TWEED
SHIRE COUNCIL

Tweed Shire Council

Transport

Asset Management Plan

Version 3.2.1

August 2024

Version Control

This Document is a live Council document and is subject to periodic review. The validity and currency of the document is critical in applying its content as it contains significant asset management and performance data that is "real-time" based.

If you are reading this document please check the version date and the endorsement date below to make sure that the document is current.

Version	Date	Changes/Amendments	Author
V1.3.3	December 2010	Final updated for TSC	
V2.1.0	February 2017	Document update	Kevin Ward
V2.1.1	23 June 2017	Review and document update	Raston Nga
V2.1.2	29 June 2017	Review	Tony Blefari
V2.1.3	5th April 2017	Further update	Raston Nga
V2.2.0	6th April 2017	Release as draft	Raston Nga
V2.2.1	5th May 2017	Update following client feedback	Raston Nga
V3.0	5th May 2021	Updated with new condition data	Ming Lei
V3.1	September 2021	Updated with Council's comments	Ming Lei
V3.2	March 2022	LTFP and budget updated	Ming Lei
V3.2.1	August 2024	Final	Van Tran

NB:

1. Primary number changes to Versions (eg V1.0 to V2.0) will be made when the document undergoes its regular review and when significant changes are made to standards and guidelines for inspections, intervention levels or work
2. Secondary number changes (V1.0 to V1.1) will apply to minor amendments that do not materially impact the document and are intended only to clarify or update issues.
3. Tertiary number changes (V2.1.1 to V2.1.1) are related to document updates and reviews undertaken by Assetic and TSC.

Endorsement Table

Name	Title	Endorsed & Signature	Date

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1 Executive Summary

1.1 Background

The Asset Management Plan is prepared to provide a record of:

- The state of Council's infrastructure for transport assets;
- The 10-year funding required to achieve Council's adopted asset performance targets; and
- Planned asset management activities for the current financial year.

The fundamental purpose of this Transport Asset Management Plan is to improve Council's long-term strategic management of its transport assets. It aims to demonstrate reasonable management of Council's transport assets in the context of available financial and human resources.

The Transport AMP achieves this by setting standards, service levels and programmes which Council will develop and deliver. The standards and service levels have been set in accordance with user needs, regulations, industry practice and legislative codes of practice.

This Plan encompasses the following infrastructure asset types:

Asset Category	Asset Type
Roads	Sealed and Unsealed
Carparks	Sealed and Unsealed
Bridges	Concrete, Timber and Steel
Kerbs	Barrier and Semi and Fully mountable
Footpaths	Concrete, Asphalt, Gravel and Paving
Road Ancillary	Guardrails, Street Lighting, Retaining Walls, Traffic Barriers, Street Furniture, Bus Shelter

Table 1 - Transport Asset Categories Definition

Assets not considered in this Plan are:

- Vehicular Crossings - these are the responsibility of the property owner;
- Street trees including landscaping - subject of a separate Asset Management Plan;
- Artwork - within the road reserves - subject of a separate Asset Management Plan;
- Stormwater drainage - subject of a separate Asset Management Plan;
- Private roads, laneways and car parks - these are the responsibility of the private owners; and
- Vehicular & pedestrian crossings that intersect with railway tracks, which includes 2.13m from the outer tracks and associated ancillary assets - Responsibility of Railway Operators.

1.2 Current State of Council's Assets

The value of Council's transport assets as at 31st June 2021 is shown in the following table.

Asset Class	Gross Replacement Cost ($)	Accumulated Depreciation ($)	Written Down Value ($)	Depreciation Expense ($)
Roads	819,133,800	119,482,975	699,650,825	12,591,105
Bridges	202,035,854	26,408,791	175,627,063	2,268,959
Kerbs	65,185,020	11,996,851	53,188,169	1,025,536
Footpaths	44,717,631	19,343,979	25,373,652	761,047
Carparks	10,511,401	1,718,353	8,793,048	171,853
Road Ancillary	17,404,714	$984,024	16,420,690	409,583
Total	**$1,158,988,420**	**179,934,973**	**979,053,447**	**17,228,083**

Table 2 - Current State of Council's Assets

The table below provides the high level asset conditions of Council's Infrastructure network:

Asset Class	Rating Date	Condition Rating	Very Good	Good	Fair	Poor	Very Poor
			Score 1	Score 2	Score 3	Score 4	Score 5
Road Network	June-May 2020	% of Local Roads Surface Condition SCI	45.6%	19.4%	32.3%	2.5%	0.3%
		% of Local Roads Pavement Condition PCI	8.3%	68.9%	19.1%	3.5%	0.2%
		% of Regional Road Surface Condition SCI	53.2%	20.2%	22.4%	4.0%	0.2%
		% of Regional Road Pavement Condition PCI	13.7%	66.5%	14.4%	5.3%	0.0%
Kerbs	Apr, May 2020	% of Kerb Length	7.4%	12.6%	77.1%	2.8%	0.1%
Bridges	2019 & 2020	% of Bridge Network by Replacement Value	93.2%	6.7%	0.0%	0.0%	0.0%
		% of Bridge Components by Asset Count	67.5%	30.7%	1.6%	0.1%	0.0%
Footpaths	Apr 2020	% of Footpath Area	9.1%	6.8%	42.5%	41.2%	0.4%
Carparks	Mar, Apr 2020	% of Carparks Surface by Asset Count SCI	15%	22%	50%	9%	5%
		% of Carparks Pavement by Asset Count PCI	17%	56%	20%	6%	0%
Road Ancillary	Varies, 1/3 rated in 2020	% of Road Ancillary by Asset Count OCI	77.8%	18.9%	2.5%	0.6%	0.2%

Table 3 - Comparison of Council's Infrastructure Condition Indices

This condition information has been used in the predictive modelling to determine the required funding levels for asset renewal and maintenance detailed in Section 5 and summarised in Section 1.3.

1.3 Asset Funding Levels

Council proposed capital and maintenance expenditure of $222,304,173 on the transport asset portfolio of over the next 10 years as shown below.

Year	Roads, Kerbs, Carparks and Ancillary	Bridges	Footpaths	Total
2021/22	19,778,984	2,096,000	629,177	**22,504,161**
2022/23	20,203,061	776,000	641,760	**21,620,821**
2023/24	20,607,701	776,000	654,596	**22,038,297**
2024/25	20,724,190	776,000	667,690	**22,167,880**
2025/26	20,315,583	776,000	681,044	**21,772,627**
2026/27	20,193,110	776,000	694,664	**21,663,774**
2027/28	20,559,685	776,000	708,558	**22,044,243**
2028/29	20,933,595	776,000	722,728	**22,432,323**
2029/30	21,314,970	776,000	737,182	**22,828,152**
2030/31	21,703,970	776,000	751,925	**23,231,895**
Total	**206,334,849**	**9,080,000**	**6,889,324**	**222,304,173**

Table 4 - Committed Funding

The predictive modelling using the software Assetic Predictor forecasted the below optimal Capital Renewal and Maintenance expenditures (excluding new additions).

Year	Roads, Kerbs, Carparks and Ancillary	Bridges	Footpaths	Total
2021/22	20,917,684	2,763,189	765,564	**24,446,437**
2022/23	21,464,523	1,181,220	690,582	**23,336,325**
2023/24	20,125,596	1,181,296	790,296	**22,097,188**
2024/25	19,374,787	1,184,825	722,343	**21,281,955**
2025/26	11,214,581	860,266	866,067	**12,940,914**
2026/27	10,222,470	595,417	969,492	**11,787,379**
2027/28	11,424,572	1,198,041	978,182	**13,600,795**
2028/29	16,655,307	1,202,456	984,231	**18,841,994**
2029/30	17,085,437	869,010	1,104,811	**19,059,258**
2030/31	16,031,600	1,068,754	1,008,475	**18,108,829**
Total	**164,516,557**	**12,104,474**	**8,880,043**	**185,501,074**

Table 5 - Recommended Capital and Maintenance Expenditure excluding Capital New

It is recommended Tweed Shire Council spend the gap between Table 4 and Table 5 on Capital New projects or bridge upgrade program.

1.4 Action Plan

Asset Management Plans must be a dynamic document, reflecting and responding to changes that occur over time. This Asset Management Plan will be reviewed during the annual budget preparation and amended (if required) to recognise changes in levels of service and/or resources available to provide those services as a result of the budget decision process.

This Asset Management Plan has a life of 4 years and is due for revision and updating within 1 to 2 years of each Council election.

A detailed Action Plan generated from the review of this Asset Management Plan is shown in Table 77, for those activities and processes that will need to be monitored, developed and fine-tuned over time. The actions for improving this Plan are categorised into the following groupings; Policies and Guidelines, Service Level and Lifecycle Analysis, Financial Planning and Asset Management Practices.

The high priority improvement action items have been identified as follows:

- Obtain Council endorsement of this Asset Management Plan;
- Obtain Council approval to the Transport Business Process Model;
- Integrate the Asset Management and GIS Systems to provide for easy identification of the location of the assets, including provision of maps of asset condition;
- Confirm the condition and remaining life of assets identified for renewal over the next 10 years and investigate alternatives for renewal or extension of the asset lives;
- Establish ongoing condition inspections for all transport assets on 3 to 4 yearly cycle, coinciding with Council's revaluation cycle;
- Update and revise the prediction modelling parameters and inputs for all transport assets once new condition data is collected;
- Utilise the predictive modelling of transport assets for financial modelling and development of annual and long term capital works programs;
- Test the current levels of service to determine if they are achievable for current budgets;
- Test the current levels of service, to determine 'a confidence level' for reasonableness;
- Review response levels of service for reactive maintenance;
- Modify/Review finance system to capture expenditure against all types of maintenance - whether proactive or reactive;
- Pilot effective works management, asset inspection (works and AM) integrated with spatial, finance and AM systems;
- Develop and document Road Ancillary condition rating manual; and
- Undertake visual assessment of Road ancillary assets to verify conditions.

It must be noted that this Asset Management Plan is not a stand-alone document but is in fact robustly related to Council's Asset Management Policy and Strategy and Community Strategic Plan.

2 Current State of Council's Assets

2.1 Key Indicators

2.1.1 Key Assets Covered by this Transport AMP

The following table provides the high level breakdown by asset classes of all transport assets managed by the Council as at June 2021:

Assets Class	2021 June Quantity			2015 June Quantity			Change
Sealed Roads – Local & Regional	1,102km	Collector Distributor Local Access	353km 237km 511km	*1,077km*	*Collector* *Distributor* *Local Access*	*352km* *231km* *494km*	+25km
Unsealed Roads	160km			*164km*			-4km
Bridges	372 No.			*362 No.*			+10No.
Kerbs	827km			*795km*			+32km
Footpaths	266km			*240km*			+26km
Carparks	102,120m^2	Asphalt Sprayed Seal	81,741 m^2 20,379 m^2	*101,640m^2*	*Asphalt* *Sprayed Seal*	*81,350 m^2* *20,290 m^2*	+480m^2
Road Ancillary	Bus Shelter Lighting Noise Walls Pedestrian Fence Retaining Walls Traffic Barrier Irrigation Seating Drinking Fountain		201 No 140 No 1,704m 1,866m 3,033m 13,849m 15 No 21 No 2No.	*Bus Shelter* *Lighting* *Noise Walls* *Pedestrian Fence* *Retaining Walls* *Traffic Barrier* *Irrigation* *Seating*		*185 No* *20 No* *568m* *1,342m* *820m* *11,461m* *1 No* *4 No*	+16No. +120No. +1,136m +524m +2,213m 2,388m +14No. +17No. +2No.

Table 6 - Transport Asset Quantities

2.1.2 What are the useful lives of Council's Transport Assets

The following table highlights the useful life/expected life that the Council has adopted for its transport assets.

Asset Type	Component	Material	*June 2016*	June 2021
Road and Carpark	Surface	Asphalt	*25-30*	25-30
		Spray Seal	*16*	15
		Concrete	*80*	N/A
		Paver	*50*	50
	Pavement Base	Gravel	*10*	10
		Asphalt	*60-100*	60-100
		Spray Seal	*60-100*	60-100
		Concrete	*60-100*	60
		Paver	*60-100*	60-100
	Pavement Sub Base	Asphalt	*180-300*	180-300
		Spray Seal	*180-300*	180-300
		Concrete	*180-300*	180-300

Asset Type	Component	Material	*June 2016*	June 2021
		Paver	*180-300*	180-300
	Formation	All	*Indefinite*	Indefinite
Kerbs	Kerbs	All	*80*	80
Footpaths	Footpaths	Concrete	*60*	60
		Asphalt	*30*	30
		Gravel	*10*	10
		Pavers	*40*	40
		Spray Seal	*30*	30
Road Ancillary	Bus Shelter	All	*40*	40
	Retaining Wall	All	*80*	80
	Guard Rail	All	*30*	30
	Standard Barrier Fence	All	*30*	30
	Timber Bollard	All	*20*	20
	Type F Barrier	All	*80*	80
	Irrigation	All	*30*	30
	Light Pole	All	*50*	50
	Seating Type 1	All	*20*	20
Bridges	Concrete Bridge	Sub Structure	*80-100*	100
		Super Structure	*80-100*	100
		Surface	*16-25*	16-25
		Rail	*80-100*	50-80
	Culvert Bridge	Culvert	*80*	80
		Surface	*16-25*	16-25
		Rail	*100*	80
	Steel Bridge	Sub Structure	*80*	80
		Super Structure	*100*	100
		Surface	*16-25*	16-25
		Rail	*100*	80
	Timber Bridge	Sub Structure	*30*	50
		Super Structure	*30*	100
		Rail	*30-50*	50-80

Table 7 - Transport Assets Expected Useful Lives

2.1.3 Transport Assets Hierarchy

In accordance with the International Infrastructure Management Manual, Council acknowledges that the primary purpose of an asset hierarchy is to ensure that appropriate management, engineering standards and planning practices are applied to the asset based on its function. It also enables more efficient use of limited resources by allocating funding to those assets that are in greater need and the costs are better justified.

At present, Council has adopted different transportation hierarchies for different asset types. The hierarchy classification provides a consistent classification of assets predominantly based on their role within the overall transport network which relates to their use and risk to pedestrians should they fail.

2.1.3.1 Roads

The Road hierarchy classification has been documented as follows.

Road Hierarchy	Definition
Distributor	Major connections between centres (High Hierarchy)
Collector	Connections between Distributor and local access (Medium Hierarchy)
Local Access	Movement within urban and rural locations (Low Hierarchy)

Table 8 - Road Hierarchy Definition

The Tweed Shire Council owns and manages approximately 1,262 km of sealed and unsealed roads which are constructed and located within the road reserve, many of which are in varying condition.

The quantum of Council's road asset stock within the road reserve by Road hierarchy is illustrated in the table below.

Road Hierarchy	*2016 Length (km)*	2021 Length (km)	2021 % of Roads	Quantity Change from 2016 to 2021
Collector	*362*	376	30%	+14km
Distributor	*235*	237	19%	+2km
Local Access	*644*	649	51%	+5km
Totals	***1,241***	**1,262**		**+21km**

Table 9 - Road Quantities by Hierarchy as in June 2021 and June 2016

The above table illustrates that of this road asset stock, some 51% of sealed roads has been defined as having a Local Access Hierarchy with the remaining 30% comprising of Collector and 19% Distributor hierarchies.

It should be noted that from June 2016, Council's roads have increased by 21km (1.7%). They have been either gifted to Council by developers or constructed by Council where Roads did not previously exist.

Road Surface Types	*2016 Length (km)*	2021 Length (km)	2021 % of Roads	Quantity Change from 2016 to 2021
Asphalt	*426*	439	35%	+13km
Spray Seal	*637*	648	51%	+11km
Concrete	*14*	14	1%	+0km
Paver	*0*	1	0.10%	+1km
Unsealed Roads	*164*	160	13%	-4km
Totals	***1,241***	**1,262**		**+21km**

Table 10 - Road Quantities by Surface Types as in June 2021 and June 2016

The above table illustrates that of the 1,262 km of road asset stock maintained by the Tweed Shire Council, the most predominant surface type is Spray Seal making up 51% of the road network, followed by Asphalt at 35%.

2.1.3.2 Bridges

The Bridge hierarchy classification has been documented as follows.

Bridge Hierarchy	Definition
Regional	Bridges constructed on Regional roads
Local	Bridges constructed on Local roads or within parks

Table 11 - Bridge Hierarchy Definition

The Tweed Shire Council owns and manages approximately 372 bridges which are constructed and located within the road reserve, many of which are in varying condition.

The quantum of Council's bridge asset stock within the road reserve by bridge hierarchy is illustrated in the table below.

Bridge Hierarchy	Number of Bridges	Replacement Value
Regional	56	$57 mil
Local	316	$145 mil
Total	**372**	**$202 mil**

Table 12 - Bridge Quantities by Hierarchy as in June 2021

The above table illustrates that of this bridge asset stock, the number of local bridges is about six times that of regional bridges, whilst the replacement value of local bridges is about three times that of regional bridges. In general, local bridges are smaller than regional bridges.

2.1.3.3 Kerbs

The Kerb hierarchy classification has been documented as follows.

Kerb Hierarchy	Definition
Collector	Kerb assets located on collector roads
Distributor	Kerb assets located on distributor roads
Local Access	Kerb assets located on local access roads

Table 13 - Kerb Hierarchy Definition

The Tweed Shire Council owns and manages approximately 827kms of kerbs which are constructed and located within the road reserve, many of which are in varying condition. Council also owns and manages kerbs within parks and open space areas, however these have been excluded at this time from the Strategic Asset Management modelling as this data was not yet available.

The quantum of Council's kerb asset stock within the road reserve by kerb hierarchy is illustrated in the table below.

Kerb Hierarchy	*2016 Length (km)*	2021 Length (km)	2021 % of kerbs	Quantity Change from 2016 to 2021
Collector	*199*	200	24%	+1km
Distributor	*81*	89	11%	+8km
Local Access	*515*	538	65%	+23km
Totals	***795***	**827**		**+32km**

Table 14 - Kerb Quantities by Hierarchy as in June 2021 and June 2016

The above table illustrates that of this kerb asset stock, local roads has 65% of kerbs whilst collector roads and distributor roads have 24% and 11% of kerbs respectively. The kerb length has increased by 32km or 4% in the past five years.

2.1.3.4 Footpaths

The Footpath hierarchy classification has been documented as follows.

Footpath Hierarchy	Definition
High	Footpaths located on the Primary Pedestrian Routes. Primary routes are those that generate regular and high levels of travel demand on a daily basis, such as to residential, retail, educational and commercial destinations.
Medium	Footpaths located on the Secondary Pedestrian Routes. Secondary destinations may provide a relatively small number of potential trips, however the route may play a significant role in the local community for connecting a particular group of people to the primary destination.
Low	Footpaths located in areas other than in High and Medium hierarchy locations

Table 15 - Footpath Hierarchy Definition

The classification is based on the locality of facilities that would indicate footpath use e.g. schools, shopping centres.

The Tweed Shire Council owns and manages approximately 266km of footpaths which are constructed and located within the road reserve, many of which are in varying condition. Council also owns and manages footpaths within parks and open space area, however these have been excluded at this time from the Strategic Asset Management modelling as this data was not yet available.

The quantum of Council's footpath asset stock within the road reserve by footpath hierarchy is illustrated in the table below.

Footpath Hierarchy	*2016 Length (km)*	2021 Length (km)	2021 %	Quantity Change from 2016 to 2021
High	*10*	19	7.1%	+9
Medium	*39*	189	71.1%	+150
Low	*191*	58	21.8%	-133
Totals	*240*	266	**100**	**+26km**

Table 16 - Footpath Quantities by Hierarchy as in June 2021 and June 2016

The above table illustrates that of this footpath asset stock, 26km (11%) of footpaths has been built by council or gifted from the developers in the past five years.

Footpath Surface	*2016 Length (km)*	2021 Length (km)	2021%	Quantity Change from 2016 to 2021
Concrete	*224*	254	95.50%	+29km
Asphalt	*12*	9	3.50%	-3km
Paver	*2*	1	0.40%	-1km
Gravel	*0.5*	0.5	0.20%	-
Spray Seal	*0*	1	0.40%	+1km
Totals	***240***	**266**		**+26km**

Table 17 - Footpath Quantities by Surface Type as in June 2021 and June 2016

The above table illustrates that 96% of footpaths is made of concrete whilst asphalt, paver, gravel and spray only made up a small percentage of footpath network.

2.1.3.5 Carparks

The Carpark hierarchy classification has been documented as follows.

Carpark Hierarchy	Definition
Urban	For parking of cars and trucks in urban areas
Rural	For parking of cars and trucks in rural areas

Table 18 - Carpark Hierarchy Definition

The Tweed Shire Council owns and manages approximately 102,120m^2 of carpark areas which are constructed and located within the road reserve, many of which are in varying condition. Council also owns and manages carparks within parks and open space areas, however these have been excluded at this time from the Strategic Asset Management modelling as this data was not yet available.

The quantum of Council's Carpark asset stock within the road reserve by Carpark hierarchy is illustrated in the table below.

Carpark Hierarchy	*2016 Area (m2)*	2021 Area (m2)	Quantity Change from 2016 to 2021
Urban	*97,463*	98,239	+776m2
Rural	*4,177*	3,881	-296m2
Totals	***101,640***	**102,120**	**+480m2**

Table 19 - Carpark Area by Hierarchy as in June 2021 and June 2016

The above table illustrates that of this Carpark asset stock, some 96% of carparks have been defined as Urban with the remaining 4% defined as Rural. Total carpark area has increased by 480m2 in the last five years.

Carpark Surface	*2016 Area (m2)*	2021 Area (m2)	Quantity Change from 2016 to 2021
Asphalt	*81,350*	81,741	+391m2
Spray Seal	*20,290*	20,379	+89m2
Total	***101,640***	**102,120**	**+480m2**

Table 20 - Carpark Area by Surface Type as in June 2021 and June 2016

The above table illustrates that of the 102,120m^2 of Carpark asset stock maintained by the Tweed Shire Council, the most predominant surface type is Asphalt making up 80% of the carpark network followed by Sprayed Seal at 20%.

