which encourages and supports safer walking and cycling for everyone.

One of the main issues for the Transportation activity over the next 10 years will be the impact from the fluctuating costs of oil for both road maintenance and construction projects.

The legislative framework for this activity includes the Land Transport Management Act, the NZ Transport Strategy and the Government Policy Statement on Land Transport Funding. A transportation strategy is to be developed to identify issues and opportunities within the activity and align to the framework.

A procurement strategy has been developed for Transportation in accordance with the NZTA Procurement Manual and endorsed by NZTA. All subsidised and unsubsidised works have been procured in accordance with this strategy since October 2010.

### 9.1.1 DELIVERY OF PROGRAMME

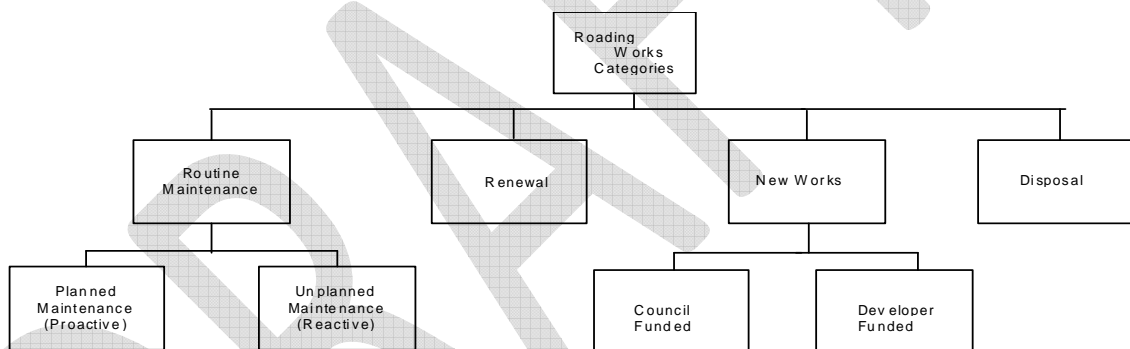
Our investment approach into the future will be based on strategic directions for transport provided by the Government Policy Statement on Land Transport Funding, NZTA Long Term Strategic View, the Regional Land Transport Plan and the Council's Long Term Plan (community outcomes), defined problems/definitions, ONRC classifications and managing the roads in line with the ONRC customer outcomes. Of these assets, pavements and bridges/culverts/structures are seen as critical assets where failure would have a dramatic impact. This has been discussed in further detail in the Risk Management section.

The transportation is made up of two teams, a team of four who manage the above contractors via a contract and a team which investigate and design new projects and manage long term budgets.

Currently there is an issue with the lack of project management resources for the number of projects we have and the number of contractors available to do the work on time and/or on budget. A couple of recent projects have cost estimates over and above the engineers cost estimate and are being deferred and/or we are unable to spend the approved budgets. A flow on effect of this is we may not get enough tenderers for the work and/or we are required to re-tender. This was particularly evident in the last financial forecast where we were forecast \$6M and final spend was \$5.2M, largely from not implementing all our minor improvement projects.

Background data for the asset type including asset description, capacity, performance, condition and valuations is included in the Asset Data section.

This section contains the *management strategies*, to achieve the levels of service defined in Level of Service section. These strategies are divided into four main work categories (routine maintenance, renewal, capital and disposal) as illustrated in the figure below.



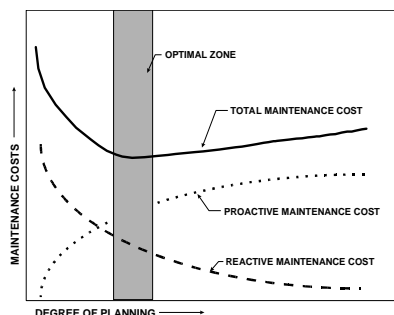
**Figure 8.1: Asset Works Categories**

The work categories are defined as follows:

**Routine Maintenance**

- Routine maintenance falls into two broad categories as follows:
- Planned (Proactive) Maintenance: Proactive inspection and maintenance works planned to prevent asset failure.
- Unplanned (Reactive) Maintenance: Reactive action to correct asset malfunctions and failures on an as required basis (i.e. emergency repairs).

A key element of asset management planning is determining the most cost-effective blend of planned and unplanned maintenance as illustrated in the following figure.



**Figure 8.2: Balancing Proactive and Reactive Maintenance**

### Renewals

This includes replacement and rehabilitation of existing assets to their original condition and capacity.

### New Works

Creation Works: New works which extend or upsize assets, which are required to cater for new development and growth. Creation works fall into two separate categories as follows:

- Council funded - Works funded and constructed by TDC.
- Developer funded - Works funded by developers as part of sub divisional development or by way of contributions that are then vested in Council.

### Asset disposal

Retirement or sale of surplus assets. Where assets become surplus to requirements or no longer meet the required level of service, they are renewed and the existing asset is removed either sold as surplus where possible or disposed of, which occurs normally at the end of useful life.

A forecast of the 30 year expenditure for each asset group in each of the categories outlined above has been provided in the Financial Summary section of this AMP.

## 9.2 The link to the Strategic issues

	<b>Strategic Issue</b>		<b>Evidence</b>	<b>Consequence of not funding or addressing issue</b>	<b>Council's proposed strategy/opportunities</b>	<b>Future benefits</b>
1	Ageing population with the majority on a fixed income	Increase in those unable to drive  More demand on footpaths and other modes of transport	Latest census data showing ageing population and declining population in Turangi and Mangakino. Median age in Turangi = 40.7, (36.6 in 2006) Mangakino = 44.2 (38.5 in 2006)  Changes to who can access/use footpaths (non-shared) eg postal vans, possibly cyclists  Passenger numbers using public transport/mobility schemes	Pressure on rates to increase and the inability for ratepayers to fund  Greater demand/complaints received for smooth footpaths, kerb ramps and safer crossing points  Greater demand for more passenger transport and/or total mobility scheme  Greater emphasis is now being placed on the footpaths as a shared facility eg postal vehicles, cycles  Safety of pedestrians on footpath versus other road users	Undertake accessibility audits in urban areas to assist with prioritising areas  Identifying where wider paths are required for mobility and/or wheelchair users, (will be a change to current level of service)  Reviewing current bus service  Review current Council engineering standards  Survey the extent of the issue and how many km of paths are left to install  Will consider developing an integrated transport strategy	Improved infrastructure to support accessibility or all road users  Safety of pedestrians improved.  Amenity value of pedestrians increases.  Increase in people's wellbeing.  Improved access.
2	Change in land use		Number of forest land being converted to dairy farming  Heavy vehicle traffic counts  Bridge/culvert inspection reports  Observation	Water runoff may increase from land to roadway due to reshaping of watercourses – surface flooding  Pavement strength challenged  Width of pavement and bridges	Continue with regular bridge/culvert inspections  Identify where flooding or ponding occurs on regular basis	Improved data will mean more proactive work programmes  Less flooding issues

	<b>Strategic Issue</b>	<b>Evidence</b>	<b>Consequence of not funding or addressing issue</b>	<b>Council's proposed strategy/opportunities</b>	<b>Future benefits</b>
3	Increase in larger vehicles using local road network	<p>Traffic counts</p> <p>VDAM changes</p> <p>Complaints by community groups eg Tirohanga Road residents</p> <p>Overweight and HPMV permits issued on the increase</p> <p>Bi-annual bridge inspection/condition assessment reports identifying more structural maintenance</p> <p>Observations</p>	<p>Increase in bridge structure renewal components (w/c 215)</p> <p>Pavement structure challenged, faster deterioration of transport assets such as bridges.</p> <p>Effects on community such as noise and congestion due to increase in traffic flows.</p> <p>Potential for crashes especially where there are vulnerable road users.</p> <p>Widening of some roads may need to occur to cater for HV, particularly on some curves, assets such as signs may be impacted</p> <p>Efficiency for operators, if not able to use all roads</p> <p>May need to restrict HV movements or find alternative routes.</p>	<p>Undertake detailed bridge inspections.</p> <p>Reduce the gaps in bridge data in RAMM database</p> <p>Continue to undertake and monitor traffic counts within the district particularly HPMVs.</p> <p>Look at alternative routes within the district</p> <p>Use dTIMS to identify where work is required on pavements</p> <p>Identify bridges and roads which may need widened or strengthened.</p>	<p>Efficient movement of freight</p> <p>Critical assets to be documented and monitored</p>
4	Seasonal traffic demand and new growth	<p>Traffic counts</p> <p>Customer service requests/complaints</p>	<p>With the increase in traffic volumes, traffic movements are impacted and drivers become frustrated.</p>	<p>Continue to use traffic modelling</p> <p>Collect further data on events and numbers of people coming into the CBD.</p>	<p>Travel demand management</p> <p>Proactive signage advising of delays and</p>

Strategic Issue		Evidence	Consequence of not funding or addressing issue	Council's proposed strategy/opportunities	Future benefits
		<p>Traffic modelling/travel time surveys</p> <p>Number of new house lots being added to northern side of town</p> <p>Number of events occurring in town</p> <p>Number of visitors who attend events or support the events.</p>	<p>Congestion occurring at one or two key intersections coming into town.</p> <p>During events and summer months the traffic volumes increase tend fold and place more pressure on the network.</p>	<p>Continue monitoring</p> <p>Short term options are being investigated currently such as VDM signage and low cost/low risk improvements</p>	<p>alternative routes</p> <p>Increase number of tourists visiting Taupo and the associated economic benefits</p>
5	Road Safety	<p>Crash history (CAS) data</p> <p>Communities at risk register data</p> <p>Waikato Regional road safety forum report undertaken by Opus</p>	<p>Crashes impact on the economy and have an impact on accessibility and a high social cost.</p> <p>Travel/time delays due to crash or having to use longer alternative routes</p>	<p>Use safety deficiency database to prioritised low cost low risk projects</p> <p>Focus on ONRC safety outcomes, personal and collective risk measures</p> <p>Undertake monitoring of crashes in district, safety audits of key routes</p> <p>Continue with road safety promotion and campaigns</p> <p>Work with other road safety partners</p>	<p>Safer roads and journeys</p> <p>Less travel time delays</p> <p>Reduced social cost</p>

In summary, the consequences for our community overall if the programme is not approved could be some or all of the following:

- Increased safety risks for all road users, increase in crashes
- Increased cost (to ratepayers) associated with providing current levels of service
- Less reliable travel times during and after weather events/time delays into and out of town (congestion)
- Rougher road surfaces, uncomfortable ride, greater damage to vehicles
- Less vibrant communities due to noise, potential inaccessibility
- Low or no economic growth particularly for smaller communities
- Low or reduced number of tourists and visitors (bed nights/economic benefits).
- Reputational risk to Council mainly due to lower level of service or time to respond in maintaining the network. There are a number of places where they will be allowed to function.

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## 9.3 Pavements (Sealed and Unsealed)

9.3.1 ACTIVITY 111 - SEALED PAVEMENT MAINTENANCE,  
ACTIVITY 124 - CYCLE LANE MAINTENANCE,  
ACTIVITY 212 - SEALED ROAD RESURFACING,  
ACTIVITY 214 - SEALED ROAD REHABILITATION

ACTIVITY 112 - UNSEALED PAVEMENT MAINTENANCE

ACTIVITY 211 - UNSEALED ROAD METALLING

The sealed pavement network is managed to ensure delivery of the One Network Road Classification (ONRC) customer outcomes. It also aligns with the Taupo District's strategic case by seeking to invest at the optimal level so the road network doesn't cost the community more in the future, particularly with an aging population demographics who are more likely to be on a fixed income in the future.

Overall Asset Outcome	To provide a pavement network that is suitable for the safe and efficient movement of vehicles and people, has a suitable all weather surface that is appropriate to its location and function in terms of skid resistance, noise reduction and smoothness, and has a structure suitable for legal traffic loading requirements.
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Pavement maintenance is carried out on pavements to ensure that the levels of service outlined in the Level of Service section of this document are met. Potholes are repaired by the road network maintenance contractor on a cyclic basis. Edgebreaks, dig out repairs, minor smoothing, surface defects and crack repairs are repaired on a task basis at tendered rates.

Transit 'C' Series Maintenance Specifications are used as the performance criteria for most maintenance activity. The strategy for pavement maintenance is to keep roads in good repair so as to increase life and decrease renewal. Data is now being collected via the pocket RAMM contractor system which sees the maintenance contractor entering data whilst on site.

### Sealed:

- Potholes are repaired by road network maintenance contractor ("the Contractor") on a cyclic basis.
- Edgebreak, dig-out repairs, minor smoothing, surface defects and crack repairs are repaired on a tasking basis at tendered rates.
- Ice gritting, snow cleaning, bleeding treatment and accumulated chip removal are carried out by the Contractor on demand, at tendered rates.
- Clean up of slips, batters and drop-outs occur as necessary.

### Unsealed:

The unsealed road network carriageway is managed to ensure delivery of the ONRC customer outcomes and levels of service are met.

Maintenance of unsealed roads network involves grading to remove surface defects, restore shape, maintain cutouts and spot metalling. The finished surface of the repair shall be constructed to the same crossfall and gradient as the adjacent pavement and the finished surface is to be such that it does not allow water to pond. Also there is to

be no difference in surface level at the joint between existing pavement and the completed repair.

- Grading cycles vary depending on the traffic volume and topography, refer below for cycle times.
- Grading is done by the road network maintenance contractor on a cyclic basis.
- Dig out and sub-base pumice reshaping is completed on a tasking basis at tendered rates.

### **Cycleways/lanes**

Cycle ways may be formed as separate facilities or be incorporated by road marking, on carriageways or footpaths.

TDC's Walking and Cycling strategy was adopted by Council in February 2010, which reviewed and updated the 2006 version. The strategy outlines suggested policies, recommendations and methods of implementation and aligns with the recently adopted regional Walking and Cycling Strategy. A decision by senior management has been to develop a Transport strategy which is proposed to cover all modes of transport including walking and cycling. It is proposed to have this embedded into the next AMP round.

Key issues relating to cycling are:

- Determining how cyclists can share existing narrow pathways with pedestrians safely.
- The provision of a smooth cycle lane/path surface at reasonable cost that does not inhibit carriageway drainage.
- Obtaining community acceptance to providing new cycle facilities often at the expense of existing assets and service (e.g. parking).

#### **9.3.2 LINKS TO THE ONRC CUSTOMER OUTCOMES**

The links to the ONRC customer outcomes for this activity is Safety, Resilience, Amenity, Accessibility, Cost Efficiency.

This activity also contributes to improving safety of all road users, maintaining and improving accessibility, including the operation of Heavy Vehicles, and to be able to maintain the quality of the existing infrastructure. All this needs to be affordable for the community particularly as the population demographics is ageing.

#### **9.3.3 EVIDENCE AND EXISTING APPROACH**

The historical data shown in the tables below has been sourced from Council's NCS MagiQ system which shows that maintenance expenditure averages \$2,888K over the last ten years, fluctuations have been based on need.

#### **For sealed pavements:**

<b>Work Type</b>	<b>2007/ 08</b>	<b>2008/ 09</b>	<b>2009/ 10</b>	<b>2010/ 11</b>	<b>2011/ 12</b>	<b>2012/ 13</b>	<b>2013/ 14</b>	<b>2014/ 15</b>	<b>2015/ 16</b>	<b>2016/ 17</b>
Maintenance	820	1097	826	746	742	762	625	756	888	793
Renewals	1343	1601	1479	1182	1390	1287	1490	1386	1457	1340
New Works	637	1270	721	726	677	636	456	464	405	395
<b>TOTAL</b>	<b>2800</b>	<b>3968</b>	<b>3026</b>	<b>2654</b>	<b>2809</b>	<b>2735</b>	<b>2716</b>	<b>2773</b>	<b>2870</b>	<b>2528</b>

Note: The above figures do not include Poihipi Road widening as it is difficult to extract exact renewal and new work amounts from total project budget.

### Cost Efficiency 2 & 3 - Sealed road maintenance

Key Question: How does the cost of maintaining my sealed road network compare to others?

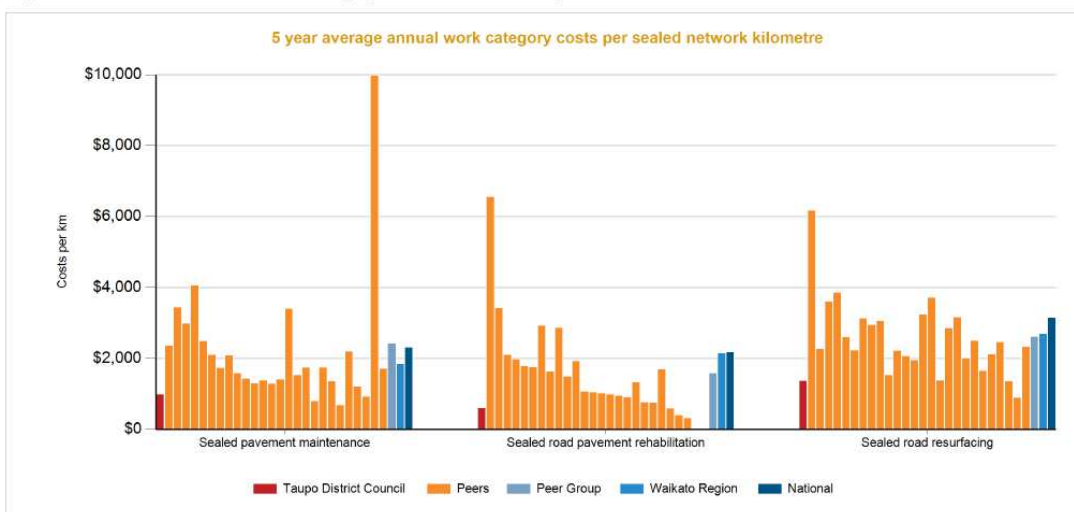


Figure 10: Sealed road maintenance costs per kilometre - Sourced from NZ Transport Agency TIO Work Category funding reports

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

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

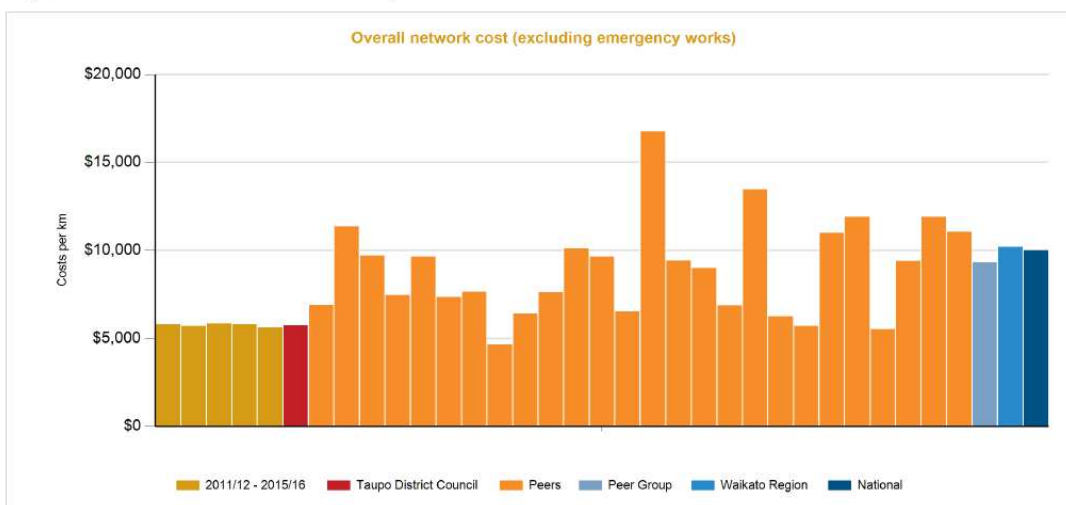


Figure 12: Overall network cost (excluding emergency works) per kilometre - Sourced from NZ Transport Agency TIO Work Category funding reports

### For unsealed pavements:

Work Type	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17*
Maintenance	110	169	150	115	89	119	83	132
Renewals	84	48	53	59	56	99	33	65
<b>TOTAL</b>	<b>194</b>	<b>217</b>	<b>203</b>	<b>174</b>	<b>145</b>	<b>218</b>	<b>116</b>	<b>197</b>

The Taupō network historically achieves good seal lives compared to its peer networks. This is due to the pavements being relatively young and in good condition, meaning that very little rehabilitation is currently required. The majority of the sub

grade is high strength pumice, leading to low cost construction being possible. The pumice also provides very good natural drainage, which assists with the longevity of our pavements.

