Report on Findings

Assessment of Costs of Carrying Out Works in the Road Corridor for Electricity Distribution Businesses

Prepared for Electricity Networks Aotearoa
Prepared by Beca Limited

4 December 2024

Contents

Glossary of Terms/ Definitions

ENA: Electricity Networks Aotearoa

EDB: Electricity Distribution Business

TTM: Temporary traffic management

NZTA: New Zealand Transport Agency/ Waka Kotahi

CoPTTM: Code of Practice for Temporary Traffic Management

NZGTTM: New Zealand Guide to Temporary Traffic Management

NTI: Non-tradeable index

ODV: Handbook for optimised deprival valuation of system fixed assets of Electricity Lines Businesses, published by Commerce Commission on 30 August 2024.

OHL: Overhead line

CoPTTM Levels:

- LV - low volume roads (Annual average daily traffic (AADT) less than 500 vehicles per day (VPD))
- Level 1 - low to moderate volume roads (AADT 500 to 10,000 VPD)
- Level 2 - high volume roads (AADT greater than 10,000 VPD)
- Level 3 - high volume, high speed multi-lane roads, expressways and motorways (AADT greater than 10,000 VPD and speed greater than 75 km/h)

1 Executive Summary

Beca was engaged by Electricity Networks Aotearoa (ENA) to conduct a commercial analysis of cost for Temporary Traffic Management (TTM) incurred by Electricity Distribution Businesses (EDBs) when working in road corridors throughout New Zealand. The study recognises the escalating costs and complexities associated with TTM.

ENA's members were asked to provide project costs and information for the period 2019 to 2024. The study assesses these project data points details of which were categorised by year, region, road classification, and CoPTTM levels.

As part of the analysis, costs were adjusted to June 2024, using non-tradeable indexation (NTI) to understand how the costs have evolved over the period relative to a single baseline. The findings indicate a rise in TTM costs over the past five years across each of the key metrics of cost of TTM per day and cost of TTM per km against which they were assessed.

1. Cost of TTM per day

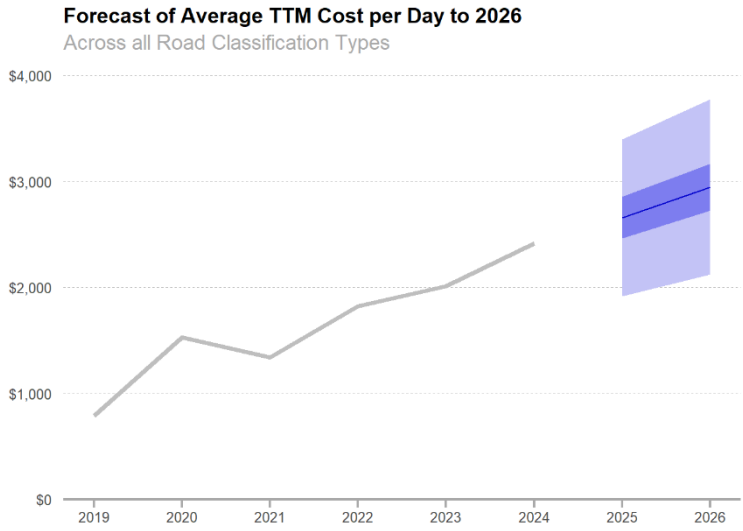

Figure 1 - Forecast Average TTM cost per day

The data indicates that the average cost per day for TTM has increased significantly between 2019 and 2024, increasing at a faster rate than the NTI rate of inflation during this period.

The data highlights an increase of circa 208% (equivalent to circa $1,631 per day) from 2019 to 2024.

Figure 1 shows that using a forecast trend approach for 2025/ 2026, the expected mid-point average cost could rise to circa $2,945/ day in 2026, an increase of around 22% from 2024 costs.

2. TTM cost vs project duration

There is a strong relationship between project duration and TTM cost. For each one-unit increase of log10 project duration (10 times the previous project duration), there is an average increase of between **153% to 399%** in TTM cost.

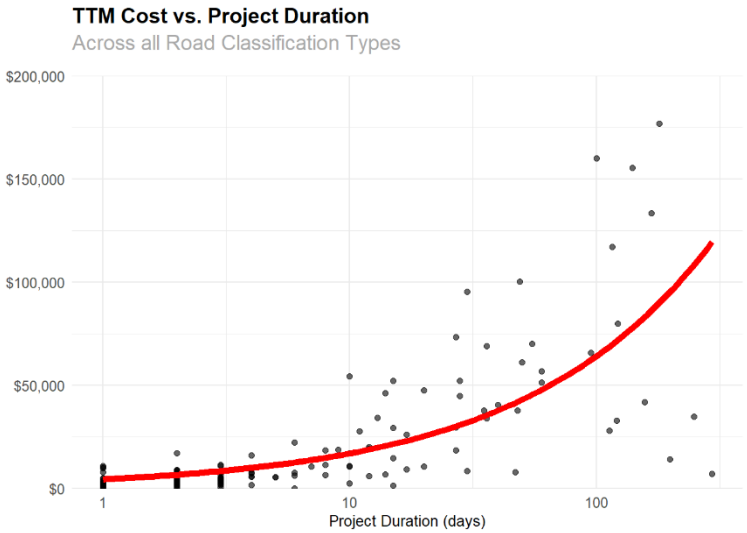

Figure 2 - Scatter plot of TTM cost vs. project duration with trend line. Project duration is in log10 scale

3. Cost of TTM per km.

The analysis indicates that the average cost of TTM, per kilometre, has significantly increased compared to the previously published Commerce Commission data, even after those published costs were adjusted for inflation. This increase is observed across each of the road categories. The costs included in the ODV Handbook, published in 2004 are represented below.