2.1.3.6 Road Ancillary

The Road Ancillary hierarchy classification has been documented as follows.

Road Ancillary Hierarchy	Definition
Collector	Road Ancillary located on collector roads (High Hierarchy)
Distributor	Road Ancillary located on distributor roads (Medium Hierarchy)
Local Access	Road Ancillary located on local access roads (Low Hierarchy)

Table 21 - Road Ancillary Hierarchy Definition

The Tweed Shire Council owns and manages various road ancillary assets as provided in Table 6 which are constructed and located within the road reserve, many of which are in varying condition.

The quantum of Council's road ancillary asset stock within the road reserve by road ancillary hierarchy is illustrated in the table below.

Road Ancillary Hierarchy	Road Ancillary Type	*2016 Number*	2021 Number	*2016 Length (m)*	2021 Length (m)
Collector	Bus Shelter	*107*	121	*0*	0
	Light Poles	*20*	140	*0*	0
	Noise Walls	*0*	0	*0*	1,704
	Pedestrian Fencing	*0*	0	*20*	165
	Retaining Walls	*0*	0	*0*	1,021
	Street Furniture	*1*	36	*0*	0
	Traffic Barrier	*0*	0	*763*	1,921
	Total	*128*	297	*783*	4,811
Distributor	Bus Shelter	*45*	50	*0*	0
	Pedestrian Fencing	*0*	0	*1,298*	1,649
	Retaining Wall	*0*	0	*0*	1,319
	Street Furniture	*13*	14	*195*	0
	Traffic Barrier	*0*	0	*6,334*	11,815
	Total	*45*	61	*7,827*	14,783
Local Access	Bus Shelter	*33*	0	*0*	0
	Pedestrian Fencing	*0*	0	*24*	0
	Traffic Barrier	*0*	135	*0*	113
	Total	*33*	135	*24*	113

Table 22 - Road Ancillary Assets by Hierarchy as in June 2016 and June 2021

2.2 What does it Cost?

Asset Category	Replacement Value ($)	Accumulated Depreciation ($)	Written Down Value ($)	Depreciation Expense ($)
Roads	819,133,800	119,482,975	699,650,825	12,591,105
Bridges	202,035,854	26,408,791	175,627,063	2,268,959
Kerbs	65,185,020	11,996,851	53,188,169	1,025,536
Footpaths	44,717,631	19,343,979	25,373,652	761,047
Carparks	10,511,401	1,718,353	8,793,048	171,853
Road Ancillary	17,404,714	$984,024	16,420,690	409,583
Total	**1,158,988,420**	**179,934,973**	**979,053,447**	**17,228,083**

Table 23 - Cost of transport assets as at June 2021

2.3 Asset Class Status

Council has documented a detailed transportation condition assessment manual that has been utilised to assess the transport network condition and this is referred to as 'Tweed Transport Business Process Manual V2.1'. The following provides a high-level overview with regards to the details of the condition rating scales and community perception scales for Council's transport asset stock.

Condition Rating	Description
0	**Brand New**: No maintenance required
1	**Excellent Condition**: Only planned maintenance required
2	**Good**: Minor maintenance required plus planned maintenance
3	**Fair**: Moderate maintenance required
4	**Poor**: Significant renewal/upgrade required
5	**Very Poor**: Unserviceable

Table 24 - Asset Condition Classification

The condition of the Tweed Shire Council's road, carpark, kerb, footpath, bridge and road ancillary asset stock is determined by a visual and equipment inspection carried out by an external contractor, with the latest condition assessment undertaken by an independent contractors in 2020. The condition data has since been updated to reflect the changes in condition as a result of major renewal and upgrade works delivered via Council's capital works program delivered via Council's preventative maintenance program.

2.3.1 Roads and Carparks

Based on the outcomes of the visual and equipment inspection, a condition of the road segment and carpark assessed for each of the defect criteria is determined and assigned to each road segment or carpark by the inspector.

Faults in each road segment (between intersecting streets) and carparks are identified using the following defect criteria:

- Measuring the severity and extent of linear cracking;
- Measuring the severity and extent of fatigue cracking (structural adequacy and fatigue failure);
- Measuring the severity of kerbs condition;
- Measuring the extent and severity of pavement defects (i.e. corrugations and depressions);
- Measuring the extent of roughness (i.e. ride quality);
- Measuring the extent of local surface texture defects (such as potholes);
- Measuring the extent of surface texture defects (such as flushing, bleeding and stripping);
- Measuring the extent of ravelling on asphalt road surfaces; and
- Measuring the surface age to drive rejuvenation/resurfacing treatments.

Road and carpark wearing surfaces such as asphalt and spray seal (also known as chip seal) are over time, subjected to surface condition deterioration which can always be attributed to the following, or a combination, of the following:

- Cracking due to shrinkage or inadequate pavement strength;
- Loss of smooth driving surface shape due to deformation of wearing surface or pavement base materials;
- Hardening of the binder over time leading to loss of surface aggregate or cracking of surface; and
- Loss of texture due to flushing of bituminous binders or embedment of sprayed seal aggregate into underlying surfaces.

Deterioration has two general causes: environmental due to weathering and aging and structural caused by repeated traffic loadings.

In most cases, road/carpark surface and pavement distresses result from both environmental and structural causes. However, it is important to try to distinguish between the two in order to select the most effective rehabilitation techniques.

The rate at which the road/carpark surface or pavement deteriorates depends on its environment, traffic loading conditions, original construction quality, and interim maintenance procedures. Poor quality materials or poor construction procedures can significantly reduce the life of a road/carpark. As a result, two roads constructed at the same time may have significantly different lives, or certain portions of a road may deteriorate more rapidly than others. On the other hand, timely and effective maintenance can extend a road's life. Timely resurfacing can reduce the effect of moisture ingress into the road pavement, thereby ensuring the integrity of the road pavement and road surface. For example, potholes generally are developed from cracking.

Council has documented a detailed road/carpark condition assessment manual that has been used to assess the Road network condition and this is referred to as "DCM1 Road Condition Assessment Rating Manual V2.0". The following table provides an overall view with regards to the details of the condition rating scales and community perception scales for Council's road/carpark asset stock.

Overall Condition	Community Rating	Generalised description of asset condition
0	Brand New	A new or recently reconstructed Road/Carpark.
1	Excellent	A road/carpark in excellent overall condition however is not new and shows no signs of distress or defects.
2	Good	Sound construction with good Road/Carpark condition and no distortion with limited ageing or may show minor signs of distress upon close inspection such as sporadic fine cracking or isolated minor defects with no associated stepping or distortion.
3	Fair	Reasonable construction with a serviceable Road/Carpark showing some aging and or signs of distress, such as fine to moderate cracking and or minor distortion. Such distortions may consist of stepping which is estimated to be typically but not exclusively greater than 5mm but less than 10mm vertical movement or insignificant undulations not readily apparent without close inspection. The extent of such defects will typically affect less than 20% of the length targeted for assessment and can be rectified with minor maintenance works.
4	Poor	Road/Carpark displays substantial deterioration from material oxidation and or may display significant lengths (20% to 50%) of distress, such as cracking or localised disintegration of the asset structure. The construction may also display instances of significant distortions consisting of stepping estimated to be typically but not exclusively between 10mm and 20mm vertical movement or intense undulations typically exceeding 75 to 100mm and obtrusive to pedestrian traffic. Major renewal work required.
5	Very Poor	Road/Carpark displays significant lengths of distress (greater than 50%) as a result of cracking, material disintegration or distortion as defined in condition four above. Or the construction may contain instances of extreme stepping estimated to be typically greater than 20mm vertical movement or extreme undulations or tilting of the structure so as to provide a clear hindrance to typical pedestrian traffic. Extensive renewal work required.

Table 25 - Road/Carpark Condition Measurement Scales

[1] DCM – Refers to Data Collection Manual

Figure 1 - Example Sealed Road Condition Score 0

Figure 2 - Example Sealed Road Condition Score 3

Figure 3 - Example Sealed Road Condition Score 5

The result from the audit have been calibrated on site. The results have been used for predictive modeling in Assetic Predictor (refer to Section 5).

The condition profile of the surface and pavement components of Council's road and carpark assets is shown below.

Condition Rating	*2016 Surface Condition*	2021 Surface Condition	*2016 Pavement Condition*	2021 Pavement Condition	*2016 Carpark Condition*	2021 Carpark Condition
1	*68.9%*	46.9%	*55.4%*	9.20%	*23.0%*	1.1%
2	*26.9%*	19.6%	*38.9%*	68.50%	*22.0%*	33.4%
3	*3.8%*	30.6%	*5.4%*	18.40%	*26.0%*	52.9%
4	*0.3%*	2.7%	*0.4%*	3.80%	*24.0%*	11.9%
5	*0.0%*	0.2%	*0.0%*	0.20%	*5.0%*	0.7%

Table 26 - Road Surface and Pavement Condition Score as in 2021 and 2015

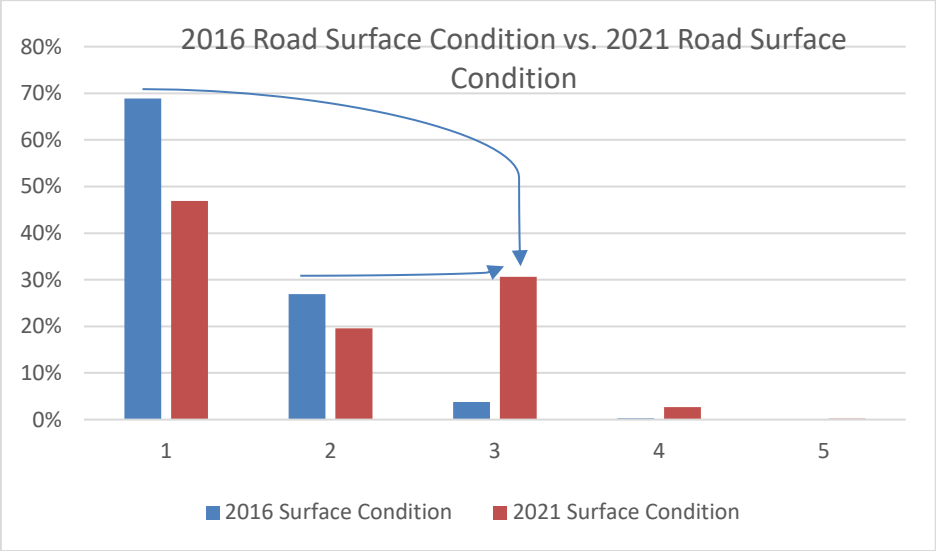

Figure 4 - Road Surface Condition Comparison

As illustrated in the above figure, a large percentage of condition 1 road surface has transformed into condition 2, and condition 2 has transformed into condition 3 in the past five years. The percentage of condition 4 surface has increased from 0.3% to 2.7%, it implies that more treatment work is required for these condition 4 surfaces in the next few years.

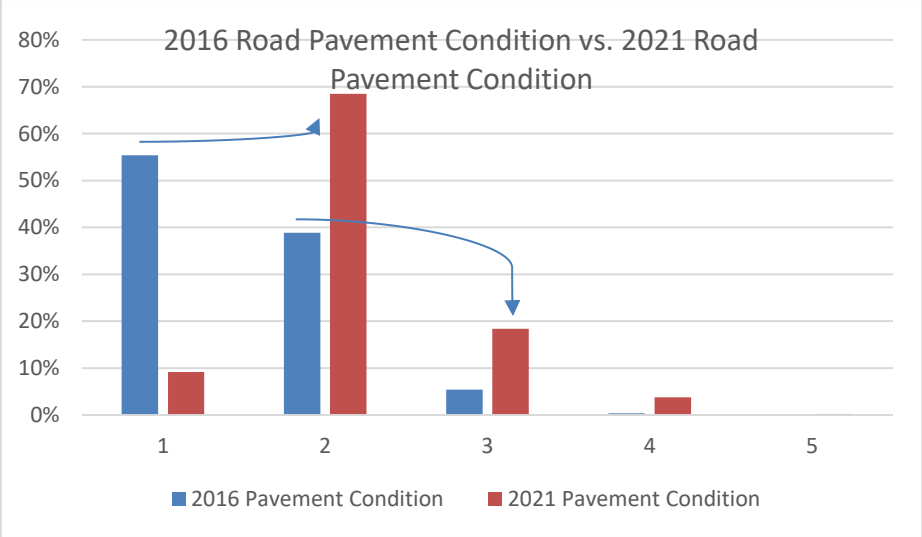

Figure 5 - Road Pavement Condition Comparison

As illustrated in the above figure, similar to road surface, a large percentage of condition 1 road pavement has transformed into condition 2, and condition 2 has transformed into condition 3 in the past five years. The percentage of condition 4 pavement has increased from 0.4% to 3.8%, it implies that more treatment work is required for these condition 4 pavements in next few years.

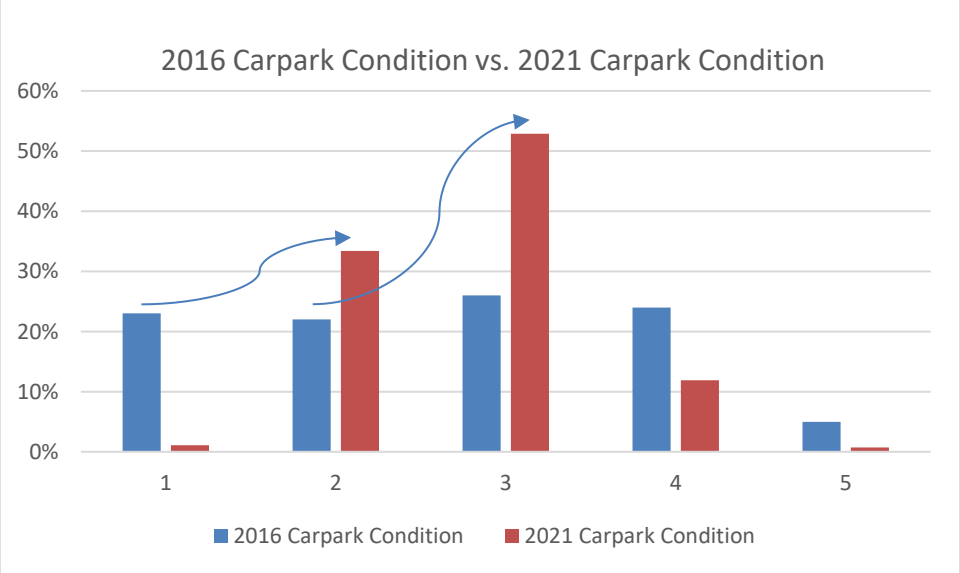

Figure 6 - Carparks Overall Condition Comparison

As illustrated in the above figure, a large percentage of condition 1 carpark has transformed into condition 2, and condition 2 has transformed into condition 3 in the past five years. The percentage of condition 4 carpark has decreased from 24% to 12%, it implies that less treatment work is required for Carparks in the next few years.

2.3.2 Bridges

With a systematic inspection regime in place, monitoring condition over time is a sensitive means of tracking the performance of each bridge component and ultimately of the bridge. A worsening change in condition is a clear indicator of component deterioration. In addition, change in condition may be used to test and demonstrate the effectiveness of adopted maintenance repair strategies. Bridge component condition is a most useful input for identifying maintenance repair needs, particularly at the local level.

Bridge condition is a summary indicator, assessed from individual component conditions, which in turn is derived from the Level Two Bridge inspections. The condition of a bridge is determined by combining the bridge component condition information for each component of the bridge and rated in terms of each of the "condition states" defined in general terms in Table 27 below.

Component Condition	Community Rating	Generalised Description of asset condition
0	Brand New	A new bridge or recently reconstructed bridge component.
1	Excellent	The component is in new or near new condition showing no signs or deterioration.
2	Good	The component is in good condition with little or no deterioration. Superficial cracks and discoloration may be present, but without effect on strength and/or serviceability.
3	Fair	The component shows deterioration of a minor nature. Minor surface defects may be present but without loss of section or effect on the serviceability of the element.
4	Poor	The component shows advanced deterioration and loss of effective section. Deterioration is to the point that there is concern a structural analysis is warranted to ascertain impact on the strength and/or serviceability of the element.
5	Very Poor	Component is no longer providing the level of service required of it due to extensive deterioration. Extensive renewal work required.

Table 27 - Bridge Condition Measurement Scales

Figure 7 - Example Timber Bridge Super Structure (Bridge Girder) Condition Score 5

Figure 8 - Example Concrete Bridge Substructure (Pier Walls) Condition Score 1

Figure 9 - Example Steel Bridge Rail Condition Score 3

The overall Bridge condition index as defined by the 2021 and 2016 Bridge visual condition inspections is shown below.

Condition Rating	*2016 % of Network*	*2016 Replacement Value ($)*	2021 % of Network	2021 Replacement Value ($)
1	*77.0%*	*140,900,482*	93.3%	188,973,749
2	*20.8%*	*38,061,429*	6.7%	13,526,967
3	*1.8%*	*3,293,778*	-	-
4	*0.4%*	*731,951*	-	-
5	-	-	-	-
	100.0%	*182,987,639*	100%	201,895,031

Table 28 – Bridge Condition Rating as in June 2016 and June 2021

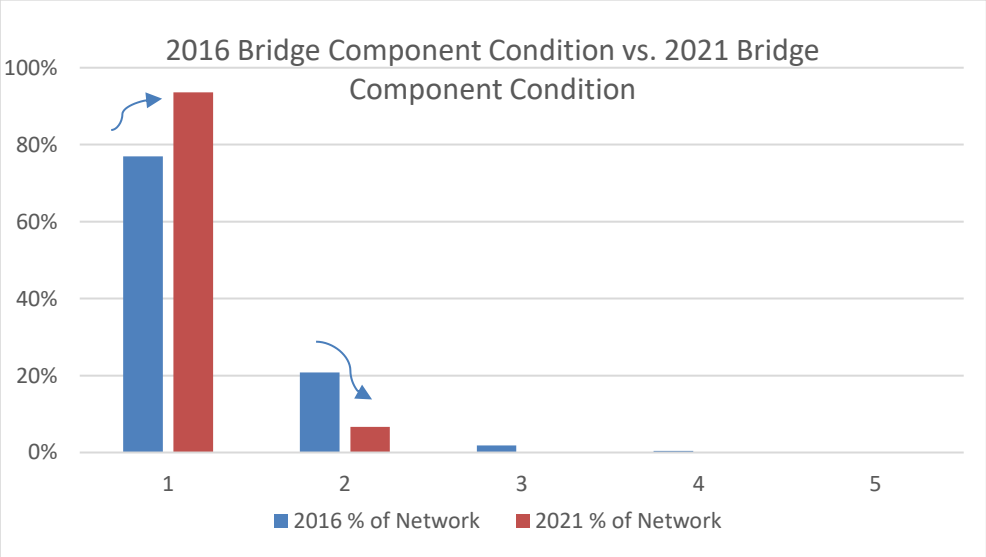

Figure 10 - Bridge Component Condition Comparison

As illustrated in the above figure, the average bridge component condition had improved in the past five years. The percentage of condition 1 bridge component has increased from 77.0% to 93.6%, it implies that Council carried out treatment works which had improved the average condition.

2.3.3 Kerbs

Faults in each kerb segment (between intersecting streets) are identified using the following defect criteria:

- Cracking or broken slab/kerb; and
- Vertical displacement such as depressions and trip hazards.

Kerb deterioration resulting in these defect criteria is generally caused or exacerbated by a combination of factors such as tree roots in the nature strip, poor reinstatement by service authorities and/or building developers and vehicles/trucks parking on the kerb.

Based on the outcomes of the visual inspection, a condition of the kerb segment assessed for each of the defect criteria is determined and assigned to each kerb segment by the inspector.

Council has documented a detailed kerb condition assessment manual that has been used to assess the kerb network condition and this is referred to as '*DCM*[2] *Road Assets V1.40*'. The following table provides an overall view with regards to the details of the condition rating scales and community perception scales for Council's kerb asset stock.

Overall Condition	Community Rating	Generalised Description of asset condition
0	Brand New	A new kerb or recently reconstructed kerb.
1	Excellent	A kerb in excellent overall condition however is not new and shows no signs of distress or defects.
2	Good	Sound construction with good kerb condition and no distortion with limited kerb ageing or may show minor distress upon close inspection such as sporadic fine cracking or isolated minor defects with no associated stepping or distortion.
3	Fair	Reasonable construction with a serviceable kerb showing some kerb aging and or signs of kerb distress, such as fine to moderate cracking and or minor distortion. Such distortions may consist of stepping which is estimated to be typically but not exclusively greater than 5mm but less than 10mm vertical movement or insignificant undulations not readily apparent without close inspection. The extent of such defects will typically affect less than 20% of the length targeted for assessment and can be rectified with minor maintenance works.
4	Poor	Kerb displays substantial kerb deterioration from material oxidation and or may display significant lengths (20% to 50%) of kerb distress, such as cracking or localised disintegration of the asset structure. The construction may also display instances of significant distortions consisting of stepping estimated to be typically but not exclusively between 10mm and 20mm vertical movement or intense undulations typically exceeding 75 to 100mm and obtrusive to pedestrian traffic. Major renewal work required.
5	Very Poor	Kerb displays significant lengths of kerb distress (greater than 50%) as a result of cracking, material disintegration or distortion as defined in condition four above. Or the construction may contain instances of extreme stepping estimated to be typically greater than 20mm vertical movement or extreme undulations or tilting of the structure so as to provide a clear hindrance to typical pedestrian traffic. Extensive renewal work required.

Table 29 - Kerb Condition Measurement Scales

The overall Kerb condition index as defined by the 2021 and 2016 visual condition inspections is shown below.

