

Roading Modelling

South Wairarapa District Council

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Contents

Introduction	3
Model Methodology	3
Model sources and key assumptions	5
Capex and Opex	6
Model outputs and key observations	7

Tables

Table 1	General traffic & heavy vehicle allocations	4
Table 2	Heavy vehicle expenditure allocation	4
Table 3	Model Sources	5
Table 4	SWDC Lengths of roads	7
Table 5	SWDC General traffic (including light vehicle) costs allocated on a pro rata basis against land value	8
Table 6	SWDC Urban heavy vehicle costs	9
Table 7	Rural heavy vehicle cost allocation	9
Table 8	SWDC Cost allocations to land use categories	10

Figures

Figure 1	Net expenditure to be funded by vehicle category - South Wairarapa District Council	7
Figure 2	SWDC Heavy vehicle cost allocations urban/rural	8
Figure 3	Breakdown of SWDC rateable tonnage by industry	9



Introduction

Morrison Low Advisory was engaged by South Wairarapa District Council (Council) to undertake a road usage modelling assessment to better understand how different land use and industry groups contribute to demand on the local roading network. The assessment combined council-provided information with publicly available and industry datasets to develop estimates of vehicle movements and road use impacts across the district using a consistent and evidence-based methodology. The findings have been mapped to the Council's rating categories and are intended to inform future discussions on roading funding, rating equity and policy development. This report summarises the approach taken, the underlying assumptions and limitations, and the key results of the analysis.

Model Methodology

The model is designed to be simple, transparent and repeatable. It uses independent data where available and documents key assumptions so the allocation method can be reviewed and updated as needed. Roading expenditure is separated into general roading costs, and pavement and structural costs.

General roading costs, which benefit all road users, are allocated across rating categories using a broad rating base such as land value. Pavement and structural costs, which are primarily driven by heavy vehicle demand, are allocated based on the estimated demand from each relevant land use category.

Heavy vehicle demand is estimated using a tonnage-based approach, drawing on production and movement data to assess the relative weight moved across the network. Where appropriate, these costs are further split between urban and rural networks. Urban costs are allocated to commercial and industrial activities, while rural costs are allocated to primary production land uses based on estimated tonnes transported.

Light vehicles, including cars, vans and small trucks, have a limited impact on pavement wear. Road damage is mainly caused by axle load, being the weight applied where a tyre meets the road surface. Light vehicle loads are generally too low to cause material deterioration. This principle is reflected in the Fourth Power Rule, which informs road user charges and fuel excise duty. In the 2020/21 National Land Transport Programme funding cycle, heavy vehicles accounted for 93% of pavement wear costs while representing only 7% of vehicle kilometres travelled.

Rural heavy vehicle costs are allocated to primary production land use categories based on freight tonnage by sector. This recognises that pavement and structural road costs are mainly driven by the weight and frequency of heavy vehicle movements. The methodology assumes heavy vehicles operate at their maximum permitted load for at least part of each journey, so total sector freight tonnage is an appropriate measure of relative contribution to pavement wear and associated costs. It also assumes pavement impact is driven by weight, not the commodity transported. For example, one tonne of fruit is treated as having the same pavement impact as one tonne of logs.

For rural heavy traffic costs, the model assumes processing plants and facilities are either on or near state highways and primarily use those routes to distribute processed products or are located outside the district(s) and therefore outside the Council's rating jurisdiction. On that basis, the approach recovers pavement and structural road costs from primary producers within the district, rather than from downstream processing plants and facilities.



This provides a clear basis for allocating roading costs in line with the demand each category places on the network and the pavement wear it is expected to cause.

We used NZTA work order codes to understand the different costs associated with maintaining roads within the districts. Those work order codes are outlined in Tables 1 and 2 below, which also show how each work code has been allocated between heavy vehicle and light vehicle/general traffic.