Traffic Management multipliers	2004 ODV Values	NTI Adjusted ODV Values	NTI Adjusted Values (2019-2024) Mean	% change from NTI adjusted figures
Overhead Lines				
(a) Level 1 TTM requirements (low to moderate volume roads)	$ 800 per km	$1,600 per km	$30,296 per km	⇧ 1794%
(b) Level 2 TTM requirements (high volume roads)	$ 1,500 per km	$3,000 per km	$18,572 per km	⇧ 519%
Underground Cables				
(c) Level 1 TTM requirements (low to moderate volume roads)	$ 6,000 per km	$12,000 per km	$37,508 per km	⇧ 212%
(d) Level 2 TTM requirements (high volume roads)	$ 15,000 per km	$30,000 per km	$49,827 per km	⇧ 66%
(e) Level 2 TTM requirements with excavation in the carriageway	$ 40,000 per km	$80,000 per km	$177,416 per km	⇧ 122%

Table 1 – Analysis of current TTM Costs measured against 2004 CoPTTM ODV Handbook – published 30 August 2004

The study suggests that without intervention, these costs may continue to rise, potentially affecting project budgets in future years. ENA members expressed their concerns about TTM requirements, especially regarding the recent change to TTM policy that requires contractors to adopt a risk-based approach. While short-term costs may rise due to these changes, it is felt that a more risk based approach should increase long-term efficiencies and market adaptations and could yield cost savings. Particularly if EDB's develop appropriate risk assessments and utilise in-house TTM plant and equipment when undertaking planned maintenance and renewals works.

The data received provided a solid foundation for this study; however additional data should always be encouraged to further enhance the trends identified. The study should continue so that data from earlier and current years can be obtained to provide appropriate benchmarking, particularly over the next 18 months as the effects of the TTM policy change begin to take effect.

2 Introduction

Beca was engaged, by Electricity Networks Aotearoa (ENA), to undertake a cost analysis exercise in relation to the cost of working in the road corridor for the Electricity Distribution Businesses (EDBs) throughout New Zealand. Concerns have been raised that the cost and complexities of working in the road corridor and specifically in relation to TTM, appear to have been rising at an alarming rate, and previous ODV book value costs did not adequately meet actual costs being incurred.

This report covers the following:

- The approach to the exercise,
- The methodology adopted in gathering the data and how the data has been collected,
- The volume and nature of the data collected,
- The assumptions made in relation to information gaps,
- Modifications made to the data received,
- Findings based on the modified data, and
- Presentation of the data against the ODV pricing information.

ENA's members were invited to provide project costs and applicable information relevant to the exercise. The requested information for study analysis included:

- Brief description of project,
- Asset type (OHL/ cable),
- Length and duration of road corridor works,
- Road type/ classification,
- Overall project cost,
- Breakdown of TTM cost,
- Breakdown of council costs (consents, permits etc.),
- Civil contract costs.

3 Data Collection

3.1 Data Received

Through this engagement, project and cost information was received from 17 member organisations.

Several assumptions were required to be made to the data where results were deemed to be irregular and the findings skewed. Members were contacted about this and adjustments made as appropriate. These adjustments typically included the following:

- Removal of anomalous results, such as those identified as having abnormally high or low costs,
- Alterations to TTM lengths where necessary. Several of the data points indicated TTM lengths of less than 0.1km. In those situations, TTM lengths were adjusted to 0.1km, using the CoPTTM as a reference. This guide suggests that an isolated work site within the road corridor, such as an overhead line pole, will typically have 50m of TTM in each direction,
- Changing road classification typology where these were considered to have been entered incorrectly (e.g. “state highway” changed to Level 3 in lieu of Level 2).

By resolving the data in this manner, the precision of analysis was improved to provide robust outcomes. A record of the modifications that have been made to the data received is available if required.

3.2 Distribution of Data

Following the data adjustments, the sample size amounted to 124 individual projects, categorised as follows:

Year		Region		Road Classification		CoPTTM Level	
Description	**No. Records**	**Description**	**No. Records**	**Description**	**No. Records**	**Description**	**No. Records**
2019	5	Bay of Plenty	8	Rural Unsealed	8	Level LV	33
2020	12	Canterbury	20	Rural Sealed	38	Level 1	62
2021	12	Hawkes Bay	10	Urban Minor	48	Level 2	10
2022	12	Nelson/ Marlborough	17	Urban Major	17	Level 3	19
2023	28	Northland	22	State Highway	13		
2024	55	Southland	4				
		Waikato	19				
		Wellington	18				
		West Coast	6				
	124		**124**		**124**		**124**

Table 2 – Summary of project record data received

4 Findings and Analysis

Data was analysed from the sample size and expressed against the key metrics identified in conjunction with ENA. Furthermore, in the analysis, NTI allowances were incorporated into the data to assess how costs have evolved relative to an indexation baseline of June 2024. By adjusting the data in this manner, the ability to identify true cost trends over time is improved, which is important for this type of study. The findings are summarised below.