#### Cost Efficiency 4 - Unsealed road maintenance

Key Question: How does the cost of maintaining my unsealed road network compare to others?

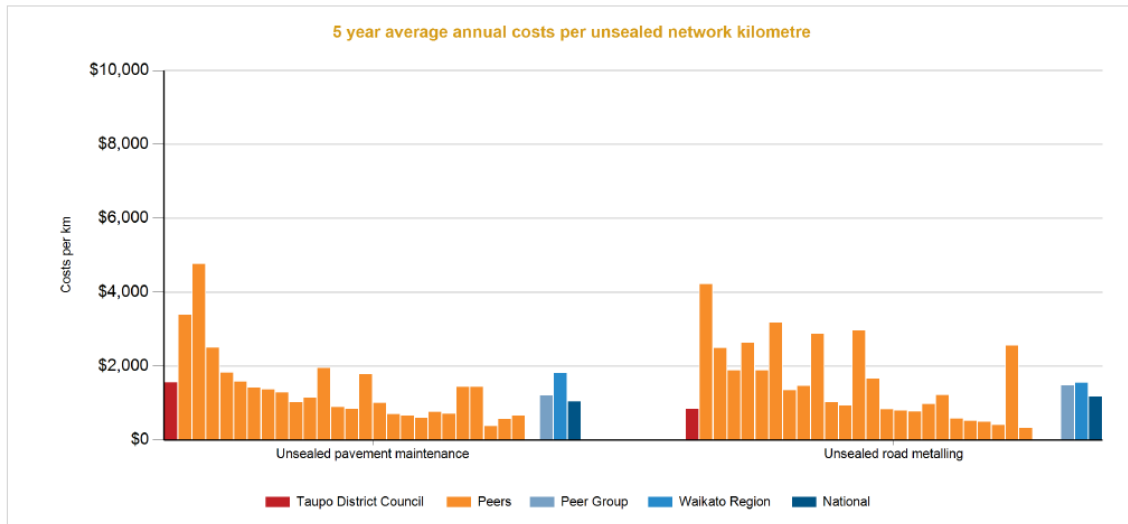
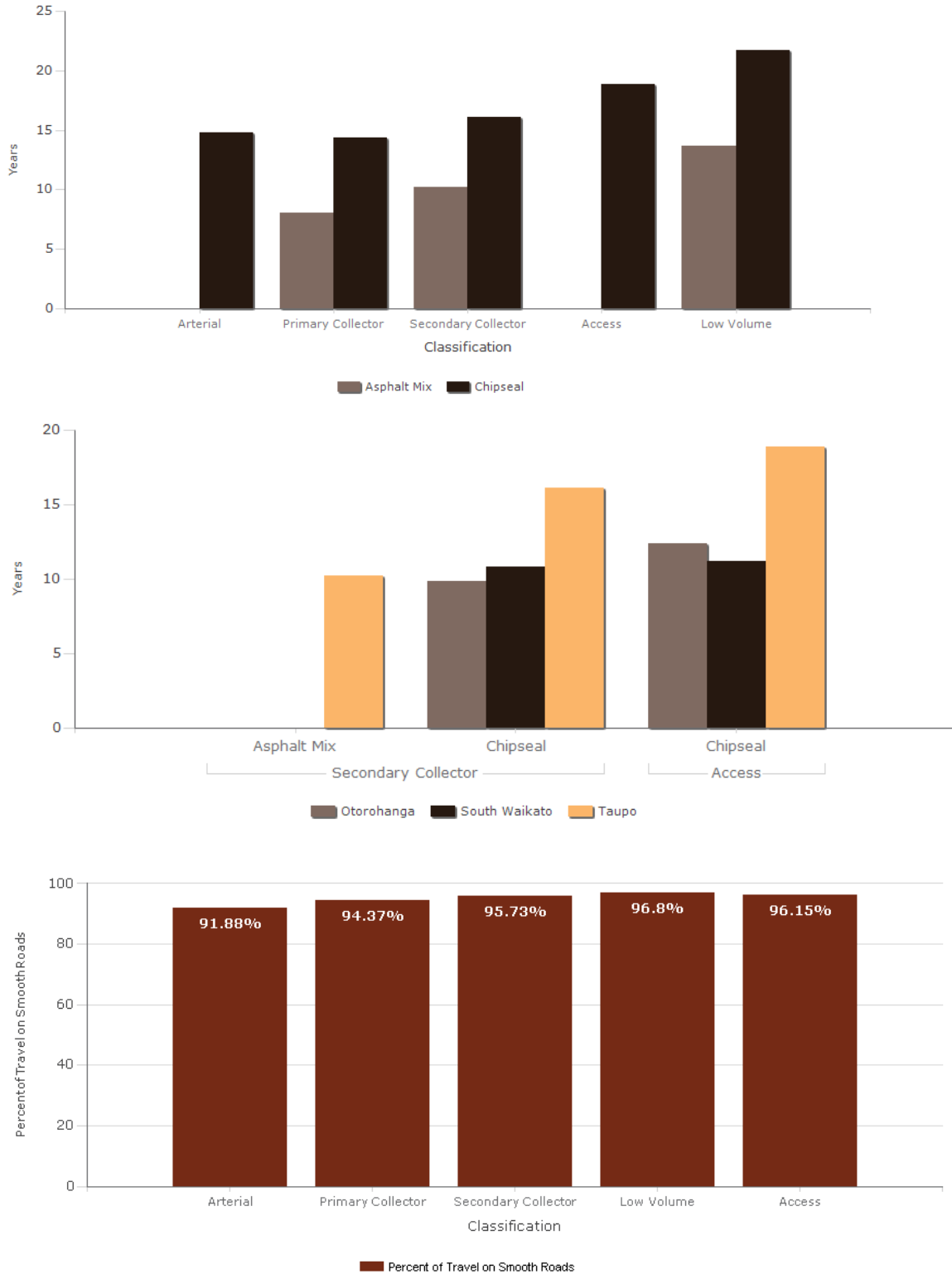


Figure 11: Unsealed road maintenance costs per kilometre - Sourced from NZ Transport Agency TIO Work Category funding reports

Impact from an increase in Heavy Productivity Motor Vehicles (HPMVs) and the introduction of 50 Max and possible increases in axle loads per vehicle (i.e. heavier vehicles) possibly more of an issue on the low cost pavement roads. We are noticing from field inspections there is more evidence of increased rutting on our network.

A dTIMS report was undertaken in 2017, which has identified the suggested programme should be between \$3M to \$4M per year which is higher than the current budget of \$2.5M. The increase in programme quantities has been based on the model recommendations and comparing the outputs with common practice and lifecycle achievements. We are not requesting the full increase recommended at this stage until we have completed verification of the report to confirm the accuracy of the data against the local conditions (such as quality of pavements and achievement of longer design lives). Also as there were a number of assumptions made due to some of the RAMM data missing. Prior to the next modelling we will need to reduce these and improve the data and run again we may find we are managing the network at the optimal level. With the handover of the SH some of the local data we had in our RAMM database was overridden and the historical pavement data was not updated.



### Pavement Renewal

Renewal expenditure is major work that restores an existing asset to its original capacity or the required condition. By renewing pavements as required the quality level of service is met. A full financial summary is included in the Financial Summary section of this AMP.

The types of pavement rehabilitation/ renewal work undertaken are summarised in the following table.

<b>Work Type</b>	<b>Objective</b>	<b>Methods</b>
Replenishment of aggregate	To maintain the unsealed road surface	Aggregate is spread on demand.
Resealing/ Resurfacing	To maintain a waterproof and skid resistant road surface	Chip sealing Slurry seal Asphaltic Concrete (refer to "Resurfacing" for definitions)
Reconstruction/ Rehabilitation	Strengthen road sub-base and/or base-course	Reconstruction: Remove the existing base course and/ or sub grade and replacing with new material Rehabilitation: Increase the strength of existing base -course/ sub-base materials by: a) adding a stabiliser (hydrated lime or cement) and re-compacting b) constructing an additional layer of road metal on top of the existing pavement construction
Smoothing	Smooth irregularities in road surfaces where the structural condition of the carriageway is sound.	Placement of an additional surfacing on the existing sealed surface to smooth out irregularities. The materials used depend on traffic volumes/ road geometry and road condition.

#### **Table outlining Rehabilitation / Renewal Options**

The required level of rehabilitation/renewal will vary depending on:

- The age profile of carriageway surfacing and structure.
- The condition profile of carriageways.
- The level of on-going maintenance demand and costs.
- The differing economic lives of the materials used.

The objective of rehabilitating and renewing the asset is to apply the correct treatments at the optimum time so that the required level of service is delivered whilst minimising total life cycle costs.

The selection of the actual sections of carriageway treated each year and the treatment used is based on output from RAMM, which analyses average life data for each surfacing material, the volume and mix of traffic using the road, and current condition. RAMM includes as part of its treatment selection criteria a table, reproduced in the table above, that sets out these average lives for varying traffic use.

RAMM selection is verified by inspection by both Council staff and road maintenance contractors. Resurfacing is carried out annually through a competitive tendering process and is included in the 3 year road maintenance contract.

## Pavement Resurfacing

In selecting the most suitable surfacing material for each category of road the impact of that material on the total pavement life and the life cycle cost should be considered. The following factors are considered during material selection:

- Traffic volume, percentage of HCVs, and road geometry (e.g. chip seal is inappropriate in high stress areas and highly trafficked roads in residential areas).
- The flexibility of the existing road formation (Friction course is a semi-rigid material and will fail if laid on a flexible road in insufficient depth to carry traffic loading).
- The proximity of dwellings to the carriageway and potential for noise and vibration nuisance.

The type of pavement surface used is generally dependent on the traffic volume and the mix of traffic using the road. Noise, safety and appearance may also be significant factors.

The main types of pavement surfaces used by TDC are:

- *Chip seal*: Layer of hot sprayed bitumen or emulsion with a stone chip spread on top as a running surface. The life cycle for a chip seal surfacing varies dependent on the chip size used (small chip means less bitumen that can be sprayed as the waterproofing membrane) and by traffic volume. Chip seal is more popular due to the cost, durability, ease to apply and maintain.
- *Slurry seal*: Emulsion and fine aggregate mix 3-8mm thick.
- *Asphaltic Concrete (AC)*: commonly called "hotmix", is a mix of graded aggregate and asphaltic binder, generally in a 20-25mm layer. It is a smooth hardwearing surface that is popular for high volume traffic areas, cul-de-sac ends and turning areas. AC is desirable in CBD areas and residential subdivisions as it is quieter and more aesthetically pleasing for pedestrians however the use of AC is limited by the substantially higher cost.
- *Unsealed*: Metal surface, may be stabilised.

Using Chip seal, AC (including slurry) and unsealed for the pavement surface is typical for a provincial district where low traffic volume does not create sufficient need for rigid and semi rigid surfacing. Increasingly asphaltic concrete and slurry seals are used in:

- All new urban subdivisions.
- Existing residential areas on arterial or collector routes where noise is a concern.
- Commercial areas to enhance streetscape and prevent surface breakdown due to turning stresses and;
- Where on street parking is provided on Council's wide berms.

## Rehabilitation

Approximately one to two kilometres of rehabilitation work is undertaken each year. However, this has not been a conscious decision to defer renewal - but rather is an indication of the quality of sub grade material. It cannot yet be accurately predicted when the districts pavements will completely fail as it is highly dependent on the underlying subgrade strength. Many of our pavements were constructed prior to the current design standards and consequently constructed at a lower standard. These

need monitoring to ensure timing of rehabilitation works are optimised and a backlog of rehabilitation works doesn't occur.

TDC has recently undertaken the pavement dTIMS predictive modelling for future years. This will more accurately predict the long term needs and expenditure with regards to pavement rehabilitation.

There currently is a small allowance for rehabilitation in the 30 year programme due to the insignificant amount required.

Where there has been an allowance is in Mangakino where there are a number of streets that require drainage improvements (kerb and channel). In conjunction with this the pavement will be rehabilitated if and when required. A number of the pavements in this area are substandard due to the perceived temporary nature of the township when it was constructed. See the map at the end of this section for priorities for street upgrading.

### **Pavement Creation**

The section covers strategies for the creation of new assets (including those created through subdivision and other development) or works which upgrade or improve an existing asset beyond its existing capacity/performance in response to changes in traffic needs or customer expectations.

The creation of new pavements addresses a number of levels of service, including accessibility, efficiency, quality, reliability and road safety. A summary of the future needs is included in the Future Demand section with a full financial summary in the Financial Summary section of this AMP.

In summary, new assets result from:

Road upgrading projects i.e. route strengthening, road widening and seal extension.  
New works i.e. neighbourhood improvement works, new roads.

Development projects i.e. subdivision and commercial development.

Pavement creation is closely related to:

- Increased LoS required by existing road users (to relieve traffic congestion, improve safety).
- Growth related capital works projects, and
- Assets resulting from developments.

The proposed development of the road network is discussed in the:

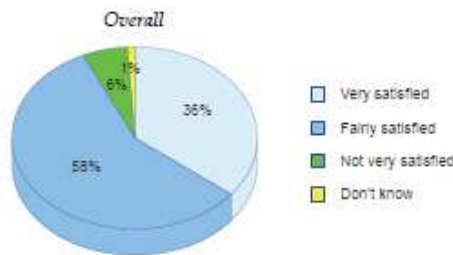
- Taupō Urban Structure Plan.
- Taupō Town Commercial Structure Plan (CISP).
- Kinloch Community Structure Plan.
- Mapara Valley Structure Plan.
- Southern Structure Plan.

New projects which are eligible for New Zealand Transport Agency funding are justified and prioritised on the basis of a Best Business Case approach which accounts for:



- The pavement design that is used on seal extensions on collector and local rural roads makes use of high pumice sub grade strength combined with relatively low traffic loadings to maximise unsubsidised seal extension programmes.
- The standard for sub divisional roads is TDC’s “Code of Practice for Development of Land”.
- General widening is normally justified on economic basis except where there may be a need for a cycle lane. Strategy studies carried out on Poihipi Road (2002), Broadlands Road (2004) and Waipapa Road (2003) have identified several sections of arterial roads which would benefit from widening.
- As a result of the Eastern Taupō Arterial (ETA) handover, Council now manages 18km of the former State Highways, SH1 – Wairakei Drive through Lake Terrace to the airport from NZTA and State Highway 5 – from Lake Terrace to Crown Road. Council are considering options to alter traffic patterns to allow better utilisation of the lakefront and CBD area and improve the pedestrian links. Sections of this will need to be resurfaced with AC in the near future.

i. *Roads In The District (excluding State Highways)*



Graph is from the NRB customer satisfaction research 2014.

94% of Taupo District residents and non-resident ratepayers are satisfied with roads in the District, including 36% who are very satisfied, while 6% are not very satisfied.

The main reasons for being not very satisfied with the roads in the district are:

- Poor condition/need upgrading/potholes/bumpy/uneven, mentioned by 3% of all residents and non-resident ratepayers.
- Too narrow 1%
- Poor quality work/patching 1%.
- Unsafe/dangerous areas/poor visibility 1%
- Traffic issues 1%.

Satisfaction With Roads In The District (excluding State Highways)

	Very Satisfied %	Fairly Satisfied %	Very/Fairly Satisfied %	Not Very Satisfied %	Don't Know %
<b>Overall</b>					
Total District 2014*	36	58	94	6	1
2012	35	59	94	6	-
2009	37	52	89	8	3
2006	29	52	81	19	-
2005*	17	57	74	26	-
<b>Comparison</b>					
Peer Group Average	15	57	72	28	-
National Average	20	58	78	21	1
<b>Residency</b>					
Resident	34	59	93	7	-
Non-resident ratepayer	42	53	95	2	3
<b>Ward</b>					
Taupo-Kaingaroa	37	58	95	5	-
Turangi-Tongariro	37	58	96	3	2
Mangakino-Pouakani	20	56	76	24	-

% read across  
 \* 2005 reading refers to roads in general  
 \* does not add to 100% due to rounding

9.3.4 GAP ANALYSIS

**For sealed pavements:**

We undertook a high speed data survey, recording roughness only, in 2010. From the dTIMS report it highlighted there is no strength data recorded in RAMM. Pavement strength has a huge impact on both surface and pavement performance, and therefore has high importance to model outcomes. It is recommended an annual falling weight deflectometer survey is implemented to start to gain an understanding of the underlying strength of network.

**For unsealed pavements:**

Need to know how much maintenance is occurring between the cycle times and what is happening in the pavement base.

9.3.5 OPTIONS

**For sealed pavements:**

- Option 1 Continue with status quo for maintenance and renewals.
- Option 2 As per option one with the combination to undertake the recommendations from dTIMS. A number of assumptions have been taken due to the lack of data in RAMM.

**For unsealed pavements:**

- Option 1 Status quo for grading times.
- Option 2 Status quo with a review undertaken on the base pavements of all unsealed roads.

There needs to be some consideration of whether we need to reconstruct unsealed pavements to improve shape and water run off with the potential benefit of reducing maintenance.