Table 1 General traffic & heavy vehicle allocations

General traffic expenditure	Heavy vehicle expenditure
Traffic services	Sealed and Unsealed Pavements ¹
Level crossings	Bridge & Structural Expenditure ²
Network asset management	Drainage ³
District-wide operations	
Cycle and foot paths	
Minor improvements	
Unsubsidised works	

Table 2 Heavy vehicle expenditure allocation

Heavy vehicle expenditure	Allocation to heavy vehicle versus light
Sealed and Unsealed Pavements	Pavement costs are allocated using approximately 93% heavy vehicle and 7% light vehicle split identified in Te Manatū Waka's 2022 report, Background to the road user charges (RUC) system. This reflects the expected relative impact of each vehicle type on the roading network.
Bridge and Structural Expenditure	Bridge and structures are allocated using a 40% heavy vehicle and 60% light vehicle split identified in Te Manatū Waka's 2022 report, Background to the road user charges (RUC) system. This reflects the expected relative impact of each vehicle type on the roading network.
Drainage	Drainage costs are allocated based on vehicle kilometres travelled, using district-specific heavy and light vehicle splits. South Wairarapa District Council: Approximately 7% heavy vehicles and 93% light vehicles.

¹ Pavement costs are allocated using the 93% heavy vehicle and 7% light vehicle split identified in Te Manatū Waka's 2022 report, Background to the road user charges (RUC) system.

² Bridge and structures are allocated using a 40% heavy vehicle and 60% light vehicle split identified in Te Manatū Waka's 2022 report, Background to the road user charges (RUC) system.

³ Drainage costs are allocated using vehicle kilometres travelled this split is district specific.



Model sources and key assumptions

A list of our model sources, including their most recent date of publication, is set out in Table 3 below. It also includes notes, where appropriate, explaining the risks associated with data sets which may otherwise appear to be out of date.

Table 3 Model Sources

Source	Use	Notes
Wood availability forecast - New Zealand 2021-2060	Allocation of tonnes expected from forestry based on age of trees	
National Exotic Forest Description 1 April 2025	Allocation of tonnes expected from forestry based on age of trees	
New Zealand Dairy Statistics 2024-25, DairyNZ	Allocation of tonnes expected from dairy sources based on milk solids for the Wairarapa	
National Animal Identification and Tracing (NAIT) livestock movements database (2016)	Allocation of the stock movements into and out of the district for dairy and general farming cattle (beef, deer, unspecified)	Although this dataset is from 2016, it remains the most suitable source available for this assessment. It provides a direct indication of livestock movements across the district and, based on the analysis undertaken, land use patterns have not changed materially since 2016.
Stats NZ - Livestock slaughtering by regional council by kill by animal type - Taranaki, Wanganui, Manawatū, Wellington (annual-September)	Supporting slaughter and livestock data used to estimate animal movements not captured in NAIT, including sheep, goats and lambs.	
Stats NZ - Livestock numbers by regional Council, 2025 data, retrieved from NZ.Stat & Goats on New Zealand farms from Figure NZ 2025	Supporting slaughter and livestock data used to estimate animal movements not captured in NAIT, including sheep, goats and lambs.	
Horticulture NZ, Fresh Facts 2025	Used to allocate hectares of horticultural planted crops	
New Zealand Wine (A Snapshot 2026)	Used to allocate hectares of planted wine crop	
2013 Agricultural Census	Used to estimate tonnes produced per hectare by crop type.	
District Councils	Land use categorisation data including land value, number of titles and land area from councils	



Source	Use	Notes
Ministry for the Environment Land Use and Carbon Analysis System (LUCAS) Land use map 2020	Allocation of proportionate land area between Greater Wellington region and Wairarapa councils for allocating data only reported at regional level	This data set is from 2020, however proportionate land use between the wider Wellington region and the Wairarapa councils is not considered likely to have changed materially in the time that has since elapsed. Council land use categorisation is used preferably to this data wherever possible.
New Zealand Transport Agency	Vehicle Kilometres Travelled data as at 25 September 2025	
Te Manatū Waka (2022) Background to the road user charges (RUC) system	This report sets out the allocation of roading wear by heavy and light vehicles	

Capex and Opex

Capital expenditure has been included within total expenditure because the current data does not appear to include significant one-off capital projects and is considered a reasonable proxy for the long-term average cost of service delivery.