Condition Rating	*2016 % of Network*	2021 % of Network
1	*59.0%*	7.4%
2	*24.1%*	12.6%
3	*8.8%*	77.1%
4	*6.3%*	2.8%
5	*1.8%*	0.1%

Table 30 –Kerb Condition Rating Scores as in June 2021 and June 2016

[2] DCM – Refers to Data Collection Manual

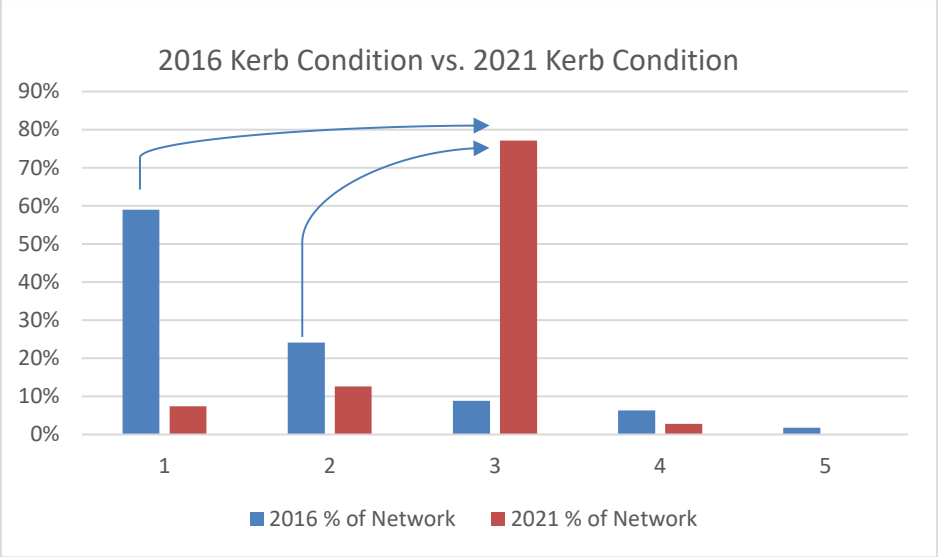

Figure 11 - Kerb Condition Comparison

As illustrated in the above figure, a large percentage of condition 1 kerbs has transformed into condition 2 and 3, and condition 2 has transformed into condition 3 in the past five years. The percentage of condition 4 and 5 kerbs has decreased from 8.1% to 2.9%, it implies that less treatment work is required for the kerbs in the next few years.

Figure 12 - Example Concrete Kerb Condition Score 0

Figure 13 - Example Concrete Kerb Condition Score 3

Figure 14 - Example Concrete Kerb Condition Score 5

2.3.4 Footpaths

Faults in each footpath segment (between intersecting streets) are identified using the following defect criteria:

- Cracking or broken slab/surface; and
- Vertical displacement such as depressions and trip hazards.

Footpath deterioration resulting in these defect criteria is generally caused or exacerbated by a combination of factors such as tree roots in the nature strip, poor reinstatement by service authorities and/or building developers and vehicles/trucks parking on the footpath.

Based on the outcomes of the visual inspection, a condition of the footpath segment assessed for each of the defect criteria is determined and assigned to each footpath segment by the inspector.

Council has documented a detailed footpath condition assessment manual that has been used to assess the footpath network condition and this is referred to as '*DCM*[3] *Road Assets V1.40*'. The following table provides an overall view with regards to the details of the condition rating scales and community perception scales for Council's footpath asset stock.

Overall Condition	Community Rating	Generalised Description of asset condition
0	Brand New	A new footpath or recently reconstructed footpath.
1	Excellent	A footpath in excellent overall condition however is not new and shows no signs of distress or defects.
2	Good	Sound construction with good surface condition and no distortion with limited surface ageing or may show minor distress upon close inspection such as sporadic fine cracking or isolated minor defects with no associated stepping or distortion.
3	Fair	Reasonable construction with a serviceable surface showing some surface aging and or signs of surface distress, such as fine to moderate cracking and or minor distortion. Such distortions may consist of stepping which is estimated to be typically but not exclusively greater than 5mm but less than 10mm vertical movement or insignificant undulations not readily apparent without close inspection. The extent of such defects will typically affect less than 20% of the area targeted for assessment and can be rectified with minor maintenance works.
4	Poor	Footpath displays substantial surface deterioration from material oxidation and or may display significant areas (20% to 50%) of surface distress, such as cracking or localised disintegration of the asset structure. The construction may also display instances of significant distortions consisting of stepping estimated to be typically but not exclusively between 10mm and 20mm vertical movement or intense undulations typically exceeding 75 to 100mm and obtrusive to pedestrian traffic. Major renewal work required.
5	Very Poor	Footpath displays significant areas of surface distress (greater than 50%) as a result of cracking, material disintegration or distortion as defined in condition four above. Or the construction may contain instances of extreme stepping estimated to be typically greater than 20mm vertical movement or extreme undulations or tilting of the structure so as to provide a clear hindrance to typical pedestrian traffic. Extensive renewal work required.

Table 31 - Footpath Condition Measurement Scales

[3] DCM – Refers to Data Collection Manual

The overall Footpaths condition index as defined by the 2016 and 2021 Footpaths visual condition inspections is shown below.

Condition Rating	*2016 % of Network*	2021 % of Network
1	*59.0%*	9.10%
2	*6.7%*	6.80%
3	*21.5%*	42.50%
4	*11.5%*	41.20%
5	*1.2%*	0.40%

Table 32 – Footpath Condition Rating Score as in June 2016 and June 2021

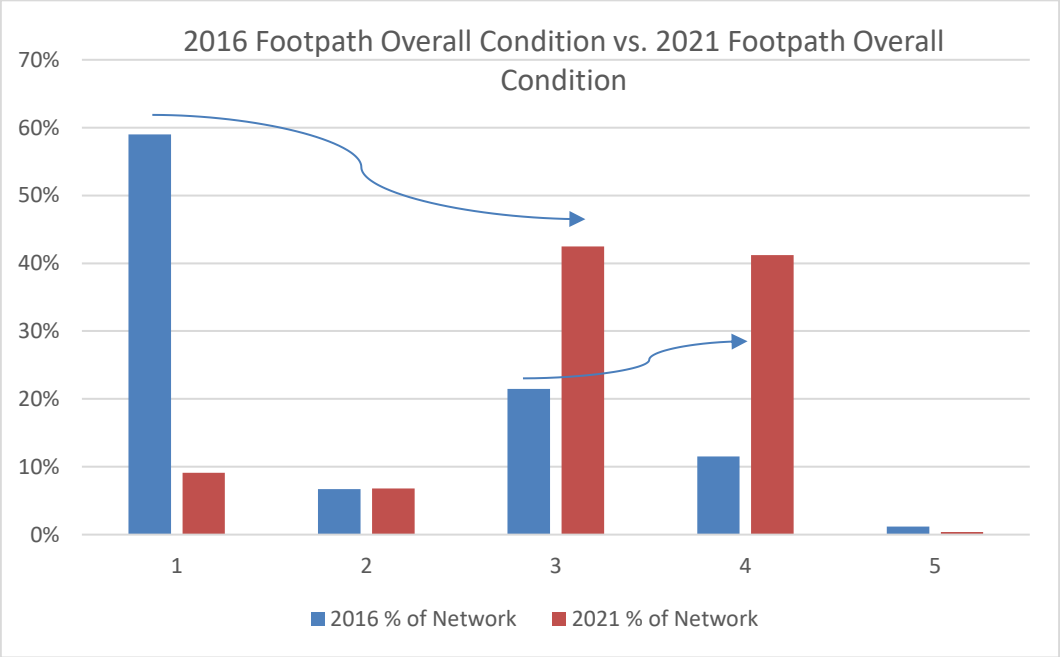

Figure 15 - Footpath Overall Condition Comparison

As illustrated in the above figure, a large percentage of condition 1 footpaths has moved into condition 2 and 3, and condition 3 has moved into condition 4 in the past five years. The percentage of condition 4 and 5 footpaths has increased from 12.7% to 41.6%, it implies that more treatment work is required for the footpaths in the next few years. The movements could be largely attributed to improved assessment techniques used in 2020 with digital equipment replacing manual observation.

Figure 16 - Example Asphalt Footpath Condition Score 0

Figure 17 - Example Concrete Footpath Condition Score 3

Figure 18 - Example Asphalt Footpath Condition Score 5

Figure 19 - Example Concrete Footpath Condition Score 5

2.3.5 Road Ancillary

Based on the outcomes of the visual inspection, a condition of the road ancillary asset assessed for each of the defect criteria is determined and assigned to each asset by the inspector.

It is noted that the condition for these assets have been assigned using general condition rating table below:

Overall Condition	Description
0	**Brand New**
1	**Excellent Condition**: Only planned maintenance required
2	**Good**: Minor maintenance required plus planned maintenance
3	**Fair**: Moderate maintenance required
4	**Poor**: Significant renewal/upgrade required
5	**Very Poor**: Unserviceable

Table 33 – Road Ancillary Condition Rating

The overall condition index as defined by the 2021 and 2015 Road Ancillary visual condition inspections is shown below.

Condition Rating	2016 % of Network	2016 Replacement Value ($)	2021 % of Network	2021 Replacement Value ($)
1	*99.66%*	*10,305,724*	77.80%	11,075,116
2	*0.22%*	*22,750*	18.90%	2,690,484
3	*0.08%*	*8,273*	2.50%	355,884
4	*0.03%*	*3,102*	0.60%	85,412
5	*0.01%*	*1,034*	0.20%	28,471
		10,340,883		**14,235,367**

Table 34 –Road Ancillary Condition Rating as in June 2021 and June 2016

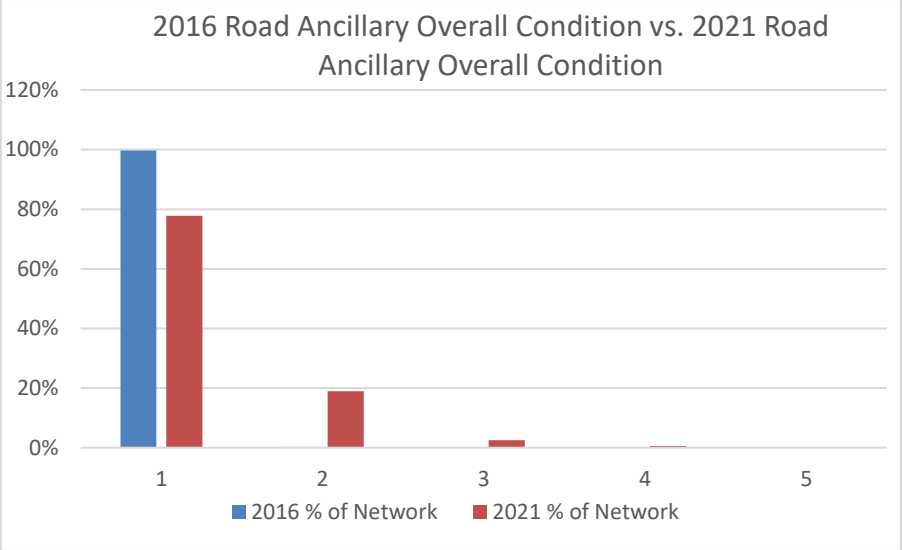

Figure 20 - Road Ancillary Overall Condition Comparison

As illustrated in the above figure, a moderate percentage of condition 1 road ancillary assets has transformed into condition 2 in the past five years. The percentage of condition 4 and 5 road ancillary remained a similar distribution. It implies that the treatment work for the road ancillary assets should be similar in the next few years.

3 Levels of Service and Condition Assessment

At Tweed Shire, we have defined two tiers for levels of service: Strategic Levels of Service and Operational Levels of Service.

3.1 Strategic Levels of Service

Strategic Levels of Service are what we expect to provide in terms of key customer outcomes:

- Appropriateness of service;
- Accessibility to users 24 hours a day, 7 days a week;
- Affordability - acknowledging that we can only deliver what we can afford; and
- Relevance of the service being provided - in terms of demand characteristics, future demographics, current back-logs and where the pressure points are.

Tweed Shire's Strategic Levels of Service are tabulated in the table below:

Service Criteria	What will Council do?	Performance Standard / Measure
Community		
Quality	Well maintained and suitable transport services.	<2,000 request / complaints per annum.
Customer Satisfaction	Transport assets meet community needs.	>60% customer satisfaction.
Accessibility	Road assets will be accessible 24 hours a day, seven days a week.	100% Compliance. In the instance where a road or footpath or bridge is closed to users for reasons such as maintenance, upgrading, renewal or a Council related public event or non-Council events such as processions, then appropriate notification shall be given to relevant users in accordance with Council's public information policy.
Responsiveness	Response time to customer requests.	> 70% of all requests adequately responded to within target.
Technical		
Condition - Sealed Roads	Condition assessment of road network every 3-5 years.	On average Pavement Condition Index and Surface Condition Index to be in condition 3 (out of 5) or better.
Condition - Unsealed Roads	Condition assessment of road network every 3-5 years.	On average, unsealed road network to be in condition 3 (out of 5) or better.
Condition - Footpaths	Condition assessment of road network every 3-5 years.	On average, footpath network to be in condition 3 or better.

Table 35 - Strategic Levels of Service

3.2 Operational Level of Service

Operational Levels of Service are what we will do in real terms i.e. reliability, functionality and adequacy of the services provided. Typically, this transport AMP has documented our standards e.g. at what point will we repair, renew or upgrade to meet the customer outcomes listed in the strategic levels.

Operational levels of service are also referred within Council as Technical Levels of Service and have been defined for each of the following:

- **New Asset** - If we provide new transport structures / assets, then what design and maintainability standards shall apply to make them meet our strategic outcomes.
- **Upgraded or Reconstructed Asset to original standard** - If we upgrade or reconstruct transport assets, then what design and maintainability standards shall apply to make them meet our strategic outcomes.
- **Maintenance** - When will we intervene with a maintenance repair and what will be our responsiveness in terms of customer requests for maintenance faults.

3.2.1 Capital Levels of Service - New Assets, Reconstructed Assets, Upgraded Assets

New or Upgraded transport assets are provided in accordance with the following.

- Tweed Shire Council Development Design Specification D5;
- Tweed Shire standard drawings;
- Australian Rainfall and Runoff Guidelines; and
- Tweed Shire Council Transportation Service Provision Manual.

3.2.2 Maintenance level of Service

For the Levels of Service delivered on a day-to-day nature (i.e. responding to customer requests for maintenance faults), refer to the following manuals, available for display at the Shire's offices:

- Tweed Road Maintenance LoS V1.0;
- Tweed Road Ancillary Maintenance LoS V1.0;
- Tweed Bridge Maintenance LoS V1.0; and
- Tweed Unsealed Road Maintenance LoS V1.0.

The service manuals documents:

1) The task or work expected to be undertaken, e.g. patch pot-holes to remove hazard;
2) The schedule of inspections to be undertaken of specified matters at specified intervals;
3) The circumstances under which intervention action is to be taken with respect to repair or maintenance needs for defects reported or found on inspection;
4) The priority to be given to intervention level;
5) The type of priority intervention action that will be carried out;
6) Provision, as far as practicable, for the unpredictable i.e. emergencies, natural disasters; and
7) Assessment of resources required to deliver the specified maintenance services.

Responsibility for immediate dangerous situations with respect to transport assets, is initially assessed or undertaken by Councils operational staff or the after-hours response team.

This transport Asset Management Plan acknowledges the importance of understanding and monitoring the linkage between workload indicators and intervention actions, as a substantial increase in area of pavement to be maintained can materially impact upon intervention action (and citizen satisfaction and duty of care requirements) if not accompanied by a comparable increase in budget allocation or productivity improvement.

Given the outcomes of an internal review with respect to Council's transport maintenance services, the standards of maintenance detailed in this Transport Asset Management Plan are considered reasonable and meeting community expectations in the context of responsible and reasonable road management.

3.3 Condition Assessment Framework

Council's "Tweed Transportation Business Process Manual" provides further information on the methodology for rating the condition of Council's transport assets.

Condition information needs to be of sufficient accuracy, repeatability and completeness to support the delivery of this transport Asset Management Plan, capital works programs and for use in corporate Asset Management system for predictive modelling.

4 Demand Management

Future demand for the transport assets is affected by the following factors:

- Population growth and associated urban development;
- Changing community expectations;
- Residential development;
- Demographic changes;
- Demand for increased services; and
- Strategic extensions to the network.

These factors will affect the addition of new assets to the transport network system as well as the renewal and upgrade requirements for the existing network.

4.1 Future Demand

Statistical information from Australian Bureau of Statistics confirms that the Tweed Shire is experiencing and will continue to experience growth.

	Forecast year						Change between 2016 and 2036	
	2011	2016	2021	2026	2031	2036	Total change	Avg. annual change
2011 consensus	88,437	91,175	97,954	106,506	116,269	125,953	34,778	1.2%
2016 consensus		93,742	97,767	102,185	108,930	120,070	26,328	0.9%

Source: Australian Bureau of Statistics, Regional Population Growth, Australia (2011&2016 consensus).

In the absence of comprehensive service strategies, population trends can be used as a guide to ascertain future demand.

For example, if the service levels are to be retained, Council will have an increase in its asset stock via developer contributed asset and will also need to increase the number of staff it has providing services to these residents.

The following table provides the high-level changes in asset stock from 2016 to 2021.

Assets Class	*2016*	2021	% Change	% YOY
Sealed Roads	*1,077 km*	1,102 km	2%	0.4%
Unsealed Roads	*164 km*	160 km	-2%	-0.4%
Bridges	*362 no*	372 no	3%	0.75%
Kerbs	*795 km*	827 km	4%	1%
Footpaths	*240 km*	266 km	11%	2.2%
Carparks	*101,640 m2*	102,120m2	0%	0%

Table 36 - Movement in Transport Asset Stock

4.2 Current Transport Asset Utilisation

In general, the transport network is considered to provide adequate capacity across developed areas of the Shire. Development standards have been in place that has ensured that the majority of urban growth areas have been provided with sufficient transport infrastructure.

In the recent community survey, two thirds of every survey respondent had scored roads in the top five services.

4.3 Current Issues Influencing Service Demand

Demographic characteristics / trends affect the demand for transport assets. The residential growth will predominantly be both in urban towns and villages as well as rural residential development. The urban areas are concentrated in the north-east corner (Tweed Heads), with an inland urban centre at Murwillumbah, and several smaller townships and villages.

At a high level, the following demographic statistics will influence service demand at Tweed Shire Council:

- Number of people per household is expected to increase;
- Percentage of people aged 65 is expected to increase; and
- Number of people below the age of 15 is expected to remain the same.

Increase in population will require improvements to public transport infrastructure. Population growth will also lead to an expectation of enhanced services to service new developments. Typical service expectations include sealed road access, footpath access, bus shelters, street lightings and garbage removal services which all rely on having reliable transport network.

The changes in population demographics, such as the increase in older residents require Council to ensure adequate footpaths are provided in those areas, whilst an increase in younger residents who have settled in Salt and Casuarina will require access to cycleways.

There is existing demand for the continued provision of improved freight routes through the LGA to service existing development. This includes demand for provision of B-Double routes on Council roads, requiring works such as shoulder sealing and intersection treatments to ensure these types of vehicles can be carried safely and efficiently.

4.4 Changes in Technology

Council is continuously monitoring new asset treatments that may be available to increase the life of its assets.

The following impacts on demand from technological changes may be brought about by:

- Rehabilitation techniques may replace some current renewal or replacement for example incorporating the use of recycled materials in specifications and designs;
- Applying new techniques to strengthen and increase the life of pavement materials;
- Passenger vehicle trend towards smaller units may raise resident expectations of a smoother ride - more reshaping and asphalt surfacing, though it may reduce a demand for wider roads;
- Crude oil shortages may accelerate the development of binder alternatives to bitumen;
- Fossil fuel scarcity may reduce the number of private vehicles such that the current traffic growth of 1 to 2 % per annum is reduced; and

- Technological change may 'drive Council's dollar further'.

4.5 Demand Management Plan

The demand for transport assets at Tweed is going to increase proportionally with the predicted population growth and predicted demographic changes. This is also in line with the community expectation where Roads, Traffic, Footpaths and Cycleways Roads have scored 61% as priority for increased services by the Council.

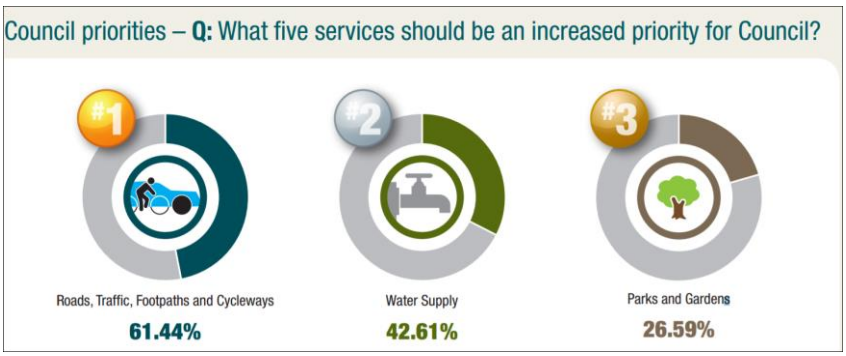

Figure 21 - Council Priorities

Demand for new services will be managed through a combination of managing existing assets, upgrading of existing assets and providing new assets to meet demand and demand management. Demand management practices include non-asset solutions, insuring against risks and managing failures.

Non-asset solutions focus on providing the required service without the need for the organisation to own the assets and management actions including reducing demand for the service, reducing the level of service (allowing some assets to deteriorate beyond current service levels) or educating customers to accept appropriate asset failures. Examples of non-asset solutions include are as follows:

- Use of appropriate signage wherever practical, to make safe critical intersections or alignments instead of complete re-design and reconstruction.
- Improvement/widening of existing arterial roads and collector roads instead of introducing new roads.
- Council to explore implementation of several policies that limit damage to the road network and to preserve remaining asset life. Such policies include implementation of speed, length and weight limits, or modification to the road network to direct traffic away from vulnerable assets (i.e. through one-way segments or road closures).
- Increasing access options by providing cycleway to replace a road vehicle and most importantly consider reducing the length of travel trips by planning the town connecting house development to the essential services.
- Providing services through external contracts including service level agreements.
- Promote alternative forms of transport and review the road hierarchy and linkages to allow the road network to develop in an efficient manner.
- Reduced Level of Service. In the long term as the condition of the road network fails to meet increased community expectations, it may become appropriate for the Council to provide a reduced level of service. This could include increase in response times to rectify defects or

conversion of sealed roads back to unsealed gravel roads. It should be noted however, that Council would be reluctant to reduce the level of service provided.