Note: For both sealed and unsealed pavement we will consider more cost effective/value for money in the new road maintenance contract due for renewal in 2018.

### 9.3.6 PREFERRED OPTIONS

For sealed pavements the preferred option is Option 2 and 3 however we need to update some of the RAMM data and improve this prior to the next dTIMS modelling is undertaken. This will be included as part of the improvement plan.

For unsealed pavements the preferred option is to continue with Option 1 but combine with Option 2 as this will determine whether the status quo option is still current. With Option 2 if we review the base pavements it may mean we either have to increase or decrease the metalling programme or confirm status quo.

The following programmes links to all the strategic issue/problem statements.

### 9.3.7 MAINTENANCE PROGRAMME

Sealed pavement repairs (cyclic inspections, programming, reporting and repairing potholes) cyclic.

From 2018/19	\$123K
From 2019/20	increasing by \$1K/yr
(Annual increase is due to more sealed roads)	

Sealed tasked pavement repairs: improving surfacing of roads

2018/19	\$750K
From 2019/20	increasing by \$8K/yr

Slips/batters/dropouts: repair damage to roads and berms

From 2018/19	
(based upon historical expenditure)	\$20K/yr

Note: This is an average figure as this amount will vary significantly depending on storm damage etc.

Special purpose roads

From 2018/19	\$6K for next 30 years.
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Maintenance due to capital projects, new subdivisions and additional 18km of road (former State Highways).

2018/19	\$193K
2019/20	\$198K
2020/21	\$208K
2021/22	\$215K
2022/23	\$220K

Note: The increase in 2018/19 the figure is based on historical expenditure figures taken over a 5 year period, provided by NZTA/Opus.

Reshaping metal roads (grading) prior to aggregate: improving drainage and surfacing of roads

2018/19 \$40K  
From 2019/20 decrease by \$1.5K/yr

Unsealed pavement dig outs, scour repairs, minor reshaping

2018/19 \$55K/yr  
From 2019/20 \$70K/yr

Note: Increase in budgets for unsealed roads are due to the increase in Heavy vehicle volumes.

### 9.3.8 RENEWALS PROGRAMME

Aggregate for metalled roads: Improving travelling comfort over unsealed roads.

2018/19 \$62K  
From 2019/20 reduce by \$2K/yr

Area Wide Treatment/Rehabilitation: improve surfacing of sections of roads

From 2018/19 \$550K/yr

Note: For most networks it is expected to do approximately 0.8% of the network or equal to approximately 6km. At this stage there is an increase of \$100k/year as this seems to be sufficient for this network due to the geology and good pavement bases however does need to be verified.

Mangakino upgrade: Upgrade of one Mangakino street every two years this will complete approximately 300m per year;

2018/19 construction Kahu St \$ 180K  
2019/20 investigation & design \$ 10K/2 years  
From 2020/21 construction \$ 180K/2 years

Note: \$180K is based on tender price, and \$80K has been allocated from stormwater AMP in the same year to cover the stormwater component.

Chip seals: The table below gives the predicted resurfacing needs for chip seals based on the current asset valuation tables.

Year ending	Remaining surface life	Reseal		Reseal-2nd cycle within planning period		Rural 2nd coat seal		Total chip reseal	
		length (km)	Replacement cost \$,000	length (km)	Replacement cost \$,000	length (km)	Replacement cost \$,000	length (km)	Budget ed cost \$,000
2018/19	1	54.9	2126	2.26	40	0	0	57	2166
2019/20	2	0.9	37			0	0	0.9	37
2020/21	3	32.5	1304			0	0	32.5	1304
2021/22	4	26.8	996	0.40	10	0	0	27.2	1006
2022/23	5	36.2	1398	4.80	121	0	0	41.5	1519
2023/24	6	31.4	1232	1.30	28.0	0	0	33	1260
2024/25	7	32.6	1233			0	0	33	1233

Year ending	Remaining surface life	Reseal		Reseal-2nd cycle within planning period		Rural 2nd coat seal		Total chip reseal	
		length (km)	Replacement cost \$,000	length (km)	Replacement cost \$,000	length (km)	Replacement cost \$,000	length (km)	Budgeted cost \$,000
2025/26	8	38.6	1469	5.78	145.1	0	0	44.38	1614.1
2026/27	9	34.3	1304	0	0	0	0		1304
2027/28	10	26.7	10960	0	0	0	0		1096
2028/29	11	30.2	1217						1217
2029/30	12	34.8	1384						1384
2030/31	13	16.6	602						602
2031/32	14	17.4	682						682
2032/33	15	21.1	870						870
2033/34	16	16.9	579						579
2034/35	17	1	40						40
2035/36	18								
2036/37	19								
2037/38	20								

### Renewal Prediction for Chip Seals

Chipseal programme

From 2018/19 to 2020/21	\$ 1100K/yr
From 2021/22	\$ 1500K/yr
From 2023/24	\$ 1900K/yr

Based on the latest dTIMS report and the data from the above table. A suggested length of 60km has been identified to provide a resurfacing lifecycle of approximately 12 years as opposed to the current achievement of 27km which will result in 27 years. The suggested treatment is considerably higher than the current achievement and is due to the high average surface age at the start of the analysis. This needs to be verified on site. If longer lives can be achieved as a result of the geology and good pavement base, this will need to be updated and recorded in the asset register. The increase in future years may not be required once we run the model again and verify data.

Thin Asphaltic surfacing (including slurry): The table below gives the predicted resurfacing needs for Thin Asphaltic surfacing based on the current asset valuation tables. NB: Cost includes backlog from previous years.

Year ending 30 June	Remaining surface life	Reseal		Slurry reseal-2nd cycle within planning period		Total AC/Slurry reseal	
		length (km)	Replacement cost \$,000	length (km)	Replacement cost \$,000	length (km)	Replacement cost \$,000
2018/19	1	0.5	93	1.4	117	1.9	210
2019/20	2	0.2	34			0.2	34
2020/21	3	0.3	78	0.9	470	1.2	125
2021/22	4	0.3	56			0.32	56
2022/23	5	0.3	35	0.3	17	0.6	52

2023/24	6	0.2	71	0.2	13	0.4	84
2024/25	7	0.7	194			0.7	194
2025/26	8	1.5	291			1.5	291
2026/27	9	0.4	65			0.4	65
2027/28	10	3.9	928			3.9	928
2028/29	11	3.7	845			3.7	845
2029/30	12	2.8	588			2.8	588
2030/31	13	4.3	1006			4.3	1006
2031/32	14	6.2	1053			6.2	1053
2032/33	15	1.3	284			1.3	284
2033/34	16	1	239			1	239
2034/35	17	0.9	271			0.9	270
2035/36	18						
2036/37	19						
2037/38	20						

### Renewal Prediction for Asphaltic Concrete Surfacing

Asphaltic concrete

From 2018/19	\$ 100K
From 2019/20 to 22/23	\$ 600K/yr
From 2022/23	\$ 200K/yr

Note: The increase for years 2 to 5 has been based on the need to resurface Lake Terrace, which had a design life of 8 years and will be due for renewal in 2019. Due to the handover of the former SH our increase in AC has increase and we would need to resurface in the same material due to the accommodation providers along Lake Terrace.

The total length of asphalt is approximately 31km plus the additional length of Lake Terrace (data in RAMM was overridden as part of the handover process and we hoping to rectify this). A suggested length of 1.5km per year will provide a life cycle of approximately 21 years as opposed to current achievement of 176 years or 0.17km.

#### 9.3.9 CAPITAL WORKS PROGRAMME

On street parking: provision for on-street parking in urban areas  
2018/19 to 2019/20 \$ 25K/yr

The CBD upgrade is approximately \$400K per intersection (Ruapehu and Paori Hapi Streets are the next focus) split over years, 18/19, 21/22, 22/23). This project is to be combined with the Parks and Reserves project timings.

Transportation	
Street lighting	\$ 45K
Footpath	\$ 600K
Drainage	\$ 45K
<b>Pavement</b>	<b>\$ 150K</b>
Landscaping	\$ 0K
Furniture	\$ 0K

**Total cost** **\$840K**

Tongariro St Traffic calming

2021/22 Investigation	\$ 150K
<del>2022/23 Construction</del>	<del>\$2,500K</del>
<del>2023/24 Construction</del>	<del>\$2,500K</del>
<b>Total cost</b>	<b>\$5,075K</b>

Note: This project was moved out of the 10 year period following Council workshops in November 2014, however due to the growth occurring in the northern side of town it should be moved back within the 10 year plan.

In November 2017 workshops it was decided to retain the investigation only at this stage due to the other number of projects.

Priority changes due to Tongariro and Norman Smith projects (Titirapunga Street)

<del>2020/21 to 2021/22</del>	<del>\$ 500K/yr</del>
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Note: These projects will be dependent on the Norman Smith project and its recommendations. Cost estimates will be confirmed as part of this investigation and have been moved into the Traffic Services section of this document.

Spa Road improvements

2041/42 Investigation	\$ 100K
2042/43 Design	\$ 150K
2043/44 to 2044/45 Construction	\$ 2,000K/yr
<b>Total cost</b>	<b>\$4,250K</b>

Note: This project has been moved well out of the Ten Year Plan as there is no growth predicted but project may need to be bought forward depending on whether heavy vehicles increase in numbers.

Tauhara Road/Spa Road intersection improvements

2029/30 to 2030/31	\$600K/yr
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Note: This project was moved out 5 years following Council workshops November 2014, due to there being no predicted growth.

~~Northern Access project including Norman Smith Street intersection with Wairakei Drive to look at congestion issues and travel delays from Acacia Bay to CBD. The project includes short, medium and long term measures;~~

~~Short term~~

<del>2018/19</del>	<del>\$ 300K</del>
<del>2019/20</del>	<del>\$ 275K</del>

~~Medium term~~

<del>2022/23</del>	<del>\$ 50K</del>
<del>2023/24</del>	<del>\$ 500K</del>
<del>2024/25</del>	<del>\$ 500K</del>

~~Long term (see structures section)~~

<del>2026/27 Design</del>	<del>\$ 100K</del>
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<del>2027/28 Construction</del>	<del>\$25,000K</del>
<del>2028/29</del>	<del>\$15,000K</del>

Spa Road and Paori Hapi Street investigation	
2024/25 Investigation	\$ 150K
2031/32 to 2032/33 Construction	\$ 560K/y

The above figures were placeholders while the investigation was taking place. The draft final report has identified a number of traffic signals at various intersections. Refer to the traffic services section below for the specific project options as (short and medium) which have been identified during the Traffic Design Group investigation.

Note: The options above including the long term/timing option of a bridge have been identified in the investigation of northern outlet project and timings are to be confirmed. It is unlikely the bridge option would be co-funded by NZTA as this would need to have a full business case approach completed and compete with other major projects through the RLTP process.

#### New intersection at Poihipi Road to Huka Falls Road

2028/29 Design	\$ 51K
2029/30 Construction	\$ 515K
2030/31 Construction	\$ 515K

Note: This project was identified as part of the Northern Access project and discussed with Councillors during the workshops in November 2017 although report hadn't been received at the time of these workshops, so costs hadn't been confirmed at these workshops. Report hadn't included design costs.

#### Broadlands Road curve easing at various locations: increased capacity and safety of road based on strategy document (includes design and construction):

2025/26 to 2026/27	\$ 185K (RP 23.3 to 23.5km)
2026/27 to 2028/29	\$ 205K (RP 11.5 to 11.7km)
2027/28 to 2028/29	\$ 195K (RP 5.2 to 5.4km)
<b>Total project cost</b>	<b>\$585K</b> (see note below)

#### Waipapa Road widening (3km to 17km): increased capacity, safety and provision for cyclists (includes design and construction):

2032/33 to 2034/35	\$ 530K
2038/39 to 2040/41	\$ 530K
2044/45 to 2046/47	\$ 530K

Note: Project to be continued outside of the 30yr period

#### Poihipi Road widening: increased capacity, safety and provision for cyclists.

2018/19 Construction & Design	\$ 300K
2019/20 Construction	\$ 250K
2021/22 Design	\$ 30K



2022/23 to 2023/24	\$ 250K/yr
2025/26 Design	\$ 30K
2026/27 to 2027/28 Construction	\$ 250K/yr
2029/30 Design	\$ 30K
2030/31 to 2031/32	\$ 250K/yr
2035/36 Design	\$ 30K
2036/37 to 2037/38	\$ 250K/yr
2041/42 Design	\$ 30K/yr
2042/43 to 2043/44	\$ 250K/yr
<b>Sub-total of project cost</b>	<b>\$3,200K</b>

Broadlands Road widening at various locations: increased capacity, safety and provision for cyclists.

2023/24 Design	\$ 50K
2024/25 to 2025/26 Construction	\$ 250K/yr
2028/2029 Design	\$ 50K
2028/29 to 2029/30 Construction	\$ 250K/yr
2033/34 Design	\$ 50K
2034/35 to 2035/36 Construction	\$ 250K/yr
2039/40 Design	\$ 50K
2040/41 to 2041/42 Construction	\$ 250K/yr
2045/46 Design	\$ 50K
2046/47 to 2047/48	\$ 250K/yr
<b>Sub-total of project cost</b>	<b>\$2,750K</b>

Note: Project continues outside the 30 year period

Seal extension: Sealing of unsealed roads (currently approximately 73km unsealed although we are unlikely to do all of these due to the number of properties)

2018/19 to 2023/24	\$ 400K/yr
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Widening of Tirohanga Road from SH1 to approximately 1.5km along

From 2018/19 to 2019/20	\$ 300K/yr
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Note: Project was costed two years earlier at \$450K. This needs to be reviewed based on latest contract unit rates.

### Cycleways Maintenance Expenditure

Maintenance of cycle ways/shared paths	
From 2018/19	\$ 5K/yr

### Cycleways Renewal Expenditure

Resealing of cycle lanes in the carriageway is normally included in the cost of carriageway resurfacing however Acacia Bay cycle lane needs resealing;

2018/2019

\$ 35K

### Cycleways Creation Expenditure

Refer to minor improvement section.

## 9.4 Footpaths

### 9.4.1 ACTIVITY 451 – WALKING FACILITIES

Overall asset objective	To provide a safe and efficient network of footpaths and access ways catering for pedestrians.
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The purpose of footpaths and pedestrian ways is to provide a safe, convenient and defined means for pedestrian movement alongside and linking roadways and public space.

Key issues relating to footpaths (and pedestrian ways) are:

- Some street berms particularly in older areas do not yet have footpaths
- breakages caused by development
- breakages caused by tree roots
- assessing the quality of footpaths and ensuring they are fit for purpose eg for ageing population this may mean wider footpaths are required.
- TDC is working towards having similar standards in all areas.
- Commercial activity on footpaths is not permitted, but showing of wares and seating for eating (i.e. cafes) is permitted in allocated areas under licence to occupy.

### 9.4.2 LINKS TO THE ONRC CUSTOMER OUTCOMES

The links to the ONRC customer outcomes for this activity is Safety (PM10) and Accessibility (PM10).

### 9.4.3 LEVELS OF SERVICE

The current level of service for footpaths is that 80% of footpaths in the district fall within the level of service standard for the condition of footpaths that is set out in the TLA's AMP (maintenance intervention when displacement greater than 10mm for Taupō CBD, Taupō urban areas and Turangi and other urban areas). This performance measures is one required by the DIA. Taupō District Council is currently meeting this level of service as measured every two years by condition rating of footpath survey.

### Standards for New Footpaths

Type	Alignment Dist from Boundary	Width (m)	Thickness	Strength	Base Clegg Value
Subdivisions	1.5 m	1.4	75 mm	17.5MPa	11
Existing Residential	0.6 m	1.4	75 mm	17.5MPa	11
Commercial	0 or 2 m	2.0 or	75 mm	17.5MPa	14

		4.0			
Industrial	0.6 m	1.4	100 mm	20MPa	14

The reason for changing the alignment for sub divisional footpaths is that the 0.6m standard can caused concern for safety at property entrances and problems with construction on established streets where batters existed on berms or there was sensitive overhanging vegetation. The new footpaths being constructed in existing residential areas need to work around existing services and hence are located in accordance with the old requirements. Existing residential paths are located at least 0.6m from kerb face where berms slope back towards property boundaries.

#### 9.4.4 EVIDENCE AND EXISTING APPROACH

The historical data shown in the table below has been sourced from Council's NCS MagiQ system.

Work Type	2007/ 08	2008/ 09	2009/ 10	2010/ 11	2011/ 12	2012/ 13	2013/ 14	2014/ 15	2015/ 16	2016/ 17
Maintenance	211	135	161	165	110	114	145	127	151	101
Renewal/ resurfacing	249	152	27	43	66	8	0	9	0	10
Creation	435	665	106	244	41	30	0	0	27	14
<b>Total</b>	<b>895</b>	<b>952</b>	<b>394</b>	<b>452</b>	<b>217</b>	<b>152</b>	<b>145</b>	<b>136</b>	<b>178</b>	<b>125</b>

#### Footpath Maintenance

Very little maintenance is required for the relatively young concrete paths stock. The majority of the maintenance is replacing small subsided, displaced or cracked sections of footpath (less than 50m long). Tree roots tend to cause a number of maintenance issues for footpaths particularly in Turangi where the berm trees are now all mature and are impacting on not only footpath but kerb and channel assets.

Other activity is generally confined to grinding any minor irregularities in levels between concrete slabs or smoothing and feathering with hot mix on sealed paths.

Maintenance costs are increasing as street and property trees mature and as more footpaths are created. Footpath maintenance addresses a number of levels of service including quality and road safety.

#### Footpath Renewals

The majority of renewals are due to lifting of the footpath by tree roots. Renewal consists of removal of tree-roots, before re-pouring of the slab. The criterion for renewal is a relative displacement of greater 10mm in the CBD, where a section of greater than 50m is replaced.

Where damage by a particular party can be proven, the offending property owner (or developer) is required to replace the damaged section. Damage deposits or bonds are not required from developers. As Taupō footpaths are young they are not yet needing to be renewed for end of life.

Cracked or aged footpaths in the Taupō CBD areas that do not meet normal replacement criteria may be upgraded with 50% property owner contribution. In the Taupō CBD areas replacement of concrete footpaths with cobblestones is encouraged.

Where Taupō CBD upgrades require the replacement of footpaths these are generally constructed from cobblestones. Resealing with slurry or AC is phasing out chips sealed footpaths, where condition allows.

Footpath renewal ensures that the level of service for quality is maintained as well as ensuring it is consistent with the affordability/price level of service.

### **Footpath creation**

The comparative costs of new surfacings are:

Concrete – approx. \$100 per square metre

Cobble stone – approx. \$85 per square metre

For creation, the general philosophy has been to infill areas and to improve connectivity of the network. The level of expenditure is governed by engineering judgement and political will. Maintenance costs are comparable for these surfaces. Renewal costs can be as much as twice the figures above due to the necessity to remove the existing footpath.