Although operating expenditure is usually funded from annual rates, and capital expenditure is typically funded through borrowing, reserves, grants, subsidies or current revenue, these costs are generally recovered over time through rates and other revenue that fund depreciation and debt servicing.

Using actual capital expenditure therefore provides a practical approximation of long-run costs where investment patterns are relatively stable. Alternative approaches, such as using depreciation or financing costs instead of capital expenditure, could also be applied. However, given the absence of material fluctuations in capital investment, these approaches are not expected to materially affect the modelling results.



Model outputs and key observations

The 2026/27 Annual Plan roading cost allocation model indicates that light vehicles and general traffic account for 58% (\$3.04 million) of South Wairarapa District's rates-funded roading costs, while heavy vehicles account for 42% (\$2.20 million). The heavy vehicle share reflects freight-generating activities such as forestry and dairy, which contribute significantly to road wear across the district's predominantly rural network, where 87.7% of roads serve rural areas.

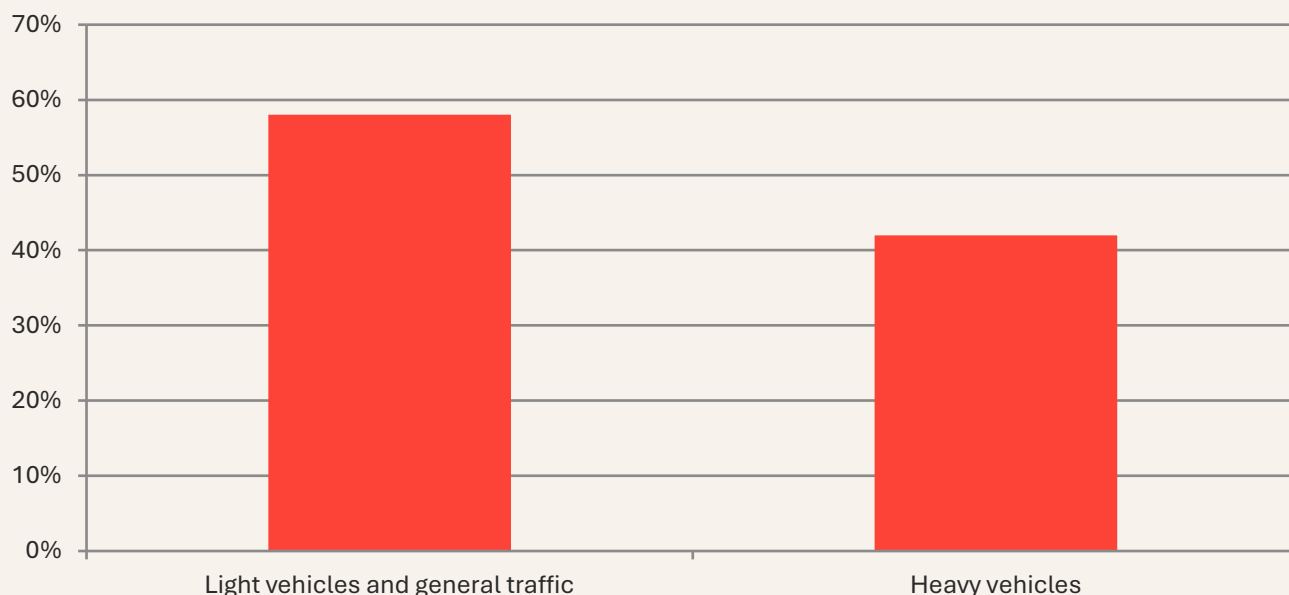


Figure 1 Net expenditure to be funded by vehicle category - South Wairarapa District Council

South Wairarapa District Council maintains a total road network of 1,133 km, comprising 742 km of sealed roads and 391 km of unsealed roads, with the majority (994 km or 87.7%) located in rural areas and 139 km (12.3%) in urban areas.

