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Road Assets

Recommendation

That the Board:

i) Receives this report.

Executive Summary

1. This report provides a summary of AT's road infrastructure assets including its inventory, condition and value for money.
2. Its purpose is to provide the Board with a greater level of understanding of AT's assets and current asset management initiatives.
3. Road infrastructure assets represent around $12 billion of value over a 7,382 km road network. In addition to sealed and unsealed roads, the road network includes 1,235 bridges and 7,403 km of footpaths. The network is increasing due to the addition of new subdivisions and AT's programme of enhancing the existing network through new roads, cycleways, footpaths and other improvements. This paper focuses on the value for money of the sealed road network.
4. Current asset management initiatives are focussed on the upcoming Asset Management Plan 2018 to 2021. The AMP directs AT's investment in road (and also public transport) asset maintenance and renewals. These are among the most significant items in AT's total budget; road maintenance expenditure in 2015/16 was $111.0 million and road renewals was $187.2 million.
5. It is important to demonstrate that investment is effective, efficient and is providing value for money. Current concerns about the road asset management process are expressed clearly in the recommendations of the Auckland Transport Alignment Project (ATAP), which calls for "improved visibility of the trade-offs between different levels of asset management investment". Providing this improved visibility is a key focus for the national One Network Road Classification (ONRC) project and for AT's own work in developing the 2018 AMP.

Strategic Context

6. The strategic context for this report is AT's stewardship of a regional asset network that contributes significantly to social and economic outcomes. AT provides the response to meet the requirements of the transport outcomes of the Auckland Plan. The primary performance measures are customer satisfaction, safety, and condition of key transport assets. Value for money measures how these are achieved for least long term cost.

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Asset Network

7. AT manages a wide portfolio of transport assets in roading and PT networks. As of July 2016 AT asset network includes 7,382 km of roads, of which:
    - 851 km is unsealed
    - 6,531 km (13,226 lane-km) is sealed
8. Between July 2015 and July 2016 the road network has increased by 61 km of local and arterial roads.

Asset Network Value

9. AT's broader road asset infrastructure has a replacement value of $12 billion and is depreciating at a rate of $217 million per year or around $600,000 per day, as shown in Table 1:

Table 1: Road asset valuations

Asset	Replacement Value ($m)	Depreciated value ($ m)	Annual depreciation ($ m)
Pavement	6,910	4,724	117
Stormwater	2,341	1,524	35
Bridges, walls and structures	1,309	737	19
Footpaths and cycleways	865	487	19
Street Lighting	194	98	8
Traffic Systems	146	80	11
Parking	210	184	6
Total road assets	**11,974**	**7,835**	**217**

Source: 2014 re-valuation

10. A revaluation is currently underway, the results of which will be available later in the year.

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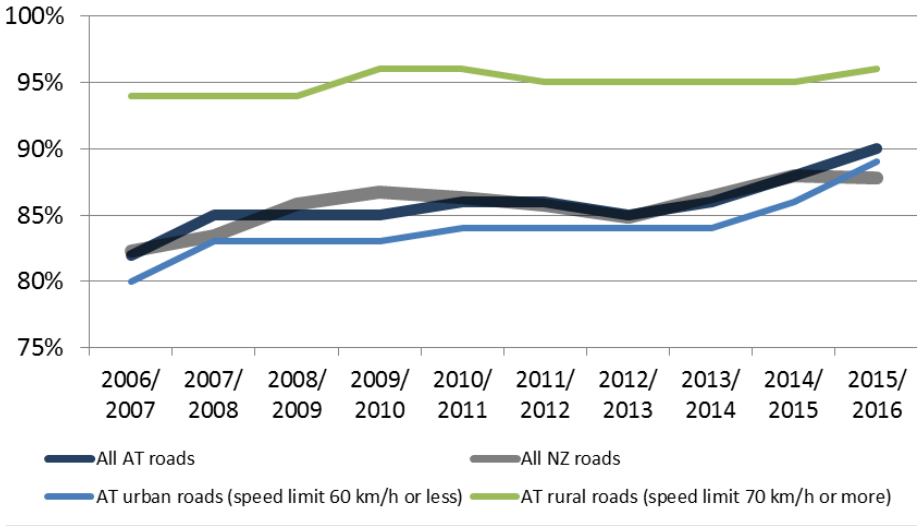
11. The cost per kilometre for managing the road corridor will be a function of:
    - Current condition
    - Traffic type and density
    - Appropriateness of surface finish
    - The balance between preventative and reactive maintenance and between maintenance, resealing and rehabilitation
    - Unit costs for treatment