4.1 Time Series Analysis

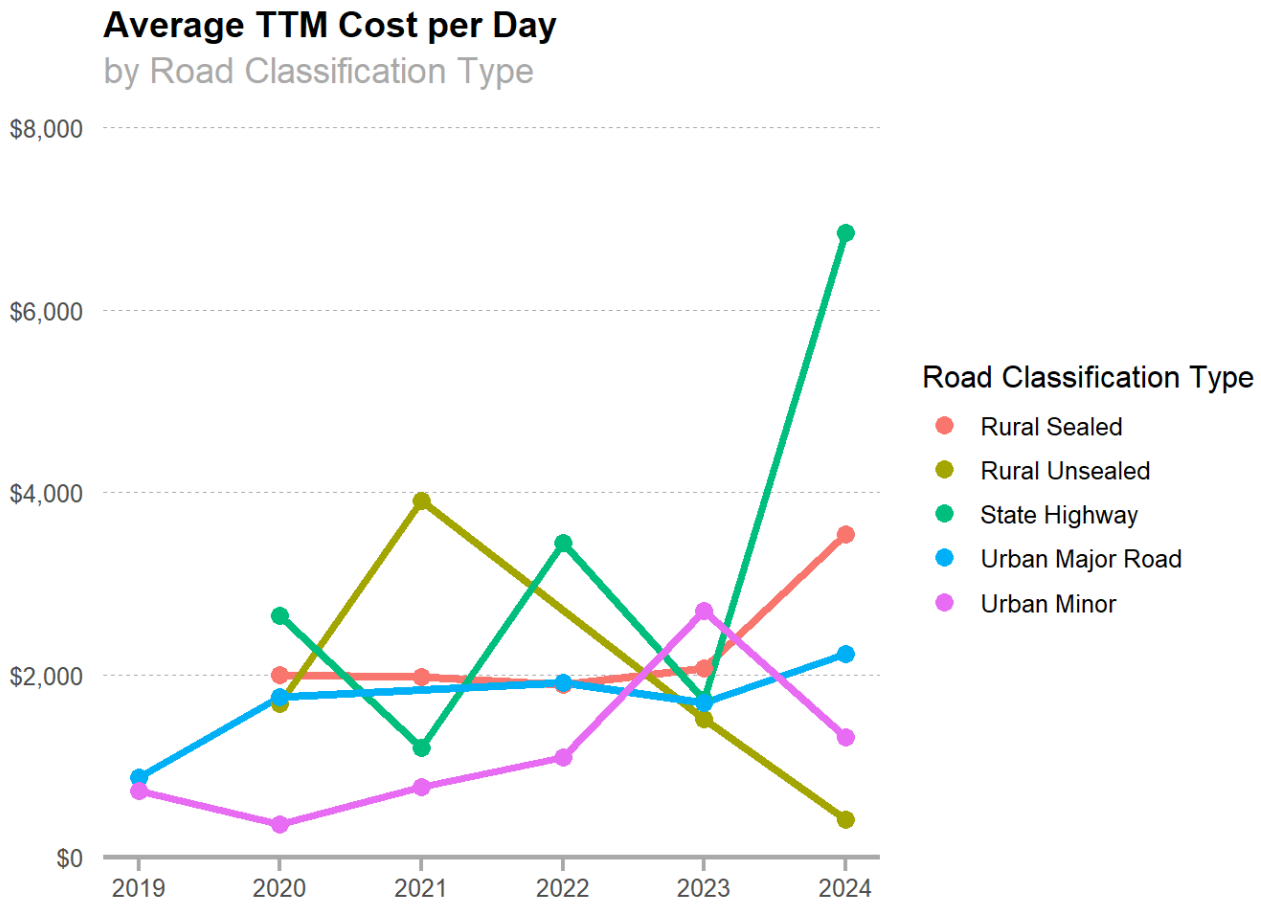

Figure 3 – Time series of average TTM cost per day by road classification type

There is a positive trend for the average TTM cost per day for most road classification types. However, rural unsealed roads exhibit a negative trend between 2021 and 2024. The average cost changes, expressed in dollar amounts and percentages, can be seen below:

Road Classification	Change in TTM cost per day from 2019/2020 to 2024	Percentage Change in TTM cost per day from 2019/2020 to 2024
Rural Unsealed Road	⇩ $1,274	⇩ 76%
Rural Sealed Road	⇧ $1,550	⇧ 78%
Urban Minor Road	⇧ $587	⇧ 81%
Urban Major Road	⇧ $1,351	⇧ 155%
State Highway	⇧ $4,202	⇧ 159%