Priority for footpath extension is given where:

- There is high berm wear and vehicular volumes
- Berms close to high use facilities (i.e. shops, schools, churches, rest homes and parks)
- Works involves safety related works on principal and arterial routes.

Council's policy has been aimed at providing footpaths initially on streets with high pedestrian and vehicular traffic volumes in the vicinity of shopping centres, schools, churches, rest-homes, parks and on both sides of principal and arterial streets for safety considerations. With reasonable progress having been made in the past in this direction, some infilling of other streets showing pedestrian wear can also now be programmed. Footpath construction in Mangakino has been dependant on street reconstruction progress which in turn has been dependant on allocated funding levels.

The older person's policy written by council has identified that the provision of footpaths, uneven footpaths and the provision of access for wheel chairs/mobility scooters from footpath to road are all of concern to the elderly. TDC addresses these issues through the intervention strategies described above as well as ensuring that all new footways have sufficient kerb crossings.

Council policy is to allow developers to build either concrete or cobblestone paths to minimise future maintenance costs. There is some discussion from impaired pedestrians for smooth footpaths especially those in wheelchairs who find the cobblestones cause some discomfort and this has also been identified through the Access Taupo group.

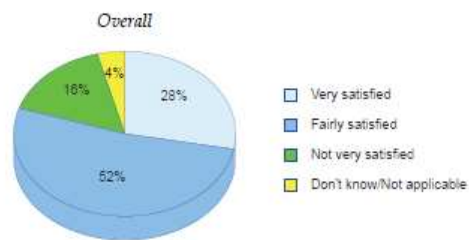
Footpath creation addresses a number of levels of service including accessibility, efficiency, quality, reliability and road safety. The last satisfaction survey undertaken

showed 80% of Taupo District residents and non-resident ratepayers are satisfied with footpaths (83% in 2012), including 28% who were very satisfied.

The main reasons for being not very satisfied with footpath are:

- Unveven/cracked/broken/uplifted by tree roots/tripping hazard
- No footpath/needs more footpaths/continuous footpaths
- Old/poor condition/need maintenance/upgrading
- Not user friendly for wheelchairs/mobility scooters/pushchairs.

ii. Footpaths



Graph is from the NRB customer satisfaction research 2014.

## Satisfaction With Footpaths

	Very Satisfied %	Fairly Satisfied %	Very/Fairly Satisfied %	Not Very Satisfied %	Don't Know %
<b>Overall</b>					
Total District 2014	28	52	80	16	4
2012	27	56	83	14	3
2009	31	45	76	18	6
<b>Comparison</b>					
Peer Group Average <sup>†</sup>	18	54	72	21	6
National Average	21	52	73	23	4
<b>Residency</b>					
Resident	25	54	79	17	4
Non-resident ratepayer	38	45	83	12	5
<b>Ward</b>					
Taupo-Kaingaroa	27	55	82	15	3
Turangi-Tongariro	31	47	78	20	2
Mangakino-Pouakani <sup>†</sup>	29	37	65	20	14
<b>Household Income</b>					
Less than \$40,000 pa	28	42	70	27	3
\$40,000 to \$70,000 pa <sup>†</sup>	28	55	83	14	4
More than \$70,000 pa <sup>†</sup>	28	54	82	14	3

% read across

<sup>†</sup> does not add to 100% due to rounding

## Audits

An accessibility audit was undertaken in the Taupō CBD in August 2016. The study are included AC Baths and the lakefront footpath up to Napier Road. This audit was requested by our Access Taupō group and this identified some issues with crossing points/kerb ramps and footpaths requiring further improvement works. A further study has been earmarked for Turangi, Mangakino and Kinloch urban areas. These audits assist us with the programming of works for footpath repairs and are based on the needs of the mobility impaired which in turn benefit the whole communities access requirements.

A footpath condition rating assessment is undertaken every two years which identifies sections of footpath which need maintenance, renewals and/or new facilities.

### 9.4.5 GAP ANALYSIS

There are still a number of streets without a footpath on one side of the road. Very few pedestrian counts are undertaken on a regular basis to see where people are walking and from.

Recommendations from the accessibility audit have been prioritised and programme to be implemented using our existing footpath maintenance budgets.

#### 9.4.6 OPTIONS

##### **Footpath Maintenance**

- Option 1 – identify maintenance issues via customer service requests (status quo).
- Option 2 – use accessibility audits/footpath condition rating to identify and prioritise maintenance of footpaths.

##### **Footpath Renewal**

- Option 1 – identify renewal sections via customer services requests
- Option 2 – use accessibility audits/footpath condition rating to identify and prioritise renewals of footpaths.

##### **Footpath creation**

- Option 1 – Status quo to ensure there is a footpath on at least one side of every road.
- Option 2 – Status quo of 1.4m wide footpaths but widen all new footpaths to 1.8m where requested or shared path or known aged pedestrians.
- Option 3 – Upgrade all footpaths to 1.8m as they are replaced so at least one side of the road has one wider footpath than the other.
- Option 4 – All new subdivisions are required to have 1.8m wide footpath to cater for aged population.

#### 9.4.7 PREFERRED OPTION

For maintenance and renewals of footpath option 1 in combination with Option 2 is preferred. All new subdivisions have footpaths on both sides.

For capital works Option 2 is preferred.

When code of practice comes up for review the 1.8m width may be considered.

The following programmes link to the strategic issue/problem statement of ageing population and accessibility/mobility.

#### 9.4.8 FOOTPATH PROGRAMME

##### **Footpath maintenance:**

Base maintenance: including replacement of isolated damaged sections less than 50m. Maintenance cost will increase as network grows in size. This increase will be in proportion to the increased value of new footpaths. Maintenance will also increase due to root damage and identified trip hazards. Accessibility audits undertaken in the CBD have identified a programme of priorities.

From 2018/19

\$ 150K/yr

##### **Footpath renewal:**

Isolated damaged sections which are greater than 50m are to be replaced. This will continue to increase due to tree root damage.

2018/19

\$ 40K

Resurfacing of chip seal, AC and slurry footpaths when surfacing reaches end of life (not required in next 20 years).

Replacement of footpaths as they reach the end of their life (not required in next 30 years)

The CBD upgrade is approximately \$400K per intersection (Ruapehu and Paori Hapi Streets are the next focus) split over years, 18/19, 21/22, 22/23). This project is to be combined with the Parks and Reserves project timings.

Transportation	
Street lighting	\$ 45K
<b>Footpath</b>	<b>\$600K</b>
Drainage	\$ 45K
Pavement	\$ 150K
Landscaping	\$ 0K
Furniture	\$ 0K
<b>Total cost</b>	<b>\$840K</b>

Horomatangi Street will need some improvements once the above locations have been completed. The project is combined with the Parks and Reserves project timings;

<del>2021/2022 Design</del>	<del>\$ 15K</del>
<del>2022/23 to 2023/24 Construction</del>	<del>\$ 500K/yr</del>

Note: This project was removed from the programme as requested by CE October 2017 and during workshops.

**Footpath creation:**

General construction based on walking and cycling strategy locations  
From 2018/19 \$140K/yr

Note: Increase in budget is required to complete having a footpath on one side of every urban street by 2020 plus we are receiving a number of requests to install new footpaths on opposite side due to mobility and ageing population.

Huka Falls Road footpath  
From 2018/19 to 2019/2020 \$ 150K/yr

Mapara Road footpath  
From 2018/19 to 2019/2020 \$ 50K

Note: Huka Falls Road and Mapara Road footpath projects were requests from earlier annual plan submissions and now based on the latest contract rates over the last period, additional funding to complete is required.

Triangle block footpath formation  
2018/19 \$ 150K

Note: This is to provide a link from the triangle block under the culverts at Lake Terrace and Pukenamu Road to access lakefront reserve.



Kinloch footpath

2018/2019

\$ 250K

2019/2020

\$ 100K

Note: This project has yet to be fully cost and there may be an issue with the crossfall.

## 9.5 Drainage

### 9.5.1 ACTIVITY 113 – ROUTINE DRAINAGE MAINTENANCE

#### ACTIVITY 213 – DRAINAGE RENEWALS

Overall Asset Outcome:	<p>The purpose of carriageway drainage is to:</p> <ul style="list-style-type: none"><li>• To divert and collect storm run-off from the roads, footpaths, berms and in some areas upstream catchments.</li><li>• To achieve minimum stormwater quality criteria as set out by the regional council and TDC stormwater catchment management plans.</li><li>• To comply with TDC's comprehensive stormwater discharge consent.</li><li>• To convey storm water overland in the event of a large rainfall event.</li></ul>
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In the urban areas this is predominately achieved by kerb and channel. Additional functions of kerb and channel is to:

- Delineate and protect the road edge.
- Protect the berm and pedestrians using it.

In the rural area carriageway drainage is achieved by the construction of water tables where necessary.

Large culverts (>2m diameter) are included within the bridges, culverts and structures section of this asset management plan.

Key issues relating to kerbs and channels are:

- A demand from some customers, particularly in Mangakino where a number of streets do not have kerb and channel;
- A wide variety of types are now produced;
- The kerb and channel is coming up for replacement in Turangi due to age and condition.
- Mountable kerbs lead to vehicles parking on berms and damage to berm occurs;
- Channel capacity is sometimes not sufficient for short duration, high intensity storms, leading to carriageway surface flooding;
- In semi-rural areas, kerb and channel is generally not wanted by locals as it is seen as urbanisation;
- Unofficial letdowns (pipes, plates, gravel) blocking water flows and creating safety issues;
- Stormwater systems are designed for a ten year return period storm with the road designed as a secondary flood path in most locations. In some locations there will be localised flooding in vulnerable areas. This will reduce carriageway efficiency;
- Potential for deposition of transport related contaminants into receiving environments;

- Potential to convey contaminants/pollution from private property to the receiving environment via the carriageway drainage system.

#### 9.5.2 LINKS TO THE ONRC CUSTOMER OUTCOMES

The links to the ONRC customer outcomes for this activity is Safety, Resilience, Amenity, Accessibility, Travel time reliability, Cost Efficiency.

#### 9.5.3 LEVELS OF SERVICE

Currently we don't measure Resilience, Travel time Reliability or Accessibility for this activity. There are customer expectations that litter and leaf fall in urban areas should be cleaned more regularly particularly prior to any large storm events. Most customers rely on a network that is free from surface flooding and associated asset and property damage.

The contractor is required to undertake general routine inspections of the network at 2 month intervals and detailed culvert inspections of all culverts at 6 monthly intervals.

Sumps are cleared annually so that detritus which has accumulated up to the level of the invert of the outlet shall be removed by adequate suction.

Kerb and channels are to be cleared quarterly so that detritus shall be removed from the channel such that the maximum depth of ponded water does not exceed 10mm after clearing.

All stormwater structures shall have 90% of their waterway area, and blockages cleared within one week except where the blockage threatens the integrity of the road and it is to be cleared immediately.

#### 9.5.4 EVIDENCE AND EXISTING APPROACH

The historical data shown in the table below has been sourced from Council's NCS MagiQ system.

Work Type	2007/ 08	2008/ 09	2009/ 10	2010/ 11	2011/ 12	2012/ 13	2013/ 14	2014/ 15	2015/ 16	2016/ 17
Maintenance	231	344	490	318	380	413	322	538	310	278
Renewals	20	20	86	31	0	109	0	0	58	30
New Works	175	468	113	33	36	31	0	4	0	0
<b>TOTAL</b>	<b>426</b>	<b>832</b>	<b>689</b>	<b>382</b>	<b>416</b>	<b>553</b>	<b>322</b>	<b>542</b>	<b>368</b>	<b>308</b>

#### **Carriageway drainage maintenance**

Kerb and channel is maintained by channel sweeping and the cleaning of catch-pits. This is completed in accordance with storm water quality criteria as set out in the storm water catchment management plans and district resource consent conditions.

- Repair of kerb and channel where the length is less than 50m is classified as maintenance. This damage is generally due to:
- Vehicles using the kerb as an unauthorised vehicle crossing.
- Tree root damage
- Poor reinstatement after installation of services
- Known/established geothermal subsidence

- A minor amount has been due to poor quality materials/workmanship.

### **Carriageway drainage renewal**

Repair of kerb and channel where the length is greater than 50m is classified as renewal. Some kerb and channel is renewed as part of upgrading of CBD footpaths.

### **Carriageway drainage creation**

Installation of kerb and channel is progressively done within the district, as some areas have been deficient in this asset. Areas lacking kerb and channel are:

- Turangi Industrial Area – isolated sections
- Atiamuri
- Tokaanu
- Acacia Bay – isolated sections
- Pukawa – as road has reverse camber, drainage along centre of road
- River Road
- Mangakino
- Omori – isolated sections
- Hatepe
- Waitetoko
- Kinloch – isolated sections
- Tauranga-Taupō

TDC regularly budgets for kerb and channel construction. The area's where this is installed is generally based on the age and condition of the kerb and channel.

Some lakeshore settlements (e.g. Hatepe) have expressed a wish not to have kerb and channel.

Customer service requests on the number of flooding or stormwater runoff complaints are recorded.

#### 9.5.5 GAP ANALYSIS

Failure in the drainage capacity could be due to the landuse change which results in impacts to pavement, access and safety. Some failures could be due to detention ponds or dams which are on private property and may be impacting the drainage of water from roads.

Climate change may impact this activity by the impact on the duration/intensity and frequency of storm and weather events. It is difficult to monitor if the structures fail due to weather events of the structure may have failed (end of life).

Unclear if there is any lack of capacity in the drainage assets or structures. Many of the culverts have lack of data eg installation date in RAMM is unknown so difficult to know when to plan for renewals or replacements. This may be mitigated by a detailed review of the culverts etc prior to the start or at the start of the new maintenance contract and improve data records.

#### 9.5.6 OPTIONS

- |          |  |
|----------|--|
| Option 1 | Status quo at a budget of \$267K per year for maintenance. |
| Option 2 | Improve data of our culverts eg age/condition              |
| Option 3 | Review cyclic maintenance and review the response times    |

Option 4 Removal and replacement programme developed

#### 9.5.7 PREFERRED OPTION

The preferred option is to have a combination of option 2 and 3 where we improve data and review cyclic maintenance response times. The cost of this programme is likely to be \$287K per year for maintenance and a \$120K per year for renewals.

The following programmes link to the strategic issue/problem statement of land use change.

#### 9.5.8 PROGRAMME

##### **Drainage maintenance programme**

Maintenance of kerb and channel plus new capital projects, new subdivisions and additional 18km of road (former State Highways).

From 2018/19 \$ 17K/yr

Note: This was removed from the last 10 yr budget after LTP 2012 workshops with Council.

Street cleaning – including for additional leaf fall in Turangi and Mangakino  
From 2018/19 \$ 170K/yr

(Subsidised \$30K per year and unsubsidised \$140K per year)

##### **Drainage renewal programme**

Kerb and channel replacement (greater than 50m) due to structures end of design life, condition. This budget has been smoothed out over the 10 year period.

From 2018/19 to 2032/34 \$ 120K/yr

Major drainage - Side drain or kerb and channel construction (New Zealand Transport Agency subsidy)

From 2018/19 \$ 30K

##### **Drainage creation programme**

Mangakino upgrade: This is to install new kerb and channel to assist with drainage in the urban streets within Mangakino. It is proposed to do one Mangakino street every two years this will complete approximately 300m per year;

From 2018/19 construction \$ 40K every two years

From 2019/20 design & investigation \$ 5K every two years

The CBD upgrade is approximately \$400K per intersection (Ruapehu and Paori Hapi Streets are the next focus, split over years, 18/19, 21/22, 22/23). This project is to be combined with the Parks and Reserves project timings.

Transportation	
Street lighting	\$ 45K
Footpath	\$ 600K
<b>Drainage</b>	<b>\$ 45K</b>

Pavement	\$ 150K
Landscaping	\$ 0K
Furniture	\$ 0K
<b>Total cost</b>	<b>\$840K</b>

## 9.6 Streetlighting

### 9.6.1 ACTIVITY 122 – STREETLIGHTING MAINTENANCE ACTIVITY 222 – STREETLIGHTING RENEWALS

Overall Asset Objective:	Provide sufficient street lighting levels for the safe and efficient movement of vehicles, cyclists and pedestrians
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The key issues relating to street lighting are:

- Obsolescence of existing lamps – continuing to upgrade older type lanterns.
- Customer demand for carriageway lighting to deliver home “security lighting”.
- Upgrading of existing lights to comply with the national standard is expensive and not demanded by residents.
- Power charges continue to rise.

The likely areas of optimising street lighting Asset Management are:

- Smart purchasing of energy through bulk/collective contracts for supply.
- Reduction of long term power costs by energy efficient lighting.
- Increased service delivery standards through technological advances.
- Installation of Light Emitting Diode Lights (LED).
- LED lights to be central management system (CMS) ready, to be able to connect to software in the future and take advantage of other services.

### 9.6.2 LINKS TO THE ONRC CUSTOMER OUTCOMES

The links to the ONRC customer outcomes for this activity is Safety, Resilience, Amenity, Accessibility, Travel time reliability, Cost Efficiency.

### 9.6.3 LEVELS OF SERVICE

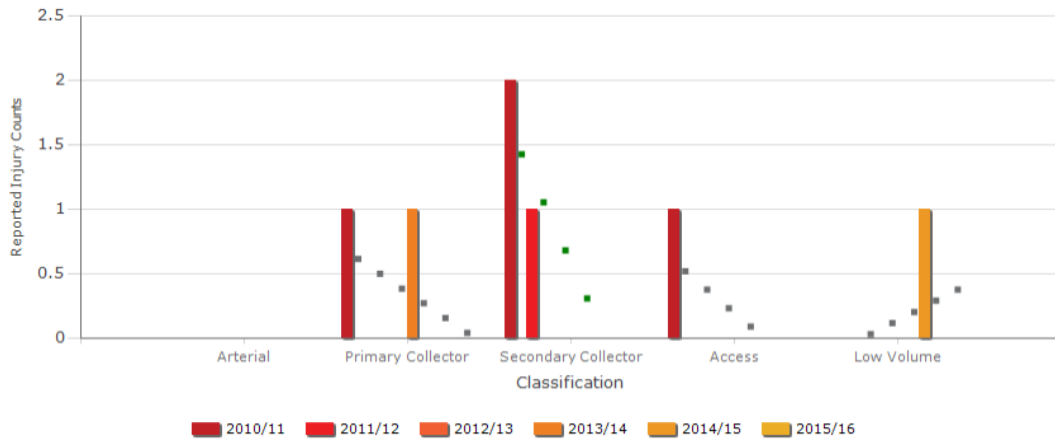
The expected customer levels of service is the AS/NZS1158 standard for streetlighting and the arterial and collector roads are generally compliant by many local roads provide a lower level of lighting than expected.

