Asset Management Plan Update 2016

June 2016

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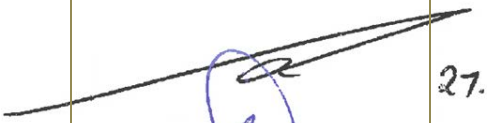
Recommended by	Tony McCartney Group Manager Assets and Maintenance		27.6.16
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Executive summary

1.1. Background

Auckland Transport (AT) manages $16.5 billion of mainly road and public transport assets. To demonstrate that these assets are being managed in a prudent, efficient and forward-looking manner, AT prepares an Asset Management Plan (AMP) every three years.

In years when AT does not prepare a new AMP, an Annual Update sets out significant changes.

AT adopted its most recent Asset Management Plan in mid-2015, following extensive consultation. The 2015 AMP gives effect to the relevant components of Auckland Council's Long Term Plan 2015-2025 and is consistent with the Government Policy Statement on Land Transport. Key messages of the 2015 Asset Management Plan are:

- Looking after what we have is AT's first priority.
- Current asset condition is good and customer satisfaction is stable. Approved investment levels are expected to maintain this status quo for the coming 3 years.
- Growth adds about 1.5% more assets (and costs) to the network each year. Funding the maintenance and renewals impacts of asset growth is an ongoing challenge.
- From 2018 onwards there is a growing gap between costs and available funding. This will be addressed in the next Asset Management Plan 2018 - 2021.

1.2. Key messages of the 2016 AMP update

This AMP update demonstrates that AT is continuing to maintain the value and service potential of its road and public transport assets, and to keep pace with growth. Key messages are:

- **Financial update:** Little change is proposed to the budgets adopted in the 2015 Long Term Plan, although there is some reallocation within approved totals.
- **Levels of service:** Asset condition remains good. AT is on track to achieve six of its nine key Asset Management performance targets in the 2015/2016 financial year, the major exception being safety. Customer satisfaction with roads and footpaths has also returned to previous levels after increases in the past two years.
- **Network growth** has been closer to 0.6% per year than to the 1.5% per year forecast in the AMP, but the pace of development is picking up.

This AMP update also reports on work underway which will inform the 2018 AMP, including:

- **Consequential opex** calculations, which set out the future costs to operate and maintain new transport assets, including the City Rail Link and roads in new growth areas.
- The **One Network Road Classification,** which is the framework AT is using to develop an optimal programme of maintenance, operations and renewals to deliver a fit for purpose level of service and maximise value for money.
- The **Auckland Transport Alignment Project**, including AT's 30 year outlook for maintenance, operations and renewals.

Other AMP improvement initiatives include implementing the environmental sustainability improvements identified in the 2015 AMP, and consideration of introducing ISO55000 practice into AT asset management. The results of this work will be reflected in AT's 2018 Asset Management Plan.

2. Financial information

The AMP directs AT spending on renewals, maintenance and asset-based operations[1]. Expenditure in these areas is tracking closely to the budget set in the 2015 AMP, although there has been some reallocation of renewals budgets between classes of asset, as shown in Table 1.

Table 1: Summary of financial changes 2015 AMP to 2016 AMP Update

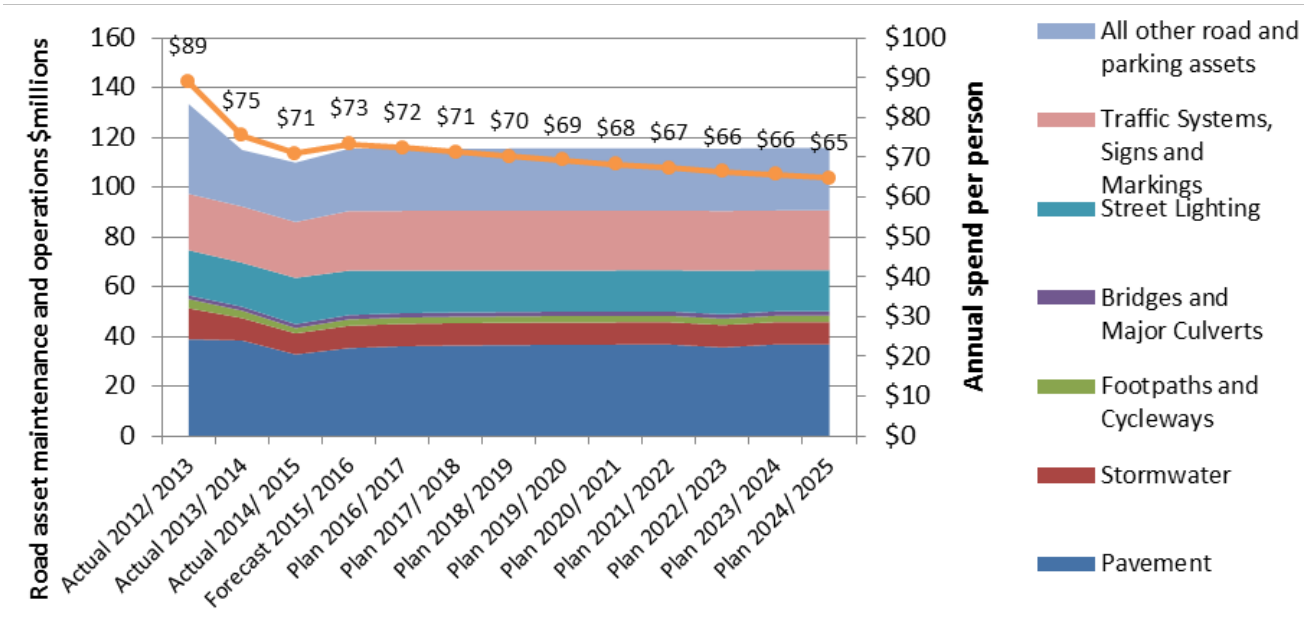
	Maintenance and asset-based operations		Asset Renewals	
$millions	2015 AMP	2016 AMP Update*	2015 AMP	2016 AMP Update*
2015/2016	179.4	179.4	198.0 m	198.1 m
2016/2017	178.6	178.6	228.2 m	229.7 m
2017/2018	182.5	182.5	239.6 m	239.6 m
Key changes	No change		More renewals of road pavements, stormwater and wharves, offset by reductions in other asset areas	

*This 2016 Update is based on the 2015 Long Term Plan budgets for maintenance and asset-based operations, and on the budgets submitted to AC for the final Annual Plan 2016/ 2017 for renewals.

2.1. Road maintenance and asset-based operations

AT budgets for road maintenance and asset-based operations were reduced in each of 2013/ 2014 and 2014/2015, relative to past expenditure and to the 2012 AMP[2]. In the 2015 Long Term Plan and AMP, budgets for 2015/2016 were set slightly higher, but there are minimal further increases after 2015/2016. Figure 1 and Table 2 also include information on road asset spend per person, which declines steadily.

Figure 1: Road maintenance and asset-based operations budgets 2012 to 2025 (actual/inflated $)



[1] Asset based operations are activities that directly consume resources to operate an asset such as energy, manpower, chemicals and materials, for example cleaning, electricity, fuel and vegetation control.
[2] The biggest single change was an end to berm mowing in the former Auckland City Council area

Auckland Transport
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Table 2: Road maintenance and asset-based operations expenditure 2012 to 2025, from 2015 Long Term Plan (actual/inflated $)

Asset Class ($millions)	Actual 2012/ 2013	Actual 2013/ 2014	Actual 2014/ 2015	Fore-cast 2015/ 2016	Plan 2016/ 2017	Plan 2017/ 2018	Plan 2018/ 2019	Plan 2019/ 2020	Plan 2020/ 2021	Plan 2021/ 2022	Plan 2022/ 2023	Plan 2023/ 2024	Plan 2024/ 2025
Pavement	50.1	38.4	32.8	35.1	35.9	36.2	36.4	36.5	36.6	36.6	35.5	36.6	36.7
Stormwater	12.4	9.0	8.5	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
Footpaths and Cycleways	3.7	3.0	2.1	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
Bridges and Major Culverts	1.5	1.6	1.6	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Street Lighting	18.2	17.7	18.6	17.8	17.1	16.8	16.7	16.6	16.6	16.6	17.5	16.6	16.6
Traffic Signals, Signs and Markings	21.9	22.6	22.5	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0
Corridor Structures and Fixtures	0.0	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Parking	9.9	10.2	10.1	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8
Vegetation	15.0	12.3	13.6	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.1
Total	132.7	115.0	109.9	114.4	114.4	114.4	114.5	114.5	114.5	114.6	114.4	114.6	114.7
Auckland population (millions) (2)	1.5	1.5	1.5	1.6	1.6	1.6	1.6	1.7	1.7	1.7	1.7	1.8	1.8
Road maintenance cost ($/person/year)	$88.50	$75.44	$70.96	$72.67	$71.63	$70.58	$69.58	$68.61	$67.66	$66.77	$65.78	$65.04	$64.21

The ten year maintenance and asset-based operations budgets shown in Figure 1 and Table 2 are in actual, inflated dollars. In each of the ten years of the LTP, AT must make provision for:

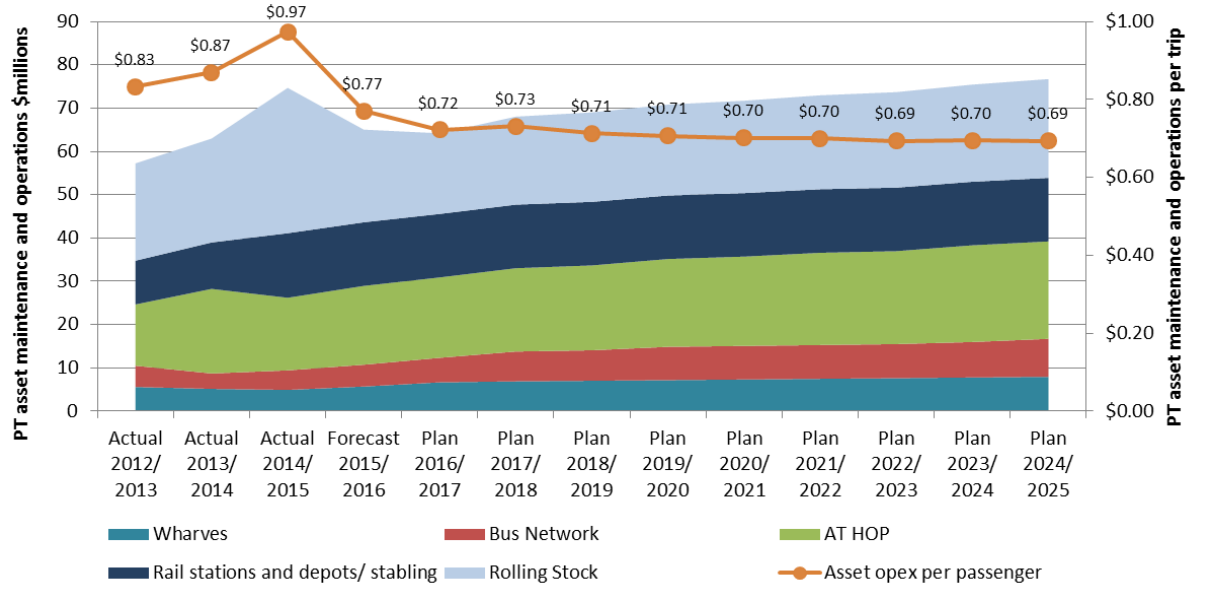
- Inflation
- Growth in the asset base
- Level of service changes
- Efficiencies

2.2. Public transport maintenance and asset-based operations

The majority of AT's public transport spending is on bus, rail and ferry service contracts. These are guided by the Regional Public Transport Plan. The 2015 AMP guides expenditure on maintenance and asset-based operations for busway stations, bus stops, rail stations and ferry wharves, and for AT HOP ticket machines and card readers.