Table 3 - Change in average TTM cost per day by road type

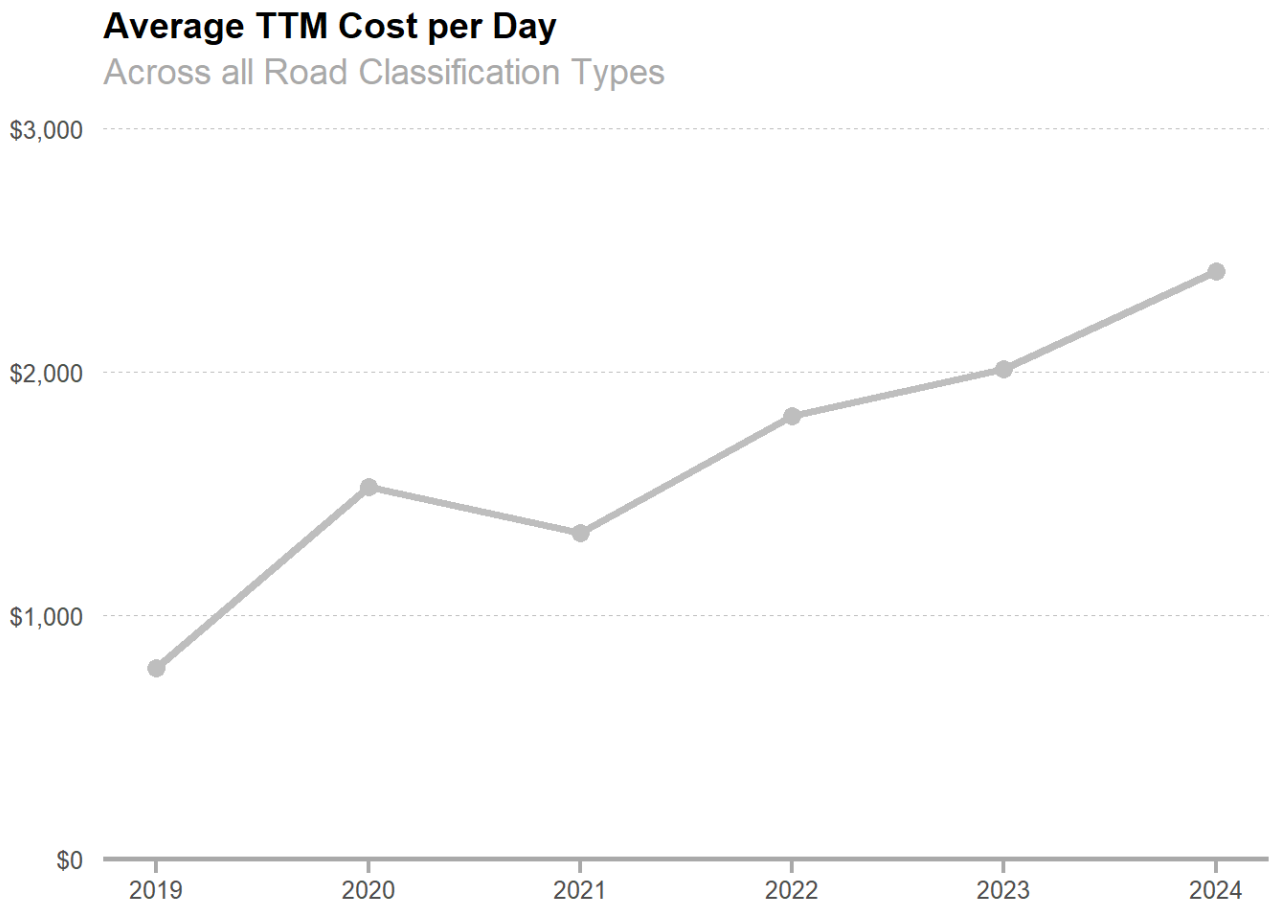

Figure 4 – Time series of average TTM cost per day across all road classifications types

There is a clear positive trend for average TTM costs per day (averaged across all road classifications), **indicating an increase of circa 208% (equivalent to circa $1,631 per day) across the period 2019 to 2024**. This trend remains evident even after adjusting for inflation.

The average TTM costs per day for 2020 appear to be inflated, possibly due to the impact of COVID-19 lockdowns throughout New Zealand. These lockdowns imposed significant restrictions on transport activities, leading to increased costs across many projects and sectors as operations needed to comply with health and safety protocols, adapt to new working conditions, and manage disruptions in supply chains.

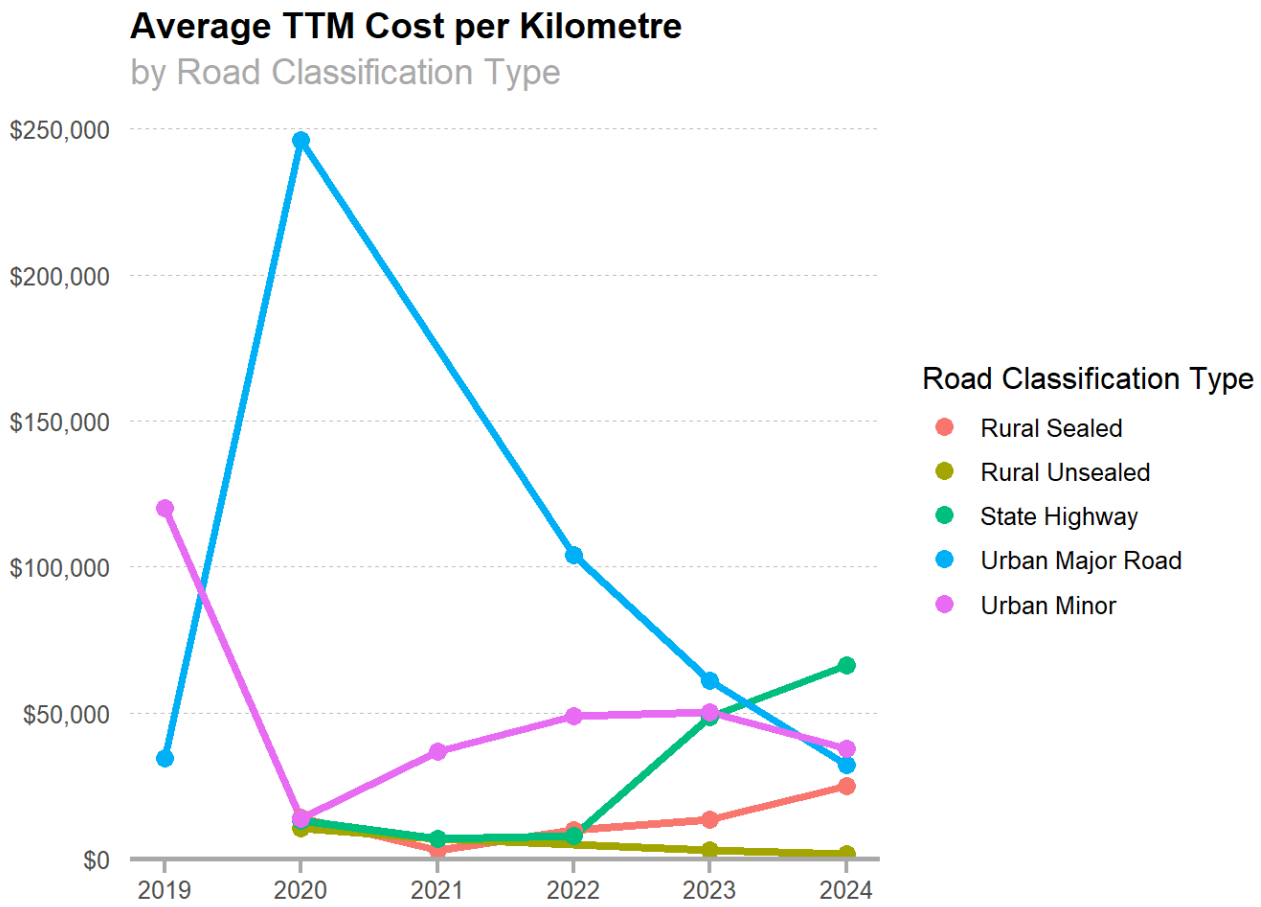

Figure 5 – Time series of average TTM cost per kilometre by road classification type

TTM costs per kilometre for urban major roads appear much higher than for other road classification types. There is a mixture of positive and negative trends across all road classification types. The most alarming trend is for works within state highway road corridors. As indicated below.