Condition Trends

12. Sealed road pavements are AT's most significant asset, both in terms of value and annual expenditure. AT's Statement of Intent measure of road pavement condition is smooth travel exposure, which is the proportion of all travel which is on roads meeting NZ Transport Agency standards for smoothness and ride comfort. By this measure, the condition of AT's road pavements is improving, particularly for urban roads, as shown in Figure 1.

Figure 1: Smooth Travel Exposure of AT roads 2006-2016



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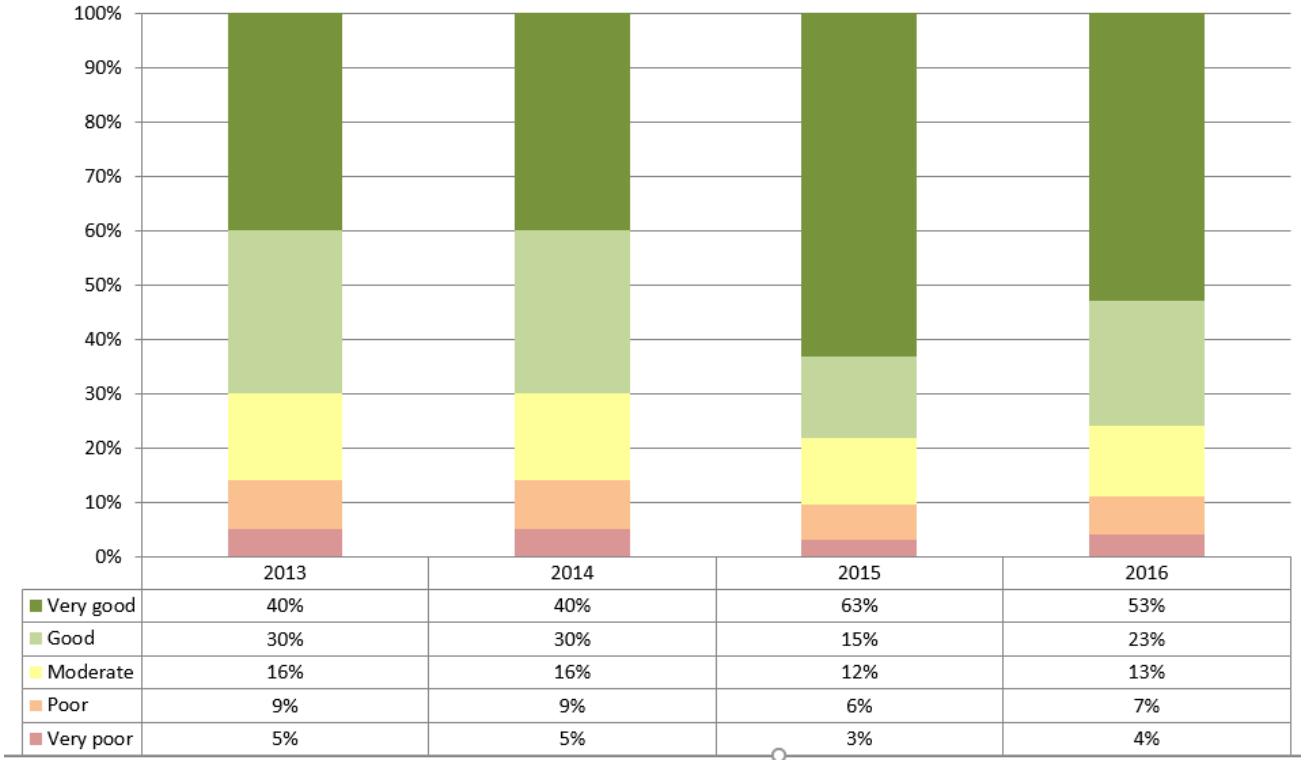
13. All AT roads are assessed for condition each year. This ensures that the annual asset management assessment of renewals investment always begins by addressing actual deterioration on the network and are based on actual rather than modelled data. AT is continually refining its data and analysis so definitions are not exactly comparable year to year. For example, the change shown in asset condition between 2014 and 2015 (shown in Figure 1) more reflects improvements in condition assessment reporting rather than material change in asset condition. However, the overall trend of stable asset condition is consistent with the pavement condition data shown in Figure 2.