Budgets for PT maintenance and asset-based operations are shown in Figure 2 and Table 3. Cost per passenger peaked in 2014/2015, while AT was managing a mixed fleet of diesel and electric trains. From 20 July 2015, all of the core rail network was operating an electric-only service, with diesel trains operating only between Pukekohe and Papakura, resulting in significant savings in asset-based operations costs.

Figure 2: Public transport maintenance and asset-based operations 2012 to 2025 (actual/inflated $)



From 2016/2017, asset costs increase each year, to reflect increased services and the opening of new bus stations and bus/rail interchanges as set out in Section 6. As with roading budgets, AT must make provision for inflation, growth, level of service changes and efficiencies within these total budgets.

Patronage is forecast to increase more rapidly than cost throughout the coming decade, so that AT expenditure on bus, ferry and rail assets falls from 97 cents per trip in 2014/2015 to 69 cents per trip in 2024/2025.

Figure 2 and Table 3 exclude the costs and patronage benefits of the City Rail Link and light rail transit; these are considered in Section 6.

Table 3 : Public transport maintenance and asset-based operations expenditure 2012 to 2025, from 2015 Long Term Plan (actual/inflated $)

Asset Class	Actual 2012/ 2013	Actual 2013/ 2014	Actual 2014/ 2015	Forecast 2015/ 2016	Plan 2016/ 2017	Plan 2017/ 2018	Plan 2018/ 2019	Plan 2019/ 2020	Plan 2020/ 2021	Plan 2021/ 2022	Plan 2022/ 2023	Plan 2023/ 2024	Plan 2024/ 2025
Rolling Stock	22.5	24.0	33.6	21.4	18.6	20.3	20.7	21.0	21.3	21.7	22.1	22.4	22.8
Rail stations and depots/ stabling	10.1	10.7	14.9	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7
AT HOP	14.2	19.6	16.8	18.2	18.6	19.2	19.6	20.3	20.6	21.3	21.5	22.3	22.5
Bus Network	4.9	3.6	4.5	5.0	5.7	6.9	7.0	7.7	7.8	7.8	7.9	8.2	8.8
Wharves	5.6	5.1	4.9	5.7	6.7	6.9	7.0	7.2	7.3	7.5	7.6	7.8	7.9
Total	**57.2**	**63.0**	**74.7**	**65.0**	**64.2**	**68.0**	**69.0**	**70.8**	**71.7**	**73.0**	**73.7**	**75.4**	**76.7**
PT trips* (millions) (3)	68.7	72.4	76.7	84.5	89.0	93.0	96.8	100.3	102.3	104.3	106.4	108.5	110.7
PT asset cost** ($/PT trip)	$0.83	$0.87	$0.97	$0.77	$0.72	$0.73	$0.71	$0.71	$0.70	$0.70	$0.69	$0.70	$0.69

*excludes additional trips generated by the City Rail Link and light rail transit projects (see Section 8)

** excludes the costs of the City Rail Link and light rail transit projects (see Section 8)

2.3. Update on cost drivers

The impact of cost drivers from inflation and asset growth since the 2015 AMP was published has been less than anticipated.

The 2015 AMP recommended that maintenance and operations funding was adequate, if constrained, in the 2015/2016 year but that a widening gap would arise between maintenance budgets and asset needs, due to:

- inflation
- consequential opex from asset growth
- growth in vehicle, public transport, freight, cycle and pedestrian trips
- a shortfall in renewals funding creating increasing demand for maintenance

An update on each of these factors is presented in Table 4.

Table 4: Update on cost pressures for road maintenance and asset-based operations

Cost driver	Update as at March 2016
Inflation	Since the AMP was adopted in June 2015 the Consumer Price Index is unchanged (3), with inflation in some goods being offset by falling fuel prices.
Consequential opex from asset growth	Table 8 shows that growth in road pavement assets in the 18 months from October 2014 to March 2016 was 0.9%, with associated assets such as streetlights and traffic signals growing by a similar percentage. This is consistent with an annual asset growth rate of 0.6%. Infrastructure provision for walking and cycling is growing more rapidly. The longer term opex consequences of asset growth are expected to be very significant, and are considered in detail in Section 6.
Additional costs associated with growth in trips	Freight growth is the most significant factor affecting road asset costs, because heavy vehicles have the greatest impact on road pavements. Over the ten years from 2004/2005 to 2014/2015, heavy vehicle volumes on Auckland state highways increased by 15% (4). Of these freight movements only 1.4% are travelling from Waikato to Northland (5) and can be assumed to use only the State Highway network; the remaining 98.6% of freight trips also use AT local roads. Public transport patronage grew by 6.9 million trips (9.5%) in 2014/2015. Cycling has grown 23.8 per cent since 2010, though there was no clear increase in 2014/2015 (2). The most recent data on vehicle travel, in 2013/2014 (3), did not show any significant growth in travel on Auckland local roads since 2006, though the recent fall in fuel prices would be expected to lead to a rise in vehicle travel.
The impact on maintenance of constrained renewals budgets	Where renewals are deferred due to budget constraints, there is an impact on maintenance costs. This is a concern beyond 2018, when renewals budgets do not increase in line with asset needs. For now, renewals budgets are in line with AMP recommendations and asset condition is stable as shown in Section 3.2.

Cost drivers have had less impact on short term budgets than anticipated, but the long term gap between asset costs and funding, from 2018 onwards, remains a concern. This issue is considered in more detail in Sections 5 to 8.

2.4. Renewals

Renewals spending in total is close to the levels set in the 2015 AMP but there has been some reallocation between asset classes as shown in Table 5.

Table 5: Actual and planned renewals expenditure 2012 to 2018

Asset class		2012/ 2013 actual	2013/ 2014 actual	2014/ 2015 actual	2015/ 2016	2016/ 2017	2017/ 2018	change 2015/ 2016	change 2016/ 2017	change 2017/ 2018
Pavement	2015 AMP	123.0	136.9	130.7	123.8	143.1	150.2			
	2016 update				136.3	143.1		12.5		0
Stormwater	2015 AMP	13.1	13.4	15.9	12.6	14.5	15.3			
	2016 update				15.5	14.5		2.8		0
Footpaths and Cycleways	2015 AMP	26.4	18.0	19.8	14.6	16.9	17.7			
	2016 update				14.6	16.9				0
Bridges	2015 AMP	8.4	4.5	4.0	15.2	17.5	18.4			
	2016 update				5.8	18.3		-9.4	0.8	0
Walls	2015 AMP	1.5	1.4	2.3	4.7	5.4	5.7			
	2016 update				0.8	6.9		-3.9	1.5	0
Street Lighting	2015 AMP	9.2	10.0	11.7	9.1	10.4	11.0			
	2016 update				10.1	10.4		1.0		0
Traffic Signals, Signs and Markings	2015 AMP	5.1	3.5	4.2	7.4	8.7	9.2			
	2016 update				4.9	8.7		-2.5		0
Corridor Structures and Fixtures	2015 AMP	1.9	2.1	1.4	2.5	2.8	3.0			
	2016 update				1.0	2.1		-1.5	-0.8	0
Parking	2015 AMP	1.8	1.7	1.7	2.2	2.3	2.4			
	2016 update				2.2	2.3				0
Total road asset renewals	2015 AMP	190.5	191.5	191.6	192.2	221.7	232.9			
	2016 update				191.1	223.2		-1.0	1.5	0
Rail stations and depots/ stabling	2015 AMP	1.2	1.6	1.7	2.2	2.5	2.6			
	2016 update				2.2	2.5				0
Rolling Stock	2015 AMP	3.5	5.3	0.0	0.5	0.5	0.5			
	2016 update				0.5	0.5				0
Wharves	2015 AMP	2.2	1.0	0.9	2.3	2.4	2.5			
	2016 update				3.4	2.4		1.1		0
Bus Network	2015 AMP	1.2	0.9	0.8	0.9	1.1	1.1			
	2016 update				0.9	1.1				0
Total PT asset renewals	2015 AMP	8.1	8.8	3.4	5.9	6.5	6.7			
	2016 update				7.0	6.5		1.1		0
Total asset renewals	2015 AMP	198.6	200.3	195.1	198.0	228.2	239.6			
	2016 update				198.1	229.7		0.1	1.5	0

The 2015 AMP proposed some step changes in renewals funding, in particular:

- Bridges (up from $4.0 million in 2014/2015 to $15.2 million in 2015/2016)
- Walls (up from $2.3 million in 2014/2015 to $4.6 million in 2015/2016)
- Wharves (up from $0.9 million in 2014/2015 to $3.4 million in 2015/2016)

These increases were offset by a reduction in renewal of pavements, stormwater and footpaths.

This 2016 update sets a more measured pace of change. A key reason for this is the need to complete a thorough seismic assessment of bridges and retaining walls and to design renewals of these high risk assets to provide an appropriate level of earthquake strengthening.

The first phase of this process, which is complete, assessed the seismic risk of AT's 1,234 bridges and 4,004 retaining walls. A second phase is now assessing in detail those assets identified in phase 1 as high risk. AT is still planning for a step change in renewals of bridge and retaining wall assets, but the rate of implementation has been revised to take account of the complexity of the planning process.

The largest change in public transport asset renewals is an even faster step change in wharf renewals, with $3.4 million in renewals funding provided in 2015/2016 and $2.4 million in 2016/2017, as shown in Table 5.

3. Levels of Service

Asset condition remains good and customer satisfaction remains stable. AT is on track to achieve six of its nine key Asset Management performance targets in 2015/2016.

3.1. Statement of Intent indicators

The AMP sets out nine asset-related performance indicators from AT's Statement of Intent. Of these, six are on track to be achieved or exceeded in 2015/2016, as shown in Table 6. The major exception is the target to reduce deaths and serious injuries on the local road network. The contribution of asset management to improving safety is considered further in Section 7.4.

Customer satisfaction with roads and with footpaths has fallen back to the levels seen in 2012/ 2013(for roads) and 2013/2014 (for footpaths).