### 9.6.4 EVIDENCE AND EXISTING APPROACH

The historical data shown in the table below has been sourced from Council’s NCS MagiQ system (,000’s), new lights are sourced from RAMM database (calendar year not financial).

Work Type	2007/ 08	2008/ 09	2009/ 10	2010/ 11	2011/ 12	2012/ 13	2013/ 14	2014/ 15	2015/ 16	2016/ 17
Maintenance	144	120	168	213	215	218	197	119	138	140
Power	252	328	355	373	425	414	452	451	480	399
<i>Subtotal</i>	<i>396</i>	<i>448</i>	<i>523</i>	<i>586</i>	<i>640</i>	<i>632</i>	<i>649</i>	<i>570</i>	<i>618</i>	<i>539</i>

Renewal	44	67	50	80	69	43	62	22	38	46
Capital	14	212	42	61	6	108	27	19	75	28
<b>TOTAL</b>	<b>454</b>	<b>727</b>	<b>615</b>	<b>727</b>	<b>715</b>	<b>854</b>	<b>738</b>	<b>611</b>	<b>731</b>	<b>613</b>



Graph above shows the number of reported serious injuries and fatalities (DSI) attributable to loss of driver control at night each year on the network, sourced from ONRC reporting tool.

### Streetlighting maintenance

Council let a new contract out in June 2012 for three year plus one plus one contract expiring 30 June 2018. This contract was extended to 30 June 2018 to allow for the maintenance of the timing of the LED lighting contract. This contract was formed as a part of the local and regional authority electricity buying group offer.

The Lines Company control the lines in the Turangi and Mangakino areas and UNISON Ltd control the remainder of the Taupo District (including Atiamuri).

The current street-lighting contract covers the Taupō District Council area. Street lights are maintained on an as needed basis. A new street lighting contract was let in includes the installation of the festive lights in the CBD which has meant a more cost effective method of delivery than the previous contract.

### Streetlighting renewal

Key issues/activities for street lighting renewals are:

- The Contractor is paid set rates for replacement where necessary.
- To progressively upgrade street lights on arterial and collector routes to appropriate standards.
- Street lights are also renewed as they reach their end of life.

### Streetlighting creation

Council has adopted AS/NZS 1158: 2005 (New Zealand Street Lighting Standard) as a standard for new subdivisions and upgrades. Generally arterial routes would be illuminated to V4 level whilst collector and local streets would be illuminated to P3 level. New lighting is generally developer installed to AS/NZS 1158:1999.

Prior to this NZS 6701 was generally used as a guide to the lighting standard.

TDC's main policy or intention is:

- to have a consistent illumination along the road and in accordance with NZ standards
- to flag light major intersections on regional and district arterial routes
- to ensure lighting is appropriate dependant on the hierarchy of the road
- Infill lighting is often carried out where spacing of lights is significantly below the specified standard.

Flag lights on rural arterials are installed as minor safety works.

#### 9.6.5 GAP ANALYSIS

Testing and condition inspections are required to determine the condition and life expectancy of the poles. The condition of the light poles is unknown in many cases and the number of faulty poles or poles that are nearing the end of life or failure. Some of the poles in the newer subdivisions have been selected on style and fashion rather than life expectancy, however many have LED lights already installed.

It is unknown whether any new LED lights need to be added to the network to bring the lighting standard up to specification or if we can replace like for like. Any additional lighting would impact on the energy costs due to requiring more electricity.

#### 9.6.6 OPTIONS

- Option 1 – Complete conversion of LED lights with like for like on P category roads. V category roads will need to have lighting design completed.
- Option 2 – Complete conversion of LED lights with the opportunity to improve the street lighting network to address any gaps.
- Option 3 – replace existing luminaires as they failure which will take time and not provide energy savings upfront.

Continuing with HPS lighting is not deemed an options as the future supply of these is expected to diminish as the world converts to LED. Other options do not provide economic savings.

#### 9.6.7 PREFERRED OPTION

The preferred option is to complete the conversion of existing streetlights to LED across the district prior to 2018/2019. There may be gaps to address later and/or any new lights installed will be specified as LED.

The inclusion of a smart control system will enhance the management of the network and will provide additional benefits.

The following programmes link to the road safety strategic issue/problem statement in reducing night time crashes.

#### 9.6.8 LIGHTING PROGRAMME

##### **Streetlighting maintenance**

Power supply (subsidised)

2018/19

\$ 180K/yr

From 2019/20

increase of \$5K/yr

Note: The decrease from \$320K to \$180K is based on the reduction of power costs with the conversion to LED lights over the next 12 to 18 months.

General maintenance of street lights (subsidised)

2018/19 \$ 80K  
From 2019/20 Increase of \$1K/yr

Note: Decrease of budget from \$100K to \$80K based on LED lights being under warranty and shouldn't require a lot of maintenance in the first 3 to 5 years unless through damage or vandalism.

Urban amenity lighting maintenance (unsubsidised)

From 2018/19 \$ 55K/yr  
From 2021/22 increase in \$5K every 3 years

Power supply to under verandah lighting in Turangi (unsubsidised)

From 2018/19 \$ 20K/yr

Festive lighting comprises of:

Storage+additional power  
Erection and maintenance of festive lights  
From 2018/19 \$ 20K/yr

**Streetlighting renewal**

Replacing obsolete lanterns and damaged poles and lights (subsidised)

From 2018/19 \$ 30K/yr

Festive lights:

From 2018/19 to 2020/21 \$ 14K/yr

Note: Currently have 21 lights to be renewed at an approx. cost of \$2K per light.

**Streetlighting creation**

Urban infill: footpath/access way lighting and road infill lighting

2019/20 to 2020/21 \$ 40K/yr

Installing lights where under-grounding has occurred (unsubsidised): reinstate streetlight lighting

From 2018/19 \$ 20K/yr

Decision was to remove this \$10K from the budget due to no undergrounding being predicted by the power companies and based on previous years expenditure. However an annual plan submission was received and decision made to reallocate this budget.

The CBD upgrade is approximately \$400K per intersection (Ruapehu and Paori Hapi Streets are the next focus, split over years, 18/19, 21/22, 22/23). This project is to be combined with the Parks and Reserves project timings.

Transportation

**Street lighting \$ 45K**

Footpath \$ 600K

Drainage \$ 45K



Pavement	\$ 150K
Landscaping	\$ 0K
Furniture	\$ 0K
<b>Total cost</b>	<b>\$840K</b>

### Streetlighting disposal

Every streetlight which is renewed is disposed of at the time of renewal. The disposal of the old luminaires when converting to LED lights is to dispose of to a metal recycler in the first instance rather than to the landfill.

## 9.7 Structures

- 9.7.1 ACTIVITY 114 – STRUCTURES MAINTENANCE  
 ACTIVITY 215 – STRUCTURES COMPONENT REPLACEMENTS  
 ACTIVITY 231 – ASSOCIATED IMPROVEMENTS

Overall Asset Outcome:	The purpose of road bridges, culverts and structures is to provide continuous all-weather roading over rivers, streams and uneven terrain.
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Detailed inspections of roading bridges and culverts with a diameter greater than 3.4m<sup>2</sup> are inspected bi-annually in a joint contract with the local NZTA State Highway Bridge Network Inspections Contractor. The bridge inspection programme inspected 97 structures including 25 bridges, 43 culverts and 29 underpasses.

The consultant also investigated structure susceptibility to overload and developed an overload analysis programme to assist over weight permit application processing.

Note: Large culverts (<2m diameter) expenditure is included in Drainage. Culverts which are > 2m diameter are classified as bridges.

### 9.7.2 LINKS TO THE ONRC CUSTOMER OUTCOMES

The links to the ONRC customer outcomes for this activity is Safety, Resilience, Amenity, Accessibility, Travel time Reliability, Cost Efficiency.

This activity links to the Government Policy Statement in terms of economic growth and productivity (freight movements), value for money with the adoption of the ONRC and road safety.

### 9.7.3 LEVELS OF SERVICE

Currently we don't measure Resilience, Travel time Reliability or Accessibility for this activity.

### 9.7.4 EVIDENCE AND EXISTING APPROACH

The historical data shown in the table below has been sourced from Council's NCS MagiQ system (,000's).

Work Type	2007/ 08	2008/ 09	2009/ 10	2010/ 11	2011/ 12	2012/ 13	2013/ 14	2014/ 15	2015/ 16	2016/ 17
Maintenance	62	51	31	46	44	38	12	35	23	31
Renewals	39	0	0	0	0	0	0	0	0	0
New Works	21	20	0	0	0	0	0	0	0	0
<b>TOTAL</b>	<b>122</b>	<b>71</b>	<b>31</b>	<b>46</b>	<b>44</b>	<b>38</b>	<b>12</b>	<b>35</b>	<b>23</b>	<b>31</b>

### **Structures maintenance/renewals**

Detailed Inspections of Roading Bridges and culverts with a waterway area greater than 3.4m<sup>2</sup> are inspected biannually in a joint contract with the local NZTA State Highway Bridge Network Inspections Contractor. The inspections are followed up by a defects report provided by the Bridge Inspector. The maintenance/renewal programme is then produced and prioritised from the defects list, working within the available budget (unless urgent safety work in excess of the budget is required).

The current budget is insufficient to fully fund the maintenance requirement and available funds are utilised to complete a routine vegetation control programme of all structures, the identified priority works and any other lesser priority maintenance that may be associated with that particular structure at that time of repair being undertaken.

Works of lesser priority are presently being monitored and deferred until such time that funding allows this work to proceed.

A general bridge/culvert inspection report is undertaken every two years and identifies potential maintenance and renewal works required. The latest bridge inspection report was undertaken in December 2015 with inspections undertaken in accordance with NZTA S6:2015. It identifies low to high priority works required on bridges.

### **Structures creation**

TDC actively encourages the installation of stock underpasses, especially on arterial routes. Council generally makes a minor contribution to these where funding allows in terms of New Zealand Transport Agency policy. Upon completion the ownership of the underpass is vested in Council.

The Taupō CBD Structure Plan details the need to construct a second bridge crossing the Waikato River to provide sufficient capacity to link Taupō Township with the developing areas to the west. Currently we have consultants investigating whether there are some short term and medium options which can be done within the next 3 years and/or whether the second bridge is still required. Further modelling will take place as part of this investigation.

#### 9.7.5 GAP ANALYSIS

During the review it was identified a number of structures would benefit from special inspections (rather than general) due to the additional access requirements being necessary for specific structural vulnerabilities.

Information regarding journey/travel time disruption from flooding issues is unknown as currently it is not recorded.

Lack of knowing what alternative routes are available if the bridge is no longer able to be maintained due to funding.

Need to update RAMM data with condition details, structural checking for HPMVs, date of installation of bridges and culverts. Also structures such as retaining walls need to be included in an inspection regime. Improved data collection may mean less risk of sudden failure of structures and therefore increased network availability.

#### 9.7.6 DEVELOP OPTIONS

- Option 1 Current maintenance and renewal planning but will consider undertaking the high priority maintenance and renewals on the bridge at the same time to save travel costs to locations.
- Option 2 Increase cyclic maintenance and review the response times. This could be more of a proactive approach however will need additional cost or resource involved here if review and response times are increased.
- Option 3 Undertake detailed inspections on more regular basis, remove substandard pipes/culverts. This will improve data and performance and could mean the option is to extend life through some structural maintenance and improvement.
- Option 4 As Option 3, however will need to look at the ONRC Levels of service.

#### 9.7.7 PREFERRED OPTION

The preferred option is to maintain the status quo (Option 1) but consider a combination of improving data and review of cyclic maintenance response times to see if there is an issue with the status quo option. Detailed inspections and/or regular inspections may be the best way to manage the ageing bridge stock.

This review could also see if the cyclic maintenance aligns with ONRC and customer feedback.

The following programmes link to the strategic issue/problem statement for both larger vehicles and land use change.

#### 9.7.8 STRUCTURES PROGRAMME

##### **Structures maintenance**

Maintenance of structures including new capital projects, new subdivisions and the additional 18km of road (former State Highways).

From 2018/19 \$ 11K/yr

Bridge maintenance: general repairs on bridges  
From 2018/19 \$ 75K/yr

Note: The increase in budget from \$32K per year from the last AMP to \$75K per year is based on the latest bridge inspection report and the increase in HPMVs/HV traffic volumes.

TDC share of maintenance of jointly owned bridges: general repairs on bridges  
From 2018/19 \$ 3K/yr

Note: Need to formalise an agreement between Otorohanga District Council on the management of the shared bridges, have allowed additional \$1K per year.

Culvert maintenance: general repairs to culverts  
From 2018/19 \$100K/yr

Bus shelters maintenance: general repairs to bus shelters  
From 2018/19 \$ 8K/yr

Foot bridge maintenance: general repairs to footbridges  
From 2018/19 \$ 10K/yr

### Structures renewal

Bridge and large culvert replacement renewals due to structures end of design life, allocation varies;

2024/25 Bridge & large culvert \$ 100K

Note: This is earmarked for the Control Gates footpath bridge. Need to consider combining this project with the Norman Smith project and/or what the plans for the bridge are currently owned by Mercury.

Culvert renewal: improve drainage  
From 2018/19 \$ 10K/yr

Culvert and culvert structure renewals due to structures end of design life and condition;

2019/20 Culvert on Tirohanga Rd \$ 320K  
2022/23 Culvert on Forest Rd \$ 180K  
2025/26 Culvert on Whangamata Rd \$ 200K  
2027/28 Culvert on Omori Rd \$ 210K

### Structures creation

Norman Smith Street intersection with Wairakei Drive to look at congestion issues and travel delays from Acacia Bay to CBD. The project includes short, medium and long term measures;

Long term options  
2018/19 Design \$ 100K  
2028/29 Construction \$ 6,500K  
2029/30 Construction \$ 6,500K

Note: The long term/timing option of a bridge will be identified in the investigation part of northern outlet project and timings are to be confirmed. The above are placeholders for the project. It is unlikely the bridge option would be co-funded by NZTA and would need to have a full business case approach completed and compete with other major projects through the RLTP process.

Retaining walls: for general work that needs to be done to protect road.

2018/19 \$ 100K  
2020/21 \$ 100K  
2041/42 \$ 93K

Note: First two years are allocated for additional work on Wily Terrace retaining wall.

Bus shelters (for school bus routes)  
2019/20 \$ 6K/2 yrs

Note: This allows one shelter to be installed every two years.

Bus shelters (for public bus routes)  
From 18/19 \$ 3K/every 2 yrs  
From 19/20 \$ 9K/every 2 yrs

Note: This funding allows one shelters to be installed every 2 years and some seating every other alternate years.

Acacia Bay handrail – to install handrail along footpath  
2018/2019 \$ 50K

Note: This was based on a quote from 2 years earlier.

## 9.8 Environmental Maintenance

### 9.8.1 ACTIVITY 121 – ENVIRONMENTAL MAINTENANCE

Overall Asset Objective:	The purpose of road berms is to: provide a buffer area between carriageway/footpath and property for public use including installation of utilities, street planting and road support structures
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Rural carriageway drainage is usually in the form of water tables within these berms.

Key issues relating to road berms are:

- Upgrading of streetscape in CBD areas;
- Aesthetics of berms (e.g. wear of berms due to vehicular traffic, how long is the grass?);
- The presence of street trees i.e. the conflict between aesthetics and damage to street ware;
- Unsealed/unformed vehicle crossings in residential and rural centres. These create maintenance, and aesthetic concerns;
- Encroachment of commercial activity into the berm;
- Reinstatement following utility service operations (e.g. power, Telecom etc.);
- Unapproved grazing on berms causing excrement on carriageway, wandering stock and damage to street ware (e.g. edge marker posts, flumes, berms);
- Stock vehicles discharging excretion on berms;
- Dairy crossing points;
- Undergrounding of service cables.

Key issues relating to rural drainage are:

- Small slips and debris decreasing available capacity;
- Entrances constructed without culverts inhibit water flows;
- Erosion of new formations prior to vegetation establishment;

- Susceptibility of pumice to scour – sometimes water tables require special treatments to prevent excessive scour;
- Discouraging of utility services laying cables in water tables;
- Debris from private properties depositing in the water tables;
- Control of vegetation and noxious weeds.

#### 9.8.2 LINKS TO THE ONRC CUSTOMER OUTCOMES

The links to the ONRC customer outcomes for this activity is Safety, Resilience and Accessibility.

#### 9.8.3 LEVELS OF SERVICE

The majority of rural unsealed road is classed as access & access low volume roads. The current levels of service are designed to maintain asset functionality within affordable constraints.

#### 9.8.4 EVIDENCE AND EXISTING APPROACH

Routine maintenance programmes are focussed on maintaining the network to ensure road safety is not compromised by vegetation overgrowth and hazards such as detritus, surface ponding and pot holes.

The historical data shown in the table below has been sourced from Council's NCS MagiQ system (,000's).

Work Type	2007/ 08	2008/ 09	2009/ 10	2010/ 11	2011/ 12	2012/ 13	2013/ 14	2014/ 15	2015/ 16	2016/ 17
Maintenance	397	543	538	631	718	525	626	659	551	
Renewals	0	0	0	0	0	0	0	0	0	0
New Works	27	0	0	0	0	317	0	0	0	
TOTAL	424	543	538	631	718	842	626	659	551	

#### **Berm maintenance (urban)**

Urban property owners are expected to maintain berm frontages. TDC mows six monthly at TDC's expense if not maintained. Overhanging vegetation is to be removed by property owner. If not removed, the vegetation is cut back and TDC aim to recoup costs.

Landscaping within the road reserve (e.g. on round-a-bouts, kerb extensions, street trees) is maintained by the Parks and Reserves division of TDC. All expense for this is currently contained within their budgets.

#### **Berm maintenance (rural)**

General maintenance comprises of repairs of scour, maintenance of rural water tables, re-grassing etc, by network contractor on a km/month basis. Major repairs such as repair of major scour, drop outs, slips as well as berm reshaping are completed as tasked works.

Vegetation mowing (Sealed roads) – the mowing width is a 2.5m wide grass strip on straights, 3m on curves, full width on selected high visibility areas by Contractor on a per km basis (four cuts per year except Matea, Taharua, Clements Mill Roads which are cut twice a year).

Vegetation mowing (Unsealed roads) - two cuts per year on same basis as above.

Vegetation control outside 2.5m strip is done on demand in a separate contract or as a variation to the existing contract (i.e. bush cutting).

Spraying to control weed pests (e.g. scrub and broom etc.) within and beyond the 2.5m strip is done on a separate contract.

Service trenching is controlled by street opening permit and TDC supervision.

Commercial activity on berms is not permitted, but rural grazing is permitted in allocated areas. Farmers may be given permission to graze berms (by licence) as this provides additional vegetation control. This grazing shall be a minimum of 2.5m from the edge of seal so not to be a safety hazard or hamper mowing operations.