Table 4 SWDC Lengths of roads

Lengths of roads (km)	Urban	Rural	Total
Sealed	138	604	742
Unsealed	1	390	391
Total	139	994	1133



The model allocates \$3.04 million of 2026/27 general traffic costs across land use categories based on proportional land value. Residential (34.1%) and Farming general (28.5%) make up nearly two-thirds of the allocation, followed by Lifestyle (15.8%) and Dairy (11.4%).

Table 5 SWDC General traffic (including light vehicle) costs allocated on a pro rata basis against land value

Sector	Proportional land value	Total general traffic cost 2026/27
Commercial	2.05%	\$62,369
Horticultural	3.48%	\$105,849
Farming general	28.51%	\$866,067
Forestry	1.64%	\$49,869
Industrial	1.14%	\$34,530
Lifestyle	15.77%	\$478,880
Dairy	11.39%	\$345,830
Other	1.88%	\$57,126
Residential	34.14%	\$1,036,798
Total	100.00%	\$3,037,318

Under the proposed cost allocation model, heavy vehicle traffic costs for South Wairarapa District Council total \$2.20 million, with rural roads accounting for \$1.89 million (86%) and urban roads \$0.30 million (14%), reflecting the predominantly rural nature of heavy vehicle movements across the district.

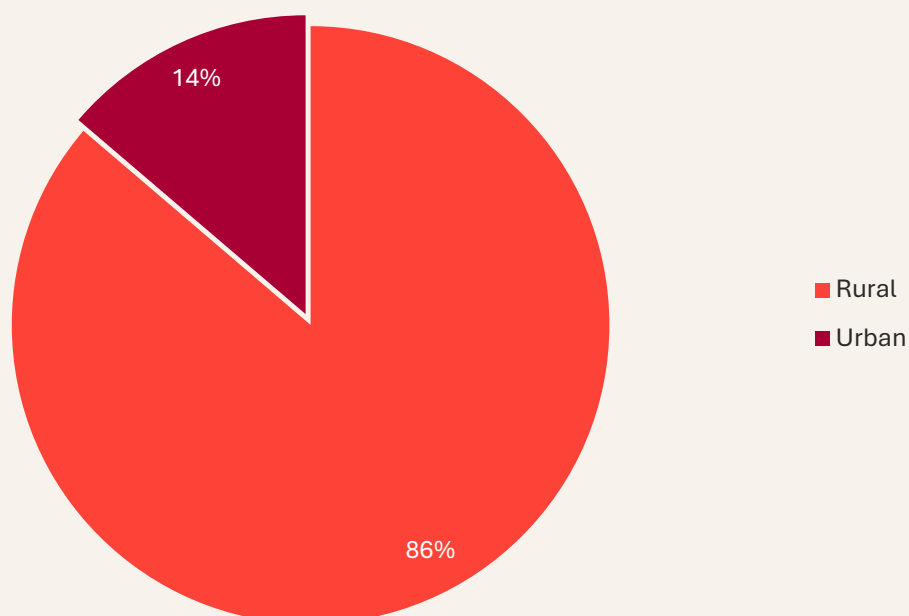


Figure 2 SWDC Heavy vehicle cost allocations urban/rural



The \$0.30 million of urban heavy vehicle costs shown in the table below are allocated to the commercial and industrial sectors based on each sector's share of properties. Commercial properties, with 195 properties, are allocated \$0.19 million, while industrial properties, with 119 properties, are allocated \$0.11 million.

Table 6 SWDC Urban heavy vehicle costs

Sector	Proportion of properties	Allocated cost, heavy vehicle urban
Commercial	195	\$187,509
Industrial	119	\$114,429
Total	314	\$301,938

Rural heavy vehicle costs total \$1.89 million, with most allocated to dairy (\$1.22 million) and forestry (\$0.51 million). Together, these sectors account for 91% of the allocation, reflecting their significant contribution to freight movements on the rural road network.