Table 6: Update on asset-related KPIs as at March 2016

Performance measure	Actual 2012/13	Actual 2013/ 2014	Actual 2014/ 2015	Interim result, Mar 2016		Target 2015/ 16
Percentage of residents satisfied with the quality of roads in the Auckland Region	68%	71%	69%	68%	●	70%
Percentage of residents satisfied with the quality of footpaths in the Auckland Region	61%	63%	65%	63%	●	65%
Percentage of public transport passengers satisfied with their public transport service		81.4%	84%	84%	●	83%
Percentage of residents satisfied with road safety in the Auckland Region		63%	65%	63%	●	60%
Deaths and serious injuries on the local road network	354 in 12 months to Dec 2013	430 in 12 months to Dec 2013	399 in 12 months to Dec 2014	532 in 12 months to Dec 2015	●	Fewer than 390
Percentage of customer service requests relating to roads and footpaths that receive a response within specified time	85%	85%	84%	88%	●	85%
Road maintenance standards (ride quality), as measured by smooth travel exposure, for all urban and rural roads	Rural 95 Urban 85	Rural 95 Urban 85	Rural 95 Urban 85	Rural 96 Urban 87	●	Rural 93 Urban 83
Percentage of the sealed local road network that is resurfaced (includes road rehabilitation)		7.6%	8%	6.8% of the network Jul 15 to Mar 16	●	8%
Percentage of footpaths in acceptable condition (as defined in AT's AMP)	99%	99%	99%	99.5%	●	99%

Key to interim results:
● On target to exceed performance measure
● On target to meet performance measure
● Not on target to meet performance measure

Sources: AT *Annual Report 2015* (1), AT *Statement of Intent 2015/2016* (2) AT *Statement of Intent performance summary 2014/2015* (3), Monthly indicators report to AT Board, April 2016 (10)

3.2. Asset Condition

Road asset condition

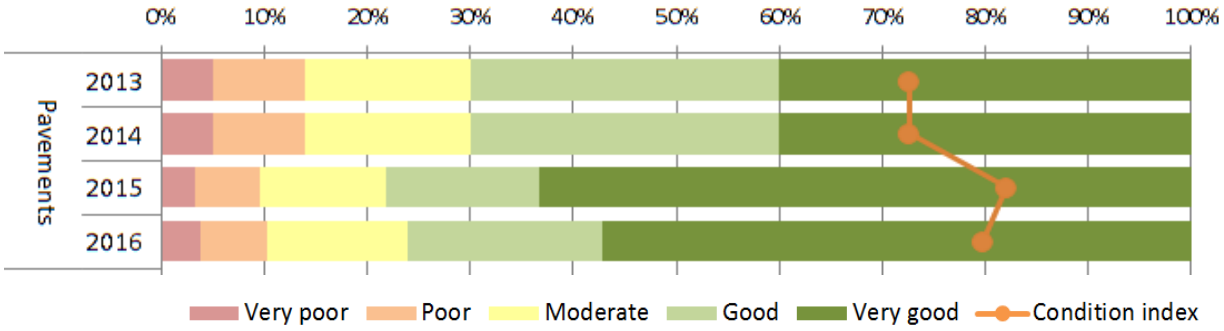
The 2015 AMP reported that asset condition was stable and that renewals budgets are sufficient in the first three years (2015/2016, 2016/2017 and 2018/2019) to maintain assets in their current condition.

This is borne out by 2016 condition data for AT's most significant roading asset classes; pavements, stormwater, footpaths and cycleways, bridges and walls. These assets have a total replacement value of $11 billion, and make up over 90% of the total road asset value of $12 billion.

In Figures 3 to 9, condition is shown as a percentage of the asset in each of five condition grades, from very good (dark green) through to very poor (red). The condition index[3] shows the overall condition of the network in each year.

Three quarters of pavement assets (76%) are in good or very good condition, and the condition index for pavements in 2016 is 80%, as shown in Figure 3. Pavement assets comprise the pavement base for all 7,369 km of AT's road network, and the pavement surface layers of the 6,481 km of sealed roads.

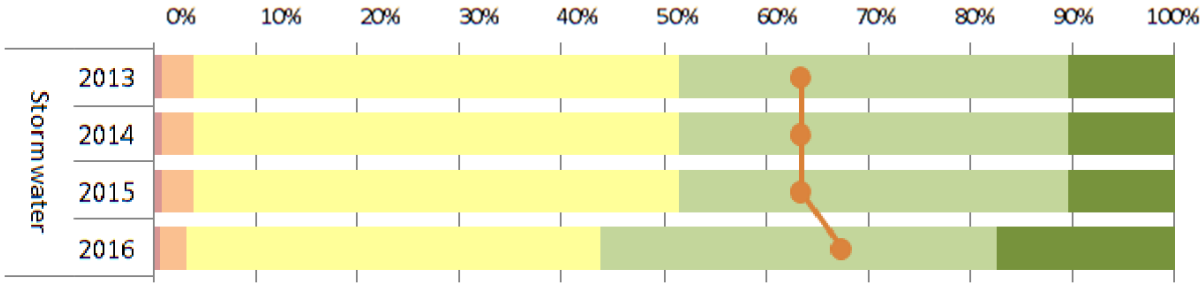
Figure 3- Condition of pavement assets 2013 to 2016



For stormwater assets, a major data improvement programme is underway but was not complete at the time of the 2016 assessment of asset condition. Over half (56%) of the stormwater assets recorded in RAMM are in good or very good condition, as shown in Figure 4. This may change as assets from legacy systems are recorded in AT's Asset Database.

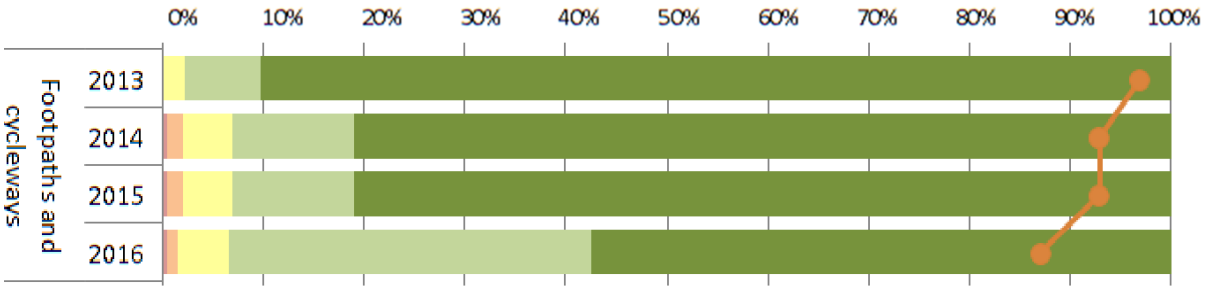
[3] The Condition Index is a weighted average of asset condition ratings. If all assets were in Very Good condition, the Condition Index would equal 100%.

Figure 4 Condition of stormwater assets 2013 to 2016



Footpaths and cycleways have been another focus for data improvements, and the decline in the condition index shown in Figure 5 is the result of more realistic data. AT has a target in the Statement of Intent that less than 1% of footpath assets will be in "very poor" condition; the current value is 0.5%.

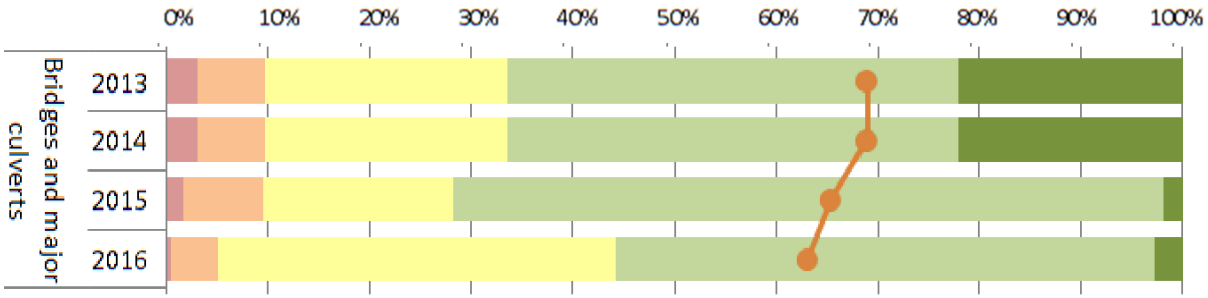
Figure 5 Condition of footpath and cycleway assets 2013 to 2016



Bridges, including major culverts with a diameter over 2 metres, have also been a focus for data improvements. Bridges are identified in the AMP as a critical asset, because the consequences of asset failure are so high. 19 of AT's 1,234 bridges have posted weight restrictions.

The AMP sets a target to have no bridges or major culverts in very poor condition, and progress is being made with 0.7% of bridge assets in very poor condition in January 2016, compared with 1.7% in 2015, as shown in Figure 6.

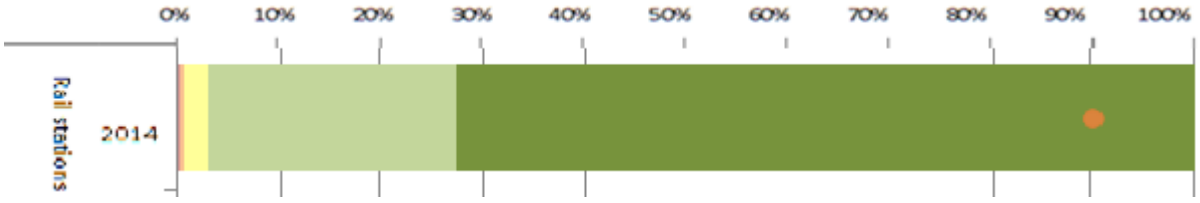
Figure 6 Condition of bridges and major culverts 2013 to 2016



Public Transport asset condition

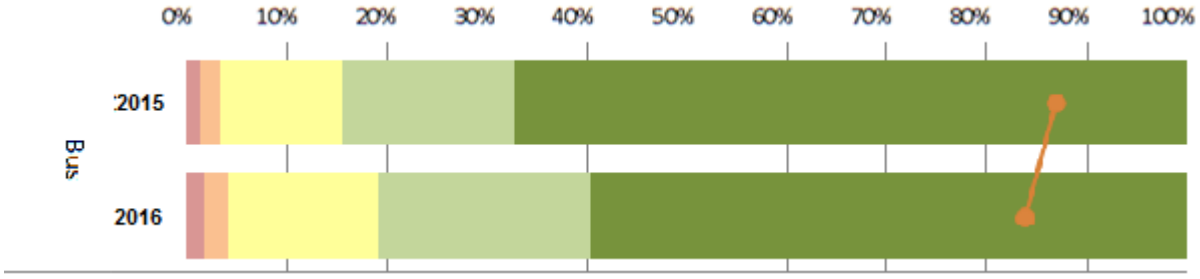
For public transport assets, the majority of AT's investment is in rail stations, most of which are relatively new and still in very good condition, as shown in Figure 7.

Figure 7: Condition of rail station assets October 2014



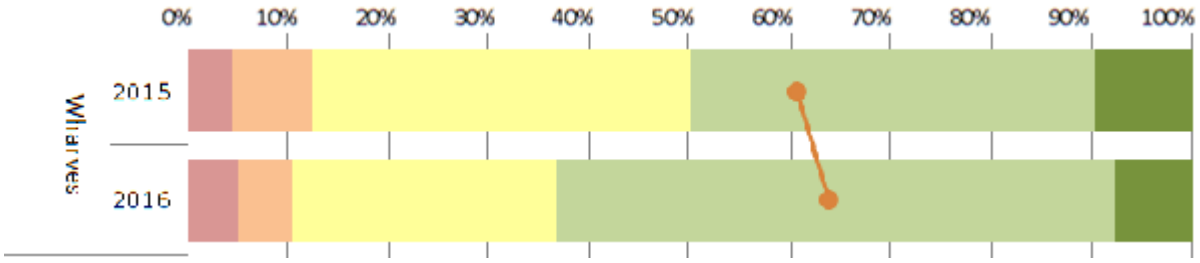
Bus assets include the Northern Busway stations, other bus stations including New Lynn, Takapuna and Manurewa, and AT-owned bus shelters. The Northern Busway stations represent most of the asset value of the bus network and are in very good condition, contributing to the overall high condition shown in Figure 8.