Key drivers or opportunities that have been identified in the preparation of this Transport Asset Management Plan with respect to transport asset capacity, capital/maintenance and land development are tabled below:

Demand Driver	Impact on Services	Demand Management Plan
Capacity • Rapid population growth. • Peak tourism requirements. • Increased legal load limits.	Pressure to expand/upgrade councils Transport Infrastructure Networks	• Fund priority works. Continue to seek grant funding for identified projects for example realigning a curve on Clothiers Creek Road and constructing a sheltered left-hand turn lane on Tweed Valley Way through Federal Government funding for the Blackspot Programme. • Improve understanding of costs and capacity to maintain current service levels. • Continue to analyse the cost of providing services and the capacity to fund at the current level of service.
Capital/Maintenance Works • Rapid asset growth. • Increased age of these assets. • Increased community expectation of accountability of asset maintenance and quality of road network. • Improved surfacing - gravelled to seal or asphalt. • Inclusion of both on-road bikeways and off-road Footpaths. • Remaining useful life of existing infrastructure. • Early failure of some donated assets. • Increased costs associated with working in more congested traffic and as a result of supply / purchase of materials and labour.	Pressure to upgrade councils Transport Infrastructure networks	• Continue to analyse the effect of larger and greater capacity vehicles on existing roads. • Communicate options and capacity to fund requirements with the community. • Monitor community expectations and communicate service levels and financial capacity with the community to balance priorities for infrastructure with what the community is prepared to pay for.
Land development	Additional Infrastructure need due to development	• Continue to monitor and manage development controls. • Undertake infrastructure planning considering land use changes from Tweed land Use Strategy.

Table 37 - Demand Driver Plan Summary

4.6 New Assets from Growth

As shown in Table 23 and Table 35, from 2016 to 2021, the replacement value of the transport assets has increased from 1.03 billion to 1.16 billion. This is mainly due to revaluations and renewals, with $5 million of the increase due to new assets.

This is mainly due to additional bridges, road ancillaries and developments in Terranora and Fraser Drive that had contributed to Council's transport asset portfolio.

5 Asset Funding Levels

5.1 Forecast 10-Year Funding Required

A key objective of this transport AMP has been to match the level of service provided by Council's transport network to the expectations of the users (i.e. the community) within available resources. This requires a clear understanding of the user needs, expectations and preferences.

To achieve and sustain acceptable standards of service for Council's transport asset network requires an annual commitment of funds. These funds provide for regular and responsive maintenance and for timely renewal or replacement of the asset. The provision of adequate financial resources ensures that the transport network is appropriately managed and preserved. Financial provisions below requirements impacts directly on community development and if prolonged, results in substantial needs for "catch up" expenditure imposed on ratepayers in the future. Additionally, deferred renewal results in increased and escalating reactive maintenance as aged assets deteriorate at increasing rates.

Council has developed a simulation model for the condition analysis of the Council's transport network using prediction modelling software (Assetic Predictor©).

The objective of this analysis is to model the performance of the Tweed Shire Council's transport network.

This process involved setting up:

- Remaining life profiles based on condition;
- Identifying the current treatments and unit rates to deliver these treatments; and
- Setting up treatment decision matrices defined for optimal interventions for each treatment.

By utilising the above process and setting up the criteria and logic within the Assetic Predictor© modelling software, it has been possible to model the future costs of Council's transport asset stock renewal requirements and also to predict the future condition of Council's transport asset stock based on four budget options. The main purpose of modelling different budget options is sensitivity analysis. The sensitivity analysis determines how budget affect the long term performance of the infrastructure assets.

5.1.1 Roads

The roads financial funding options considered in this strategic modelling analysis are divided as local sealed roads, regional sealed roads and unsealed roads as follows:

Local Sealed Road Network Funding Options

Option 1 - This funding option models how the road asset stock would improve or deteriorate if Council's current financial budget allocation as outlined in Council's current Long Term Financial Plan is adopted over the following 10 years. **$9 million** maximum **annual** Capital Renewal funding allocation for 10 years (plus 2% inflation factor). Council only renews roads when the road condition reaches renewal threshold.

Option 2 - This funding option decreases Option 1 by 20% each year over the following 10 years. **$7 million** maximum **annual** Capital Renewal funding allocation for 10 years.

Option 3 - This funding option increases Option 1 by 20% each year over the following 10 years. **$11 million** maximum **annual** Capital Renewal funding allocation for 10 years.

Option 4 - This funding option has been based on the financial requirements to achieve and maintain the current road condition (average 1.91 surface condition index) over the following 10 years and has

been determined by the Optimisation module in the Assetic Predictor© software. **$51 million** in Capital Renewal funding allocation over 10 years.

Regional Road Network Funding Options

Option 1 - This funding option models how the road asset stock would improve or deteriorate if Council's current financial budget allocation as outlined in Council's current Long Term Financial Plan is adopted over the following 10 years. **$3.9 million** maximum annual Capital Renewal funding allocation for 10 years. Council only renews roads when the road condition reaches renewal threshold.

Option 2 - This funding option decreases Option 1 by 20% each year over the following 10 years. **$3.1 million** maximum annual Capital Renewal funding allocation for 10 years.

Option 3 - This funding option increases Option 1 by 20% each year over the following 10 years. **$4.7 million** maximum annual Capital Renewal funding allocation for 10 years.

Option 4 - This funding option has been based on the financial requirements to achieve and maintain the current road condition (average 1.50 surface condition index) over the following 10 years and has been determined by the Optimisation module in the Assetic Predictor© software. **$17 million** in Capital Renewal funding allocation annum over 10 years.

Unsealed Road Network Funding Options

Option 1 - This funding option models how the road asset stock would improve or deteriorate if Council's current financial budget allocation as outlined in Council's current Long Term Financial Plan is adopted over the following 10 years. **$850,000** maximum annual Capital Renewal funding allocation for 10 years. Council only renews roads when the road condition reaches renewal threshold.

Option 2 - This funding option decreases Option 1 by 20% each year over the following 10 years. **$1,015,000** in maximum annual Capital Renewal funding allocation over 10 years.

Option 3 - This funding option increases Option 1 by 20% each year over the following 10 years. **$600,000** in maximum annual Capital Renewal funding allocation over 10 years.

Option 4 - This funding option has been based on the financial requirements to achieve and maintain the current road condition (average 2.3 overall condition index) over the following 10 years and has been determined by the Optimisation module in the Assetic Predictor© software. **$6.3 million** in Capital Renewal funding allocation annum over 10 years.

Road Maintenance funding

When determining the required maintenance in year 2021 based on the distribution of the Road asset stock, Council has adopted per square metre rate approach to determine the Required Annual Maintenance. This is consistent with the International Infrastructure Management Manual and other industry standards.

Roads Surface & Pavement Condition	$ per m2 for sealed roads	$ per m2 for unsealed roads
0	$0.50	$0.50
1	$0.65	$0.70
2	$0.75	$0.90
3 - Satisfactory	$0.90	$1.25
4	$1.25	$1.70
5	$2.00	$2.15
End of Life	$2.90	$2.60

Table 38 - Multiplication Factors to Determine Maintenance Requirements for All Roads

The maintenance requirement estimates will be determined from the Assetic Predictor© modelling software, which will base its financial outputs as a direct result of the asset stock condition as predicted by each of the Funding Options.

Each funding option will have a direct impact of the predicted asset stock distribution for each condition state and as a result, will require different funds based on this outcome.

Capital Renewal & Maintenance Funding Allocation Options for Local Sealed Road Network

	Option 1	Option 2 - 20% Decrease	Option 3 – 20% Increase	Option 4 Maintain SCI 1.91
CAPITAL BUDGET $				
Year	**Option 1**	**Option 2**	**Option 3**	**Option 4**
1	8,724,079	6,979,149	10,469,060	1,724,122
2	8,916,213	7,132,840	10,698,938	999,687
3	9,094,620	7,276,702	10,914,957	3,999,763
4	9,070,758	7,256,784	10,885,666	4,999,891
5	8,677,303	6,940,283	2,244,305	6,677,515
6	1,818,878	6,785,076	1,023,010	10,481,693
7	1,480,615	5,289,766	1,704,045	11,625,415
8	3,655,573	2,519,973	4,880,583	8,013,745
9	6,819,452	6,116,548	6,974,832	335,821
10	6,211,562	7,191,178	5,514,718	2,135,314
Sub Total	64,469,054	63,488,299	65,310,115	50,992,967
MAINTENANCE BUDGET $				
Year	**Option 1**	**Option 2**	**Option 3**	**Option 4**
1	4,077,354	4,364,826	3,808,063	5,267,755
2	3,886,228	4,150,356	3,690,610	5,598,755
3	3,979,223	4,142,062	4,018,010	5,381,582
4	4,454,367	4,437,061	4,434,340	5,327,914
5	4,758,180	4,745,927	4,839,254	4,930,160
6	5,155,284	5,111,002	5,198,356	4,523,817
7	5,354,608	5,339,117	5,364,677	4,945,483
8	5,328,230	5,443,882	5,179,104	5,417,557
9	5,119,004	5,221,043	5,083,070	5,882,567
10	5,349,140	5,272,387	5,383,865	6,047,853
Sub Total	47,461,618	48,227,663	46,999,349	53,323,443
TOTAL CAPITAL & MAINTENANCE BUDGET $				
Year	**Option 1**	**Option 2**	**Option 3**	**Option 4**
1	12,801,433	11,343,975	14,277,123	6,991,877
2	12,802,441	11,283,196	14,389,549	6,598,442
3	13,073,844	11,418,765	14,932,966	9,381,344
4	13,525,126	11,693,845	15,320,006	10,327,805
5	13,435,483	11,686,210	7,083,559	11,607,675
6	6,974,162	11,896,078	6,221,366	15,005,510
7	6,835,223	10,628,883	7,068,723	16,570,898
8	8,983,804	7,963,855	10,059,687	13,431,302
9	11,938,456	11,337,591	12,057,902	6,218,389
10	11,560,702	12,463,565	10,898,583	8,183,167
Grand Total	111,930,674	111,715,963	112,309,464	104,316,409

Table 39 - Capital Renewal and Maintenance Funding Options for Local Sealed Road Network

Capital Renewal & Maintenance Funding Allocation Options for Regional Sealed Road Network

	Option 1	Option 2 - 20% Decrease	Option 3 – 20% Increase	Option 4 - Maintain SCI 1.50
CAPITAL BUDGET $				
Year	**Option 1**	**Option 2**	**Option 3**	**Option 4**
1	3,737,311	2,988,565	4,481,045	1,499,845
2	3,817,743	3,046,891	4,573,926	1,199,327
3	3,732,854	3,099,591	2,187,766	1,199,860
4	456,684	2,699,183	456,684	1,994,561
5	423,280	396,845	396,845	2,982,391
6	0	19,212	27,123	3,784,963
7	341,691	244,919	272,301	68,952
8	2,363,020	2,315,014	2,713,543	890,170
9	1,003,266	1,216,974	887,667	1,728,479
10	1,513,478	1,485,669	1,173,889	1,711,725
Sub Total	17,389,328	17,512,863	17,170,790	17,060,273
MAINTENANCE BUDGET $				
Year	**Option 1**	**Option 2**	**Option 3**	**Option 4**
1	581,204	640,480	560,750	880,434
2	859,520	848,453	824,410	908,047
3	830,118	869,651	854,869	910,476
4	971,936	942,267	974,192	990,646
5	1,031,162	1,026,655	1,033,377	1,011,482
6	1,120,141	1,114,286	1,119,577	1,057,264
7	1,135,639	1,143,334	1,145,058	1,142,083
8	917,450	920,988	879,646	1,101,519
9	1,087,945	1,068,416	1,082,752	1,018,885
10	1,137,485	1,138,577	1,157,323	1,110,375
Sub Total	9,672,601	9,713,107	9,631,953	10,131,211
TOTAL CAPITAL & MAINTENANCE BUDGET $				
Year	**Option 1**	**Option 2**	**Option 3**	**Option 4**
1	4,318,515	3,629,044	5,041,796	2,380,279
2	4,677,263	3,895,343	5,398,337	2,107,374
3	4,562,972	3,969,242	3,042,634	2,110,336
4	1,428,620	3,641,450	1,430,876	2,985,207
5	1,454,442	1,423,501	1,430,222	3,993,874
6	1,120,141	1,133,498	1,146,699	4,842,227
7	1,477,330	1,388,253	1,417,359	1,211,035
8	3,280,470	3,236,002	3,593,189	1,991,689
9	2,091,212	2,285,390	1,970,419	2,747,364
10	2,650,963	2,624,246	2,331,212	2,822,100
Grand Total	27,061,928	27,225,970	26,802,743	27,191,484

Table 40 - Capital Renewal and Maintenance Funding Options for Regional Sealed Road Network

Capital Renewal & Maintenance Funding Allocation Options for Unsealed Road Network

	Option 1	Option 2 - 20% Decrease	Option 3 – 20% Increase	Maintain Current OCI 2.30
CAPITAL BUDGET $				
Year	**Option 1**	**Option 2**	**Option 3**	**Option 4**
1	96,959	96,959	96,959	96,959
2	46,081	46,081	46,081	46,081
3	580,049	580,049	580,049	580,049
4	750,520	600,625	901,039	998,995
5	765,863	612,553	919,268	999,888
6	781,084	624,980	936,584	999,667
7	796,728	637,166	955,895	599,899
8	812,774	650,357	972,860	499,797
9	829,148	662,990	993,178	698,515
10	845,376	676,578	583,173	698,757
Sub Total	6,304,581	5,188,336	6,985,085	6,218,606
MAINTENANCE BUDGET $				
Year	**Option 1**	**Option 2**	**Option 3**	**Option 4**
1	855,845	855,845	855,845	855,845
2	984,328	984,328	984,328	984,328
3	1,054,888	1,054,888	1,054,888	1,054,888
4	1,086,663	1,126,947	1,046,211	1,019,885
5	1,141,771	1,213,665	1,064,886	1,021,584
6	1,207,061	1,304,922	1,102,644	1,049,844
7	1,136,890	1,273,569	998,173	1,052,816
8	1,063,091	1,243,476	897,968	1,056,021
9	1,008,827	1,192,159	769,145	1,007,654
10	923,242	1,165,881	788,125	942,219
Sub Total	10,462,607	11,415,682	9,562,215	10,045,086
TOTAL CAPITAL & MAINTENANCE BUDGET $				
Year	**Option 1**	**Option 2**	**Option 3**	**Option 4**
1	952,804	952,804	952,804	952,804
2	1,030,409	1,030,409	1,030,409	1,030,409
3	1,634,937	1,634,937	1,634,937	1,634,937
4	1,837,183	1,727,572	1,947,250	2,018,880
5	1,907,634	1,826,218	1,984,154	2,021,472
6	1,988,145	1,929,901	2,039,229	2,049,511
7	1,933,619	1,910,735	1,954,068	1,652,715
8	1,875,866	1,893,833	1,870,828	1,555,818
9	1,837,975	1,855,149	1,762,323	1,706,169
10	1,768,617	1,842,459	1,371,297	1,640,976
Grand Total	16,767,188	16,604,018	16,547,300	16,263,692

Table 41 - Capital Renewal and Maintenance Funding Options for Unsealed Road Network

Below table summarizes the forecasted capital renewal and maintenance expenditure for all roads assets. Option 1 expenditure had been modified to reduce the large annual budget fluctuation.

	Option 1	Option 2 - 20% Decrease	Option 3 – 20% Increase	Option 4 Maintain Current OCI
CAPITAL BUDGET $				
Year	**Option 1**	**Option 2**	**Option 3**	**Option 4**
1	12,558,349	10,064,672	15,047,064	3,320,926
2	12,780,038	10,225,811	15,318,946	2,245,095
3	13,407,523	10,956,342	13,682,771	5,779,671
4	10,277,963	10,556,593	12,243,390	7,993,447
5	9,866,446	7,949,681	3,560,418	10,659,795
6	2,599,961	7,429,268	1,986,717	15,266,323
7	2,619,034	6,171,851	2,932,241	12,294,266
8	6,831,368	5,485,345	8,566,986	9,403,713
9	8,651,866	7,996,511	8,855,677	2,762,816
10	8,570,416	9,353,425	7,271,781	4,545,795
Sub Total	88,162,963	86,189,498	89,465,990	74,271,846
MAINTENANCE BUDGET $				
Year	**Option 1**	**Option 2**	**Option 3**	**Option 4**
1	5,514,403	5,861,151	5,224,659	7,004,034
2	5,730,076	5,983,137	5,499,349	7,491,130
3	5,864,230	6,066,602	5,927,767	7,346,946
4	6,512,966	6,506,275	6,454,742	7,338,445
5	6,931,114	6,986,247	6,937,517	6,963,226
6	7,482,486	7,530,209	7,420,577	6,630,925
7	7,627,137	7,756,020	7,507,909	7,140,382
8	7,308,771	7,608,346	6,956,718	7,575,097
9	7,215,777	7,481,619	6,934,967	7,909,105
10	7,409,867	7,576,846	7,329,312	8,100,448
Sub Total	67,596,828	69,356,452	66,193,516	73,499,739
TOTAL CAPITAL & MAINTENANCE BUDGET $				
Year	**Option 1**	**Option 2**	**Option 3**	**Option 4**
1	18,072,752	15,925,824	20,271,723	10,324,960
2	18,510,114	16,208,948	20,818,295	9,736,226
3	19,271,753	17,022,943	19,610,538	13,126,618
4	16,790,929	17,062,868	18,698,132	15,331,892
5	16,797,560	14,935,928	10,497,935	17,623,021
6	10,082,447	14,959,477	9,407,294	21,897,247
7	10,246,171	13,927,871	10,440,149	19,434,648
8	14,140,140	13,093,690	15,523,704	16,978,809
9	15,867,643	15,478,131	15,790,644	10,671,921
10	15,980,283	16,930,270	14,601,093	12,646,243
Grand Total	155,759,791	155,545,950	155,659,506	147,771,585

Table 42 - Capital Renewal and Maintenance Funding Options for All Road Network

5.1.2 Bridges

The Bridges financial funding options considered in this strategic modelling analysis are as follows:

Option 1 - This funding option models how the bridge asset stock would improve or deteriorate if Council's current financial budget allocation as outlined in Council's current Long Term Financial Plan is adopted over the following 10 years. **$2.1 million** annual Capital Renewal funding allocation in the first year, then **$780,000** over the next 9 years, 2% inflation rate has been introduced to the models.

Option 2 - This funding option decreases Option 1 by 20% each year over the following 10 years. **$1.7 million** annual Capital Renewal funding allocation in the first year, then **$621,000** over the next 9 years.

Option 3 - This funding option increases Option 1 by 20% each year over the following 10 years. **$2.5 million** annual Capital Renewal funding allocation in the first year, then **$931,000** over the next 9 years.

Option 4 - This funding option has been based on the financial requirements to achieve and maintain the current bridge condition (average 2.26 overall condition index) over the following 10 years and has been determined by the Optimisation module in the Assetic Predictor© software. **$7 million** in Capital Renewal funding allocation annum over 10 years.

When determining the required maintenance in year 2021 based on the distribution of the bridge asset stock, Council has adopted an 'As a percentage of Replacement Cost' approach to determine the Required Annual Maintenance. This is consistent with the International Infrastructure Management Manual and other industry standards.

Bridge Component Condition	Multiplication Factor of $1 Replacement Cost
0	0.000
1	0.000
2	0.001
3 - Satisfactory	0.002
4	0.003
5	0.004
End of Life	0.004

Table 43 - Multiplication Factors to Determine Maintenance Requirements for Bridges

The maintenance requirement estimates will be determined from the Assetic Predictor© modelling software, which will base its financial outputs as a direct result of the asset stock condition as predicted by each of the funding options.

Each funding option will have a direct impact of the predicted asset stock distribution for each condition state and as a result, will require different funds based on this outcome.

Capital Renewal & Maintenance Funding Allocation Options

	Option 1	Option 2 - 20% Decrease	Option 3 – 20% Increase	Option 4 Maintain Current OCI
CAPITAL BUDGET $				
Year	**Option 1**	**Option 2**	**Option 3**	**Option 4**
1	2,094,302	1,675,732	2,513,715	797,200
2	773,979	601,290	930,244	749,678
3	774,870	614,102	928,756	745,029
4	775,996	577,730	930,569	699,916
5	775,973	619,106	602,841	649,841
6	775,990	620,797	333,455	649,999
7	775,989	620,778	931,143	599,999
8	775,963	620,775	931,049	649,988
9	775,961	620,784	590,649	799,993
10	775,961	620,745	783,593	649,878
Sub Total	9,074,983	7,191,839	9,476,015	6,991,522
MAINTENANCE BUDGET $				
Year	**Option 1**	**Option 2**	**Option 3**	**Option 4**
1	251,041	252,616	249,473	255,909
2	253,160	255,385	250,977	258,218
3	255,356	258,203	252,540	260,630
4	257,716	261,351	254,256	263,366
5	260,180	264,508	257,426	266,447
6	263,122	268,139	261,961	269,968
7	268,675	274,403	266,898	276,368
8	273,768	280,152	271,407	282,074
9	280,150	287,221	278,361	288,529
10	287,031	295,017	285,161	296,016
Sub Total	2,650,198	2,696,994	2,628,461	2,717,525
TOTAL CAPITAL & MAINTENANCE BUDGET $				
Year	**Option 1**	**Option 2**	**Option 3**	**Option 4**
1	2,345,343	1,928,348	2,763,189	1,053,109
2	1,027,139	856,674	1,181,220	1,007,897
3	1,030,226	872,305	1,181,296	1,005,660
4	1,033,712	839,081	1,184,825	963,281
5	1,036,153	883,614	860,266	916,288
6	1,039,112	888,936	595,417	919,966
7	1,044,663	895,181	1,198,041	876,368
8	1,049,731	900,928	1,202,456	932,062
9	1,056,110	908,005	869,010	1,088,521
10	1,062,992	915,761	1,068,754	945,894
Grand Total	11,725,181	9,888,833	12,104,476	9,709,047

Table 44 - Capital Renewal and Maintenance Funding Options for Bridges

5.1.3 Kerbs

The Kerbs financial funding options considered in this strategic modelling analysis are as follows:

Capital/Renewal Funding

Option 1 - This funding option models how the kerb asset stock would improve or deteriorate if Council's current financial budget allocation as outlined in Council's current Long Term Financial Plan is adopted over the following 10 years. **$80,000** in maximum annual Capital Renewal funding allocation over 10 years. 2% inflation rate has been considered in this model.