Figure 2: Pavement condition assessments, 2013 to 2016



	2013	2014	2015	2016
Very good	40%	40%	63%	53%
Good	30%	30%	15%	23%
Moderate	16%	16%	12%	13%
Poor	9%	9%	6%	7%
Very poor	5%	5%	3%	4%

14. Road pavements have a replacement value of $6.9 billion, with a current (depreciated) value of $4.7 billion. This implies that the road pavement asset is on average a third (32%) of the way through its useful life.

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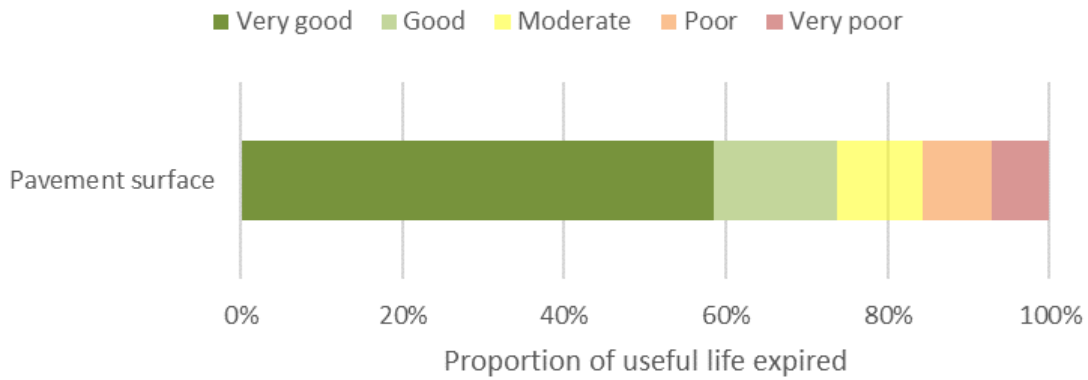
15. Road pavements tend to stay in very good condition for much of their life, deteriorating more rapidly as they get closer to the end of their useful life. For example, a chipseal road surface with a design life of ten years would be expected to remain in very good condition (condition grade 1 on a 5-point scale) for almost six of those years. The proportion of asset life spent in each of the five condition grades is shown in Figure 3.

Figure 3: Typical deterioration of pavement surface over its useful life



Cost Drivers

16. Pavements deteriorate over time due to:

- Gradual oxidation and sun damage, which makes asphalt brittle
- Heavy vehicle (including double decker bus) damage (cars cause minimal wear to pavement, but the impact of heavy vehicles increases exponentially with axle weight). Ministry of Transport data shows travel by heavy vehicles (defined as 12 tonne or more) registered in Auckland has increased by 10% since 2011.
- Storm damage causing slips, undercutting road pavements and damaging retaining walls and railings

17. Total pavement failure, to the point where a road becomes impassable, is very rare on the Auckland network. Still, pavements in poor or very poor condition are uncomfortable to drive on for the customer and can be a contributing factor in road trauma through poor skid resistance and obstacles including potholes which require evasive action by drivers. Poor pavement condition can also deter cyclists and make cycling more dangerous.