Figure 8: Condition of bus assets 2015 and 2016



Wharves are more of a concern, with 5% of wharf assets in very poor condition as shown in Figure 9. To address this, renewals funding has been increased from $0.9 million in 2014/2015 to $3.4 million in 2015/2016 and $2.4 million in 2015/2016.

Figure 9 : Condition of wharf assets 2015 and 2016



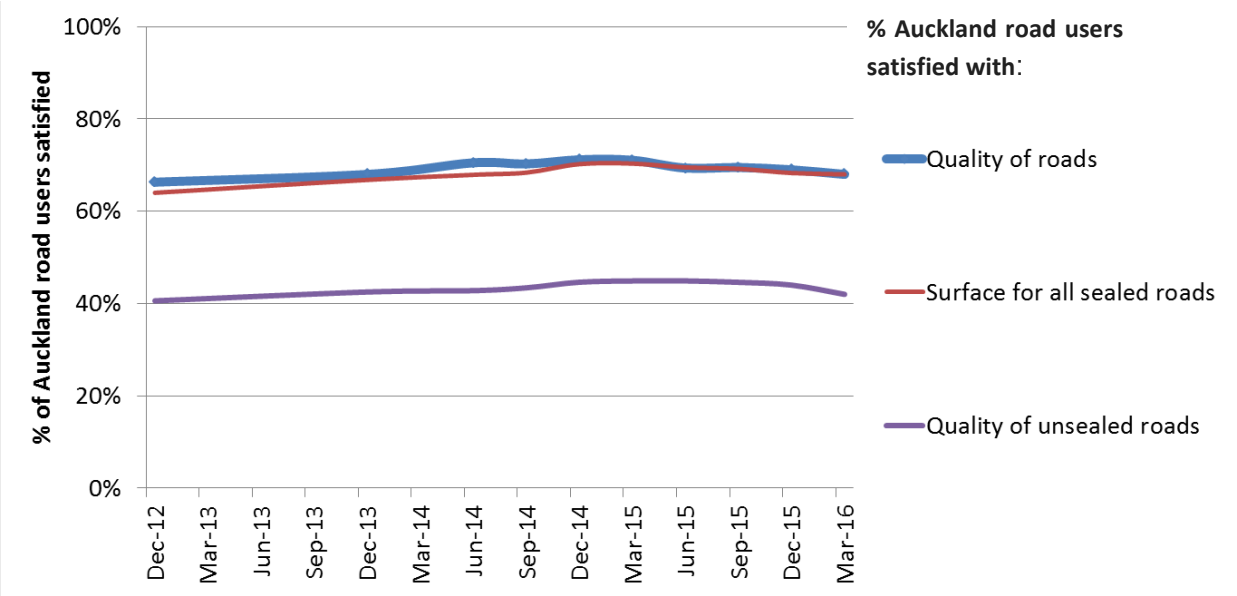
3.3. Customer satisfaction

Customer satisfaction - Roads

AT's roading customer satisfaction survey to March 2016 shows that 68% of residents are satisfied with the quality of roads in the Auckland Region. This interim result is below the target set in the Statement of Intent for the year to June 2016, of 70%.

Satisfaction with the quality of roads overall closely matches satisfaction with the surface of sealed roads. Current satisfaction is similar to that in 2012, as shown in Figure 10. This is consistent with the asset condition data in Figure 3 above which shows that there has been little change in the condition of sealed road pavements, with 76% of pavements in good or very good condition.

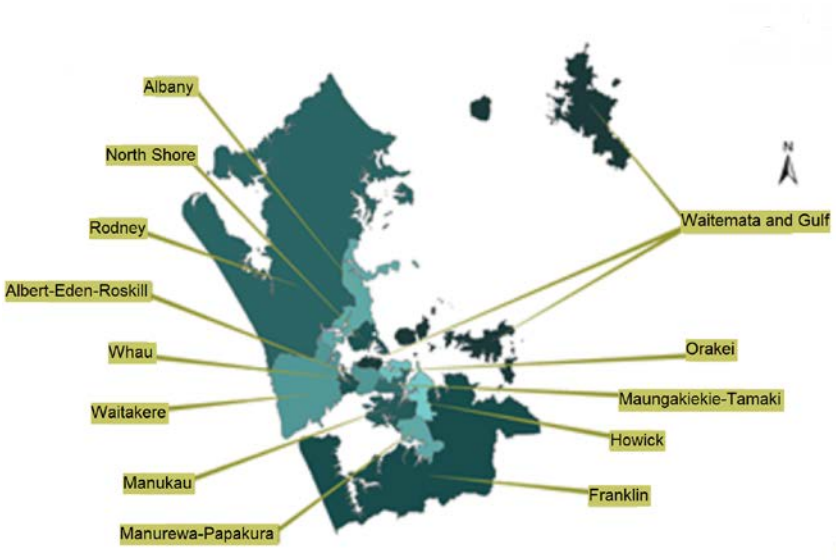
Figure 10: Auckland road user satisfaction with roads



Satisfaction with roads is significantly higher in the urban wards, as shown in Table 7. The proportion of road users satisfied with the quality of roads in urban Whau, Orakei and Howick is twice that of the almost completely rural Rodney ward. This is probably connected with the very low customer satisfaction with the quality of unsealed roads, which at 42% is much lower than satisfaction with sealed roads.

Table 7: Satisfaction with the quality of roads by ward, in descending order

% satisfied with the quality of roads in the Auckland Region, by ward	
Whau	80%
Orakei	78%
Howick	76%
Albert-Eden-Roskill	75%
Waitemata and Gulf	73%
North Shore	73%
Albany	70%
Maungakiekie - Tamaki	69%
Manukau	65%
Franklin	63%
Waitakere	63%
Manurewa-Papakura	59%
Rodney	38%



3.4. Other customer satisfaction measures

Other measures of customer satisfaction in AT's Statement of Intent are:

- Percentage of residents satisfied with the quality of footpaths in the Auckland Region
- Percentage of public transport passengers satisfied with their public transport service
- Percentage of residents satisfied with road safety in the Auckland Region

Footpaths

The proportion of residents satisfied with the quality of footpaths in the Auckland Region is 63%, and there have been no significant changes in this measure over time. There are also no significant differences between satisfaction with the quality of footpaths in the Auckland Region as a whole, and satisfaction with footpaths in the customer's local area (also 63%).

Public transport

Overall satisfaction with public transport services is 84%, and has been rising since September 2014, when satisfaction stood at 81%. This result is the combination of satisfaction with bus (84%), rail (84%), and ferry (88%). The most significant trend is an increase in satisfaction with rail services over the past year, coinciding with the introduction of electric trains. This is offset by a slight decline in satisfaction with ferry services.

Road safety

63% of residents are satisfied with road safety, which is 2% lower than the 65% satisfaction reported in 2014/2015. Road deaths and serious injuries are increasing as set out in Section 7.2.

4. Update on Network Growth

Growth in road and PT network assets has been closer to 0.6% per year than to the 1.5% per year forecast in the AMP, but the pace of development is picking up.

4.1. Population growth and urban development

Population growth and changing travel demand puts additional pressure on Auckland's transport network. Increasing transport demand is focused in areas of new development and economic activity, but is also linked to population growth and changing demographics within the existing urban area.

Auckland's population growth is accelerating. Population estimates published by Statistics New Zealand (1) show Auckland to have grown by 43,500 in the past year (June 30th 2014 to June 30th 2015), an increase of 2.9 per cent.

Net migration to Auckland has contributed the majority of this observed population growth. Over the past year, new permanent and long-term migrants, including migrants from Australia (mostly returning New Zealanders) and international students, have all contributed to higher net migration flow to Auckland, resulting in an increased growth in the working age population. Increasing population has a direct impact on the number of new trips and demand on the transport network.

Alongside the increase in the working age population, Auckland's total employment has also increased. According to Statistics New Zealand's Business Demographics, employment in Auckland is up by 3.7 per cent for 2015 from the previous year.

Building activity is also accelerating. The number of new dwellings consented in Auckland in the 2014/2015 financial year was 17 per cent higher than the previous year.

Residential growth has been driven by the introduction of the Auckland Housing Accord and the declaration of Special Housing Areas (SHAs). According to the latest Monitoring Report (5) SHAs will play a significant role in housing supply. Over the next 10 years (2016 to 2026), 85,000 new dwellings and sections are expected to be built from SHAs and other major developments, with a focus on Paerata, Whenuapai and Puhinui.

4.2. Growth in Assets 2015 – 2016

Growth and changes to the transport asset inventory occurs through:

- AT capital projects
- New development, where new transport assets including roads, footpaths, streetlights and drainage infrastructure is constructed by the developer and then transferred to AT ownership

In some years State Highways have been revoked, with the assets being transferred to AT to manage as part of the local road network, but this has not been a factor in asset growth since the 2015 AMP.

The 2015 AMP was based on an asset inventory as at October 2014. Table 8 summarises the changes and growth in Auckland Transport's Asset inventory in the 18 months between October 2014 and March 2016.

The transport network has expanded, through AT projects and new development, by:

- 55 km added to local and arterial roads
- 13 km of new off road cycleways and shared paths
- 6 new bridges and culverts
- 7 additional signalised intersections
- 294 new streetlights
- 24 new AT Hop ticketing devices in rail and ferry terminals

For sealed roads, this equates to 0.9% growth in the network over 18 months, or 0.6% per year. The number of other road-related assets including bridges and streetlights is growing at a similar rate to road pavement. This rate of growth is substantially lower than the 1.5% growth per year forecast in the AMP. However the pace of growth is accelerating, as Special Housing Areas and other developments move from planning to construction.

New assets, whether constructed by developers or through AT projects, need to be maintained and operated, and eventually renewed, by AT. The consequential costs of new assets are significant and are covered separately in Section 6.

As well as keeping track of new assets, AT is continuously improving the definitions and fieldwork that underpin the Asset Inventory. This has resulted in some changes in asset totals as shown in Table 8 and Table 9.