Road Classification	Change in TTM cost per km from 2019/2020 to 2024	Percentage Change in TTM cost per km from 2019/2020 to 2024
Rural Unsealed Road	⇩ $8,735	⇩ 84%
Rural Sealed Road	⇧ $10,958	⇧ 78%
Urban Minor Road	⇩ $82,243	⇩ 69%
Urban Major Road	⇩ $2,264	⇩ 7%
State Highway	⇧ $53,207	⇧ 403%

Table 4 - Change in average TTM cost per kilometre by road classification type

Again, the period 2020 for State Highways could be impacted by COVID-19 restrictions.

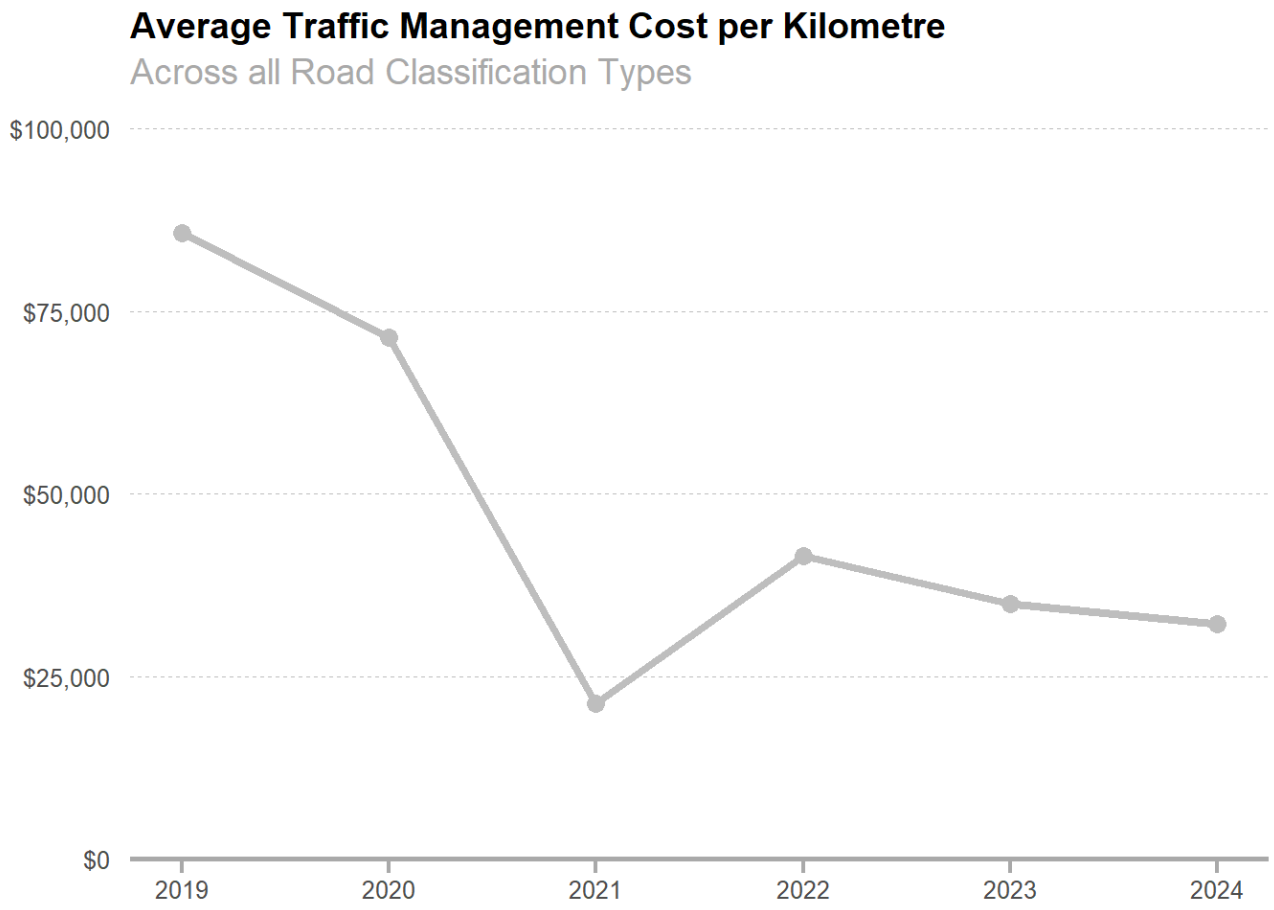

Figure 6 – Time series of average TTM cost per kilometre

There appears to be a clear negative trend for average TTM costs per kilometre across all road classification types. **These average costs fluctuate throughout the period with an overall decrease of circa -63% (equivalent to circa -$53,631 per kilometre) across 2019 to 2024.** This is expected and aligns with the allocation of road types for each year within the dataset.

It is noted that only five data points from 2019 were included within the study and therefore their weighting carried a greater level of significance. When the 2019 figures were removed from the analysis, and accounting for the impact that COVID-19 had on the 2020 costs, the trend across 2021 to 2024 is more uniform and therefore more in line with other observations.