Dairy herd crossing of berm and stock effluent spillage is an issue. TDC is encouraging farmers to install stock underpasses or to seal the crossing point to enable flushing after stock crossing. TDC has installed an effluent disposal area at the Oruanui Sale Yards to address the issue of stock effluent discharge onto berms in that area.

#### **Berm renewal**

Urban berms are re-sown in conjunction with footpath upgrade where necessary.

Periodically, turf build up on rural grass shoulders is removed to allow sheet flow drainage off the carriageway.

Rural water table restoration is carried out as required.

#### **Berm creation**

Batters in new urban and rural residential development are required to be constructed outside road reserve on private property.

Sealed road berms are constructed with 1:8 grass shoulders. This grade has been selected to allow adequate drainage and safe vehicular stopping.

Rural road cuts in sound pumice may be battered at 0.25:1, while fill batter are constructed at 1.5:1 but scours with runnels until vegetation is established.

Narrow cuttings may be battered back to allow wider berms resulting in better visibility and more light on the carriageway to prevent frosting. Widening of the berm is also carried out to allow horse/pedestrian access in selected rural areas usually in association with adjacent development.

Formed and sealed vehicle crossings are encouraged with building consents.

### 9.8.5 GAP ANALYSIS

Environmental issues associated with illegal discharges of effluent by stock trucks, difficult to control if we are unaware of the locations.

Need to identify routes where loose chip and detritus occurs and prioritise these routes particularly where we have major cyclist and motorcyclist using the routes.

#### 9.8.6 OPTIONS

Option 1	Increase environmental/routine maintenance
Option 2	Decrease environmental/routine maintenance
Option 3	Status quo

#### 9.8.7 PREFERRED OPTION

The preferred option is option 1. The increase in level of routine maintenance is required on some of our main arterials and the key tourist routes into Taupo, where we are experiencing an increase in litter collections prior to mowing and a couple of climatic events where we have had to clear more snow than previous years.

The following programme links to the strategic issue/problem statements for road safety and land use change.

#### 9.8.8 ENVIRONMENTAL PROGRAMME

##### **Berm maintenance programme**

Amenity/Safety Maintenance (mowing, litter control, spraying)  
From 2018/19 \$330K/yr

Note: An increase in \$30K per year based on historical expenditure and to cover additional litter pick up on rural and high volume roads such as Poihipi Rd, Wairakei Drive and tourist roads.

Stock effluent: All TLAs within the Waikato Regional Council cost share, this is the amount for TDC.

2018/19	\$ 19.5K
From 2019/20 to 2022/23	increase \$1.5K
2023/24	\$ 18K

Note: This is a placeholder as an agreement is still to be set up regarding maintenance, possibly this will be funded by NZTA and WRC.

Maintenance due to capital projects, new subdivisions and additional 18km of road (former State Highways).

From 2018/19	\$ 40K/yr
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Verge maintenance: control of vegetation on verges

From 2018/19	\$ 20K/yr
Decrease of \$15K per year based on historical expenditure	

Tidy up of berm following footpath construction

From 2018/19	\$ 15K/yr
Decrease of \$5K per year based on historical expenditure	

Shoulder maintenance: street sweeping of shoulders

From 2018/19	\$ 25K/yr
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Maintenance of water-tables: removal of slips and debris from water tables  
 From 2018/19 \$140K/yr  
 Decrease of \$10K per year based on historical expenditure.

Berm lowering  
 From 2018/19 \$ 80K/yr

Weed spraying  
 From 2018/19 \$ 50K/yr

**Berm renewal programme**

No renewal costs as formation is not depreciated.

**Berm formation programme**

Rural berm widening – for horse/pedestrian tracks in rural areas (day lighting):  
 provision for horse/pedestrian access

Note: After consultation/deliberation on the draft LTP 2012, Council decided to move the project outside of the 10 year funding plan due to financial constraints.

**Berm disposal**

Surplus berm greater than 20m road reserve widths may be disposed of to adjoining land owners or swapped for private land where there are realignments.

**9.9 Traffic Services**

9.9.1 ACTIVITY 122 – TRAFFIC SERVICES MAINTENANCE  
 ACTIVITY 222 – TRAFFIC SERVICES RENEWALS

Overall Asset Outcome	To provide signs, markings and other traffic control devices that are easy to see, understand and that contribute to the safety and efficiency of the road network.
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Traffic services cover road marking, traffic signs and other control devices (roundabouts, splitter islands etc). Each of these are explained in more detail below.

The purpose of road marking is to delineate the road/pavement/footpath/service lanes to guide traffic movements and indicate road use restrictions.

Signs are provided to aid the safe and orderly movement of traffic. They may contain:

- Regulating instructions which road users are required to obey.
- Warnings of temporary or permanent hazards which may not be self evident.
- Directions and distances to destinations.
- An indication of road user services and tourist features/establishments.
- Other information of general interest to road users.

Traffic controls in this section refer to traffic safety barriers, medians, roundabouts, calming devices and local area traffic management (LATM) systems. Their purpose is

to regulate, warn or guide traffic. Their effectiveness as traffic control devices depends on them being:

- Logical;
- Readily identifiable;
- Appropriately selected and located.

The key issues relating to traffic services are:

- Optimisation painting frequencies to ensure good quality road marking at minimum cost;
- Increasing traffic growth will increase road marking required as thresholds for installation of edge lines etc are met;
- An increase in reflectorised markings;
- An increasing use in water borne paint to increase the life of road markings;
- Reduced life spans of signs due to vandalism and graffiti;
- The demand for commercial signs is controlled to prevent a plethora of signage;
- Obtaining cheap and effective means of rating the condition of signs;
- Pressure from sign material companies to increase reflectivity standards and policies;
- The width of Taupō urban streets are requiring traffic controls such as kerb extensions, flush medians and edge lines to be installed to better define and narrow the carriageway and to effectively slow traffic – also allows for positive amenity value;
- The frequency of damage of signs (RG 17) associated with traffic controls;
- The demand for speed reduction devices;
- The demand for pedestrian crossing points, especially of school entrances and consideration of alternatives.

#### 9.9.2 LINKS TO THE ONRC CUSTOMER OUTCOMES

Traffic services maintenance links to the strategic case via reducing the number of serious and fatal injuries, reducing social cost and time delays which may be caused by road crashes etc.

The activity links to all ONRC customer outcomes - Safety, Resilience, Amenity, Accessibility, Travel time Reliability, Cost Efficiency but mainly Safety – (CO 1 – the number of fatal and serious injuries on the network, CO2 – collective risk (fatal and serious injury rate per km), CO 3 – personal risk (fatal and serious injury rate by traffic volume).

Taupō's crash trend over the last 5 years shows Primary and Secondary Collector roads crashes are tending up while all other road classifications are trending down.

#### 9.9.3 LEVELS OF SERVICE

The desired outcome is for road and roadsides becoming safer for all road users.

Current level of service for Streetlighting is to provide and maintain lighting in a consistent and fit for purpose manner. This is current all arterial roads – the lighting design should meet category V4 as per AS/NZ standard 1158, for Primary and Secondary collector roads – the lighting design should meet P3 and for Access and Low volume access roads – the lighting design should meet P4.

For signs and markings the current level of service is set by the Department of Internal Affairs which is the percentage of customer service requests relating to roads and footpaths responded to in line with the timeframes set out in the Taupō Districts relevant document. For Taupō it is set at 5 working days response time. This relates to all levels of road classification.

For traffic signals – these are to be connected to SCATS via agreement with Tauranga City Council, which will monitor performance and send alarm if any failures which can then be responded to immediately.

#### 9.9.4 EVIDENCE AND EXISTING APPROACH

The historical data shown in the tables below has been sourced from Council’s NCS MagiQ system (,000’s).

Total road marking expenditure over the past ten years has been:

Work Type	2007/ 08	2008/ 09	2009/ 10	2010/ 11	2011/ 12	2012/ 13	2013/ 14	2014/ 15	2015/ 16	2016/ 17
Maintenance	136	223	169	178	99	151	95	77	217	191
Renewals	0	24	11	13	0	0	0	0	0	24
New Works	61	2	2	2	0	0	0	0	0	0
<b>TOTAL</b>	<b>197</b>	<b>249</b>	<b>182</b>	<b>193</b>	<b>99</b>	<b>151</b>	<b>95</b>	<b>77</b>	<b>217</b>	<b>191</b>

The new works are only estimates as at this stage this is not coded separately. The maintenance/renewal varies each year depending how many RRPMS need replacing.

Safety works are the main influence in new works expenditure. The trend for higher safety standards and traffic growth means this expenditure is likely to increase.

Resealing programmes have a significant affect on remarking. However, remarking immediately after sealing is written into reseal contracts and coded against pavement renewal.

Total traffic signs expenditure over the past ten years has been:

Work Type	2007/ 08	2008/ 09	2009/ 10	2010/ 11	2011/ 12	2012/ 13	2013/ 14	2014/ 15	2015/ 16	2016/ 17
Maintenance	62	60	52	86	63	53	63	55	70	77
Renewals	39	46	58	37	79	62	67	43	28	28
New Works	21	61	97	23	15	30	0	3	3	10
<b>TOTAL</b>	<b>122</b>	<b>167</b>	<b>207</b>	<b>146</b>	<b>157</b>	<b>145</b>	<b>130</b>	<b>101</b>	<b>101</b>	<b>115</b>

\*approximately \$100K was spent on speed humps, barrier rails and refuge islands in 2009/10. The source for the above data is taken from TDC NCS MagiQ system and minor improvement programme.

#### Roadmarking maintenance and renewal

TDC lets a contract for three years on a one plus one plus one year basis, to spray all markings, at least once per year. Some high use roads are marked twice a year. As this is completed on an amount basis it is classified as maintenance and not renewal.

The volume of work has steadily increased with past seal extension programmes. However, current seal extensions are on low volume, local roads that generally do not meet the guidelines for pavement marking.

The Contractor maintains the RRPMS within the road marking contract.

Reflective glass beads are being used on all markings except parking and no stopping lines. An increased LOS has been delivered with the use of water borne paint and painted kerbing on blisters and island noses etc. Existing fire hydrant markers (yellow paint and/or blue RRPM) and culvert markers (green RRPMS) are replaced after sealing.

TDC have changed their road marking contract to use waterborne paints. These paints are reported to hold beads better, hence can provide better reflectivity and a longer life than other comparable paints. Waterborne paints also have a low environmental impact. The markings will be monitored to confirm that they will provide a good quality marking at minimum cost.

### **Roadmarking creation**

The current tactical practice (in accordance with MOTSAM and/or Traffic Control Device Rule and/or RTS5 Guidelines for rural roads) is:

- Centre lines installed on all rural roads with AADT greater than 250 and seal width greater than 5.5m.
- Centre lines installed on isolated sections of rural roads with AADT greater than 100 and seal width greater than 5.5m (where frequent or deceptive/substandard horizontal and/or vertical curves).
- Centre lines installed on all urban arterials and collectors with large volumes of non local traffic.
- Edge lines installed on all rural roads with AADT greater than 750 and seal width greater than 6.6m.
- Centre lines installed on all urban arterials and other roads where there is a wish to better define traffic moving lanes and to provide a defined area for parking and cycling.
- The demand for unwarrantable pedestrian crossings has been resisted, as there is concern about their safety to the elderly and the young.

Current seal extensions are on low volume, local roads that generally do not meet the guidelines for pavement marking.

### **Signs maintenance**

- Signs are maintained by network contractor on a cyclic Lump Sum basis.
- Replacement of posts and relocation of signs from service poles to posts is classified as maintenance.

### **Signs renewals**

- Replacement of signs.
- Physical damage (renewal) is repaired on a tasking basis.
- Marker posts are maintained on a cyclic basis. This usually consists of replacement of defective marker posts.
- A computerised sign inventory system is operated (SAM) that has the ability to record a request for work and tasks completed.

### **Sign creation**

All traffic signs are designed and located to meet the requirements of the Transit NZ "Manual of Traffic Signs and Markings - Part 1. Traffic Signs" (MOTSAM) and Traffic Control Devices Rule.

TDC has adopted white on green upper/lower case street name blades of high reflectivity.

TDC has adopted a general policy on signage to minimise the plethora of signs being requested by the community groups and clubs plus to avoid any unnecessary advertising signs.

Key activities for new signs are:

- Signs are required for new subdivision paid for by developer and installed by TDC;
- Upgrading of edge marker posts to New Zealand Transport Agency's standards;
- Installation of new warning signs as necessary.

### **Traffic control maintenance and renewal**

Traffic controls are maintained and renewed by the general maintenance contractor and included in pavement maintenance section of 30 year programme.

Maintenance and renewal are included within the pavement maintenance section of the 20 year programme – also kerb extensions as below.

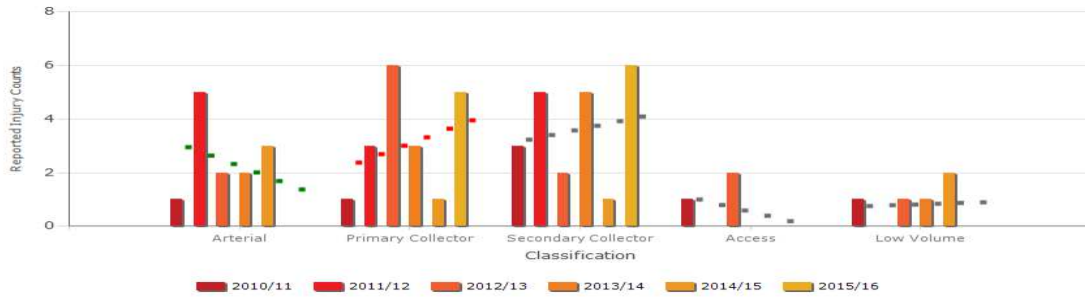
### **Traffic control creation**

Traffic control devices are generally installed after specific investigations and/or crash studies. As such, they comprise of a visible, but low maintenance item that is not a 'critical asset'. It is likely that installation of new traffic controls will be as required and will not involve major capital expenditure. Expenditure for such items will generally be out of minor safety improvements.

Safety barriers/guard-rails installed at some potentially dangerous sites. Custom-made plastic speed control humps have been installed in commercial service lanes near pedestrian areas. They have also been installed in Hatepe and on Wily Terrace which are narrow (4.5m wide) streets. A 20km/h speed limit was established by by-law in Hatepe in the early seventies.

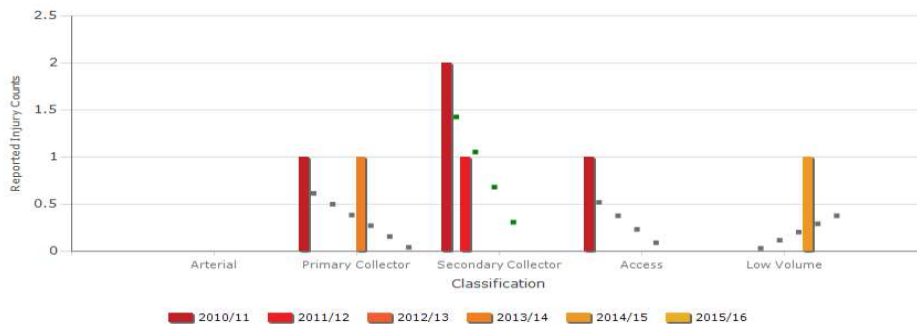
Roundabouts and some blister islands are beautified with flower gardens by Council's Parks and Reserves department.

Below is a snapshot taken from the ONRC reporting tool showing the crash trend over the last 5 years.



DSI Counts	Arterial	Primary Collector	Secondary Collector	Access	Low Volume	Total
2010/11	1	1	3	1	1	7
2011/12	5	3	5			13
2012/13	2	6	2	2	1	13
2013/14	2	3	5		1	11
2014/15	3	1	1		2	7
2015/16	?	5	6			11
<b>Trend (Change in DSI per year)</b>						
Taupo District Council	-0.31	0.31	0.17	-0.20	0.03	

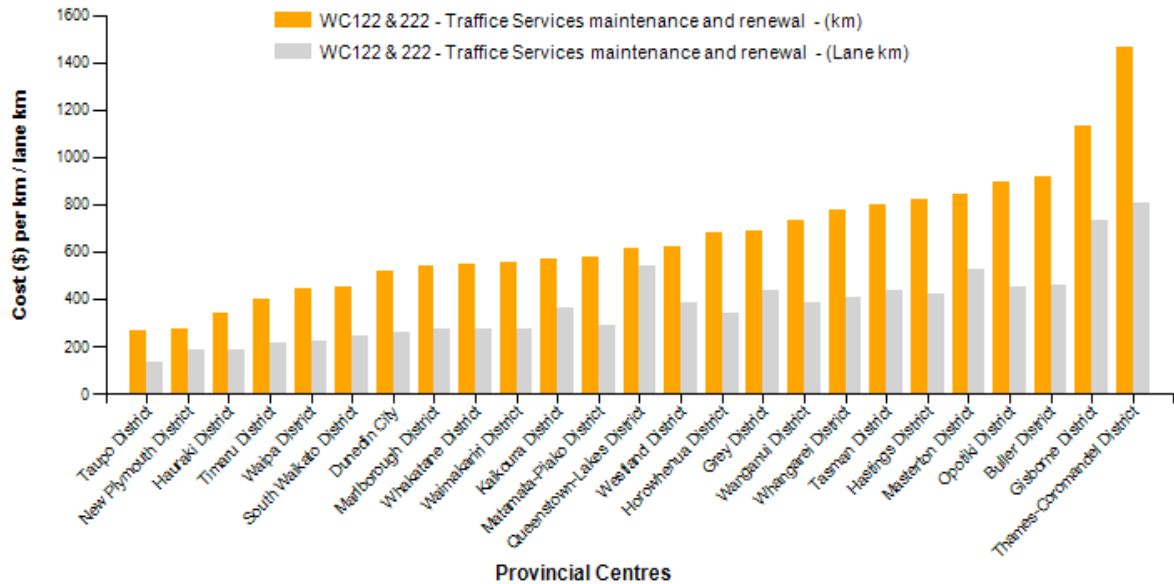
The crash numbers at night which are taken from the ONRC reporting tool as shown below are over a 5 year period, a total of 2 crashes on Primary Collector roads, 3 crashes on Secondary Collector roads, 1 crash on each of Access and Low volume roads.



DSI Counts	Arterial	Primary Collector	Secondary Collector	Access	Low Volume	Total	% of crashes
2010/11	?	1	2	1	?	4	66.67
2011/12			1			1	7.69
2012/13						0	0
2013/14		1				1	9.09
2014/15					1	1	14.29
2015/16	?					0	0
<b>Trend (Change in DSI per year)</b>							
Taupo District Council	0.00	-0.11	-0.37	-0.14	0.09		

The cost per km/lane km centres for traffic services maintenance is one of the lowest with comparison with other provincial centres as shown below.