Table 8 Details of road asset growth 2015 – 2016

Asset group	Sub-asset group	Unit	2015 AMP value (Oct 2014)	Change due to subdivision and asset growth		Change due to rectification of inventory discrepancies	2016 update (Mar 16)
Road Network				number	%		
Pavement	Total AT roads	km	7,302	55	0.8%	12	7,369
	Sealed roads	km	6,416	55	0.9%	10	6,481
	Pavement Surface	km^2	53.1	1	1.0%		53.6
Footpaths and cycleways	Footpaths	km	6,959	109	1.6%	219*	7,287
	Offroad cycleways	km	321	13	4.0%		334
Bridges and structures	Bridges & major culverts	no.	1,020	8	0.8%	206*	1,234
	Retaining walls	no.	3,553			451*	4,004
Parking	Parking buildings	no.	872	23	2.6%		895
Streetlighting	Luminaires	no.	105,347	294	0.3%	2,481	108,122
	Columns (AT owned)	no.	65,021	222	0.3%	3,931	69,174
Traffic systems	Signalised intersections/ midblock crossings	no.	769	7	0.9%	98	874
Street signs	All types	no.	136,887	2,726	2.0%	26,188	165,801
Stormwater	Catchpits	no.	75,481	987	1.3%	-18,465	58,003
	Soak holes	no.	2,409			9	2,418
	Manholes	no.	6,352	41	0.6%	-733	5,660

*Offroad paths and associated bridges and structures were added to the asset register in 2015

Table 9: Details of public transport asset growth 2015 – 2016

Asset group	Sub-asset group	Unit	2015 AMP value (Oct 2014)	Change due to subdivision and asset growth	Change due to rectification of inventory discrepancies	2016 update (Mar 16)
Bus	Bus shelters	no.	2,432		-82	2,350
	Busway stations		6			6
Wharf	Ferry wharves	no.	21			21
	Ferry terminals with facilities	no.	9			9
Rail stations	Rail stations (with scheduled services)	no.	42			42
Rolling stock	Trains - Electric Multiple Units	no.	57			57
	Trains - Diesel Multiple Units	no.	10			10
AT HOP	AT HOP ticketing devices	no.	305	24		329

5. Asset Management Improvement Programme

Preparations for AT's 2018 Asset Management Plan are well underway. Major projects which will shape the 2018 Asset Management Plan are:

- Improved understanding of consequential opex costs of new infrastructure (Section 6)
- The One Network Road Classification (Section 7)
- The Auckland Transport Alignment Project (Section 8)

Other asset management improvement initiatives are summarised in Table 10.

Table 10: Asset Management improvement initiatives

ISO 55000	ISO 55000 is the international asset management quality assurance standard. AT is progressively aligning its asset management to best practice as defined in ISO 55000 and is preparing a business case to move to full implementation, including achieving certification to the standard. A project has been initiated to develop a strategy for an Enterprise Asset Management system which may help AT alignment with ISO 55000.
Pavement	AT is developing a pavement and reseal strategy. Testing of priority sections of the rural network for skid resistance is underway and will inform a skid resistance improvement programme.
Stormwater	Responsibility for stormwater is shared with Auckland Council, and to date there has been no single information system which includes all stormwater assets. AT is making progress on capturing all stormwater assets and is working with Auckland Council to ensure that accountability for each asset is clear.
Footpaths and Cycleways	AT has developed a regional footpath strategy. A slip resistance policy is being developed to address the high number of injury falls on footpaths
Bridges and Major Culverts Walls	Phase 1 of AT's seismic screening programme has identified bridges and walls at high risk in a seismic event, and these are now being assessed in more detail
Streetlighting	The rollout of energy efficient LED lighting is underway. This project includes an improved lighting management system which will provide detailed information to inform asset management decisions.
Sustainability initiatives	AT is progressing four key sustainability initiatives: • Improved alignment of the renewals programme to deliver public transport, walking and cycling and freight networks in line with future strategies • A review of the risks posed by sea level rise to AT assets • A vegetation asset class management plan which considers maintenance and enhancement of ecosystems in the road corridor • Review and identify sustainability issues and opportunities for each asset class including specific opportunities at time of renewal.

6. Consequential maintenance and operations costs

Consequential operational expenditure (consequential opex) is the operations and maintenance cost of new assets. By 2024/2025, AT will require $79.1 million per year to operate and maintain new assets built or acquired over the coming decade. AT's current (2015/2016) expenditure on maintenance and asset based operations is $179.4 million and over the next 10 years this will need to increase by 44% to cater for the consequential opex impacts of urban growth and AT's capital programme.

6.1. Sources of consequential opex

Over the next 30 years, Auckland's population is expected to increase by more than 700,000 people, and freight volumes are expected to rise 78 percent (11). New strategic capital projects are essential to accommodate this level of growth. The 2015 Asset Management Plan includes the capital costs of the City Rail Link, the AMETI package of road and public transport initiatives, and a range of other road and public transport improvements.

Planning is also underway for light rail transit which is being considered through the Auckland Transport Alignment Project, set out in Section 8 of this document.

Most of the consequential opex in the coming 10 years arises from AT's strategic capital projects with some costs coming from vested assets that are built, usually by developers, in new growth areas. This is evident in Figure 11 and Table 11 below, where new costs associated with AT projects are expected to build up significantly, alongside a steady increase in costs associated with vested assets.

There will also be additional consequential opex costs associated with light rail transit, to be confirmed through the ATAP project.

Figure 11: Consequential maintenance and operations costs for new transport assets

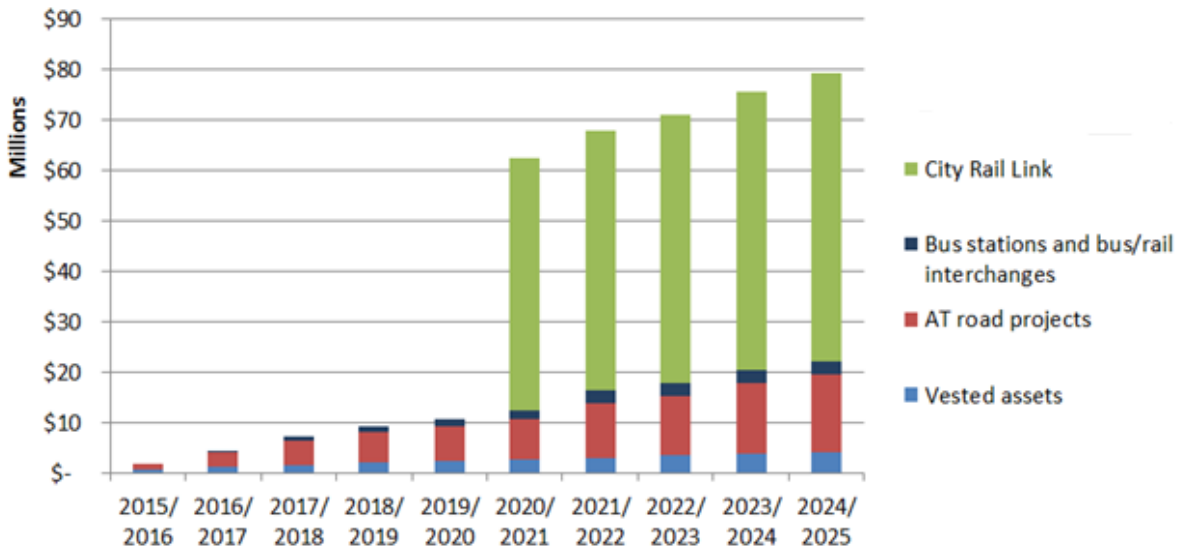


Table 11: Consequential maintenance and operations costs for new transport assets

($millions, uninflated, base year 2015/2016))	Forecast 2015/ 2016	Plan 2016/ 2017	Plan 2017/ 2018	Plan 2018/ 2019	Plan 2019/ 2020	Plan 2020/ 2021	Plan 2021/ 2022	Plan 2022/ 2023	Plan 2023/ 2024	Plan 2024/ 2025
Vested assets	0.6	1.3	1.6	2.0	2.4	2.8	3.1	3.5	3.9	4.3
AT road projects	1.3	2.8	4.7	6.2	7.0	7.9	10.7	11.8	13.9	15.3
Bus stations and bus/rail interchanges	0.0	0.4	0.9	1.1	1.2	1.9	2.5	2.5	2.6	2.6
City Rail Link	0.0	0.0	0.0	0.0	0.0	50.0	51.6	53.3	55.1	57.0
Total consequential opex	**1.9**	**4.5**	**7.2**	**9.3**	**10.6**	**62.6**	**67.9**	**71.1**	**75.5**	**79.1**

The City Rail Link dominates future consequential opex, making up 69 per cent of the additional maintenance and operations costs (note that these figures exclude light rail transit). These costs will be offset by fare revenue.

Figure 12 and Table 12 set out the estimated cost, by year, for the maintenance and operation of vested assets and AT road projects. Over the 10 years, these costs rise at approximately $2 million per year, reaching almost $20 million by 2025. Streetlights and traffic systems make up the majority (64%) of road consequential opex costs.

Figure 12 Breakdown of road consequential opex (vested assets and AT road projects) by asset type

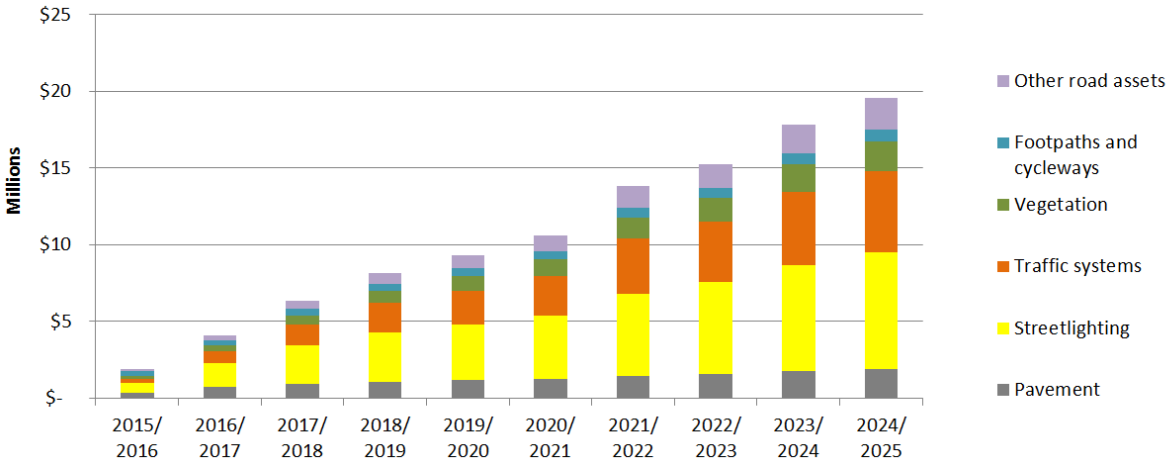


Table 12: Consequential opex for road assets separated by asset group (for both vested assets and AT road projects) (uninflated$, base year 2015/16)

($millions)	2015/ 2016	2016/ 2017	2017/ 2018	2018/ 2019	2019/ 2020	2020/ 2021	2021/ 2022	2022/ 2023	2023/ 2024	2024/ 2025
Pavement	0.4	0.8	0.9	1.1	1.2	1.3	1.5	1.6	1.8	1.9
Streetlighting	0.6	1.5	2.5	3.2	3.6	4.1	5.3	6.0	6.9	7.6
Traffic systems	0.3	0.8	1.4	1.9	2.2	2.5	3.6	4.0	4.8	5.3
Vegetation	0.2	0.4	0.6	0.8	0.9	1.1	1.4	1.5	1.8	1.9
Footpaths and cycleways	0.3	0.3	0.4	0.5	0.5	0.5	0.6	0.6	0.7	0.8
Other road assets	0.1	0.3	0.5	0.7	0.9	1.0	1.4	1.6	1.9	2.1
Total road assets	**1.9**	**4.1**	**6.3**	**8.2**	**9.3**	**10.6**	**13.8**	**15.3**	**17.8**	**19.6**