Option 2 - This funding option decreases Option 1 by 20% each year over the following 10 years. **$640,000** in maximum annual Capital Renewal funding allocation over 10 years.

Option 3 - This funding option increases Option 1 by 20% each year over the following 10 years. **$96,000** in maximum annual Capital Renewal funding allocation over 10 years.

Option 4 - This funding option has been based on the financial requirements to achieve and maintain the current kerb condition (average 2.75 overall condition index) over the following 10 years and has been determined by the Optimisation module in the Assetic Predictor© software. **$1.4 million** in Capital Renewal funding allocation annum over 10 years.

Kerbs Maintenance funding

When determining the required maintenance in year 2021 based on the distribution of the Kerb asset stock, Council has adopted a cost per metre approach to determine the Required Annual Maintenance. This is consistent with the International Infrastructure Management Manual and other industry standards.

Kerb Condition	$ per metre
0	$0.00
1	$0.00
2	$0.05
3 - Satisfactory	$0.20
4	$0.40
5	$0.50
End of Life	$0.50

Table 45 - Multiplication Factors to Determine Maintenance Requirements for Kerbs

The maintenance requirement estimates will be determined from the Assetic Predictor© modelling software, which will base its financial outputs as a direct result of the asset stock condition as predicted by each of the funding options.

Each funding option will have a direct impact of the predicted asset stock distribution for each condition state and as a result, will require different funds based on this outcome.

Capital Renewal & Maintenance Funding Allocation Options

	Option 1	Option 2 - 20% Decrease	Option 3 – 20% Increase	Option 4 Maintain Current OCI
CAPITAL BUDGET $				
Year	**Option 1**	**Option 2**	**Option 3**	**Option 4**
1	80,027	63,755	96,034	99,931
2	81,382	65,307	97,420	94,123
3	54,807	66,576	21,795	21,103
4	7,383	29,373	7,383	7,383
5	0	0	0	0
6	35,088	35,088	35,088	35,088
7	90,169	72,066	108,156	151,599
8	91,972	73,106	110,036	253,903
9	93,811	74,953	112,574	359,457
10	95,565	76,526	114,825	411,559
Sub Total	630,205	556,748	703,312	1,434,148
MAINTENANCE BUDGET $				
Year	**Option 1**	**Option 2**	**Option 3**	**Option 4**
1	143,695	143,977	143,508	143,425
2	145,906	146,479	145,283	145,311
3	149,833	149,616	150,180	150,188
4	153,803	153,798	153,803	153,803
5	157,603	157,603	157,603	157,603
6	161,781	161,781	161,781	161,781
7	169,056	169,416	168,699	167,836
8	180,726	181,523	180,033	176,277
9	198,069	199,199	197,085	188,301
10	219,609	221,430	218,478	203,908
Sub Total	1,680,080	1,684,820	1,676,451	1,648,431
TOTAL CAPITAL & MAINTENANCE BUDGET $				
Year	**Option 1**	**Option 2**	**Option 3**	**Option 4**
1	223,722	207,731	239,542	243,356
2	227,288	211,786	242,703	239,434
3	204,640	216,191	171,976	171,291
4	161,186	183,171	161,186	161,186
5	157,603	157,603	157,603	157,603
6	196,869	196,869	196,869	196,869
7	259,225	241,482	276,855	319,435
8	272,698	254,629	290,069	430,180
9	291,881	274,152	309,658	547,758
10	315,174	297,955	333,303	615,467
Grand Total	2,310,285	2,241,568	2,379,763	3,082,579

Table 46 - Capital Renewal and Maintenance Funding Options for Kerbs

5.1.4 Footpaths

The Footpaths financial funding options considered in this strategic modelling analysis are as follows:

Capital/Renewal Funding

Option 1 - This funding option models how the footpath asset stock would improve or deteriorate if Council's current financial budget allocation as outlined in Council's current Long Term Financial Plan is adopted over the following 10 years. **$752,000** in maximum annual Capital Renewal funding allocation over 10 years. 2% inflation rate has been considered in this model.

Option 2 - This funding option decreases Option 1 by 20% each year over the following 10 years. **$602,000** in maximum annual Capital Renewal funding allocation over 10 years.

Option 3 - This funding option increases Option 1 by 20% each year over the following 10 years. **$902,000** in maximum annual Capital Renewal funding allocation over 10 years.

Option 4 - This funding option has been based on the financial requirements to achieve and maintain the current footpath condition (average 3.17 overall condition index) over the following 10 years and has been determined by the Optimisation module in the Assetic Predictor© software. **$4.3 million** in Capital Renewal funding allocation annum over 10 years.

Footpaths Maintenance Funding

When determining the required maintenance in year 2021 based on the distribution of the Footpath asset stock, Council has adopted a cost per square metre approach to determine the Required Annual Maintenance. This is consistent with the International Infrastructure Management Manual and other industry standards.

Footpath Condition	$ per m2 for whole network
0	$0
1	$0
2	$0
3 - Satisfactory	$0.80
4	$1.50
5	$2.00
End of Life	$2.00

Table 47 - Multiplication Factors to Determine Maintenance Requirements for Footpaths

The maintenance requirement estimates will be determined from the Assetic Predictor© modelling software, which will base its financial outputs as a direct result of the asset stock condition as predicted by each of the funding options.

Each funding option will have a direct impact of the predicted asset stock distribution for each condition state and as a result, will require different funds based on this outcome.

Capital Renewal & Maintenance Funding Allocation Options

	Option 1	Option 2 - 20% Decrease	Option 3 – 20% Increase	Option 4 Maintain Current OCI
CAPITAL BUDGET $				
Year	**Option 1**	**Option 2**	**Option 3**	**Option 4**
1	356,508	356,508	356,508	356,508
2	268,836	268,836	268,836	268,836
3	364,972	364,972	364,972	364,972
4	279,981	279,981	279,981	279,981
5	413,665	413,665	413,665	413,665
6	511,967	511,967	511,967	511,967
7	506,509	506,509	506,509	506,509
8	502,182	502,182	502,182	502,182
9	623,330	623,330	623,330	623,330
10	501,390	501,390	501,390	501,390
Sub Total	4,329,340	4,329,340	4,329,340	4,329,340
MAINTENANCE BUDGET $				
Year	**Option 1**	**Option 2**	**Option 3**	**Option 4**
1	409,055	409,055	409,055	409,055
2	421,746	421,746	421,746	421,746
3	425,323	425,323	425,323	425,323
4	442,361	442,361	442,361	442,361
5	452,402	452,402	452,402	452,402
6	457,525	457,525	457,525	457,525
7	471,672	471,672	471,672	471,672
8	482,048	482,048	482,048	482,048
9	481,481	481,481	481,481	481,481
10	507,085	507,085	507,085	507,085
Sub Total	4,550,701	4,550,701	4,550,701	4,550,701
TOTAL CAPITAL & MAINTENANCE BUDGET $				
Year	**Option 1**	**Option 2**	**Option 3**	**Option 4**
1	765,564	765,564	765,564	765,564
2	690,582	690,582	690,582	690,582
3	790,296	790,296	790,296	790,296
4	722,343	722,343	722,343	722,343
5	866,067	866,067	866,067	866,067
6	969,492	969,492	969,492	969,492
7	978,182	978,182	978,182	978,182
8	984,231	984,231	984,231	984,231
9	1,104,811	1,104,811	1,104,811	1,104,811
10	1,008,475	1,008,475	1,008,475	1,008,475
Grand Total	8,880,041	8,880,041	8,880,041	8,880,041

Table 48 - Capital Renewal and Maintenance Funding Options for Footpaths

5.1.5 Carparks

The carparks financial funding options considered in this strategic modelling analysis are as follows:

Carparks Capital/Renewal Funding

Option 1 - This funding option models how the carpark asset stock would improve or deteriorate if Council's current financial budget allocation as outlined in Council's current Long Term Financial Plan is adopted over the following 10 years. **$74,000** in maximum annual Capital Renewal funding allocation over 10 years. 2% inflation rate has been considered in this model.

Option 2 - This funding option decreases Option 1 by 20% each year over the following 10 years. **$59,000** in maximum annual Capital Renewal funding allocation over 10 years.

Option 3 - This funding option increases Option 1 by 20% each year over the following 10 years. **$89,000** in maximum annual Capital Renewal funding allocation over 10 years.

Option 4 - This funding option has been based on the financial requirements to achieve and maintain the current carpark condition (average 2.16 overall condition index) over the following 10 years and has been determined by the Optimisation module in the Assetic Predictor© software. **$1.5 million** in Capital Renewal funding allocation annum over 10 years.

Carpark Maintenance Funding

When determining the required maintenance in year 2021 based on the distribution of the Carpark asset stock, Council has adopted a cost per square metre approach to determine the Required Annual Maintenance. This is consistent with the International Infrastructure Management Manual and other industry standards.

Carpark Overall Condition	$ per m2 for whole network
0	$0.50
1	$0.65
2	$0.75
3 - Satisfactory	$0.90
4	$1.25
5	$2.00
End of Life	$2.90

Table 49 - Multiplication Factors to Determine Maintenance Requirements for Carparks

The maintenance requirement estimates will be determined from the Assetic Predictor© modelling software, which will base its financial outputs as a direct result of the asset stock condition as predicted by each of the funding options.

Each funding option will have a direct impact of the predicted asset stock distribution for each condition state and as a result, will require different funds based on this outcome.

Capital Renewal & Maintenance Funding Allocation Options

	Option 1	Option 2 - 20% Decrease	Option 3 – 20% Increase	Option 4 Maintain Current OCI
CAPITAL BUDGET $				
Year	**Option 1**	**Option 2**	**Option 3**	**Option 4**
1	59,337	46,853	71,909	59,337
2	35,802	48,536	22,979	35,802
3	46,226	46,226	46,226	46,226
4	59,187	45,202	68,609	82,594
5	66,775	41,612	66,775	71,317
6	68,004	54,427	82,057	154,442
7	69,908	55,517	83,679	140,291
8	70,700	56,697	85,626	153,912
9	71,476	58,103	87,280	300,432
10	74,117	57,725	88,854	499,348
Sub Total	621,533	510,899	703,993	1,543,700
MAINTENANCE BUDGET $				
Year	**Option 1**	**Option 2**	**Option 3**	**Option 4**
1	84,118	84,527	83,707	84,118
2	85,850	85,601	86,102	85,850
3	87,654	87,654	87,654	87,654
4	92,048	92,315	91,655	91,283
5	96,801	98,545	96,792	96,339
6	105,097	105,393	103,673	101,327
7	106,733	108,401	105,654	102,668
8	109,221	113,404	108,269	104,313
9	117,741	121,427	116,409	102,374
10	136,760	140,129	133,742	101,938
Sub Total	1,022,023	1,037,394	1,013,657	957,864
TOTAL CAPITAL & MAINTENANCE BUDGET $				
Year	**Option 1**	**Option 2**	**Option 3**	**Option 4**
1	146,275	134,253	158,296	146,275
2	149,250	136,322	162,183	149,250
3	152,320	139,387	165,254	152,320
4	158,007	145,083	170,806	391,283
5	164,080	152,369	177,528	396,339
6	173,722	160,294	186,024	401,327
7	176,730	164,400	189,652	402,668
8	180,617	170,522	193,945	404,313
9	190,563	179,685	203,797	602,374
10	211,038	199,552	222,877	601,938
Grand Total	1,702,602	1,581,867	1,830,361	3,648,087

Table 50 – Capital Renewal and Maintenance Funding Options for Carparks

5.1.6 Road Ancillary

The road ancillary financial funding options considered in this strategic modelling analysis are as follows:

Road Ancillary Capital/Renewal Funding

Option 1 - This funding option models how the road ancillary asset stock would improve or deteriorate if Council's current financial budget allocation as outlined in Council's current Long Term Financial Plan is adopted over the following 10 years. **$271,000** in maximum annual Capital Renewal funding allocation over 10 years. 2% inflation rate has been considered in this model.

Option 2 - This funding option decreases Option 1 by 20% each year over the following 10 years. **$217,000** in maximum annual Capital Renewal funding allocation over 10 years.

Option 3 - This funding option decreases Option 1 by 20% each year over the following 10 years. **$325,000** in maximum annual Capital Renewal funding allocation over 10 years.

Option 4 - This funding option has been based on the financial requirements to achieve and maintain the current road ancillary condition (average 1.1 overall condition index) over the following 10 years and has been determined by the Optimisation module in the Assetic myPredictor© software. **$837,000** in Capital Renewal funding allocation annum over 10 years.

Road Ancillary Maintenance Funding

When determining the required maintenance in year 2021 based on the distribution of the Road Ancillary asset stock, Council has adopted an 'As a percentage of Replacement Cost' approach to determine the Required Annual Maintenance. This is consistent with the International Infrastructure Management Manual and other industry standards. The percentage of the Replacement Cost adopted for Road Ancillary assets is as follows.

Road Ancillary Condition	Multiplication Factor of $1 Replacement Cost
0	0.000
1	0.000
2	0.005
3 - Satisfactory	0.020
4	0.040
5	0.050
End of Life	0.050

Table 51 - Multiplication Factors to Determine Maintenance Requirements for Road Ancillary

The maintenance requirement estimates will be determined from the Assetic Predictor© modelling software, which will base its financial outputs as a direct result of the asset stock condition as predicted by each of the funding options.

Each funding option will have a direct impact of the predicted asset stock distribution for each condition state and as a result, will require different funds based on this outcome.

Capital Renewal & Maintenance Funding Allocation Options

	Option 1	Option 2 - 20% Decrease	Option 3 – 20% Increase	Maintain Current OCI
CAPITAL BUDGET $				
Year	**Option 1**	**Option 2**	**Option 3**	**Option 4**
1	119,644	119,644	119,644	119,644
2	140,601	140,601	140,601	140,601
3	41,196	41,196	41,196	41,196
4	229,698	191,042	268,353	268,353
5	229,666	190,238	292,216	654,290
6	244,057	199,941	296,030	827,602
7	254,235	202,466	305,845	960,341
8	255,127	207,810	310,949	502,016
9	264,570	210,726	317,598	451,718
10	268,097	214,858	323,920	1,771,921
Sub Total	2,046,890	1,718,523	2,416,352	5,737,681
MAINTENANCE BUDGET $				
Year	**Option 1**	**Option 2**	**Option 3**	**Option 4**
1	139,506	139,506	139,506	49,112
2	144,540	144,540	144,540	50,194
3	168,692	168,692	168,692	56,692
4	171,644	173,191	170,098	58,542
5	202,075	205,230	197,996	57,110
6	240,265	245,265	234,144	51,243
7	279,229	285,880	270,903	46,493
8	304,609	313,692	293,778	46,425
9	333,586	347,091	320,855	50,405
10	378,340	389,305	365,467	47,744
Sub Total	2,362,487	2,412,391	2,305,979	513,958
TOTAL CAPITAL & MAINTENANCE BUDGET $				
Year	**Option 1**	**Option 2**	**Option 3**	**Option 4**
1	259,150	259,150	259,150	168,756
2	285,141	285,141	285,141	190,795
3	209,888	209,888	209,888	97,888
4	401,342	364,233	438,451	326,894
5	431,742	395,468	490,212	711,400
6	484,322	445,206	530,174	878,845
7	533,465	488,347	576,748	1,006,834
8	559,735	521,502	604,727	548,441
9	598,156	557,817	638,452	502,122
10	646,437	604,163	689,387	1,819,664
Grand Total	4,409,377	4,130,914	4,722,331	6,251,640

Table 52 - Capital Renewal and Maintenance Funding Options for Road Ancillary

5.2 Predicted Service level results VS Funding options

5.2.1 Roads

As a result the prediction modelling identifies that the relationship between funding allocation and predicted condition state behaviour is therefore positively proportional.

Road Predicted Overall Condition Index (OCI)				
Year	**Option 1**	**Option 2**	**Option 3**	**Option 4**
0	2.06			
1	1.40	1.50	1.31	1.81
2	1.07	1.20	0.96	1.77
3	0.95	1.05	0.92	1.67
4	1.15	1.17	1.15	1.63
5	1.29	1.27	1.31	1.39
6	1.50	1.46	1.53	1.21
7	1.64	1.63	1.68	1.25
8	1.65	1.68	1.59	1.45
9	1.52	1.58	1.46	1.62
10	1.47	1.48	1.47	1.80
Average	**1.36**	**1.40**	**1.34**	**1.56**

Table 53 - Average Road Predicted OCI vs. 'What If' Funding Options

It should be noted that whilst funding Option 1, 2 and 3 have very similar life cycle cost, Table 53 highlights that funding Option 4 achieves the worst return in terms of the predicted average condition index and Option 3 achieves the best condition.

In this sensitivity analysis, spending 20% less (maximum annual budget) will result in a worse average condition (0.04 average condition regress) than spending 20% more (0.02 average condition improvement). The recommended budget option is assessed in Section 5.3.

5.2.2 Bridges

As a result, the prediction modelling identifies that the relationship between funding allocation and predicted condition state behaviour is therefore positively proportional.

Bridge Predicted Overall Condition Index (OCI)				
Year	**Option 1**	**Option 2**	**Option 3**	**Option 4**
0	2.26			
1	2.22	2.23	2.21	2.24
2	2.21	2.22	2.19	2.23
3	2.19	2.21	2.18	2.22
4	2.18	2.20	2.16	2.21
5	2.17	2.19	2.15	2.20
6	2.16	2.18	2.15	2.19
7	2.16	2.18	2.15	2.19
8	2.16	2.18	2.15	2.19
9	2.16	2.19	2.15	2.20
10	2.17	2.20	2.16	2.20
Average	**2.18**	**2.20**	**2.17**	**2.21**

Table 54 - Average Bridge Predicted Condition Index vs. 'What If' Funding Options

Similar to the road network, spending more on bridge renewal works will achieve a better average condition, and vice versa. Option 3 has the greatest life cycle cost, $12.1 million and is forecasted to achieve 2.17 average condition. Option 4 and Option 2 achieves the same average condition whilst they have similar lifecycle cost. The recommended budget option is assessed in Section 5.3.

5.2.3 Kerbs

As a result, the prediction modelling identifies that the relationship between funding allocation and predicted condition state behaviour is therefore positively proportional.

Kerb Predicted Overall Condition Index (OCI)				
Year	**Option 1**	**Option 2**	**Option 3**	**Option 4**
0	2.75			
1	2.75	2.75	2.75	2.75
2	2.75	2.76	2.75	2.75
3	2.77	2.77	2.77	2.77
4	2.78	2.78	2.78	2.78
5	2.78	2.78	2.78	2.78
6	2.79	2.79	2.79	2.79
7	2.81	2.81	2.81	2.8
8	2.85	2.86	2.84	2.8
9	2.92	2.93	2.91	2.82
10	3.01	3.02	3	2.86
Average	**2.82**	**2.83**	**2.82**	**2.79**

Table 55 - Average Kerb Predicted Overall Condition Index vs. 'What If' Funding Options

As shown in Table 55, Option 1, 2 and 3 have similar life cycle cost and whilst Option 4 has the highest life cycle cost with the best average overall condition index.

5.2.4 Footpaths

As a result, the prediction modelling identifies that the relationship between funding allocation and predicted condition state behaviour is therefore positively proportional.

Footpath Predicted Overall Condition Index (OCI)				
Year	**Option 1**	**Option 2**	**Option 3**	**Option 4**
0	3.17			
1	3.16	3.16	3.16	3.16
2	3.16	3.16	3.16	3.16
3	3.19	3.19	3.19	3.19
4	3.21	3.21	3.21	3.21
5	3.23	3.23	3.23	3.23
6	3.24	3.24	3.24	3.24
7	3.25	3.25	3.25	3.25
8	3.26	3.26	3.26	3.26
9	3.25	3.25	3.25	3.25
10	3.28	3.28	3.28	3.28
Average	**3.22**	**3.22**	**3.22**	**3.22**

Table 56 - Average Footpath Predicted OCI vs. 'What If' Funding Options

All four funding Options are forecasted to achieve the same condition, because as shown in Table 47, all four funding Options are sufficient to carry out all the required capital renewal work over next ten years. The surplus budget is recommended to be used for capital new works.

5.2.5 Carparks

As a result, the prediction modelling identifies that the relationship between funding allocation and predicted condition state.

Carpark Predicted Overall Condition Index				
Year	**Option 1**	**Option 2**	**Option 3**	**Option 4**
0	2.16			
1	2.16	2.16	2.16	2.16
2	2.10	2.10	2.09	2.10
3	2.10	2.10	2.10	2.10
4	2.12	2.12	2.12	2.12
5	2.25	2.25	2.25	2.23
6	2.35	2.38	2.35	2.34
7	2.49	2.54	2.47	2.44
8	2.55	2.61	2.52	2.47
9	2.55	2.63	2.54	2.44
10	2.63	2.70	2.59	2.39
Average	**2.39**	**2.43**	**2.38**	**2.30**

Table 57 - Average Carpark Predicted Overall Condition Index vs. 'What If' Funding Options

It should be noted that whilst funding option 2 has the lowest life cycle cost, as shown in Table 57, highlights that funding option 2 achieves the worst return in terms of the predicted average Carpark overall condition index. Option 4 is predicted to maintain current asset stock network and it has the highest life cycle cost with the best predicted condition. Option has 3 is predicted to achieve the similar overall condition index as Option 1 whilst has similar lifecycle cost.