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18. Keeping roads in good condition over time requires the right balance of maintenance, resealing and rehabilitation. AT's programme of road maintenance and renewals for 2015/16 is summarised below:

Table 2: Asset management activities and costs for road pavements

Road pavement expenditure	Budget (2015/16 actual)	Example activity
Maintenance	$27.5 million	Of this, $14.6 million is sealed road routine maintenance including pothole filling and small pavement patches. Other activities include clearing crash debris, reinstating road access after slips, and town centre cleaning
Reseals - asphalt	$133 million	Mill existing surface and apply a new asphalt layer
Reseals - chipseal		Apply binder and chip to create a new chipseal surface
Pre-reseal repairs		Pavement repairs before resealing
Rehabilitation		Reconstruct the road pavement, including the gravel base and surface

19. The above programme implements the 2015 Asset Management Plan, to avoid the risk of pavement failure by renewing pavements in the year in which they fall into very poor condition. In this way, the proportion of pavements in very poor condition has been kept to below 5%, and asset condition overall has been stable. In 2015/16, AT resurfaced 983 lane km or 7.4% of the sealed network, and rehabilitated 77.4 lane-km or 0.6% of the network.

20. This strategy has successfully managed asset condition and risk, but the costs are high. NZ Transport Agency, in their annual audits 2014/15, 2015/16 and 2016/17, have raised concerns that AT renews some pavements before the end of their useful life. However, whilst AT continues seeking ongoing efficiencies to deliver increased value for money, it is confident that roading assets are generally in good condition and are being appropriately managed.

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Operation, Maintenance and Renewal Delivery

21. The road network carries in excess of 8 billion vehicle kilometres per annum. Approximately 5% of the traffic is Heavy Commercial Vehicles (HCV).
22. Physical works include operation, maintenance and renewals on the network, and are delivered through 10 area-based road maintenance contracts and nine street light maintenance contracts.
23. The road maintenance contracts include both reactive and cyclic maintenance activities such as pothole repairs, sign maintenance, road sweeping, road marking and planned renewal works such as footpath renewals, culvert replacements, carriageway resurfacing and pavement renewals.
24. Historical expenditure trends on the transport network are given in tables 3 and 4 below.

Table 3: Historical expenditure and current year plan – Road maintenance ($ millions)

Asset Class	2012/13	2013/14	2014/15	2015/16		2016/17	2017/18
	Actual	Actual	Actual	Actual	LTP	Annual Plan	Draft Budget
Pavement	44.7	32.2	28.9	27.5	30.9	29.1	29.1
Stormwater	12.4	9.0	8.5	9.0	9.0	9.4	9.4
Bridges and structures	1.5	1.8	1.8	1.2	1.8	1.3	1.3
Footpaths and cycleways	3.7	3.0	2.1	2.3	2.6	2.8	2.8
Street lighting	18.2	17.8	18.8	19.4	18.1	18.7	18.7
Traffic systems	27.6	28.8	27.3	26.7	28.3	24.6	24.6
Vegetation	17.0	14.4	14.5	15.0	14.2	15.1	15.1
Parking	10.1	10.3	10.1	10.0	11.8	9.9	9.9
Total Road Asset Maintenance	**135.2**	**117.3**	**111.9**	**111.2**	**116.8**	**111.0**	**111.0**

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Table 4: Historical expenditure in proportion to growth

Asset Class	2012/ 2013	2013/ 2014	2014/ 2015	2015/2016		2016/ 2017	2017/ 2018
	Actual	Actual	Actual	Actual	Plan	Annual Plan	Draft Budget
Total road asset maintenance ($m)	135.2	117.3	111.9	111.2	116.8	111.0	111.0
Road network length (km)	7,258	7,277	7,302	7,369		7,382	7,422
Road maintenance cost per km	$18,628	$16,119	$15,325	$15,090		$15,037	$14,956