Table 13: Comparison of consequential opex with LTP growth provision

($millions)	2015/ 2016	2016/ 2017	2017/ 2018	2018/ 2019	2019/ 2020	2020/ 2021	2021/ 2022	2022/ 2023	2023/ 2024	2024/ 2025
Vested assets	0.6	1.3	1.6	2.0	2.4	2.8	3.1	3.5	3.9	4.3
AT road projects	1.3	2.8	4.7	6.2	7.0	7.9	10.7	11.8	13.9	15.3
Bus stations and bus/rail interchanges	0.0	0.4	0.9	1.1	1.2	1.9	2.5	2.5	2.6	2.6
City Rail Link	0.0	0.0	0.0	0.0	0.0	50.0	51.6	53.3	55.1	57.0
Light rail transit						Operational costs of light rail transit to be assessed				
Total consequential opex	**1.9**	**4.5**	**7.2**	**9.3**	**10.6**	**62.6**	**67.9**	**71.1**	**75.5**	**79.1**
LTP provision for City Rail Link								29.1	29.8	30.6
LTP provision for bus and bus/rail stations	0.0	0.4	0.9	1.1	1.2	1.9	2.5	2.5	2.6	2.6
LTP provision for road asset cost increases		0.1	0.1	0.1	0.1	0.2	0.2	0.0	0.2	0.3
Gap - unfunded consequential opex	**1.9**	**4.0**	**6.3**	**8.1**	**9.2**	**60.5**	**65.2**	**39.4**	**42.8**	**45.7**

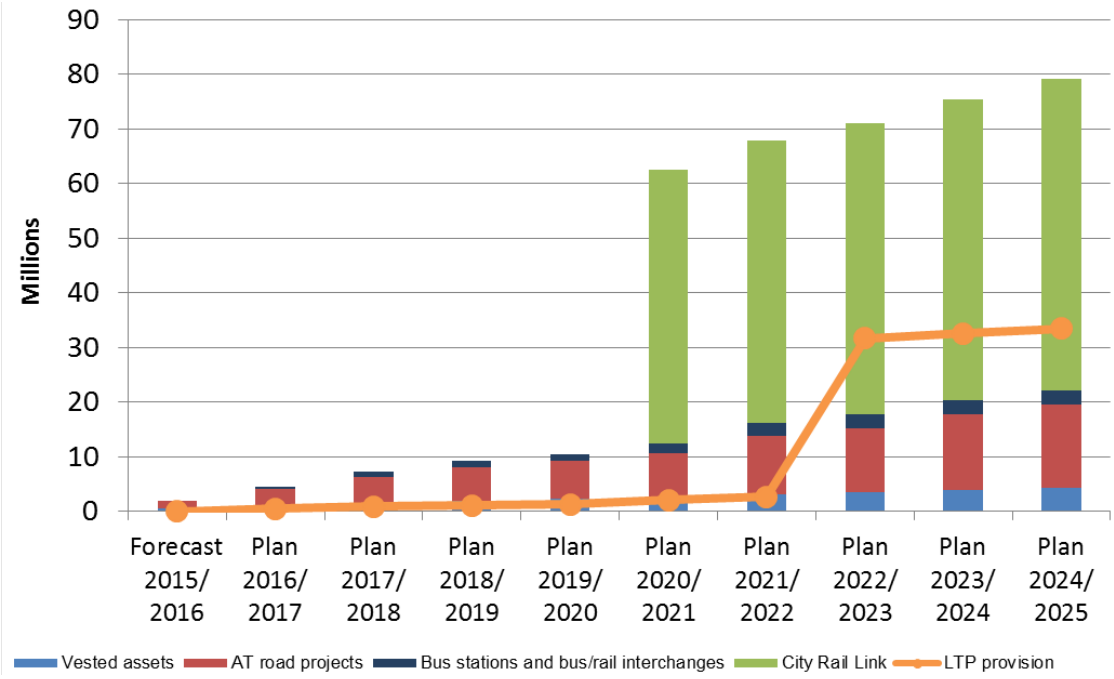
6.2. Comparison with 2015 Long Term Plan

AT's budgets from 2015/2016 to 2024/2025 are set in the 2015 Long Term Plan approved by Auckland Council. These budgets were described in detail in Section 2 and are summarised in Table 13 above.

Figure 14 shows the scale of the funding gap for consequential opex. There is provision in the 2015 Long Term Plan for funding of the City Rail Link from 2022/2023, and for the operational costs of bus stations and bus/rail interchanges, but almost no increase in budgets for road maintenance and asset-based operations.

Key changes in this AMP update are the earlier opening date for the City Rail Link (2021 not 2023) and a more detailed assessment of the consequential opex implications of AT projects (excluding light rail transit). In total, the funding required for consequential opex by 2025 is $76.6 million, a funding gap of $45.7 million, as shown in Figure 13 and Table 13.

Figure 13: Consequential opex, in context with provision in the 2015 LTP



6.3. Consequences of not funding growth-related asset costs

Auckland's transport asset network needs to expand to meet the needs of a growing population and economy, even though this expansion is costly both in terms of new capital and ongoing maintenance and operational costs. To realise the benefits of a new capital project, it is essential to meet the ongoing costs of maintaining, operating and eventually renewing that asset.

While it is possible in theory to meet the costs of new assets by reducing the level of service of existing assets, the disbenefits of this approach would soon outweigh the benefits of the new infrastructure.

AT is committed to looking after the assets we have as the first priority and is highlighting the funding gap for consequential opex as a key issue for the 2018 Asset Management Plan.

7. One Network Road Classification

The One Network Road Classification (ONRC) is the framework AT is using to develop an optimal programme of maintenance, operations and renewals to deliver a fit for purpose level of service and maximise value for money.

7.1. Purpose

ONRC is a joint initiative of the NZ Transport Agency and Local Government NZ developed to streamline the operation, maintenance and management of NZ road networks. A central principle is that levels of service, for example the acceptable roughness of a road, need to be set at a level that is appropriate for the purpose of each road in the national network. A nationally consistent classification system for roads also assists with benchmarking across NZ local authorities, and achieving value for money for road maintenance and renewals.

ONRC is part of a wider process led by the NZ Transport Agency and Local Government NZ to apply the Business Case Approach to road network management. The NZ Transport Agency expects that ONRC will be the basis for its funding allocation decisions for maintenance and renewals of roads from 2018 onwards.

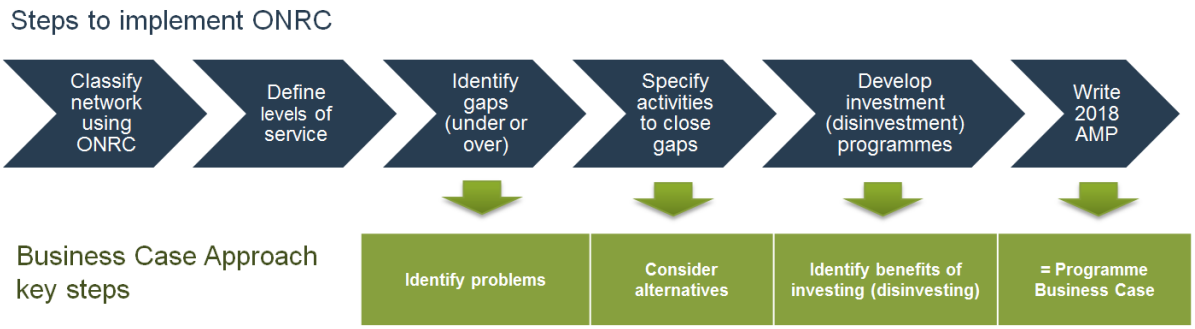
Auckland Transport has committed to fully integrate ONRC into its planning, management, financial and delivery processes.

7.2. Implementation of ONRC

AT completed its classification of the Auckland local road network in late 2014. The classification, and key points of AT's Transition Plan for implementing ONRC, were included in the 2015 AMP.

This AMP Update provides an update on the work underway to agree a fit for purpose level of service for roads, consistent with national guidance, and to quantify the gap between current service delivery and the desired level of service. This represents steps 2 and 3 of AT's process for implementing ONRC, as shown in Figure 14.

Figure 14: AT process for implementing ONRC



7.3. Business Case Approach

The business case approach is a structured process that integrates best practice decision-making, programme management and investment assurance tools.

Application of the business case approach to new capital projects is well established, but there is less guidance about how to apply the process to operations, maintenance and renewals.

Figure 15 demonstrates that AT's process for implementing ONRC will also answer the key steps in the business case approach; these are:

- identifying the core problems
- considering alternative ways to address these problems
- identifying the benefits to be gained by investing in solving the problems

As a result of following this process AT will develop a robust, evidence based Activity Management Plan which meets the requirements of a programme business case.

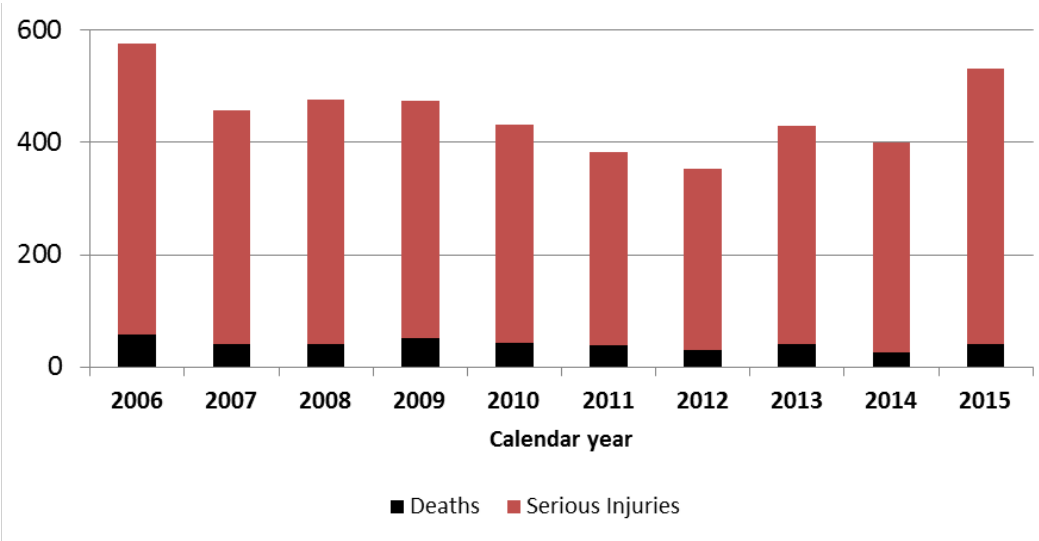
7.4. Progress to date –gap analysis

As a first step, AT has undertaken a gap analysis comparing current levels of service with a fit for purpose level of service defined using ONRC classifications and performance measures. This section sets out some initial results from AT's gap analysis, along with the implications of these for the development of maintenance and renewals work programmes for the 2018 AMP.