5.2.6 Road Ancillary

As a result, the prediction modelling identifies that the relationship between funding allocation and predicted condition state behaviour is therefore positively proportional.

Road Ancillary Predicted Overall Condition Index				
Year	**Option 1**	**Option 2**	**Option 3**	**Option 4**
0	2.16			
1	2.16	2.16	2.16	2.16
2	2.17	2.17	2.17	2.17
3	2.33	2.33	2.33	2.33
4	2.32	2.33	2.31	2.31
5	2.43	2.45	2.41	2.32
6	2.54	2.57	2.52	2.32
7	2.67	2.69	2.63	2.31
8	2.73	2.77	2.68	2.38
9	2.80	2.85	2.75	2.48
10	2.92	2.96	2.86	2.29
Average	**2.51**	**2.53**	**2.48**	**2.31**

Table 58 - Average Road Ancillary Predicted Condition Index vs. 'What If' Funding Options

Funding option 2 has the lowest life cycle cost, as shown in the above table, it highlights that funding option 2 achieves the worst return in terms of the predicted average Road Ancillary overall condition index. Option 4 is predicted to maintain current asset stock network condition and Option 4 is predicted to achieve the highest life cycle cost with the best predicted condition.

5.3 Condition rating backlog and funding option summary

5.3.1 Roads

The concept of maximising long-term Road asset stock value can be applied to asset management decisions. Improved Road condition will increase the asset stock value and vice versa. Backlog is also introduced in the asset management decisions. The theory of backlog which the Tweed Shire Council adopted is the cost to restore all assets to a condition 3 or better. Therefore assets with condition state worse than condition 3 will be considered below Council's acceptable level of service and hence comprise the Road asset stock backlog.

The outcomes of the four financial options that have been modelled for the Local Road network are detailed below.

Funding Option	Total Capital Over 10 Years	Total Maintenance Over 10 Years	% Assets in Condition 4 & 5 at year 10	Renewal Gap / Backlog Movement	10-Year Average OCI	Net Cost of Strategy*	Budget Rank
1	$88,162,963	$67,596,828	3.6%	$3,087,792	1.36	$159,959,188	4
2	$86,189,498	$69,356,452	3.8%	$3,020,680	1.40	$159,774,902	3
3	$89,465,990	$66,193,516	3.4%	$2,825,971	1.34	$159,446,307	2
4	$74,271,846	$73,499,739	3.8%	$3,289,305	1.56	$152,902,901	1

Table 59 - Strategic Modelling Comparison of 4 Funding Options for Roads Network

** Net Cost of Strategy = Total Capital Cost + Total Maintenance Cost + Backlog movement*Average Condition*

Figure below illustrates each financial option's trend of budget spending and resulted predicted average OCI over the following ten years.

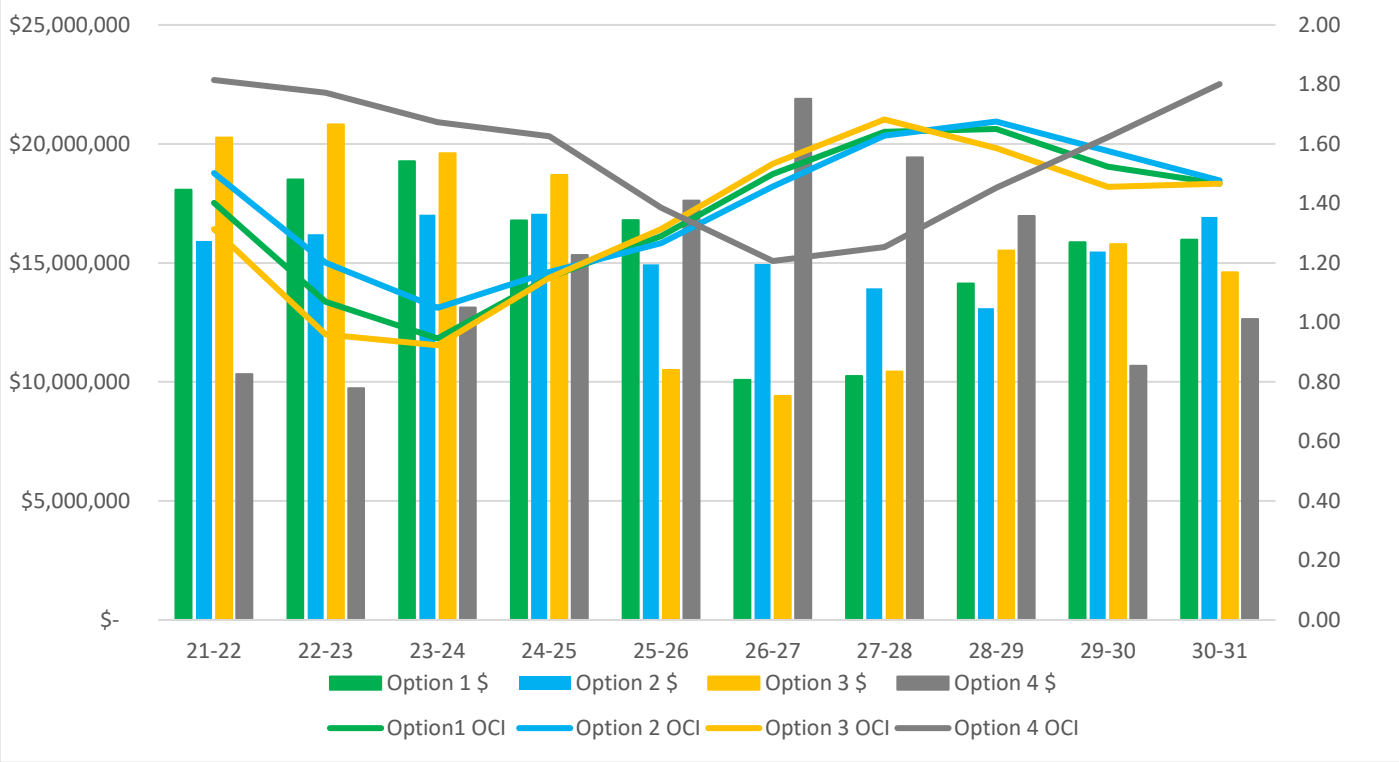

Figure 22 - 10 Year Projected Average OCI vs Budget Comparison for Road Network

5.3.2 Bridges

The outcomes of the four financial options that have been modelled are detailed below.

Funding Option	Total Capital Over 10 Years	Total Maintenance Over 10 Years	% Assets in Condition 4 & 5 at year 10	Renewal Gap / Backlog Movement	10-Year Average OCI	Net Cost of Strategy*	Budget Rank
1	9,074,983	2,650,198	0.23%	-3,042,947	2.18	5,097,642	2
2	7,191,839	2,696,994	1.31%	-1,683,189	2.20	6,189,184	3
3	9,476,015	2,628,461	0.00%	-3,418,025	2.17	4,704,452	1
4	6,991,522	2,717,525	1.48%	-1,530,483	2.21	6,331,271	4

Table 60 - Strategic Modelling Comparison of 4 Funding Options

Figure below illustrates each financial option's trend of budget spending and resulted predicted average OCI over the following ten years.

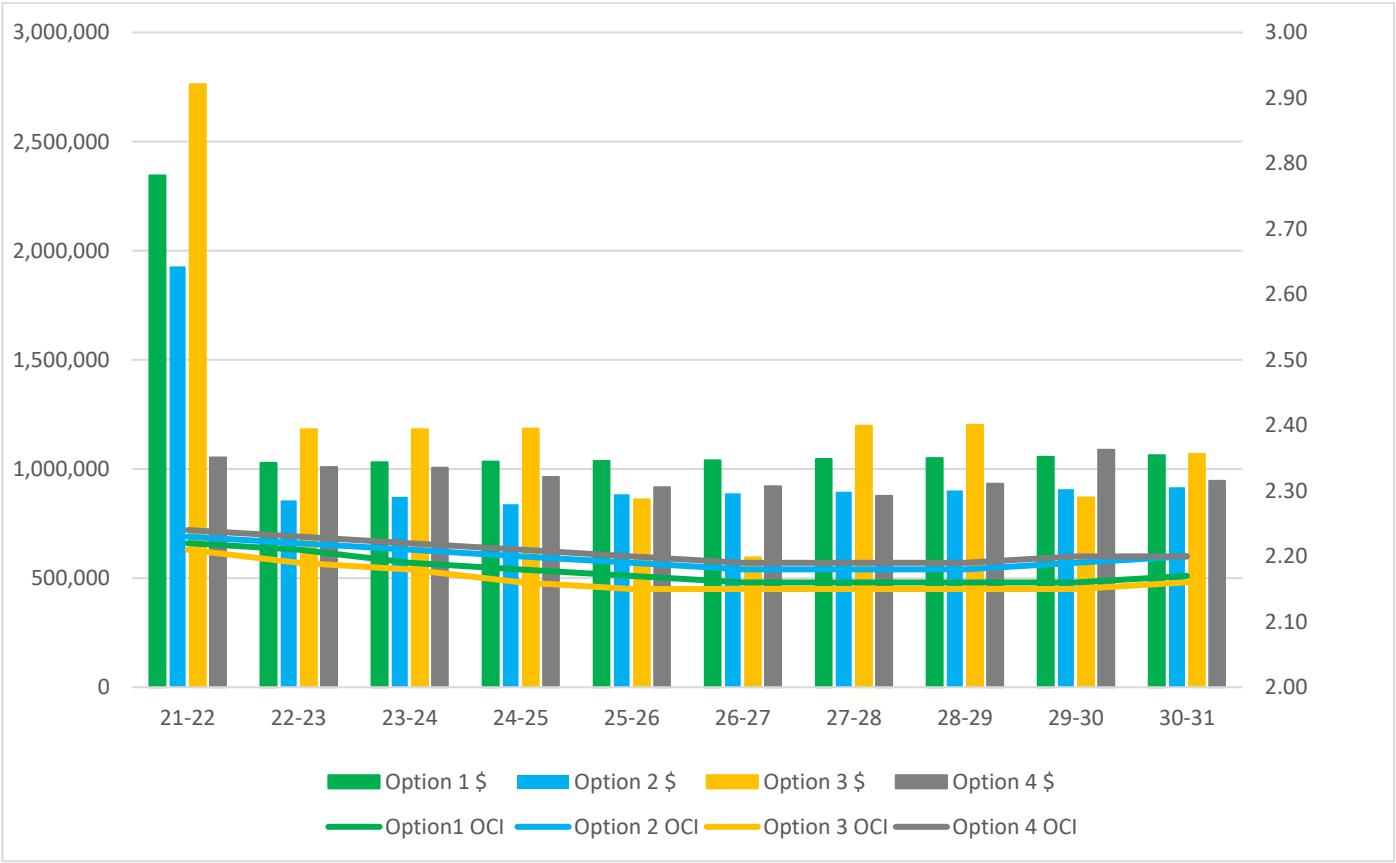

Figure 23 - 10 Year Projected Average OCI vs Budget Comparison for Bridge Network

5.3.3 Kerbs

The outcomes of the four financial options that have been modelled are detailed below.

Funding Option	Total Capital Over 10 Years	Total Maintenance Over 10 Years	% Assets in Condition 4 & 5 at year 10	Renewal Gap / Backlog Movement	10-Year Average OCI	Net Cost of Strategy*	Budget Rank
1	630,205	1,680,080	22.83%	4,155,126	2.82	14,031,895	3
2	556,748	1,684,820	23.29%	4,245,694	2.83	14,265,373	4
3	703,312	1,676,451	22.55%	4,095,972	2.82	13,934,500	2
4	1,434,148	1,648,431	18.86%	3,351,602	2.79	12,433,549	1

Table 61 - Strategic Modelling Comparison of 4 Funding Options for Kerbs

Figure below illustrates each financial option's trend of budget spending and resulted predicted average kerb conditions over the following ten years.

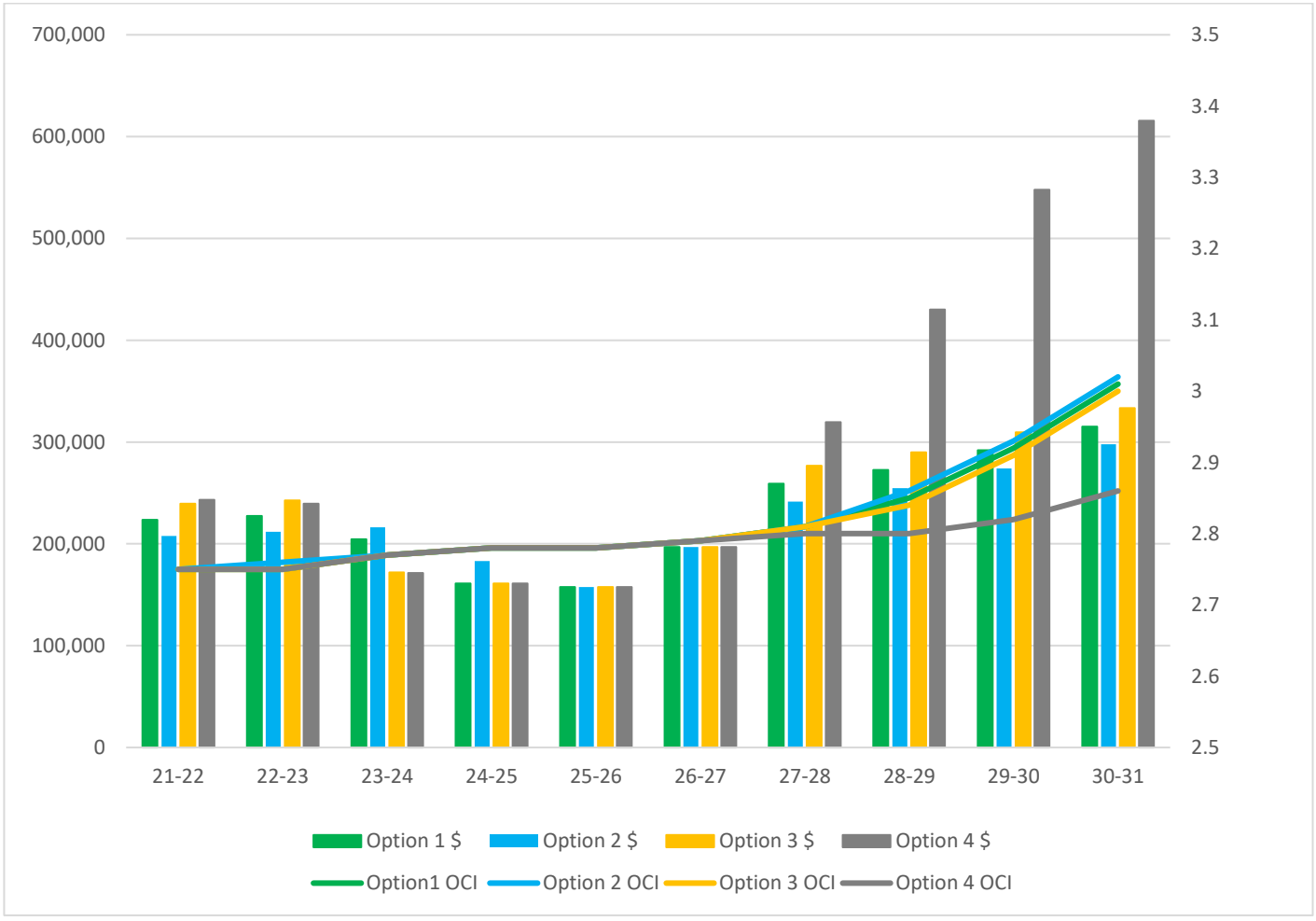

Figure 24 - 10 Year Projected Average Condition vs Budget Comparison for Kerbs

5.3.4 Footpaths

The outcomes of the four financial options that have been modelled are detailed below.

Funding Option	Total Capital Over 10 Years	Total Maintenance Over 10 Years	% Assets in Condition 4 & 5 at year 10	Renewal Gap / Backlog Movement	10-Year Average OCI	Net Cost of Strategy*	Budget Rank
1	4,329,340	4,550,701	44.81%	1,370,088	3.22	13,291,724	1
2	4,329,340	4,550,701	44.81%	1,370,088	3.22	13,291,724	1
3	4,329,340	4,550,701	44.81%	1,370,088	3.22	13,291,724	1
4	4,329,340	4,550,701	44.81%	1,370,088	3.22	13,291,724	1

Table 62 - Strategic Modelling Comparison of 4 Funding Options for Footpaths

Because all four funding options are more than the required budget to treat all necessary defects, therefore all four funding options illustrated the same forecasted expenditures and condition.

Figure below illustrates each financial option's trend of budget spending and resulted predicted average footpath conditions over the following ten years.

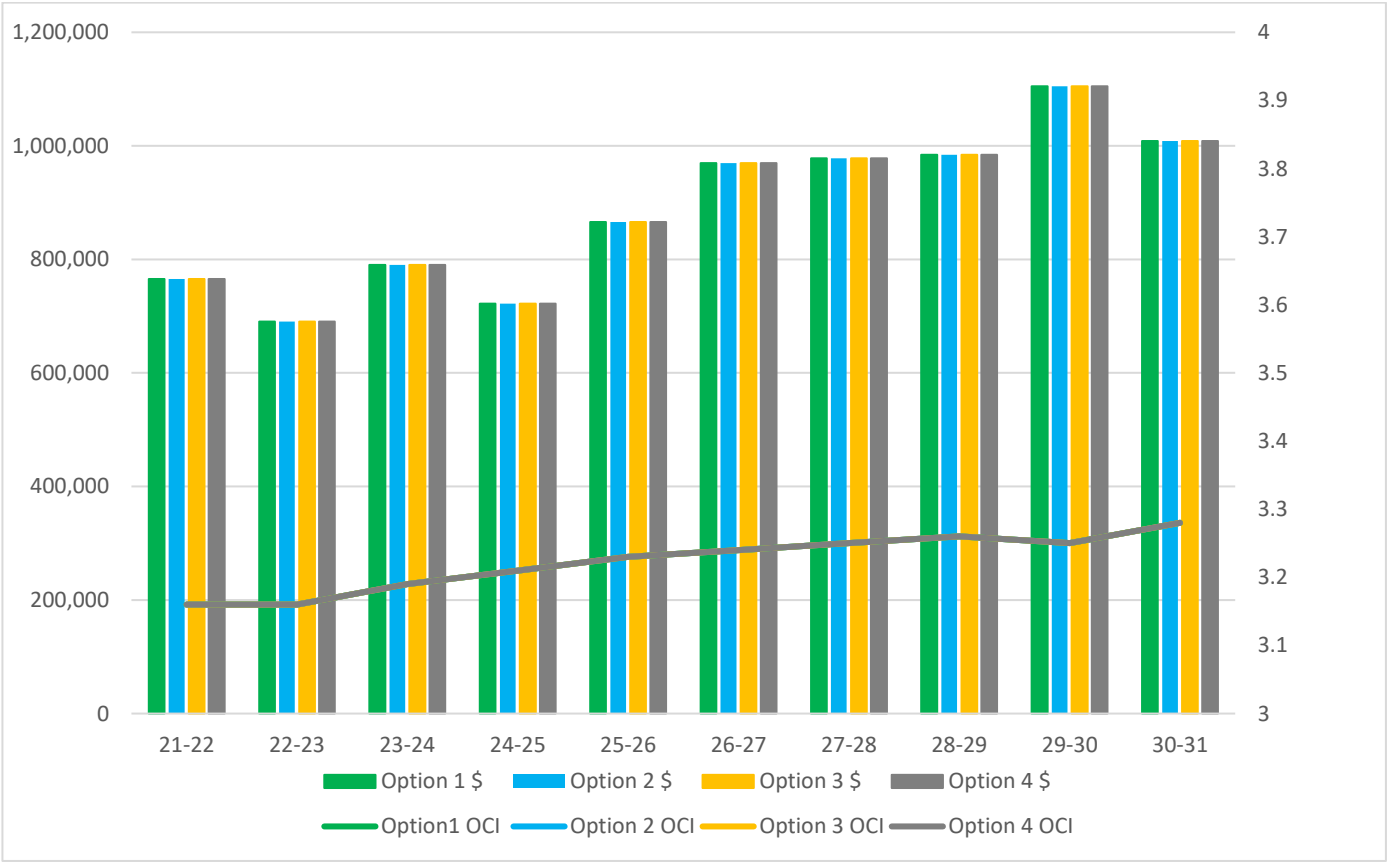

Figure 25 - 10 Year Projected Average Condition vs Budget Comparison for Footpaths

5.3.5 Carparks

The outcomes of the three financial options that have been modelled are detailed below.

Funding Option	Total Capital Over 10 Years	Total Maintenance Over 10 Years	% Assets in Condition 4 & 5 at year 10	Renewal Gap / Backlog Movement	Road 10-Year Average OCI	Net Cost of Strategy*	Budget Rank
1	621,533	1,022,023	8.61%	164,554	2.39	2,036,840	1
2	510,899	1,037,394	9.92%	228,978	2.43	2,104,710	3
3	703,993	1,013,657	8.16%	150,370	2.38	2,075,531	2
4	1,543,700	957,864	5.37%	-61,004	2.30	2,361,255	4

Table 63 - Strategic Modelling Comparison of 4 Funding Options for Carparks

Figure below illustrates each financial option's trend of budget spending and resulted predicted average carpark conditions over the following ten years.