4.2 Scatter Plots

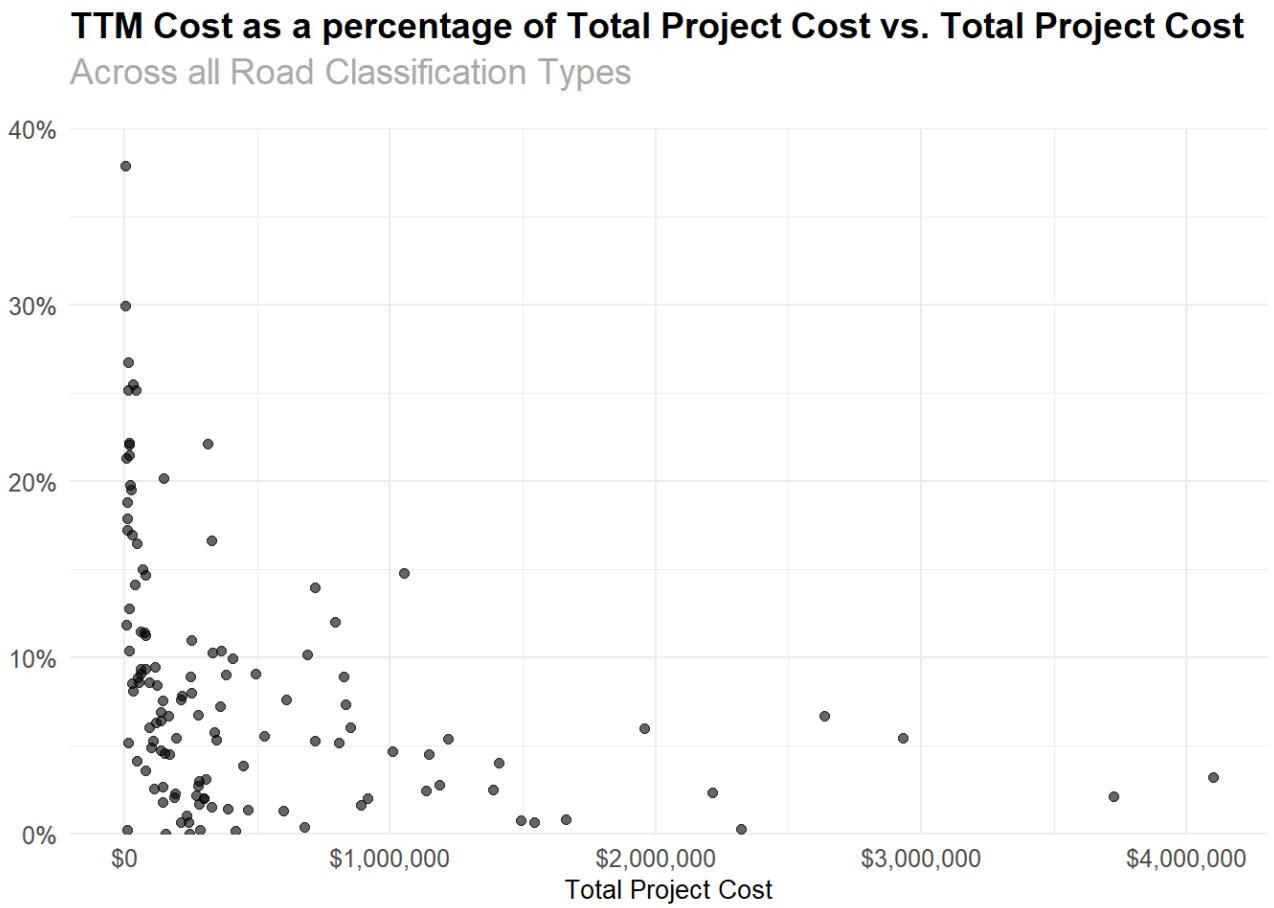

Figure 7 - Scatter plot of TTM cost, as a percentage of total project cost vs. total project cost

Outcome – We find that the percentage of TTM cost relative to total project cost decreases as the total project cost increases. This is expected as a proportion of the TTM cost is fixed and therefore spread across a larger overall cost, such as TTM establishment/ removal costs and administrative costs.