Table 5: Historical expenditure and current year plan – Asset Renewals ($millions)

Asset Class	2012/13	2013/14	2014/15	2015/16		2016/17	2017/18
	actual	actual	actual	actual	LTP	Annual Plan	Draft Budget
Pavement	120.5	134.6	128.4	133.0	123.8	143.1	157.8
Stormwater	13.1	13.4	15.9	14.9	12.6	14.5	15.3
Bridges and structures	14.4	10.2	9.9	8.4	22.4	25.8	27.1
Footpaths and cycleways	26.4	18.0	19.8	15.0	14.6	16.9	17.7
Street lighting	9.2	10.0	11.7	10.5	9.1	10.4	11.3
Traffic systems	5.1	3.5	4.2	3.9	7.4	8.7	4.2
Parking	1.9	1.7	1.7	1.6	2.2	2.3	3.8
Total road asset renewals	**190.5**	**191.5**	**191.6**	**187.2**	**192.2**	**221.7**	**237.2**

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25. Key messages:

- Overall, road maintenance costs have decreased over the last four years even though the road network grew at approximately 0.65% per annum and contract costs increased due to cost escalation. This can be attributed to efficiencies in programme delivery and absorbing consequential opex costs within the current budgets. However, this trend will not be sustainable in the future due to the growth of the network and construction cost inflation.
- The largest decrease in maintenance costs is in the area of road pavements
- Road maintenance costs are decreasing on a per-person and on a per-km basis
- Overall, asset renewal costs have been stable since 2012/13, though a significant increase is planned in the current year 2016/17 and further increases are forecast.

Benchmarking Pavement Costs

26. All road controlling authorities submit an annual achievement report to the Transport Agency including the cost of pavement maintenance and renewals and the quantity of works completed.
27. This data has been used to compare the cost effectiveness of Auckland, Wellington and Christchurch road maintenance and renewals activities. For road maintenance, AT and Wellington City have similar costs per km, but Christchurch is higher as shown in Figure 4. Christchurch also has rougher roads and a backlog of maintenance work due to the earthquake and aftershocks.
28. For chipseal reseals, costs are very similar across the three organisations, but for asphalt reseals, the costs reported by Wellington are very high (The Transport Agency are following up on the reasons for this). This highlights the difficulty of benchmarking across multiple organisations; the methodology for cost accounting may be different and therefore unit costs not directly comparable.

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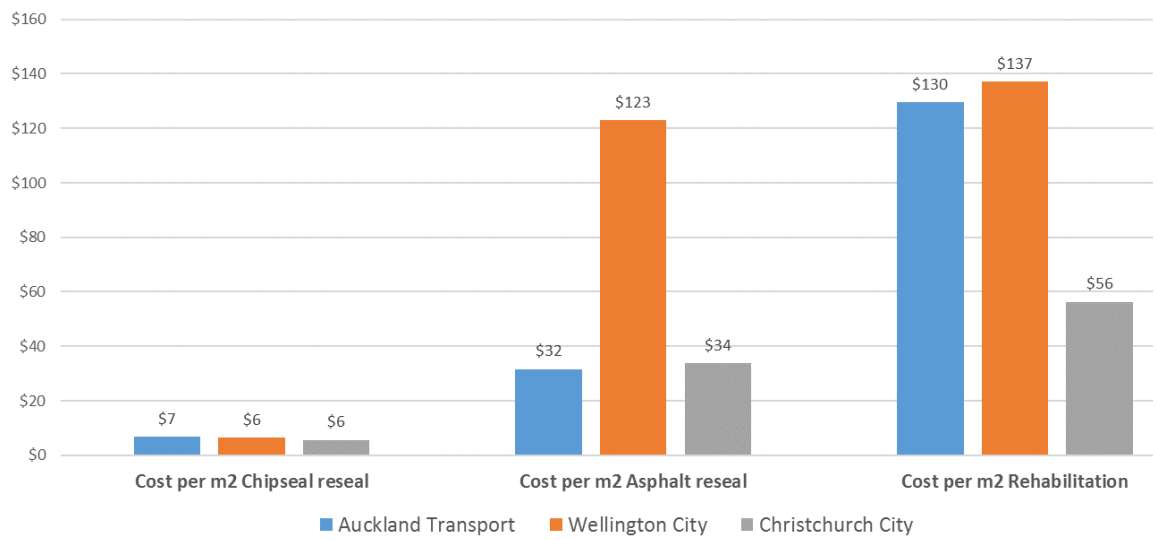
29. Overall, Figures 4 and 5 support the conclusion that AT is achieving value for money on a per-unit basis for its maintenance and renewals programme.