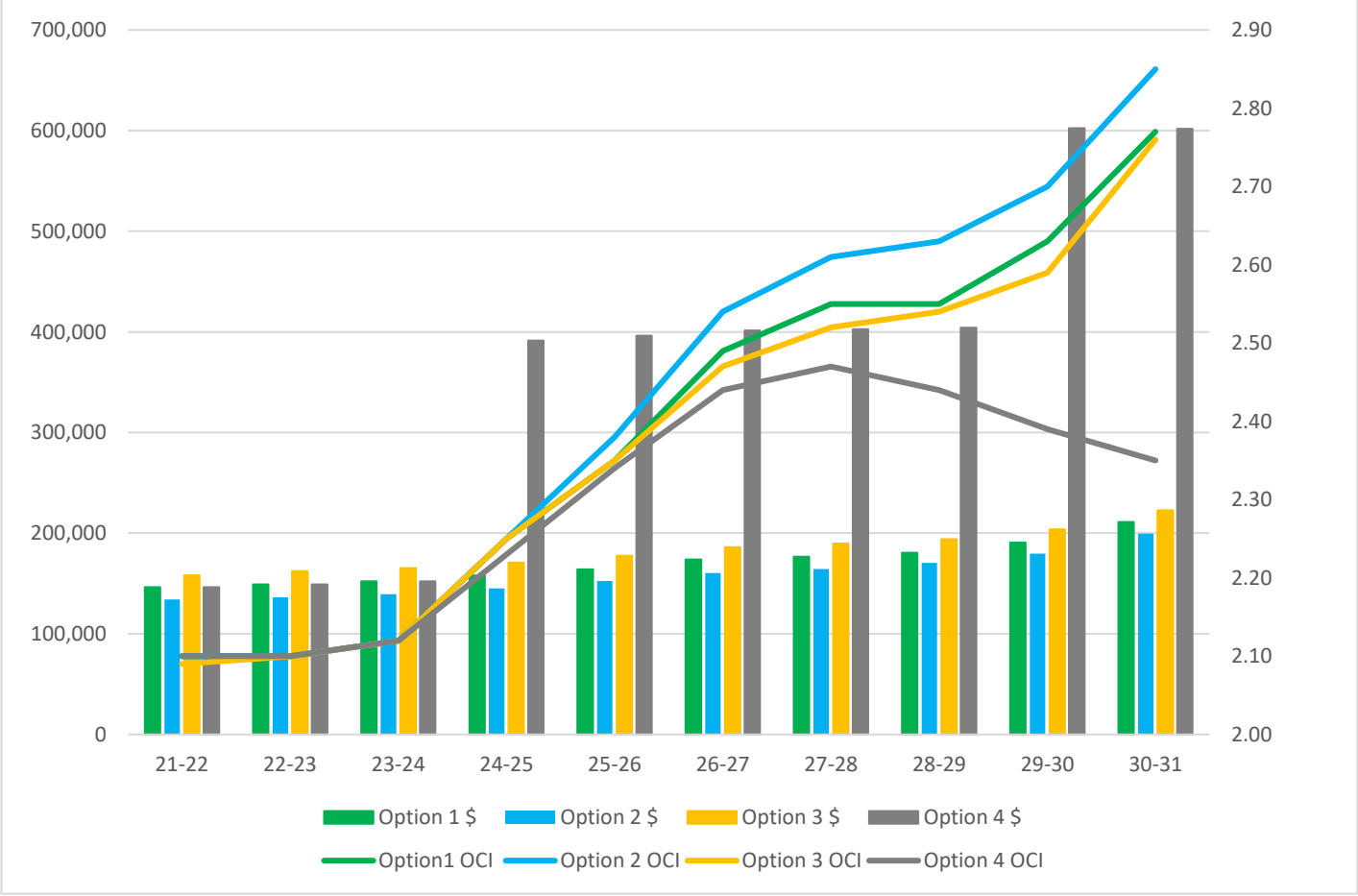

Figure 26 - 10 Year Projected Average Condition vs Budget Comparison for Carparks

5.3.6 Road Ancillary

The outcomes of the three financial options that have been modelled are detailed below.

Funding Option	Total Capital Over 10 Years	Total Maintenance Over 10 Years	% Assets in Condition 4 & 5 at year 10	Renewal Gap / Backlog Movement	Road 10-Year Average OCI	Net Cost of Strategy*	Budget Rank
1	2,046,890	2,362,487	23.95%	1,076,787	2.51	4,409,377	2
2	1,718,523	2,412,391	25.78%	1,160,158	2.53	4,130,914	1
3	2,416,352	2,305,979	22.21%	978,885	2.48	4,722,331	3
4	5,737,681	513,958	2.84%	107,248	2.31	6,251,639	4

Table 64 - Strategic Modelling Comparison of 4 Funding Options for Road Ancillary Assets

Figure below illustrates each financial option's trend of budget spending and resulted predicted average road ancillary overall conditions over the following ten years.

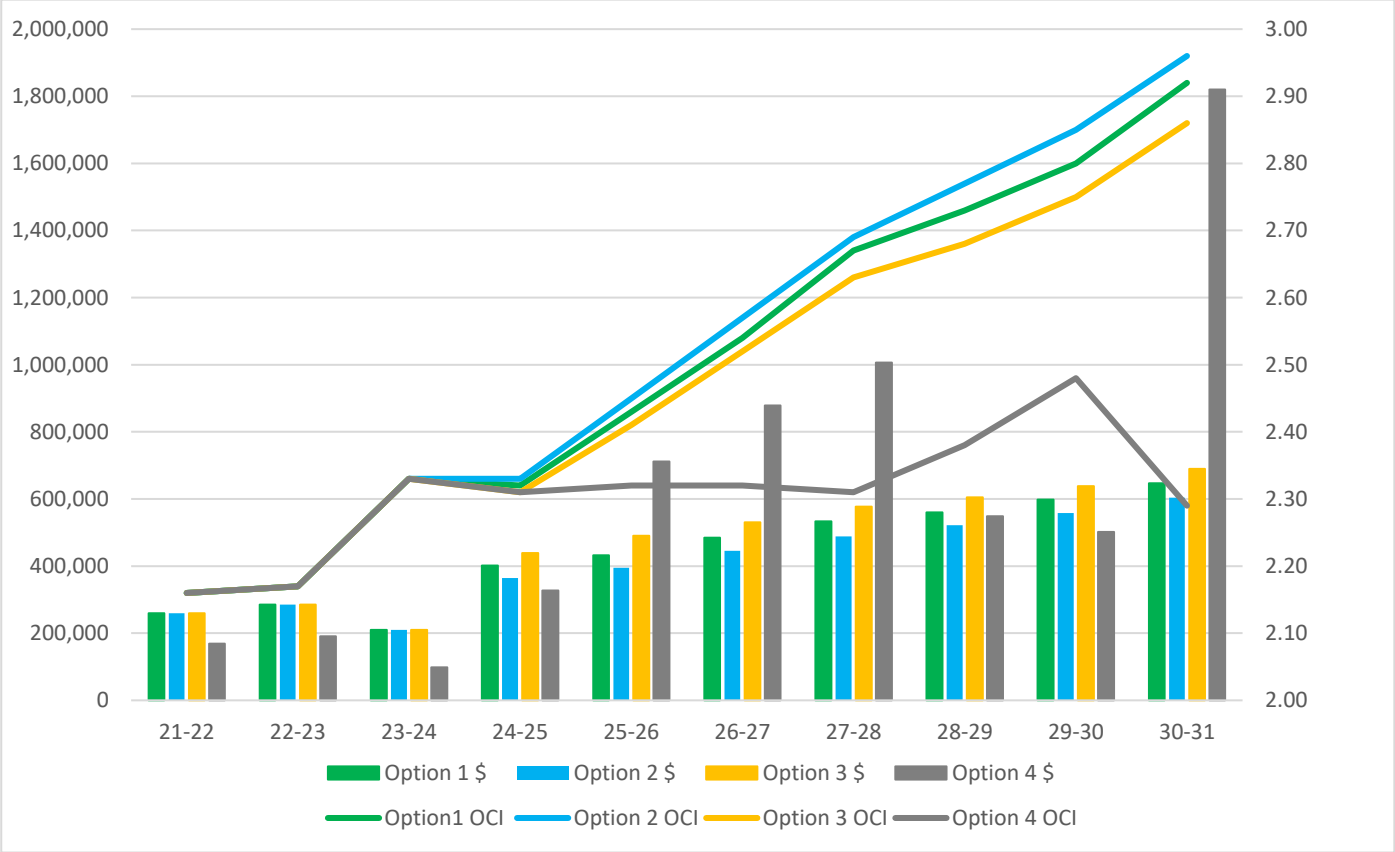

Figure 27 - 10 Year Projected Average Condition vs Budget Comparison for Road Ancillary

5.4 Historical Transportation Expenditure

Typically, where more than 50% of the transport assets requires rectification or the entire asset requires rectification, this work is referred to Council's capital works program for prioritisation and reconstruction.

Capital expenditure refers to works undertaken to address major condition or service capacity issues such as removing an existing transport asset and constructing a new asset at the existing location (considered to be renewal expenditure as it returns the life or service potential of the asset to that which it had originally) or constructing a higher transport asset so that it can cater for increased traffic (considered to be upgrade expenditure as it enhances the existing asset to provide a higher level of service).

These capital treatment works are undertaken to improve the overall condition of the transport asset stock and provide an improved service to users of Council's transport network.

Where conditions such as cracking or broken transport assets or differential displacement occurs and the defects requiring repairs are undertaken on less than 50% of the road length (not totalling more than $5,000), the work is determined to be maintenance expenditure.

The following table identifies the historical expenditure on transport assets.

Financial Year	2017/2018		2018/2019		2019/2020		2020/2021	
Asset Category	Capital	Maintain'	Capital	Maintain'	Capital	Maintain'	Capital	Maintain'
Road	16,961,029	4,038,623	12,148,276	3,334,820	14,995,465	4,435,079	12,632,232	5,461,295
Bridge	1,372,732	411,248	2,436,862	385,961	355,605	355,605	300,331	350,618
Footpath	747,603	539,315	237,013	479,590	697,341	697,341	715,143	374,336
Kerb	1,120,102	129,428	1,309,514	209,598	128,642	128,642	965,337	48,017
Carpark	178,124	1,173	74,777	28,168	10,956	10,956	20,697	-
Road Ancillary	1,632,549	139,834	402,518	132,750	-	199,689	1,420,588	220,255
Total	**22,012,139**	**5,259,621**	**16,608,960**	**4,570,887**	**16,188,009**	**5,827,312**	**16,054,328**	**6,454,521**

Table 65 - 2018-2021 FY Capital & Maintenance Expenditure

Financial Year	4-Year Average Expenditure	
Asset Category	Capital	Maintenance
Road	14,184,251	4,317,454
Bridge	1,116,383	375,858
Footpath	599,275	522,646
Kerb	880,899	128,921
Carpark	71,139	10,074
Road Ancillary	863,914	173,132
Total	**17,715,859**	**5,528,085**

Table 66 - 4-Year (2018-2021 FY) Average Capital and Maintenance Expenditure

5.5 Funding Requirement Recommendation

The summary of recommended capital and maintenance funding using the best net cost strategy from four funding options are illustrated in the following tables:

Capital Renewal LTFP

Year	Roads	Bridges	Kerbs	Footpaths	Carparks	Road Ancillary	Total
2021/22	15,047,064	2,513,715	99,931	356,508	59,337	119,644	18,196,200
2022/23	15,318,946	930,244	94,123	268,836	35,802	140,601	16,788,552
2023/24	13,682,771	928,756	21,103	364,972	46,226	41,196	15,085,024
2024/25	12,243,390	930,569	7,383	279,981	59,187	191,042	13,711,554
2025/26	3,560,418	602,841	-	413,665	66,775	190,238	4,833,937
2026/27	1,986,717	333,455	35,088	511,967	68,004	199,941	3,135,173
2027/28	2,932,241	931,143	151,599	506,509	69,908	202,466	4,793,866
2028/29	8,566,986	931,049	253,903	502,182	70,700	207,810	10,532,630
2029/30	8,855,677	590,649	359,457	623,330	71,476	210,726	10,711,316
2030/31	7,271,781	783,593	411,559	501,390	74,117	214,858	9,257,298
Total	**89,465,990**	**9,476,015**	**1,434,148**	**4,329,340**	**621,533**	**1,718,523**	**107,045,550**

Table 67 - Capital Renewal LTFP

Maintenance LTFP

Year	Roads	Bridges	Kerbs	Footpaths	Carparks	Road Ancillary	Total
2021/22	5,224,659	249,473	143,425	409,055	84,118	139,506	**6,250,236**
2022/23	5,499,349	250,977	145,311	421,746	85,850	144,540	**6,547,773**
2023/24	5,927,767	252,540	150,188	425,323	87,654	168,692	**7,012,163**
2024/25	6,454,742	254,256	153,803	442,361	92,048	173,191	**7,570,402**
2025/26	6,937,517	257,426	157,603	452,402	96,801	205,230	**8,106,978**
2026/27	7,420,577	261,961	161,781	457,525	105,097	245,265	**8,652,206**
2027/28	7,507,909	266,898	167,836	471,672	106,733	285,880	**8,806,929**
2028/29	6,956,718	271,407	176,277	482,048	109,221	313,692	**8,309,364**
2029/30	6,934,967	278,361	188,301	481,481	117,741	347,091	**8,347,943**
2030/31	7,329,312	285,161	203,908	507,085	136,760	389,305	**8,851,531**
Total	**66,193,516**	**2,628,461**	**1,648,431**	**4,550,701**	**1,022,023**	**2,412,391**	**78,455,524**

Table 68 - Maintenance LTFP

Total LTFP excluding Capital New

Year	Roads	Bridges	Kerbs	Footpaths	Carparks	Road Ancillary	Total
2021/22	20,271,723	2,763,189	243,356	765,564	143,456	259,150	**24,446,436**
2022/23	20,818,295	1,181,220	239,434	690,582	121,652	285,141	**23,336,325**
2023/24	19,610,538	1,181,296	171,291	790,296	133,880	209,888	**22,097,187**
2024/25	18,698,132	1,184,825	161,186	722,343	151,236	364,233	**21,281,955**
2025/26	10,497,935	860,266	157,603	866,067	163,576	395,468	**12,940,914**
2026/27	9,407,294	595,417	196,869	969,492	173,101	445,206	**11,787,379**
2027/28	10,440,150	1,198,041	319,435	978,182	176,641	488,347	**13,600,795**
2028/29	15,523,704	1,202,456	430,180	984,231	179,921	521,502	**18,841,994**
2029/30	15,790,644	869,010	547,758	1,104,811	189,218	557,817	**19,059,259**
2030/31	14,601,093	1,068,754	615,467	1,008,475	210,877	604,163	**18,108,829**
Total	**155,659,506**	**12,104,476**	**3,082,579**	**8,880,041**	**1,643,557**	**4,130,914**	**185,501,074**

Table 69 - Total LTFP Excluding Capital New

Funding for creating, renewing or maintaining Council's transport network is obtained from a number of sources.

Source of Funds	Description
Ordinary Rate Revenue	Funding required for the maintenance of the transport assets is heavily reliant on Council's rate revenue as the main source of funds and as such, competes with other Council projects and programs for funds, such as building and recreation works.
Loan borrowings	A large majority of the bridge renewal program is financed by loan borrowings. This provides for the cost and benefit of the transport assets to be shared across the life of the assets and its users.
Developer Contribution Plan	Council obtains funds from developers under the Developer Contributions Plan for transport assets. Developers who undertake works within the Shire are required to pay a contribution which is utilised by Council to fund the upgrade of existing transport assets to be able to meet the service needs of the community in future due to the population growth.
Government Grants and Contributions	Council receives a number of recurring grants and contributions from state and federal governments which are specifically or voluntarily applied to transport renewal and maintenance, and may apply for specific infrastructure grants when available.

Table 70 - Source of Funds

Sub-sections below highlight the key recommendation for each asset class within the transport asset portfolio.

5.5.1 Sealed Roads

The key recommendations for Tweed Shire Council as determined by the road strategic modelling prediction analysis are as follows:

- **Capital Renewal Recommendation Road Network**- Tweed Shire Council adopts the Road capital works budget allocation for renewals as documented in Table 59 and Table 42 by Funding Option 3 (note that higher spending in the first four years is forecasted to fix the severe defects then less

spending required from year 5-10. The overall total financial commitment by Council will require some **$65 million** over the following 10 years to fund the capital costs.

- This equates to an average expenditure of approximately **$6.5 million** per year for the following 10 years and as a result, it is predicted that the current asset backlog will increase by $2.8 million, whilst the average Road condition is predicted to be at an average network condition of 1.34 out of 5 (with 5 being the worst).
- **Maintenance Recommendation** - Tweed Shire Council continues to fund annual maintenance budget allocations for roads maintenance activities as predicted in Table 42.

5.5.2 Bridges

- **Capital Renewal Recommendation** - Tweed Shire Council adopts the bridge capital works budget allocation for renewals as documented in Table 60 and Table 44 by funding Option 3. The overall total financial commitment by Council will require some **$9.5 million** over the following 10 years to fund the capital costs.
- It is predicted that the current asset backlog will reduce by $3.4 million, whilst the average bridge condition will be maintained at an average network condition of 2.17 out of 5 (with 5 being the worst).
- **Maintenance Recommendation** - Tweed Shire Council continues to fund annual maintenance budget allocations for bridge maintenance activities as per Table 60.

5.5.3 Kerbs

The key recommendations for Tweed Shire Council as determined by the kerb strategic modelling prediction analysis are as follows:

- **Capital Renewal Recommendation** - Tweed Shire Council adopts the kerb capital works budget allocation for renewals as documented in Table 61 and Table 46 by Funding Option 4. The overall total financial commitment by Council will require some **$1.4 million** over the following 10 years to fund the capital costs.
- This equates to an average expenditure of **$140,000** per year for the following 10 years and as a result, it is predicted that the current asset backlog will increase by $3.4 million whilst the average kerb condition is predicted to be at an average network condition of 2.79 out of 5 (with 5 being the worst).
- **Maintenance Recommendation** - Tweed Shire Council continues to fund annual maintenance budget allocations for kerb maintenance activities as per Table 61.

5.5.4 Footpaths

The key recommendations for the Tweed Shire Council as determined by the footpath strategic modelling prediction analysis are as follows:

- Tweed Shire Council adopts the footpath capital works budget allocation for renewals as documented in Table 62 and Table 48. The overall total financial commitment by Council will require some **$4.3 million** over the following 10 years to fund the capital costs.
- This equates to an average expenditure of **$430,000** per year for the following 10 years and as a result, it is predicted that the current asset backlog will increase by $1.4 million whilst the average footpath condition is predicted to be at an average network condition of 3.22 out of 5 (with 5 being the worst).

- **Maintenance Recommendation** - Tweed Shire Council continues to fund annual maintenance budget allocations for footpath maintenance activities as per Table 62.

5.5.5 Carparks

The key recommendations for the Tweed Shire Council as determined by the carpark strategic modelling prediction analysis are as follows:

- Tweed Shire Council adopts the carpark capital works budget allocation for renewals as documented in Table 63 and Table 50 by Funding Option 1. The overall total financial commitment by Council will require some **$621,533** over the following 10 years to fund the capital costs.
- This equates to an average expenditure of **$60,000** per year for the following 10 years and as a result, it is predicted that the current asset backlog will increase by $164,000 whilst the average carpark condition is predicted to be at an average network condition of 2.39 out of 5 (with 5 being the worst).
- **Maintenance Recommendation** - Tweed Shire Council continues to fund annual maintenance budget allocations for carpark maintenance activities as per Table 63.

5.5.6 Road Ancillary

The key recommendations for the Tweed Shire Council as determined by the Road Ancillary strategic modelling prediction analysis are as follows:

- Tweed Shire Council adopts the Road Ancillary capital works budget allocation for renewals as documented in Table 64 and Table 52 by Funding Option 2. The overall total financial commitment by Council will require some **$1.7 million** over the following 10 years to fund the capital costs.
- This equates to an average expenditure of **$170,000** per year for the following 10 years and as a result, it is predicted that the current asset backlog will increase by $1 million whilst the average road ancillary condition is predicted to be at an average network condition of 2.48 out of 5 (with 5 being the worst).
- **Maintenance Recommendation** - Tweed Shire Council continues to fund annual maintenance budget allocations for road ancillary maintenance activities as per Table 64.

5.6 Committed Funding

Council's Long Term Financial Plan proposed capital and maintenance expenditure of **$222,304,173** on the transport asset portfolio of over the next 10 years as shown below.

Year	Roads, Kerbs, Carparks and Ancillary	Bridges	Footpaths	Total
2021/22	19,778,984	2,096,000	629,177	**22,504,161**
2022/23	20,203,061	776,000	641,760	**21,620,821**
2023/24	20,607,701	776,000	654,596	**22,038,297**
2024/25	20,724,190	776,000	667,690	**22,167,880**
2025/26	20,315,583	776,000	681,044	**21,772,627**
2026/27	20,193,110	776,000	694,664	**21,663,774**
2027/28	20,559,685	776,000	708,558	**22,044,243**
2028/29	20,933,595	776,000	722,728	**22,432,323**
2029/30	21,314,970	776,000	737,182	**22,828,152**
2030/31	21,703,970	776,000	751,925	**23,231,895**
Total	**206,334,849**	**9,080,000**	**6,889,324**	**222,304,173**

Table 71 - Committed Funding

The predictive modelling using the software Assetic Predictor forecasted below Capital Renewal and Maintenance expenditures except Capital New activities.

Year	Roads, Kerbs, Carparks and Ancillary	Bridges	Footpaths	Total
2021/22	20,917,684	2,763,189	765,564	**24,446,436**
2022/23	21,464,523	1,181,220	690,582	**23,336,325**
2023/24	20,125,596	1,181,296	790,296	**22,097,187**
2024/25	19,374,787	1,184,825	722,343	**21,281,955**
2025/26	11,214,581	860,266	866,067	**12,940,914**
2026/27	10,222,470	595,417	969,492	**11,787,379**
2027/28	11,424,572	1,198,041	978,182	**13,600,795**
2028/29	16,655,307	1,202,456	984,231	**18,841,994**
2029/30	17,085,437	869,010	1,104,811	**19,059,259**
2030/31	16,031,600	1,068,754	1,008,475	**18,108,829**
Total	**164,516,556**	**12,104,476**	**8,880,041**	**185,501,074**

Table 72 – Recommended Capital and Maintenance Expenditure excluding Capital New

It is recommended Tweed Shire Council spend the gap between Table 71 and Table 72 on Capital New projects or bridge upgrade program.