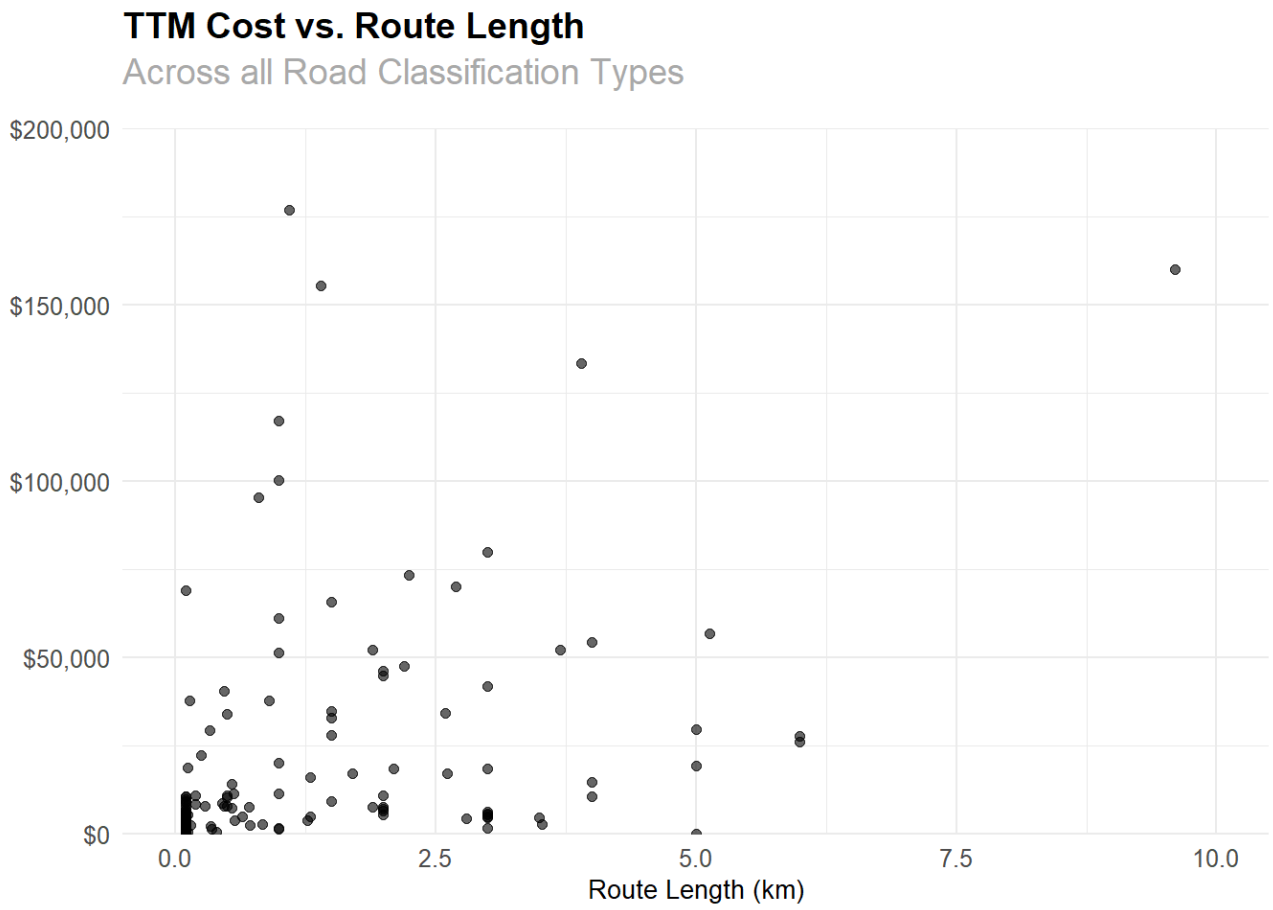

Figure 8 - Scatter plot of TTM cost vs. route length

Outcome – There is a clear relationship between TTM cost and route length. This is also expected as TTM costs are typically based on the overall length of the works.

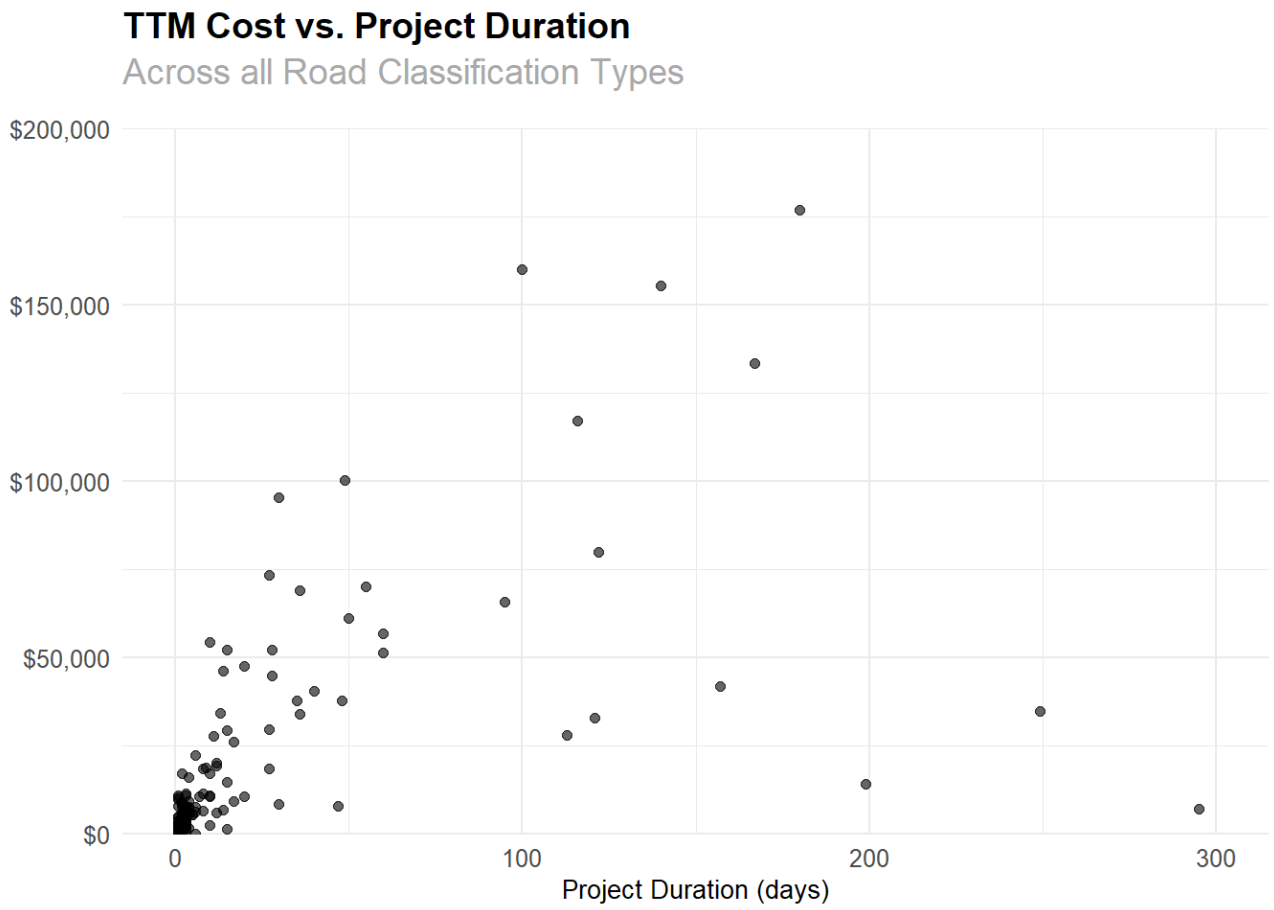

Figure 9 - Scatter plot of TTM cost vs. project duration

Outcome – Increasing project duration appears to increase TTM costs. This is also an expected outcome, as the duration for which TTM is required is a clear factor in its overall cost.

4.3 Effects of Project Duration on TTM Cost

The study has also sought to understand the causal effects of the data variables on the TTM cost outcome.