Safety

The ONRC safety target is for annual declines in deaths and serious injuries, consistent with the Safer Journeys strategy (7) and with AT's Statement of Intent (7). As shown in Figure 15, there has been no decline 2010-2014, and 2015 results show an increase in road trauma.

Figure 15: Deaths and serious injuries on Auckland local roads 2006 to 2015



Road trauma on Auckland local roads in 2015 imposed a social costs of $957 million, including reduced quality of life, reduced productivity, medical and other resource costs (15). There are opportunities to reduce this burden through better targeting of maintenance, renewals and minor capital projects to safety risk.

Around half of all road trauma is on arterial roads, as shown in Figure 16. Arterial roads make up only 15% of the road network by length.

Figure 16: Deaths and reported serious injuries 2010-2014 by ONRC classification

Road maintenance and renewals can make a significant contribution to road safety. The safe road system envisaged in the Safer Journeys strategy (12) includes:

- Safe roads and roadsides
- Safe speeds
- Safe road users
- Safe vehicles

Maintenance and renewals make a central contribution to safe roads and roadsides, and can also have a significant impact on safe speeds. When integrated with other road safety initiatives, a focussed approach to road maintenance and renewals can make a significant contribution to reducing death and serious injury on the road network.

The summary safety actions arising from this analysis are shown in Table 14. These actions are already being pursued within current budgets and will have an impact on the development of maintenance and renewals budgets in the 2018 AMP.

Table 14 : Summary of ONRC safety gap analysis and mitigation actions

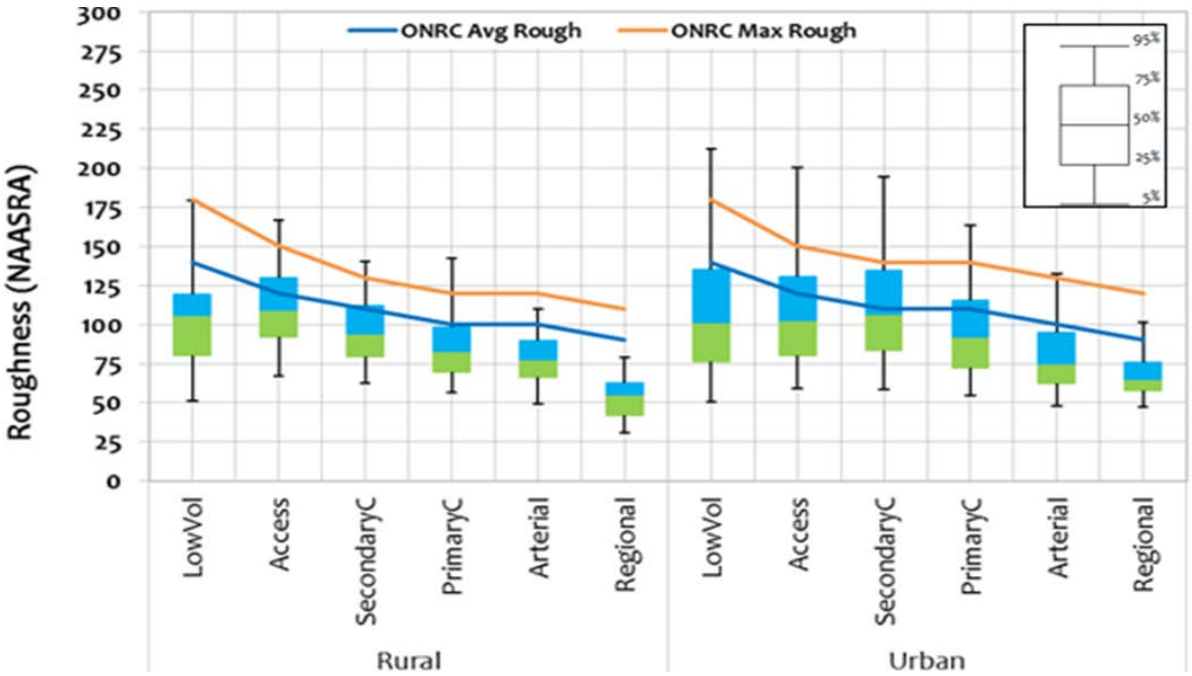
Risk	Intersection crashes	Vulnerable road users	Loss of control crashes
Contribution of maintenance and renewals to managing risk	Maintain and renew markings, traffic signals, signs. Clear sightlines and/or engineer a lower speed environment	Improve infrastructure provision for walking and cycling and encourage safer vehicle speeds	Improve surface condition and skid resistance, maintain sightlines and roadside clear zones
Opportunities to improve targeting	Prioritise high risk intersections which perform poorly given their status in the ONRC network	A focus on high risk urban arterials	Target high risk rural corridors, many of which are linked to growth areas

Amenity

ONRC amenity targets are based on the roughness (average NAASRA) of roads, on the basis that a smoother road provides a more comfortable ride.

Across all road categories, AT roads are smoother on average than the provisional ONRC target, but roughness levels vary widely especially on urban roads. Figure 17 shows that, for most road categories, the 95th percentile roughness (top of black bar) is above the ONRC target for peak roughness (orange line). This means that although most Auckland roads offer a good level of driver comfort, a significant minority of roads are too rough.

Figure 17: Roughness distribution for urban and rural roads by ONRC classification



Aside from driver comfort, rough roads have a significant economic impact through reduced fuel efficiency and increased wear and tear on tyres and the vehicle itself. The NZ Transport Agency estimates that costs (including externality costs such as CO_2 and air pollution) for car travel on a rough urban road with NAASRA of 200 are around 13 cents/km higher than for a smooth urban road (66 NAASRA or below) (14). On busy roads, pavement rehabilitation projects which reduce roughness can have economic benefits many times higher than their costs.

Interim conclusions from AT's gap analysis for road pavements include:

- Improving average smoothness across the whole network is not a priority, but reducing variability by targeting the roughest roads will deliver benefits, especially on busier roads
- Roads with a higher ONRC classification should be maintained to a higher standard of smoothness, on cost effectiveness grounds as well as to maintain customer satisfaction

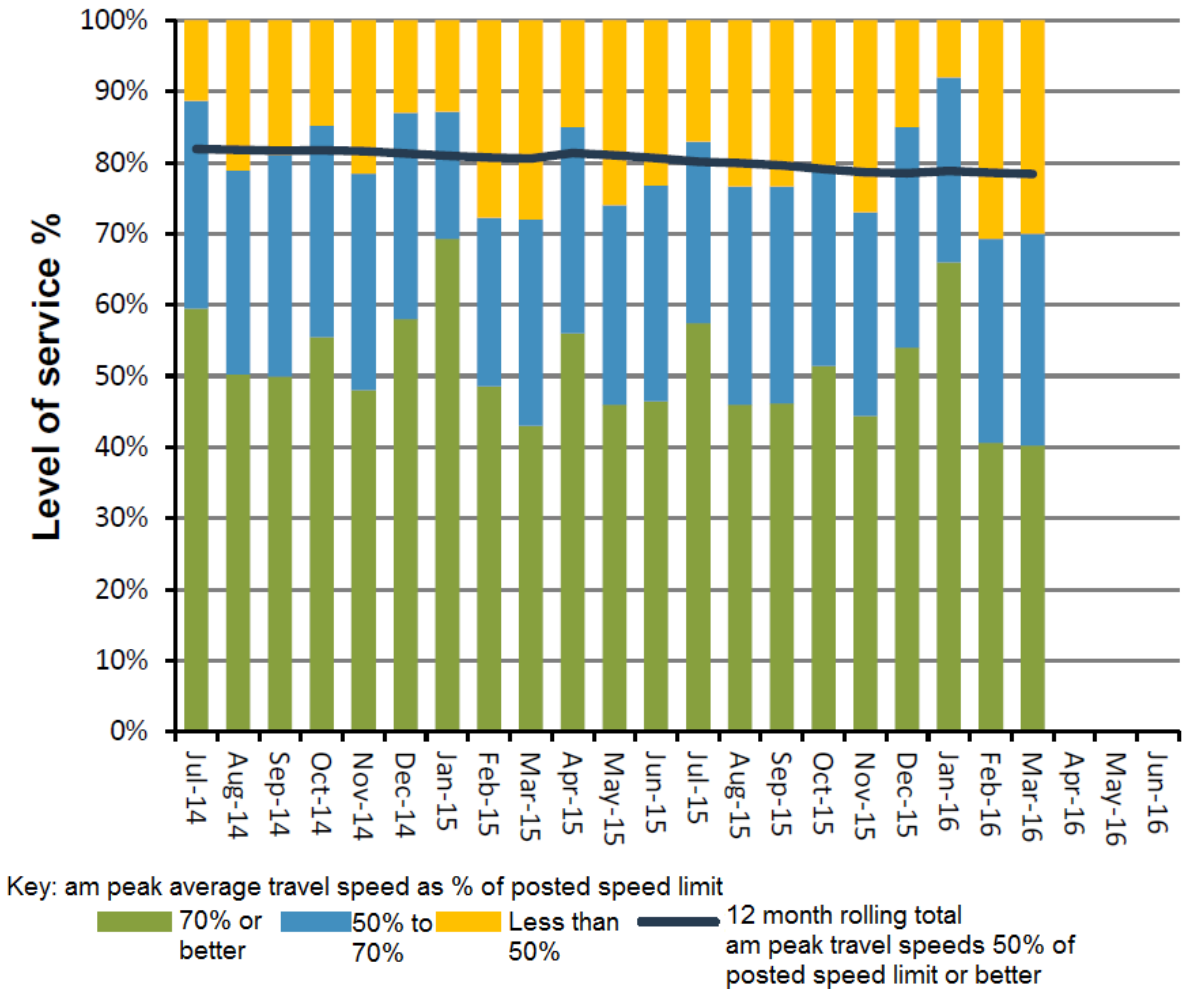
AT is developing a Pavement and Reseal Strategy which will incorporate these findings and give direction to AT's pavement renewals budgets in the 2018 AMP.

Travel Time Reliability

Travel speed is the aspect of Auckland roads that customers are least satisfied with, as shown in Section 3.3. Travelling slowly is frustrating for drivers, and unpredictable variations in travel times can be even more frustrating. The NZ Transport Agency recognises the value of improving travel times, and travel time reliability, in its Economic Evaluation Manual (14).

Figure 18 shows that in March 2016, travel speeds averaged less than half the posted speed limit during the morning peak on 30% of Auckland's regional and arterial roads. This measure shows high monthly variability, timed with school holidays; there is also considerable day-to-day variability in travel times on congested routes. Overall trends as shown by the 12 month rolling total appear to be negative.

Figure 18: Vehicle travel speeds on regional and arterial roads



Source: AT analysis of Auckland Traffic Operations Centre data

AT's network operating plan includes managing the traffic signal network to improve the level of service to users, including general vehicle traffic. The network operating plan also directs some minor capital works to improve traffic flow. However there are very few remaining opportunities to improve traffic flow in Auckland through maintenance and renewals programmes.