Figure 4:Benchmark costs, road maintenance, 2015/16

Figure 5: Benchmark costs, road renewals, 2015/16



Source: Annual Achievement Reports to NZ Transport Agency

30. Costs per m^2 are negotiated within each of AT's ten area-based road maintenance contracts. Value for money is achieved by negotiating a fair unit price, and by ensuring that renewals are targeted to the right treatment, on the right roads, at the right time.

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Consequential Operational and Renewal needs

31. The consequential operational and renewals needs (generally known as consequential opex) arise due to the growth of the transport network.

32. The network growth takes place due to:

- Vested assets through the sub division development process
- AT capital improvement and new works
- Revocation of state highways by the Transport Agency

33. The 2015 Long Term Plan (LTP) includes a sum of around $1.60 million in each of the 10 years to cater for the consequential opex needs of the roading network

34. For the development of ATAP, further work has been undertaken to ascertain consequential opex needs on a more robust basis. The following growth factors have been established for the consequential opex included in ATAP.

35. For the roading network - 0.5% for first decade, 0.7% for second decade and 1% for third decade

36. The following table provides a summary of consequential opex needs established through this approach in ATAP.

Consequential Opex ($ million) – First Decade of ATAP (2019-28)

			2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2019-28 total
Maintenance	Consequential	Road network	0.9	1.2	1.5	1.8	2.1	2.4	2.7	3.0	3.3	3.6	22.2
Operations	Consequential	Road network	0.6	0.8	1.0	1.2	1.4	1.7	1.9	2.1	2.3	2.5	15.5
Renewal	Consequential	Road network	0.0	0.0	0.0	0.0	0.1	0.4	0.8	1.2	1.7	2.3	6.5

37. Further improvements to the current processes are being planned to capture the consequential opex needs more accurately.

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Renewal Optimisation Model (ROM) Development

38. ROM has been built to support Auckland Transport's long term renewals investment decisions at the portfolio level. It provides an understanding of the trade-off relationships between condition, risk and cost across the various asset classes. Specifically, it identifies:
    - The future cost implications of current condition and risk policies
    - The future condition and risk consequences of budgets
39. The model provides visibility of these relationships across the portfolio and gives AT the ability to test options and policies to optimise the cost, condition and risk relationship.
40. It is intended to give decision makers the ability to implement asset management (AM) policy decisions in a consistent manner across the AT asset portfolio.
41. ROM outputs have been used to develop the asset renewal recommendations of the recently published Auckland Transport Alignment (ATAP) and the 2015 Long Term Plan (LTP).

Enterprise Asset Management

42. Currently asset management has a limited lens across AT's business, with the main focus around managing and optimising renewals and maintenance. Opportunities to enhance customer outcomes and to maximise the benefits are being missed through not taking a whole of life approach, from initial strategic planning through to decommissioning. This end to end view is known as Enterprise Asset Management (EAM) and is the subject of a significant ISO standard (ISO 55000) which identifies good practice in asset management.
43. AT has undertaken an asset management diagnostic, and developed a strategy and proposed operating model along with an improvement implementation roadmap. This initiative allows the existing areas of good practice currently within AT to be consistently applied whilst identifying potential business and technology improvements to allow AT to meet the coming challenges. This work is continuing.