**WC122 & 222 - Traffic services maintenance and renewal  
Cost per Network km/lane km by Peer Group  
3 Year Average 2014-2016**



**9.9.5 GAP ANALYSIS**

Current practice with traffic services maintenance is based on a reactive programme rather than proactive. This is done by either the contractor or customer identifying items that are in need of repair.

Need to see if a proactive programme could be achieved for traffic service maintenance.

Need to identify any difference between existing road hierarchy lighting and ONRC.

Local roads are currently not rated for risk (Kiwirap) so unable to report against the measure, consider once risk ratings have been established.

Need to look at the number of faults for each traffic service – lighting, signs, markings and see if there are any trends based on location and/or per road classification.

**9.9.6 DEVELOP OPTIONS**

Streetlight maintenance

- Option 1 Undertake maintenance as per existing contract which see high maintenance and power costs associated with this.
- Option 2 Convert luminaires to LED across the full network, accompanied by design specification for compliance. Poles spacing changes may be required.
- Option 3 Renew streetlights to LED on a ONRC programme basis road classification or major crashes occurring.
- Option 4 Repair and renew streetlight to LED as and when they need replacing – maintenance costs high to begin with until replacement is complete.

### Signs and markings maintenance

- Option 1 Continue with maintenance of signs and markings as per existing signs contract and markings contract.
- Option 2 To investigate and develop a programme based on road classification and/or number of faults in network. Prioritise higher classification roads.
- Option 3 To develop a programme of works based on where high crash rates are occurring to tie back into strategic case for reducing serious crashes.

### Traffic signals

- Option 1 Replace old/end of life poles and lights and upgrade to new LED technology, cost of this option is between \$80K to \$100K and continue with the agreement between Tauranga City Council to manage the signals via SCATS.
- Option 2 Remove existing lights and install some other traffic control such as a roundabout.
- Option 3 Do option 2 as part of the CBD and/or other upgrade projects or some other similar upgrade project which is more of a long term timeframe.

## 9.9.7 PREFERRED OPTION

### Streetlighting

The preferred option for streetlighting is Option 2, which is to complete the change to LED streetlights as soon as practicable. This option is expected to provide a cost savings of \$1.46M in electricity costs over the 20 year life.

### Signs and markings

The preferred option for signs and markings is Option 1 but to combine this with option 2 and/or 3 where possible in order to look at a more proactive approach.

### Traffic signals

The preferred option for Traffic signals is Option 1 to upgrade to the new technology. Option 2 and option 3 are more long term options and the signals could be retained if necessary.

The following programme links to the strategic issue/problem statement for road safety.

## 9.9.8 FUTURE PROGRAMME

### **Roadmarking maintenance**

A base rate has been included for the annual road remark (as it is annual this is considered maintenance). No increase allowed for any new marking on seal extensions (local roads are generally not marked).

From 2018/19

\$200K/yr

Maintenance due to capital projects, new subdivisions and additional 18km of road (former State Highways).

2019/20 onwards

\$49K/yr

Note: (SH maintenance have been based on 5 year historical expenditure received from NZTA)



### Roadmarking renewal

RRPM renewal due to replacement as RRPM meet the end of their life is estimated on current contract rates. A proportional amount has been included for replacing of the new RRPMs installed.

From 2018/19	\$ 45K
From 2025/26	increase of \$5K

### Roadmarking creation

New markings for safety related works including marking for new controls (stop, give way etc). Increased traffic volumes will trigger the cut offs where centre lines, edge lines etc are required.

From 2018/19	\$ 10K/5yrs
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### Signs maintenance

Additional maintenance for new signs, costs based on existing contract rate.

2018/19	\$ 42K
From 2019/20	increasing by \$1K/yr

Note: SH maintenance have been based on 5 year historical expenditure received from NZTA

2018/19 onwards	\$ 60K/yr
(includes gantries which may not be retained after handover, based on 5 year historical maintenance expenditure received from NZTA/Opus).	

Street signs expenditure includes marker posts and sight rail painting.

Taupō Welcome signs maintenance

From 2018/19	\$ 2K/yr
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Electronic signs maintenance

From 2018/19	\$ 6K/yr
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### Signs renewal

Renewal due to replacement as signs meet the end of their life, vandalism and damage caused by crashes and estimated on current contract rates.

2018/19	\$ 80K
2021/22	\$ 75K

Replacement of marker posts: due to reaching end of life or damage

From 2018/19	\$ 20K/yr
From 2021/22	\$ 25K/yr

### Signs creation

Edge marker posts: Increased traffic volumes will trigger the cut offs where centre lines, edge lines etc are required and edge marker posts required to bring the network up to MOTSAM/TCD rule.

From 2018/19	\$5K/5yrs
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New signs: provision of signs for increased roading network

From 2018/19	\$25K/yr
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### Traffic controls maintenance, renewal and creation

Traffic controls expenditure is currently not significant.

Creation is included as a small part of the minor safety component within the pavement creation section of the 20 year programme.

These items will be monitored and the costs identified separately should there be any significant increases.

The CBD upgrade is approximately \$400K per intersection (Ruapehu and Paori Hapi Streets are the next focus) split over years, 18/19, 21/22, 22/23). This project is to be combined with the Parks and Reserves project timings.

Transportation	
Street lighting	\$ 45K
<b>Footpath</b>	<b>\$600K</b>
Drainage	\$ 45K
Pavement	\$ 150K
Landscaping	\$ 0K
Furniture	\$ 0K
<b>Total cost</b>	<b>\$840K</b>

### Traffic signals maintenance

Since the handover of SH1, TDC has currently one set of traffic signals which are currently maintained via Tauranga City operations.

From 2018/19	\$ 20K/y
From 2021/22	\$ 25K/y

### Traffic signals renewals

We have recently renewed the set of signals at the intersection of Tongariro Street and Heuheu Street so these are unlikely to require renewal in the next 10 to 15 years. As the northern access project has proposed or identified six sets of new signals as recommendations there will need to be some renewal added in the next 30 years or next long term plan cycle.

### Traffic signal creation

Installation of new signals at various intersections in town. These were added during Council workshops and yet to match budget spreadsheets. The figures below are still to be confirmed. Some of the projects were included in the priority changes on Titiraupenga Street:

2018/19	Norman Smith/Wairakei Dr	\$ 479K
2019/20	Spa Road/Ruapehu St	\$ 413K
2020/21	Titiraupenga St/Spa Rd	\$ 622K
2021/22	Titiraupenga St/Tamamutu St	\$ 470K
2022/23	Titiraupenga St/Heuheu St	\$ 451K
2023/24	Paori Hapi St/Gascoigne St	\$ 379K
2024/25	Paori Hapi St/Ruapehu St	\$ 458K

Note: These projects will be included as minor improvement projects. The draft report we received from the consultants didn't include design costs so we have added an additional 10 % in the first 3 years and will review the costs in the next long term plan cycle.

## 9.10 Network and Asset Management

### 9.10.1 ACTIVITY 151 – NETWORK AND ASSET MANAGEMENT

The general management and control of the road network and road assets.

### 9.10.2 LINKS STRATEGIC CASE

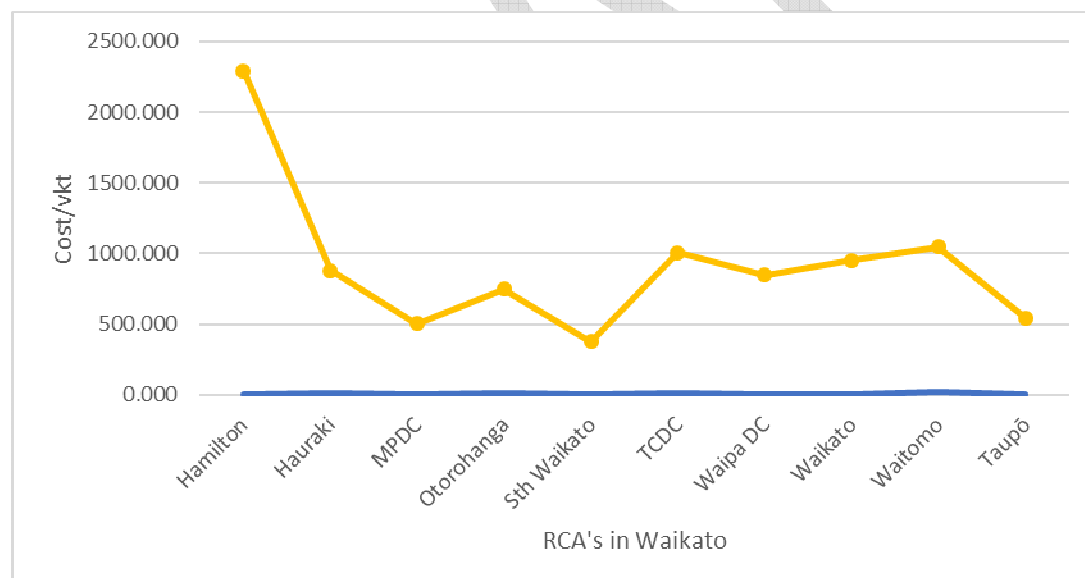
Network and asset management is the implementation of a well planned and procured maintenance asset management plan.

### 9.10.3 LEVELS OF SERVICE

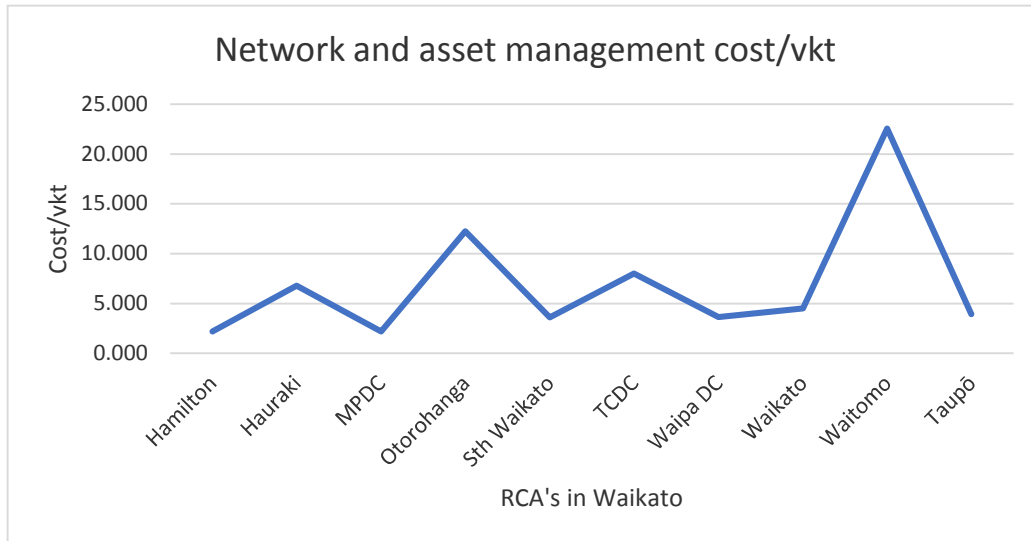
Response time to customer service enquires (differentiated by ONRC)

### 9.10.4 EVIDENCE

Benchmarking against other Councils.



Data for tables obtained from Regional workshop template and Taupo added via information off NZTA website.



#### 9.10.5 GAP ANALYSIS

There may be opportunities for collaboration to deliver some services.

#### 9.10.6 OPTIONS

- Option 1 Status quo
- Option 2 Join the Regional Asset and Technical Accord group to undertake shared activities such as dTIMs, RAMM rating etc.

#### 9.10.7 PREFERRED OPTION

The preferred option is option 1 with 2. While there will be an additional \$55K per year to join this group there will be some cost benefits of having the group provide services such as dTIMS etc.

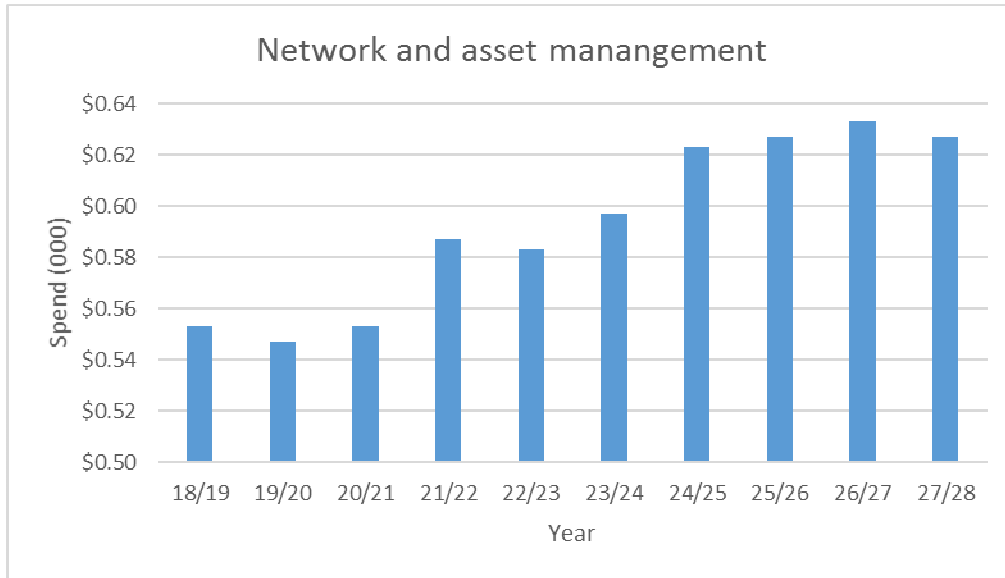
The following programme links to all the strategic issue/problem statements.

#### 9.10.8 PROGRAMME

Network asset management programme includes;

- WRTM modelling
- RAMM rating and RAMM upgrade fees
- Road legalisation
- Revaluation review (every 3 years)
- AMP external review
- dTIMs
- Business Unit
- SCRIM high speed data collection
- Specialist consultants
- RATA membership
- Speed management plan development

Network and asset management programme costs for the next 10 years;



The increase in 2018/2019 from 2017/2018 includes the joining of the Waikato Regional Asset and Technical Accord group. There is also an increase in business unit costs, regular condition assessments and traffic survey equipment is required on the former State Highways. There are options to reinstate the existing counters is estimated to be approximately \$50K however we are considering purchasing new ones which are easier to install on our high volume/arterial roads. The graph above doesn't include some renewal of the existing traffic counting batteries and speed trailer.

A speed management plan is to be developed for where we are required to invest in new infrastructure or engineer up, targeted investment and speed limit reviews. As our speed limit bylaw review is due to be completed by October 2018, we are now in the process of drafting a bylaw and reviewing the speed limits against the NZTA safe and appropriate speed maps and the speed management guide. This comparison will assist in providing a "sense" test and also show where it is best to invest in any safety improvement and where it is more efficient to manage speed limits by reduction them with public consultation. Both 5% and 10% maps will enable us to plan ahead so it is accepted and understood by road users, our communities and stakeholders.

Early indications of the review show some urban roads have been identified as roads to be reduced from 50km/hr to 40km/hr or less. Some unsealed low volume access roads are showing a proposed reduction of 100km/hr to 80km/hr. These will need to be included in the speed management plan for more discussion with the community, some will be difficult conversations and some will require some engineering work prior to these being adopted. We also have some roads which have posted speed limits at 70km/hr and these locations may need to have discussions with the community in terms there are no 70km/hr signs to be installed under the new guidelines.

The bylaw review will take place between November 2017 and August 2018, in which we will be engaging with all key stakeholders including NZTA, Ministry of Transport, Police and other key road safety partners.

## 9.11 Emergency Works

### 9.11.1 ACTIVITY 141 – EMERGENCY WORKS ACTIVITY 140 – MINOR EVENTS

#### 9.11.2 LINKS TO ONRC CUSTOMER OUTCOMES

The links to the ONRC customer outcomes for this activity is Safety (CO1 - the number of fatal and serious injuries on the network, CO2 – Collective Risk, CO3 – Personal risk), Resilience (CO1 – number of vehicles impacted by unplanned events, CO2 – number of instances where road access is lost).

#### 9.11.3 LEVELS OF SERVICE

No current levels of service.

#### 9.11.4 EVIDENCE

No evidence collected on road closures or unplanned events.

#### 9.11.5 GAP ANALYSIS

For any road closure or unplanned event there should be some record of the event, initial response and the permanent reinstatement timeframes. From this we can identify any changes possibly required in response times or reinstatements can be made.

#### 9.11.6 OPTIONS

- Option 1      Status quo.
- Option 2      Increase response time based on road classification.
- Option 3      Decrease response time based on road classification.

#### 9.11.7 PREFERRED OPTION

The preferred option is to remain with Option 1 however initial response and permanent reinstatement works should be prioritised based on ONRC.

Record response times and incidents in order to gain knowledge of what the response times are and the permanent reinstatement works are.

## 9.12 Low cost/low risk improvements

### 9.12.1 ACTIVITY 231 – ASSOCIATED IMPROVEMENTS ACTIVITY 341 - MINOR IMPROVEMENTS ACTIVITY 432 – ROAD SAFETY PROMOTION

#### 9.12.2 LINKS TO ONRC CUSTOMER OUTCOMES

The links to the ONRC customer outcomes for this activity is Safety (CO1 - the number of fatal and serious injuries on the network, CO2 – Collective Risk - whereby

the number of FSi's per km is reducing and CO3 – Personal risk – whereby the number of FSi's by traffic volume is reducing).