5.7 Financial Ratios

Asset Consumption Ratio:

This ratio seeks to highlight the aged condition of a local government's stock of physical assets. If a local government is responsibly maintaining and renewing/replacing its assets in accordance with a well prepared asset management plan, then the fact that the Asset Consumption Ratio may be relatively low and/or declining should not be cause for concern - providing it is operating sustainably.

Asset Consumption Ratio = $\frac{\textit{Depreciated Replacement Cost of Depreciable Assets}}{\textit{Current Replacement Cost of Depreciable Assets}}$

Purpose: This ratio measures the extent to which depreciable assets have been consumed by comparing their written down value to their replacement cost.

Standards: Standard is met if the ratio can be measured and is 50% or greater (0.50 or >). Standard is improving if the ratio is between 60% and 75% (0.60 and 0.75).

Current Asset Consumption Ratio

Asset Category	*2016 Current Replacement Cost*	*2016 Depreciated Replacement Cost*	*2016 Ratio*	2021 Current Replacement Cost	2021 Depreciated Replacement Cost	2021 Ratio
Roads	*$737,453,602*	*$590,898,784*	*80.1%*	$819,133,800	$699,650,824	85.4%
Bridges	*$182,987,639*	*$157,373,491*	*86.0%*	$202,035,854	$175,627,062	86.9%
Kerbs	*$53,148,513*	*$43,651,978*	*82.1%*	$65,185,020	$53,188,170	81.6%
Footpaths	*37,108,823*	*30,705,743*	*82.3%*	$44,717,631	$25,373,652	56.7%
Carparks	*$9,450,374*	*$7,931,035*	*83.9%*	$10,511,401	$8,793,047	83.7%
Road Ancillary	*$10,340,883*	*$9,544,299*	*92.3%*	$17,404,714	$16,420,690	94.3%
Totals	***1,030,489,834***	***840,105,330***	***81.5%***	**$1,158,988,420**	**$979,053,446**	**84.5%**

Table 73 - Current Asset Consumption Ratio as in June 2016 and June 2021

Asset Sustainability Ratio

This ratio is an approximation of the extent to which assets managed by a local government are being replaced as these reach the end of their useful lives. It is calculated by measuring capital expenditure on renewal or replacement of assets, relative to depreciation expense. Expenditure on new or additional assets is excluded.

Depreciation expense represents an estimate of the extent to which the assets have been consumed during that period. Measuring assets at fair value is critical to the calculation of a valid depreciation expense value.

Asset Sustainability Ratio = $\frac{\textit{Capital Renewal and Replacement Expenditure}}{\textit{Depreciation}}$

Purpose: This ratio indicates whether a local government is replacing or renewing existing non-financial assets at the same rate that its overall asset stock is wearing out.

Standards: Standard is met if the ratio can be measured and is 90% (or 0.90) Standard is improving if this ratio is between 90% and 110% (or 0.90 and 1.10).

Asset Category	2021 Capital Renewal Expenditure	2021 Depreciation	2021 Ratio
Roads including kerbs, carparks and road ancillary	$8,525,156	14,171,225	60%
Bridges	$2,780	2,268,959	0%
Footpaths	$50,068	761,046	7%
Totals	$8,578,004	17,201,230	50%

Table 74 - Asset Sustainability Ratio as in June 2021

Asset Renewal Funding Ratio

This ratio indicates whether the local government has the financial capacity to fund asset renewal as required and can continue to provide existing levels of services in future, without additional operating income or reductions in operating expenses.

The ratio is calculated from information included in the local government's Long Term Financial Plan and Asset Management Plan, not the Annual Financial Report. For the ratio to be meaningful, a consistent discount rate should generally be applied in Net Present Value (NPV) calculations

$$\textit{Asset Renewal Funding Ratio} = \frac{\textit{NPV of Planned Capital Renewals over 10 years}}{\textit{NPV of Required Capital Expenditure over 10 years}}$$

Purpose: This ratio is a measure of the ability of a local government to fund its projected asset renewal / replacements in the future.

Standards: Standard is met if the ratio is between 75% and 95% (or 0.75 and 0.95). Standard is improving if the ratio is between 95% and 105% (or 0.95 and 1.05), and the ASR falls within the range 90% to 110%, and ACR falls within the range 50% to 75%.

Asset Category	Planned Capital Renewals over 10 years	Required Capital Expenditure over 10 years	Ratio
Roads including kerbs, carparks and ancillary	206,334,849	164,516,556	125%
Bridges	9,080,000	12,104,476	75%
Footpaths	6,889,324	8,880,041	78%
Totals	222,304,173	185,501,074	120%

Table 75 - Asset Renewal Funding Ratio from 2021-22 to 2030-31

6 Asset Management Practices

This section outlines the decision-making tools Council currently uses, to determine long term maintenance, renewal and upgrade expenditure for its transport assets. Asset management systems are generally categorised as follows:

- **Asset Management Systems** - The information support tool used to store and manipulate asset data.
- **Data** - Data available for interrogation by information systems to produce outputs.

6.1 Accounting / Financial Systems

Tweed Shire Council currently utilises Technology One - Financials software system.

The Manager Financial Service has accountability and responsibility for this system.

6.2 Asset Management Systems

Tweed Shire Council currently utilises the 'myData' software system for asset management purposes. The system stores inventory, attribute, condition, financial and historical data.

All information pertaining to location, type, dimensions, materials, known construction dates and where available, condition of these transport assets are recorded and stored in Council's Asset Register which is myData. At the time of preparing this Transport AMP, it is estimated that Council's Asset Register is 98% up to date.

The Financial Services Unit and the Engineering Division share accountability and responsibility for this system.

Assetic Predictor was used for the prediction analysis to determine the future strategies and capital expenditure (Capex) plans contained in Section 5 of this Plan.

Currently, Council utilises the Reflect with Insight software (Asset edge provided) to store maintenance records and information. This system will be assessed in the near future.

Tweed also utilises Open Spatial and Weave as its Geographical Information System (GIS). The GIS system stores asset and other information spatially.

6.3 Accounting Framework

The following Accounting Framework applies to Local Government in New South Wales:

- Local Government Code of Accounting Practice and Financial Reporting
- AASB 13 Fair Value Measurement - prescribes fair value measurement of assets
- AASB 2022-10 Amendments to Australian Accounting Standards – Fair Value Measurement of Non-Financial Assets of Not-for-Profit Public Sector Entities
- AASB 116 Property, Plant & Equipment - prescribes requirements for recognition and depreciation of property, plant and equipment assets
- AASB 136 Impairment of Assets - aims to ensure that assets are carried at amounts that are not in excess of their recoverable amounts

- AASB 108 Accounting Policies - specifies the policies that Council is to have for recognition of assets and depreciation

The Council's asset materiality threshold limit has been set at $5,000.

6.4 Information Flow Transportation and Process

The key information flows into this transport AMP are:

- The asset register data on material types, design data such as dimensions, replacement cost, age, remaining life of the asset;
- The unit rates for categories of work/material;
- The adopted service levels;
- Projections of various factors affecting future demand for services;
- Historical maintenance and capital works treatments;
- Correlations between maintenance and renewal, including decay models; and
- Data on new assets acquired by Council.

The key information flows from this infrastructure and asset management plan are:

- The assumed Capital Works Program and trends;
- The resulting budget, valuation and depreciation projections; and
- The useful life analysis.

These will impact the Long Term Financial Plan, Council Plan, annual budget and departmental business plans and budgets.

As the 'myData' system maintains core asset data and financial data, the flow of information is entered directly into this one system.

Information is updated within 'myData' on an as required basis.

7 Action Plan

7.1 AM Document Register

Document	Adopted	Proposed Revision	Comment
Tweed Shire Council Asset Management Policy - Version 1.4	Adopted by Council at its meeting on 21 June 2011 Minute No: 371	2016	
Tweed Shire Council Asset Management Strategy 2010.	Adopted by Council at its meeting on 21 June 2011 Minute No: 371	2016	
Tweed Shire Council Transportation Assets Management Plan December 2010	Adopted by Council at its meeting on 21 June 2011 Minute No: 371	2016	
Tweed Transport Business Process Manual V2.1	2017		
Tweed Transport Maintenance LoS V1.1	2008		Incorporated into Tweed Transport Business Process Manual V2.1
Tweed Shire Council Asset Management Policy - Version 1.5	Adopted by Council at its meeting on 16 June 2022 Agenda No: 26.2	2025	
Tweed Shire Council Asset Management Strategy 2021.	Adopted by Council at its meeting on 16 June 2022 Agenda No: 26.2	2025	
Tweed Shire Council Transportation Asset Management Plan Version 3.2.1	Adopted by Council at its meeting on 16 June 2022 Agenda No: 26.2	2025	

Table 76 - Asset Document Register

7.2 AM Practice Improvements

7.2.1 Performance Measures

The effectiveness of the Asset Management Plan can be measured in the following ways:

- The degree to which the required cash flows identified in this AMP are incorporated into Council's Long Term Financial Plan and Strategic Management Plan;
- The degree to which the detailed works programs, budgets, business plans and organisational structures take into account the 'global' works program trends provided by the AMP; and
- The performance of Council against the Strategic Levels of Service documented in the Transport Business Process Model.

7.2.2 Improvement Plan

The asset management improvement plan generated from this Asset Management Plan shown in the following table.

Note: Importance, Urgency and Risk - 1 = Low, 5 = High
DE = Director Engineering
DCS= Director Corporate Services

Task No	Task	Importance	Urgency	Risk	Responsibility	Resources Required	Start Date	End Date
1.	Obtain Council approval of this Plan.	5	5	5	DE & DCS	In-house	2022	2022
2.	Integrate the Asset Management and GIS Systems to provide for easy identification of the location of the assets, including provision of maps of asset condition.	4	3	2	DE	In-house	Ongoing	Ongoing
3.	Confirm the condition and remaining life of assets identified for renewal over the next 10 years and investigate alternatives for renewal or extension of the asset lives.	4	3	3	DE	In-house	Ongoing	Ongoing
4.	Establish ongoing condition inspections for all transport assets on 3 to 4 yearly cycle, coinciding with Council's revaluation cycle.	5	4	4	DE	In-house and Contract	Ongoing	Ongoing
5.	Update and revise the prediction modelling parameters and inputs for all transport assets once new condition data is collected	5	4	4	DE	In-house and Contract	Ongoing	Ongoing
6.	Utilise the predictive modelling of transport assets for financial modelling and development of annual and long term capital works programs.	5	4	4	DE & DCS		Ongoing	Ongoing

Task No	Task	Importance	Urgency	Risk	Responsibility	Resources Required	Start Date	End Date
7.	Test the current levels of service to determine if they are achievable for current budgets. Test the current levels of service, to determine 'a confidence level' for reasonableness. Review response levels of service for reactive maintenance.	3	3	3	DE	In-house	2022	2022
8.	Modify/Review finance system to capture expenditure against all types of maintenance - whether proactive or reactive	3	3	3	DE & DCS	In-house	2022	2022
9.	Pilot effective works management, asset inspection (works and AM) integrated with spatial, finance and AM systems.	4	3	3	DE	In-house	2022	2023

Table 77 - Improvement Plan

7.2.3 Monitoring and Review Procedures

This Asset Management Plan will be reviewed during annual budget preparation and amended to recognise any changes in service levels and/or resources available to provide those services as a result of the budget decision process.

This AMP has a life of 4 years and is due for revision and updating within 2 years of each Council election.

An asset management plan is a dynamic document, reflecting and responding to changes over time. Monitoring of this roads asset management plan is required to:

- Ensure compliance with the proposed improvement program milestones.
- Ensure compliance with adopted standards and procedures for condition and performance.

A full review of this asset management plan should be undertaken every three to five years to document progress and set out proposals for the next five years.

GLOSSARY

Asset class	Grouping of assets of a similar nature and use in an entity's operations (AASB 166.37).
Asset condition assessment	The process of continuous or periodic inspection, assessment, measurement and interpretation of the resultant data to indicate the condition of a specific asset so as to determine the need for some preventative or remedial action.
Asset management	The combination of management, financial, economic, engineering and other practices applied to physical assets with the objective of providing the required level of service in the most cost effective manner.
Assets	Future economic benefits controlled by the entity as a result of past transactions or other past events (AAS27.12). Property, plant and equipment including infrastructure and other assets (such as furniture and fittings) with benefits expected to last more than 12 months.
Backlog Works* **	Estimated cost to bring infrastructure, buildings and other structures and depreciable land improvements to a satisfactory standard, measured at a particular point in time
Capital expenditure	Relatively large (material) expenditure, which has benefits, expected to last for more than 12 months. Capital expenditure includes renewal, expansion and upgrade. Where capital projects involve a combination of renewal, expansion and/or upgrade expenditures, the total project cost needs to be allocated accordingly.
Capital funding	Funding to pay for capital expenditure.
Capital new expenditure	Expenditure which creates a new asset providing a new service to the community that did not exist beforehand. As it increases service potential it may impact revenue and will increase future operating and maintenance expenditure.
Capital renewal expenditure	Expenditure on an existing asset, which returns the service potential or the life of the asset up to that which it had originally. It is periodically required expenditure, relatively large (material) in value compared with the value of the components or sub-components of the asset being renewed. As it reinstates existing service potential, it has no impact on revenue, but may reduce future operating and maintenance expenditure if completed at the optimum time, e.g. resurfacing or resheeting a material part of a road network, replacing a material section of a drainage network with pipes of the same capacity, resurfacing an oval. Where capital projects involve a combination of renewal, expansion and/or upgrade expenditures, the total project cost needs to be allocated accordingly.
Capital upgrade expenditure	Expenditure, which enhances an existing asset to provide a higher level of service or expenditure that will increase the life of the asset beyond that which it had originally. Upgrade expenditure is discretional and often does not result in additional revenue unless direct user charges apply. It will increase operating and maintenance expenditure in the future because of the increase in the Council's asset base e.g. widening the sealed area of an existing road, replacing drainage pipes with pipes of a greater capacity, enlarging a grandstand at a sporting facility. Where capital projects involve a combination of renewal, expansion and/or upgrade expenditures, the total project cost needs to be allocated accordingly.
Carrying amount	The amount at which an asset is recognised after deducting any accumulated depreciation / amortisation and accumulated impairment losses thereon.
Class of assets	See asset class definition.
Component	An individual part of an asset which contributes to the composition of the whole and can be separated from or attached to an asset or a system.
Cost of an asset	The amount of cash or cash equivalents paid or the fair value of the consideration given to acquire an asset at the time of its acquisition or construction, plus any costs necessary to place the asset into service. This includes one-off design and project management costs.
Current replacement cost (CRC)	The cost the entity would incur to acquire the asset on the reporting date. The cost is measured by reference to the lowest cost at which the gross future economic benefits could be obtained in the normal course of business or the minimum it would cost, to replace the existing asset with a technologically modern equivalent new asset (not a second hand one) with the same economic benefits (gross service potential) allowing for any differences in the quantity and quality of output and in operating costs.
Current Replacement Cost "As New" (CRC)	The current cost of replacing the original service potential of an existing asset, with a similar modern equivalent asset i.e. the total cost of replacing an existing asset with an as NEW or similar asset expressed in current dollar values.

Cyclic Maintenance	Replacement of higher value components/sub-components of assets that is undertaken on a regular cycle including repainting, building roof replacement, cycle, replacement of air conditioning equipment, etc. This work generally falls below the capital/ maintenance threshold and needs to be identified in a specific maintenance budget allocation.
Depreciable amount	The cost of an asset, or other amount substituted for its cost, less its residual value (AASB 116.6).
Depreciated replacement cost (DRC)	The current replacement cost (CRC) of an asset less, where applicable, accumulated depreciation calculated on the basis of such cost to reflect the already consumed or expired future economic benefits of the asset.
Depreciation / amortisation	The systematic allocation of the depreciable amount (service potential) of an asset over its useful life.
Economic life	See useful life definition.
Expenditure	The spending of money on goods and services. Expenditure includes recurrent and capital.
Fair value	The amount for which an asset could be exchanged, or a liability settled, between knowledgeable, willing parties, in an arm's length transaction.
Greenfield asset values	Asset (re)valuation values based on the cost to initially acquire the asset.
Heritage asset	An asset with historic, artistic, scientific, technological, geographical or environmental qualities that is held and maintained principally for its contribution to knowledge and culture and this purpose is central to the objectives of the entity holding it.
Impairment Loss	The amount by which the carrying amount of an asset exceeds its recoverable amount.
Infrastructure assets	Physical assets of the entity or of another entity that contribute to meeting the public's need for access to major economic and social facilities and services e.g. roads, drainage, footpaths and cycleways. These are typically large, interconnected networks or portfolios of composite assets. The components of these assets may be separately maintained, renewed or replaced individually so that the required level and standard of service from the network of assets is continuously sustained. Generally the components and hence the assets have long lives. They are fixed in place and are often have no market value.
Level of service	The defined service quality for a particular service against which service performance may be measured. Service levels usually relate to quality, quantity, reliability, responsiveness, environmental, acceptability and cost).
Life Cycle Cost	The life cycle cost (LCC) is average cost to provide the service over the longest asset life cycle. It comprises annual maintenance and asset consumption expense, represented by depreciation expense. The Life Cycle Cost does not indicate the funds required to provide the service in a particular year.
Life Cycle Expenditure	The Life Cycle Expenditure (LCE) is the actual or planned annual maintenance and capital renewal expenditure incurred in providing the service in a particular year. Life Cycle Expenditure may be compared to Life Cycle Expenditure to give an initial indicator of life cycle sustainability.
Maintenance and renewal gap	Difference between estimated budgets and projected expenditures for maintenance and renewal of assets, totalled over a defined time (e.g. 5, 10 and 15 years).
Maintenance and renewal sustainability index	Ratio of estimated budget to projected expenditure for maintenance and renewal of assets over a defined time (e.g. 5, 10 and 15 years).
Maintenance expenditure	Recurrent expenditure, which is periodically or regularly required as part of the anticipated schedule of works required to ensure that the asset achieves its useful life and provides the required level of service. It is expenditure, which was anticipated in determining the asset's useful life.
Materiality	An item is material is its omission or misstatement could influence the economic decisions of users taken on the basis of the financial report. Materiality depends on the size and nature of the omission or misstatement judged in the surrounding circumstances.
Modern equivalent asset.	A structure similar to an existing structure and having the equivalent productive capacity, which could be built using modern materials, techniques and design. Replacement cost is the basis used to estimate the cost of constructing a modern equivalent asset.
Non-revenue generating investments	Investments for the provision of goods and services to sustain or improve services to the community that are not expected to generate any savings or revenue to the Council e.g. parks and playgrounds, footpaths, roads and bridges, libraries, etc.

Operating expenditure	Recurrent expenditure, which is continuously required excluding maintenance and depreciation e.g. power, fuel, staff, plant equipment, on-costs and overheads.
Pavement Condition Index (PCI)	A Pavement Condition Index (PCI) is a numerical score given to a road pavement to represent its condition. The index is typically based on the extent and/or severity of a range of defects including roughness, cracking, rutting and patching.
Planned Maintenance	Repair work that is identified and managed through a maintenance management system (MMS). MMS activities include inspection, assessing the condition against failure/breakdown criteria/experience, prioritising scheduling, actioning the work and reporting what was done to develop a maintenance history and improve maintenance and service delivery performance.
Rate of annual asset consumption	A measure of average annual consumption of assets (AAAC) expressed as a percentage of the depreciable amount (AAAC/DA). Depreciation may be used for AAAC.
Rate of annual asset renewal	A measure of the rate at which assets are being renewed per annum expressed as a percentage of depreciable amount (capital renewal expenditure/DA).
Rate of annual asset upgrade	A measure of the rate at which assets are being upgraded and expanded per annum expressed as a percentage of depreciable amount (capital upgrade/expansion expenditure/DA).
Reactive maintenance	Unplanned repair work that carried out in response to service requests and management/supervisory directions.
Recoverable amount	The higher of an asset's fair value, less costs to sell and its value in use.
Recurrent expenditure	Relatively small (immaterial) expenditure or that which has benefits expected to last less than 12 months. Recurrent expenditure includes operating and maintenance expenditure.
Recurrent funding	Funding to pay for recurrent expenditure.
Rehabilitation	See capital renewal expenditure definition above.
Remaining life	The time remaining until an asset ceases to provide the required service level or economic usefulness. Age plus remaining life is economic life.
Renewal	See capital renewal expenditure definition above.
Residual value	The net amount which an entity expects to obtain for an asset at the end of its useful life after deducting the expected costs of disposal.
Risk management	The application of a formal process to the range of possible values relating to key factors associated with a risk in order to determine the resultant ranges of outcomes and their probability of occurrence.
Section or segment	A self-contained part or piece of an infrastructure asset.
Service potential	The capacity to provide goods and services in accordance with the entity's objectives, whether those objectives are the generation of net cash inflows or the provision of goods and services of a particular volume and quantity to the beneficiaries thereof.
Service potential remaining	A measure of the remaining life of assets expressed as a percentage of economic life. It is also a measure of the percentage of the asset's potential to provide services that are still available for use in providing services (DRC/DA).
Strategic Management Plan	Documents Council objectives for a specified period (3-5 years), the principle activities to achieve the objectives, the means by which that will be carried out, estimated income and expenditure, measures to assess performance and how rating policy relates to the Council's objectives and activities.
Sub-component	Smaller individual parts that make up a component part.
Surface Condition Index (SCI)	A Surface Condition Index (SCI) is an overall condition value that reports an aggregation of a number of surface defects over a specified length of road pavement.
Useful life	Either: (a) the period over which an asset is expected to be available for use by an entity, or (b) the number of production or similar units expected to be obtained from the asset by the entity. It is estimated or expected time between placing the asset into service and removing it from service, or the estimated period of time over which the future economic benefits embodied in a depreciable asset, are expected to be consumed by the Council. It is the same as the economic life.