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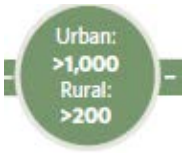
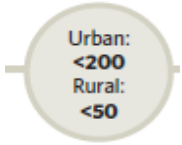
One Network Road Classification

44. The One Network Road Classification (ONRC) is a joint initiative of the Transport Agency and Local Government NZ developed to streamline the operation, maintenance and management of NZ road networks. There are two main achievements of the ONRC project to date:
    - All NZ roads have been classified according to their function in the national network
    - An agreed set of customer levels of service, customer outcomes and technical outputs have been developed to measure the performance of road networks
45. Auckland Transport has committed to fully integrate ONRC into its planning, management, financial and delivery processes.
46. The One Network Road Classification divides roads into six categories based on traffic volumes, connections to important destinations like hospitals, airports or ports, tourist routes, and roads which provide the only access for communities. The ONRC classifications of the AT network is shown in Table 6.

Table 6: ONRC classification of AT network

ONRC classification	Regional	Arterial	Primary Collector	Secondary Collector	Access	Low Volume
AT network, length by ONRC classification	183 km	1,140 km	1,049 km	2,052 km	1,897 km	1,098 km
As % of total	2%	15%	14%	28%	26%	15%
Typical traffic volumes						

47. In comparison with other local road networks, only Christchurch has a similar proportion of regional roads. Many local authorities have no regional or arterial roads at all.

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Procurement

48. Procurement of AT's Strategic Asset Management contracts, to replace contracts expiring this year, is about to begin.

49. Some Asset Management services can be of a specialist nature, and therefore a limited number of consultancies are available in the market. Others are more generic, and are better covered by the general consultancy market. We compete with the Transport Agency, Auckland Council, KiwiRail and the private sector. This will provide competition for the Auckland Transport Asset Management contracts and will ensure that consultancies who aren't successful in the Auckland Transport programme have other opportunities in the market.

50. The Asset Management team have consulted with industry, and held briefings. No specific concerns regarding the market's ability to support Auckland Transport's Asset Management services requirements have been identified.

51. The Asset Management services market is aligned to the growth in infrastructure in Auckland generally. Auckland Transport will influence the market in some areas through the limitations on the number of contracts suppliers may hold. This is a deliberate strategy to ensure distribution of work and the continued growth in industry capability and is not expected to have a detrimental (tightening) effect. The ideal market would have a number of capable, high performing consultancies for the larger contracts, with a lesser number of smaller consultancies to support specialist contracts. This will provide Auckland Transport with the ability to be agile and resilient in our contracting. Contract and performance management will be important. The market will need to continue to grow in capacity and capability as demand in the Auckland region and New Zealand continues to grow.

Conclusion

52. More work is needed to benchmark value for money. However, it is reasonable to conclude that existing management of Auckland's sealed road network represents reasonable value for money in that:

    - The current condition reflects less than 5% of roads in poor or very poor condition
    - There are business rules to determine the appropriate surface treatment and to balance maintenance and renewals. These business rules consider customer experience, engineering and financial factors.
    - Asset management systems, including ONRC definitions, provide a sound basis for decision making
    - Maintenance cost is being held constant in nominal terms in a growing network facing greater traffic volumes
    - Areas for improvement include further improvement in asset management systems and in decision making around renewals.

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Document Ownership

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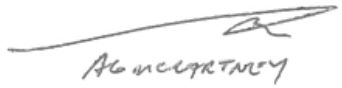
Recommended by	Tony McCartney **Group Manager- Assets & Maintenance** Richard Morris **Chief Financial Officer**	 
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