Maintenance and renewals programmes can make a significant contribution to bus travel time reliability if coordinated with the rollout of the Frequent Transit Network. Most bus priority measures are implemented through road markings, signs and traffic signal changes. Implementing these changes at the time that a road is renewed can reduce the cost significantly, allowing more bus priority measures to be introduced for a fixed budget.

The Busway stands as an example that when buses travel faster, travel times improve for cars as well. This is because enough users will transfer from car to bus to make a real difference to traffic congestion.

Further work is underway to analyse ONRC levels of service and gaps in more detail and to develop more specific programmes to target these gaps.

7.5. Next steps

The above gap analysis for safety, amenity and travel time represents Step 3 in the ONRC implementation process set out in Figure 14. The full process for the development of a Business Case for road asset maintenance, operations and renewals is set out in Table 15.

Table 15: Steps to implement ONRC and develop a Business Case based AMP

ONRC stage (see Figure 14)	Steps completed / to complete	Due date
Classify network using ONRC	Initial classification complete	Dec 2014
	Refresh classification annually	Dec 2016
Define levels of service	Initial work complete	Sept 2016
	Finalise and adopt	
Identify gaps (under or over)	Initial gap analysis complete	Sept 2016
	Finalise and adopt	
Specify activities to close gaps	Further analysis of costs and benefits	Dec 2016
	Recommend strategy to close gaps	
Develop investment (disinvestment) programmes	Develop maintenance and renewals programme in the format needed for the RLTP	March 2017
Write 2018 AMP	Consult, alongside RLTP	early 2018

All stages of the process involve working with experts from across AT and other stakeholders to ensure progressive development of a robust, evidence based investment case for operations, maintenance and renewals.

8. The Auckland Transport Alignment Project

The Government and Auckland Council have agreed on the need to improve alignment on a long term strategic approach to transport in Auckland, and have established the Auckland Transport Alignment Project (ATAP) to jointly develop this strategic approach. This section sets out AT's input into the renewals, operations and maintenance work stream within ATAP.

8.1. Purpose of ATAP

ATAP will identify whether better returns from transport investment can be achieved, particularly in relation to four key objectives:

- Support economic growth and increased productivity by ensuring access to employment/labour improves relative to current levels
- Improve congestion results, relative to predicted levels, in particular travel time and reliability, in the peak period and to ensure congestion does not become widespread during working hours
- Improve public transport's mode share, relative to predicted results, where it will address congestion
- Ensure any increases in the financial costs of using the transport system deliver net benefits to users of the system.

ATAP includes consideration of all land transport interventions, including roads, rail, public transport, personal mobility services, walking, cycling, technology, network optimisation and demand management (including pricing for demand management purposes).

8.2. Assumptions and limitations

ATAP has a 30-year planning horizon and therefore relies on a number of assumptions about the future. Uncertainty about the assumptions and their impacts increases the further the project looks out. The scale and location of population and employment growth is a critical factor influencing Auckland's future travel demand.

Two key growth trends are at the heart of Auckland's future transport challenges:

> **Population growth** is spread throughout Auckland's urban area and extends into major future urban growth areas to the north, northwest and south. Nearly a third of population growth is projected to occur in areas beyond 20km of the city centre.
>
> **Employment growth** is highly concentrated in a few locations, particularly the city centre, the airport and other regional metropolitan centres. Over a third of employment growth is projected to occur within 5km of the city centre. The growth in service sector jobs, which tend to locate in major centres to benefit from agglomeration, is a key factor behind the projected concentration of employment growth.

Other future trends and opportunities to be considered are freight volumes, which are projected to increase by 78% over the next 30 years (5), and technology change including new vehicle technologies, big data applications, ride-sharing and car-sharing technologies.

A key challenge for the project is to identify strategic approaches that are able to respond to future opportunities, while maintaining the flexibility to adapt to potential changes in demand, technologies and behaviour as they emerge.

8.3. 30 year asset management costs

The Auckland Transport Alignment Project has an Asset Management workstream tasked with collaboratively developing and testing a 30 year projection of the costs necessary to operate, maintain and renew the regional roading and transport network (excluding KiwiRail assets).

Auckland Transport's role includes clarifying costs for local roads and public transport assets, and advising on consequential opex as described in Section 6. To achieve this, AT has developed a Renewals Optimisation Model which allows for modelling of renewals, operational and maintenance budgets over a 30 year horizon from July 2018. The results of the analysis are impacted by a number of assumptions, but the model allows for these assumptions to be changed and their impacts tested.

Input data for the Renewals Optimisation Model includes:

- Updated asset condition and performance as of January 2016
- Updated levels of service, differentiated by ONRC category of road
- Updated risk policy, also differentiated by ONRC category of road
- Updated new capital programmes e.g. light rail transit

This is a work in process which will lead to further assessment and revision before being reported later in the year. The result of ATAP decisions will be reflected in the 2017 AMP update and built into the 2018 AMP.

The analysis of the provisional 30 year renewal, operation and maintenance budget is summarised in Figure 19 and Table 16.

Figure 19: 30 year summary of AT costs

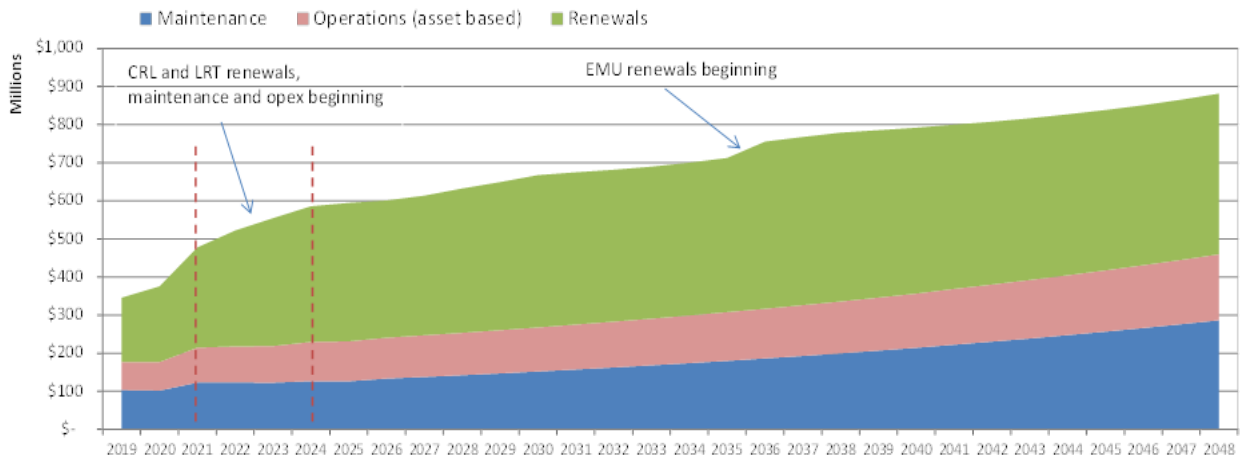


Table 16 - AT 30 Year Summary

($millions)	2019-28 total	2029-38 total	2039-48 total	2019-48 total	30 year Annual average
Renewals	3,098.0	4,116.8	4,265.9	11,480.6	3,098.0
Maintenance	1,239.7	1,719.5	2,445.4	5,404.5	1,239.7
Operations (asset based)	967.1	1,243.2	1,556.9	3,767.2	967.1
Total	**5,304.9**	**7,079.4**	**8,268.1**	**20,652.4**	**5,304.9**

The increase in operations and maintenance costs over the 30 year period are largely a result of the operational costs of the city rail link (opening in 2021) and of light rail transit (from 2023).

Figure 22 shows how the recommended 30 year renewals programme will result in an improvement in asset condition for the entire AT road and PT network, with fewer assets in poor condition and a reduction in the backlog of assets requiring renewals.

In the first decade, there is a need to significantly increase renewals expenditure as existing backlog is reduced and levels of service, including for ONRC, are normalised across the region. Thereafter, despite significant network growth, the second and third decades show a decreasing renewals need as the network settles into a steady state where levels of service and backlog have largely been addressed.

Figure 20: 30 year condition, backlog and cost for AT assets

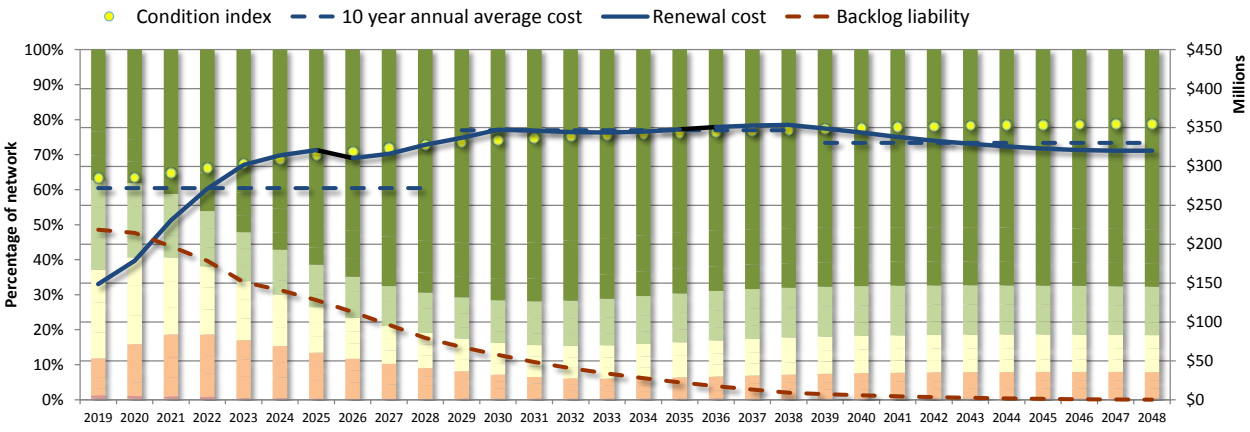


Table 17 summarises the consequential maintenance and operations costs in future decades resulting from the addition of assets to the network through AT projects and vesting from developers. The first years of consequential opex, to 2025, are covered in more detail in Section 6. These figures represent the future cost liability from growth of the physical network.

Table 17 - AT 30 Year Consequential Opex

$m uninflated	Decade 1 2018/2019 – 2027/2028	Decade 2 2028/2029 – 2037/2038	Decade 3 2038/2039 – 2047/2048	30 Year Total
Maintenance	298.5	509.8	664.0	1,472.3
Operations (Asset Based)	272.7	437.2	561.4	1,271.2
Operational services	9.3	27.3	27.9	64.6
Total	580.4	974.3	1,253.4	2,808.1

8.4. AMP implications

ATAP was not in existence for the current 2015-18 AMP. At that time, future renewals, maintenance and operations needs were identified on the basis of:

- October 2014 condition and performance of the network
- levels of service
- AT asset risk policy
- LTP and RLTP new capital programmes

This 2016 AMP update provides initial indications of the renewals, maintenance and operations costs being input into the ATAP process. These figures reflect changes in the above areas including:

- Updated condition and performance as of January 2016
- Updated levels of service including for ONRC
- Updated risk policy including for ONRC
- updated new capital programmes e.g. light rail transit

This work will be further aligned during the year.

The result of ATAP decisions will be reflected in the 2017 AMP update and built into the 2018 AMP.

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