Table 7 Rural heavy vehicle cost allocation

Land use category	Heavy vehicle rural costs
Horticultural	\$37,534
Farming general	\$130,089
Forestry	\$511,910
Dairy	\$1,215,277
Total	\$1,894,810

South Wairarapa District Council's estimated heavy vehicle weights are allocated using annual freight tonnages, with dairy contributing the largest share at 64%, followed by forestry at 27%, general farming at 7%, and horticulture at 2%.

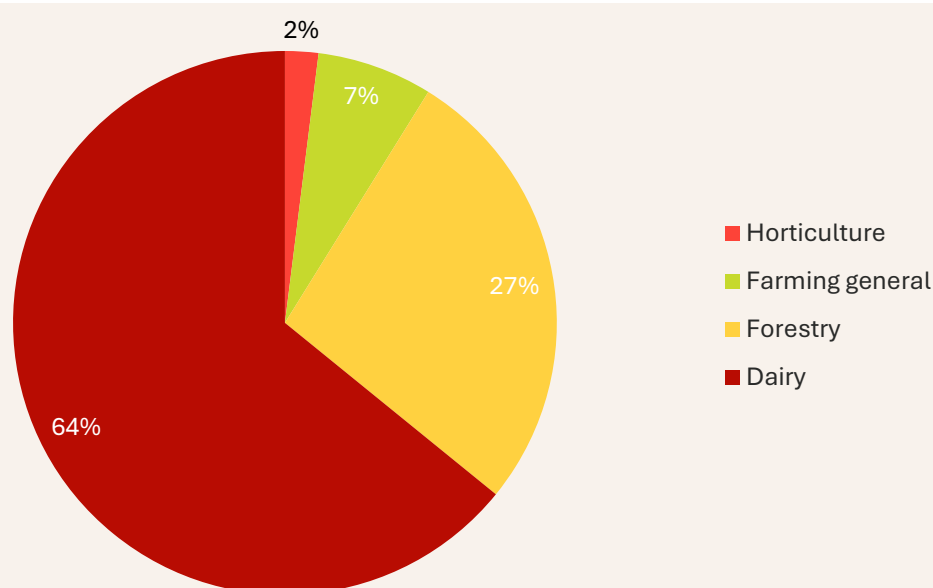


Figure 3 Breakdown of SWDC rateable tonnage by industry



Under the proposed model, South Wairarapa District Council's \$5.23 million of rates-funded roading costs are allocated across land-use categories. Dairy receives the largest share at \$1.56 million (30%), followed by residential at \$1.04 million (20%), farming general at \$1.00 million (19%), and forestry at \$0.56 million (11%). These allocations reflect the combined effects of heavy vehicle impacts, land value, property numbers and rural freight tonnages.

Table 8 SWDC Cost allocations to land use categories

Land use categories	Land value (000)	General costs based on land value	Heavy vehicle costs - rural allocated on tonnages	Heavy vehicle costs - Urban allocated on # of properties	Total costs allocated	Proposed share of roading costs
Commercial	\$101,294	\$62,369	-	\$187,509	\$249,878	5%
Horticultural	\$171,910	\$105,849	\$37,534	-	\$143,383	3%
Farming general	\$1,406,590	\$866,067	\$130,089	-	\$996,156	19%
Forestry	\$80,993	\$49,869	\$511,910	-	\$561,779	11%
Industrial	\$56,080	\$34,530	-	\$114,429	\$148,959	3%
Lifestyle	\$777,754	\$478,880	-		\$478,880	9%
Dairy	\$561,667	\$345,830	\$1,215,277	-	\$1,561,107	30%
Other	\$92,780	\$57,126	-	-	\$57,126	1%
Residential	\$1,683,876	\$1,036,798	-	-	\$1,036,798	20%
Total	\$4,932,943	\$3,037,318	\$1,894,810	\$301,938	\$5,234,066	100%



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