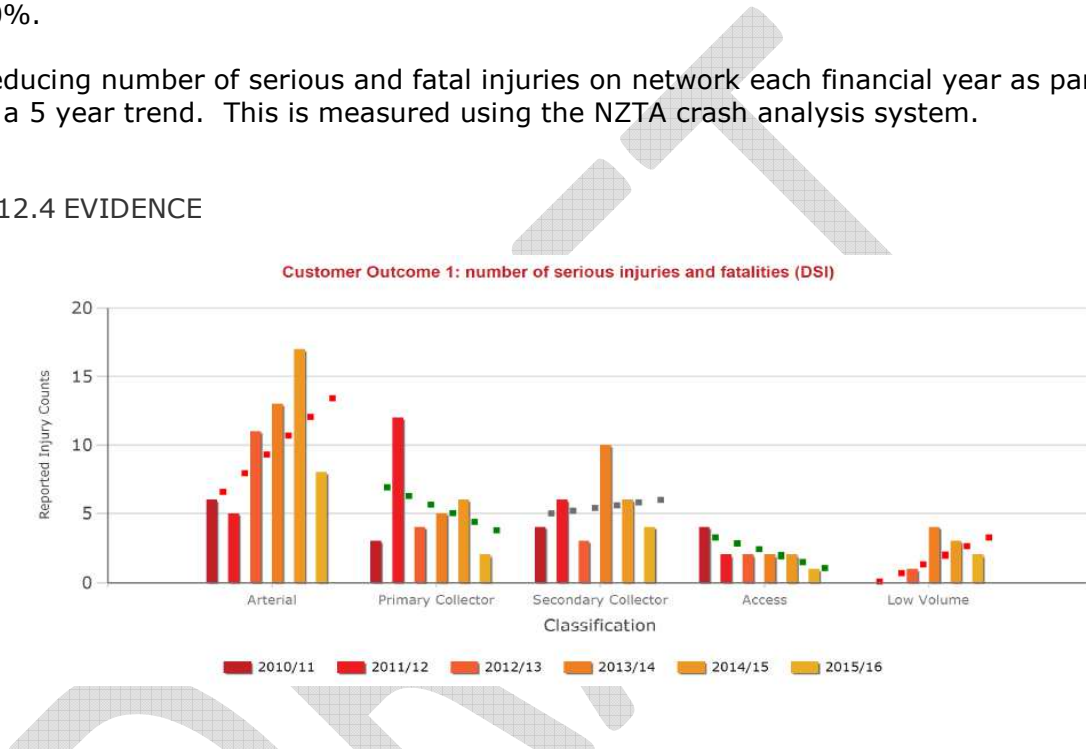
This activity is directly related to the ONRC LOS, and also linked to the National Safer Journeys strategy and the Waikato Regional Road safety strategy.

### 9.12.3 LEVELS OF SERVICE

The current Council level of service relates to annual change in Fatal and Serious injuries (FSi) from the previous year, where the FSi is attributable to the road conditions, in addition there is a measure for Smooth Travel Exposure with a target of 90%.

Reducing number of serious and fatal injuries on network each financial year as part of a 5 year trend. This is measured using the NZTA crash analysis system.

### 9.12.4 EVIDENCE



Classification	Earliest Reported Crash Date	Last Reported Crash Date	Collective Risk
Arterial <span style="color: red; font-weight: bold;">?</span>	25/03/2006	17/01/2015	0.057
Primary Collector	13/01/2006	25/12/2015	0.056
Secondary Collector	25/04/2006	26/12/2015	0.019
Access	6/12/2006	14/08/2015	0.005
Low Volume	23/03/2008	16/10/2014	0.003

Collective risk highlights which road links have a high number of fatal and serious crashes occurring on them which can be used to determine where the greatest road safety focus should be made from investment in engineering.

Classification	Earliest Reported Crash Date	Last Reported Crash Date	Personal Risk per 100M VKT
Arterial ?	25/03/2006	17/01/2015	8
Primary Collector	13/01/2006	25/12/2015	6
Secondary Collector	25/04/2006	26/12/2015	9
Access	6/12/2006	14/08/2015	5
Low Volume	23/03/2008	16/10/2014	5

Personal risk shows the likelihood of a driver, on average being involved in a fatal or serious road crash on a particular road classification. The measure is limited to rural sections only and the ranges are low risk is anything lower than 4, medium anything lower than 6.9 and high is over 9. The above shows our secondary collectors and arterial should be the roads to focus on for road safety improvements. Community at Risk register.

Evidence is based on the historical crash trends over the last 5 years. The Waikato Regional Council commissioned Opus to report on crash trends as part of the Waikato Regional road safety strategy document 2017-2021.

The communities at risk register identified a number of areas we need to consider in our road safety programme and/or road safety action plan.

Historically we have been spending approximately 5% of our maintenance budget (\$160K per year) on minor improvements and approximately \$220K on road safety/community programmes over the last 5 years.

#### 9.12.5 GAP ANALYSIS

The deficiency database doesn't currently align with the ONRC road classification, currently the priority is based on the type of treatment/improvement, cost of treatment, crash history and other multi criteria.

#### 9.12.6 OPTIONS

- Option 1 - Decrease the level of funding and crashes will continue to occur on all road classifications. The focus would need to be on the road classifications which are trending upwards in crashes which are arterial and low volume access roads as per the graphs above.
- Option 2 - Maintain the current level of funding which will allow the status quo but may not influence the Council's ability to contribute to the regional and national aim of the lowering the road toll or meeting the actions as identified in the Safer Journeys action plan.
- Option 3 - Increase the level of funding - this option will allow Council to continue to contribute to the regional and national focus and continue to realise the investment already made in the minor improvement programme.

#### 9.12.7 PREFERRED OPTION

Option 3 is preferred based on the continuation of fatal and serious crashes on the network. Currently Taupo District has had 22 serious and fatal crashes this year and



therefore needs to continue to address crashes where at all possible. We will continue to use the NZTA deficiency network database to record and prioritise all our network deficiencies identified by customers, contactors and/or staff.

The following programme links back to address all the strategic issue/problem statements particularly road safety.

#### 9.12.8 PROGRAMME

##### **Low cost/low risk (minor improvements)**

These projects are prioritised using multi-criteria (NZTA deficiency database). Minor improvements also include projects such as lighting improvements to address night time crashes, guardrail installations, pedestrian refuge islands and/or similar facilities, walking and cycling improvement projects and intersection improvements.

Over the next 10 years we will be spending an average of \$200 per year on projects relating to safety, availability and access, and infrastructure safety.

Other low cost/low risk projects include :

Spa Rd/Ruapehu St signals	\$375K
Norman Smith intersection signals	\$435K
Speed limit signage	\$ 75K
Spa Rd/Titiraupenga St signals	\$565K
Titiraupenga St/Tamamutu St signals	\$470K
Titiraupenga St/Heuheu St signals	\$451K
Poihipi Road widening	\$550K
Tirohanga Road widening	\$600K over 2 years

Note: The first group of projects have come from Northern Access investigation which was completed in December 2017.

##### **Road Safety Programme**

Road safety programme based on high and/or medium strategic focus areas as identified in the safer journeys document and the communities at risk register. Over the next 10 years we propose to spend \$230K per year up \$14K per year from the previous AMP. The increase is due to inclusion of some budget for the National cycling skills programme.

Road safety programme will also include the speed management development.

##### **Cycleways creation expenditure**

Cycle strategy improvements: as identified by the Walking & Cycling Strategy

From 2018/19	\$ 80K
From 2019/20 to 2020/21	\$ 60K to \$ 62K
From 2021/22 onwards	\$ 20K/yr

Note: \$80K is to complete the shared path up Control Gates Hill to link with Stage 1 and Huka Falls Road footpath link. This project will link with the Bike Taupo project and on road cycle lane in future years.

Shared path beside the ETA (surface existing path in 4 sections over 4 years).

<del>From 2021/22 to 2022/23</del>	<del>\$ 450K/yr</del>
<del>From 2023/24 to 2024/25</del>	<del>\$ 500K/yr</del>
<b>Total cost</b>	<b>\$1,950K</b>

Note: This was removed during Council LTP workshops in November 2017.

## 9.13 Passenger Transport

9.13.1 ACTIVITY 511 - BUS SERVICES  
ACTIVITY 517 - TOTAL MOBILITY SERVICES

9.13.2 LINKS TO THE ONRC CUSTOMER OUTCOMES

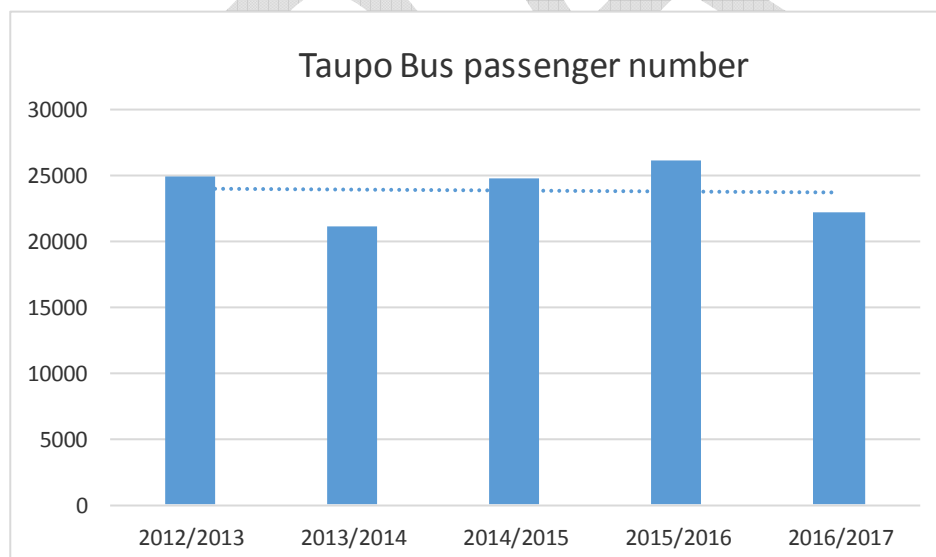
The links to the ONRC customer outcomes for this activity is Accessibility (OM1) – Access to Public transport is available. The customer measure is the bus services is what I would expect in an area like this. The technical measures is the proportion of the population living within 500m of a bus stop.

9.13.3 LEVELS OF SERVICE

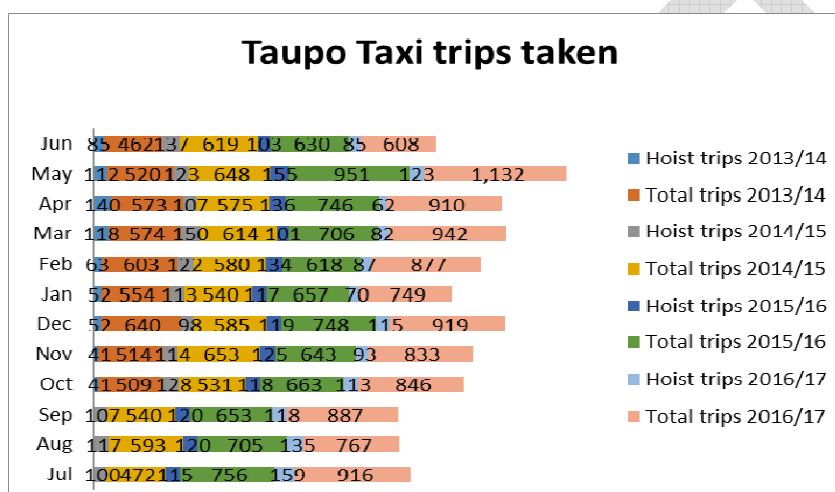
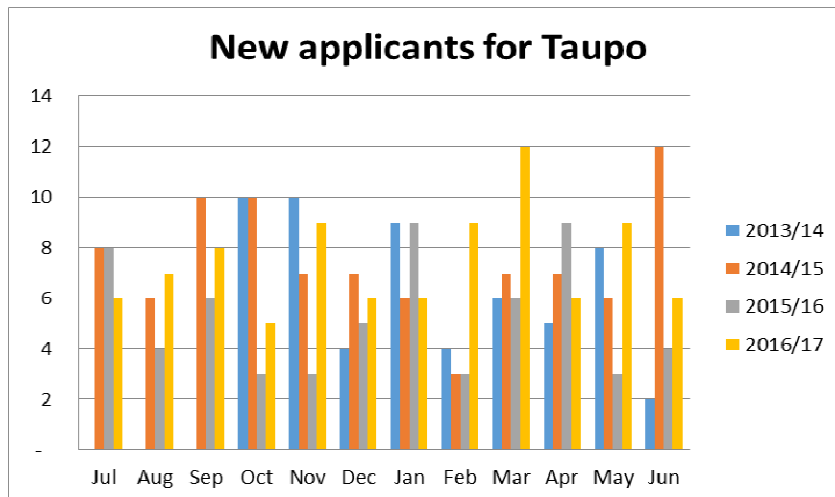
We currently don't have a service level for passenger transport however we used to have a performance measure of increasing passenger numbers using the service per year so this will need to be developed further. We need to confirm the Taupo service is classed as either a rural or urban service.

9.13.4 EVIDENCE

Historical passenger numbers have steady, however there was a slight dip in numbers when we last reviewed the service and removed a couple of areas from the route (Acacia Bay and Waitahanui) and when we increased the fares.



Total mobility scheme – numbers have been increasing which would be due to the urban boundary being removed. Any one in the Taupo District can apply to be part of the scheme if they meet certain criteria however the maximum subsidy for any fare is capped at \$12.50.



#### 9.13.5 GAP ANALYSIS

We are currently undertaking a review of the current bus service to identify any route changes required or issues prior to the renewal of the contract in June 2018. From the two user groups there appears to be some shortfalls of the current bus route mainly with the school children in the afternoons, but overall the route seems to cover a good area of the community, with some concerns about Acacia Bay, Nukuhau and Waitahanui.

Workshops with key stakeholders are planned with options and recommendations to come from these workshops.

#### 9.13.6 OPTIONS

##### For passenger transport

- Option 1 Status quo – leave the bus service as is and retender with current budget of \$200K.
- Option 2 Review service and route by undertaking a business case approach and identifying where issues/customer concerns are. Some additional budget is being allowed in the next 10 year as options haven't been developed or costed at the time of writing this AMP.

##### For total mobility scheme

- Option 1      Status quo – budget allocation of \$25K.  
Option 2      Review total mobility scheme on annual basis as per number of trips and registered applicants. Due to the increase in numbers per year an additional \$3K is estimated.

#### 9.13.7 PREFERRED OPTION

The preferred option for the bus passenger service is to review the service and look at improvements to the route but within a similar budget to what we are allocating now. We are currently undertaking a business case approach and working with focus groups (bus and non-bus users) to see what improvements can be made. Other options we will be considering are smaller buses providing a more flexible on demand service and/or increasing the fares to improve farebox recovery.

The preferred option for the total mobility scheme is to review the scheme annually and discuss with Age Concern. We have allowed a small increase in the budget this year however if there is no appetite for an increase we could review the maximum subsidy which is currently \$12.50 per trip. The scheme currently provides transport for those aged between 9 and 90 years.

The following programme links to the strategic issue/problem statements for aging population and road safety.

#### 9.13.8 PROGRAMME

The programme for the next 10 years is as follows.

Bus service                      \$220K per year  
Total mobility scheme        \$28K per year

This programme links to the strategic issue relating to the aging population and the affordability of those on fixed incomes. The passenger transport system provides the community with an affordable alternative mode and provides a wellbeing for those who are unable to drive any longer. The benefits for this service, but not limited to, is to provide access to health & educational services, connectivity to others, mobility and sense of independence. The consequences for not providing these services are people will lose their independence and become dis-associated with their friends and/or community life and their health and wellbeing may deteriorate.

### 9.14 Service Delivery and Rationale

The Transportation service is carried out by a number of providers as shown in Table 14.1.

<b>Service</b>	<b>Provider</b>	<b>Rationale</b>
<b>Asset Management</b>	Council	To maintain the knowledge of the asset in house.
<b>Management of Maintenance Contracts</b>	Council business unit	To maintain control of the costs of the services and is part of the requirements by NZTA.
<b>Minor Design/Investigations</b>	Council	In house knowledge and resource available.
<b>Major Design</b>	Tendered	To capitalise on external expertise resource/ experience and take advantage of

		competitive pricing/competition.
<b>Road Maintenance</b>	Tendered	To capitalise on external expertise resource/ experience and take advantage of competitive pricing/competition.
<b>Streetlight Maintenance</b>	Tendered	To capitalise on external expertise resource/ experience and take advantage of competitive pricing/competition.
<b>Signs &amp; Markings Maintenance</b>	Tendered	To capitalise on external expertise resource/ experience and take advantage of competitive pricing/competition.
<b>Construction of new footpaths / cycleways</b>	Tendered	To capitalise on external expertise resource/ experience and take advantage of competitive pricing/competition.
<b>Reseals (combined with Road maintenance contract)</b>	Tendered	To capitalise on external expertise resource/ experience and take advantage of competitive pricing/competition.

**Table 14.1 TDC Service and Providers**

### Transportation Contracts

The following table shows a summary of all TDC maintenance and renewals contracts. It is noted that we will have three contracts up for tender with the starting date of June 2018.

<b>Contract Name</b>	<b>Contract No.</b>	<b>Approx. Value (\$)</b>	<b>Term (yrs)</b>	<b>Comments</b>	<b>Maintenance/ Renewal/ Creation</b>
Road maintenance & reseals	TDC 1314/089	\$5,535,559	3+1+1	Higgins commenced 01//2013, to be renewed in 2018	Maintenance Renewal Creation
Pavement Marking	TDC/1314/099	\$602,313	3+1+1	Roadrunners commenced 01/12/2013	Creation Renewal
Streetlight Maintenance	TDC 1112/069	\$638,835	3+1+1	Broadspectrum commenced 01/07/2012 - extended to end in June 2018	Maintenance Renewal Creation
Streetlight - LED upgrade		\$2,500,000		Tender has closed	Renewal
Signs Maintenance	TDC 1415/140	\$347,258	3	Commenced 01/07/2015	Maintenance Renewal Creation
RAMM Rating and Roughness	TDC/1617/196	\$128,840		Opus commenced 1/06/17	Maintenance
Electricity Supply Contract	TDC/1314/116		3	Commenced 01/04/2014	Maintenance

Footpaths		No budget in last 10 year plan			Creation
Passenger Transport	WRC contract		9 years	Up for renewal in June 2018.	Operations

**Table 14.2 TDC Maintenance and Renewal Contracts as of July 2017**

Notes: \*Energy supply only – does not include network charges

### Contract types

Lump sum contract and measure and value contracts are the two types of contract procurement, Taupō District Council utilise for project tendering. Where the estimated cost of the project is less than \$50,000, a lump sum contract is generally used. If greater than \$50,000, a schedule of quantities is provided to enable a measure and value contract be tendered.

Lump sum contract: More than one contractor is asked to supply a fixed price quote for the project. The contractor is responsible for the measurement of quantities.

Measure and value contract: The quantities in the Schedule of Prices are measured by the Engineer, which is provided for the purpose of evaluating tenders. Each item of work is carried out at the fixed rate set out in the Schedule of Prices. The sum shall be adjusted by any additions or deductions under the contract.

### Methods for tendering and evaluation

Tender Evaluation Method	Contract \$ Value		
	\$0-50,000	\$50,001-\$100,000	\$100,000+
Expedited Procedures (Negotiation)	√	×	×
Expedited Procedures (Limited Invitation to Tender)	√	√	×
Lowest Price Confirming Tender	√	√	√
Quality-Price Trade Off Method	√	√	√
Weighted Attribute Method	√	√	√

**Table 8.3: Physical Works - Method Selection Matrix**

**Key** (×) = not permitted (√) = permitted

**Note:** For projects with a dollar value of less than \$100,000 the expedited procedures are generally the most appropriate methods because administration costs will be less and hence a more reasonable proportion of total contact value.

**Reference:** Section 2. New Zealand Transportation Agency Procurement Manual.