A simple quasi-Poisson model has been adopted to demonstrate the relationship between project duration (in log10 scale) and TTM costs with adjustments made for data variables such as road classification, region, work scope, NZTA CoPTTM Levels and route length.

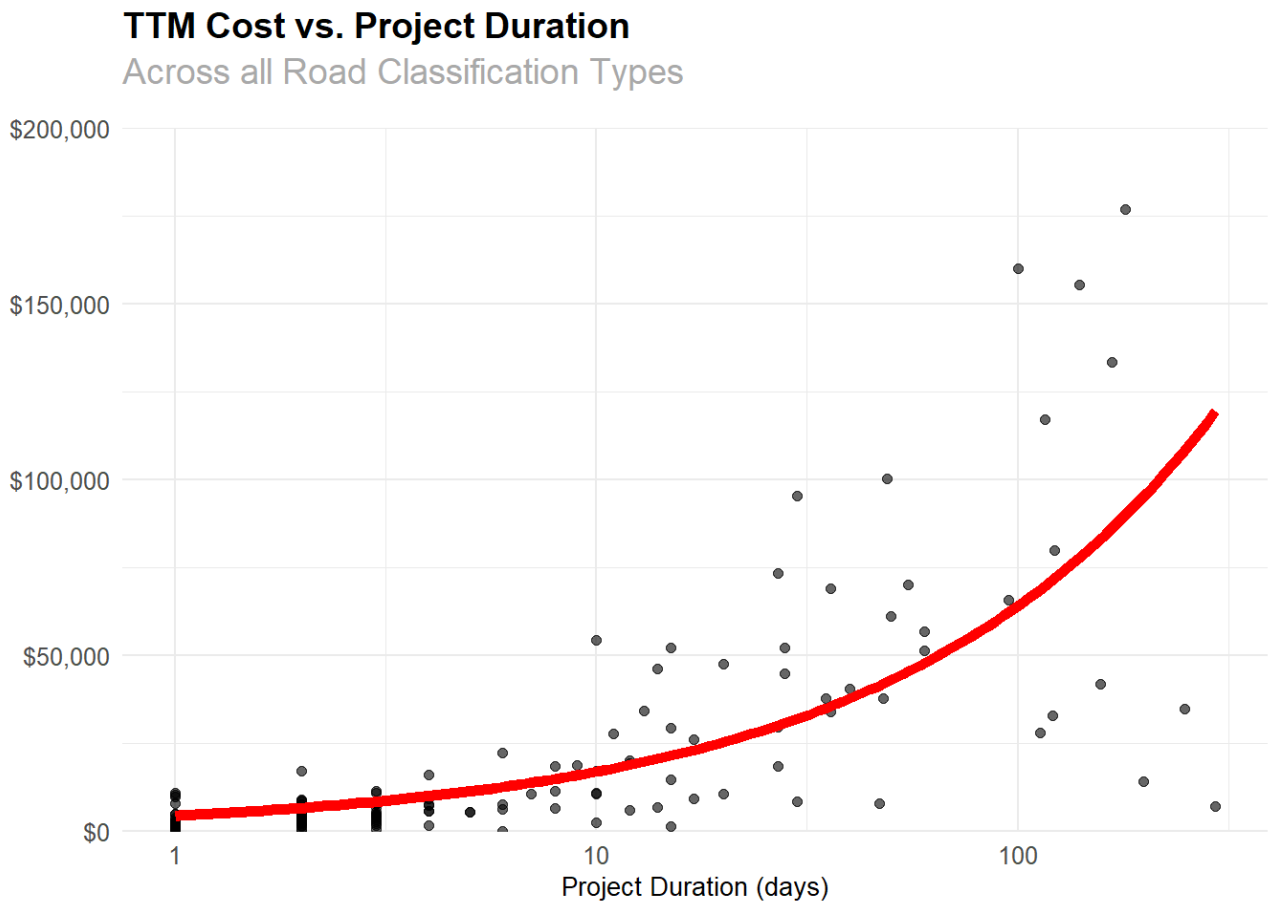

Figure 10 - Scatter plot of TTM cost vs. project duration with trend line. Project duration is in log10 scale.

Outcome – The model appears appropriately fitted as there is a strong relationship between project duration and TTM cost. For each one-unit increase of log10 project duration (10 times the previous project duration), there is an average increase of between **153% to 399%** in TTM cost.

4.4 Comparison Against ODV Traffic Management Multipliers

The figures that have traditionally been adopted by the Commerce Commission for calculation of the TTM proportion of repairs and renewals are based upon the following ODV data. It is against this ODV data that the study has also baselined the cost data to establish current trends, with an allowance included for NTI.

Reference is made to an extract from the *Handbook for Optimised Deprival Valuation of System Fixed Assets of Electricity Lines Businesses, dated 30 August 2004.*

Traffic Management

A.19 The standard replacement costs for overhead lines and cables include the cost of temporary traffic management as normally required for roads with low traffic volumes. However, where extensive traffic management provisions (e.g. the provision of dedicated staff to direct/control traffic) are required by road control authorities, a traffic management allowance may be added to the standard replacement cost, after any other multipliers have been applied, for every kilometre of cable or line route length. The allowances are:

Overhead Lines

(a)	Level 1 temporary traffic management requirements[4]	$800 per km
(b)	Level 2 temporary traffic management requirements	$1,500 per km

Underground Cables

(c)	Level 1 temporary traffic management requirements	$6,000 per km
(d)	Level 2 temporary traffic management requirements	$15,000 per km
(e)	Level 2 temporary traffic management requirements with excavation in the carriageway	$40,000 per km

For any line or cable route, the traffic management allowance shall be included in the replacement cost of the primary asset only. It shall not be added to the replacement cost of underbuilt overhead lines or to the incremental costs of additional cables installed in a cable trench.

Figure 11 – Extract from the ODV Handbook (published by Commerce Commission, 2004)

Using the datasets from this exercise, the cost comparison illustrates the extent of cost increases relative to these metrics since the original figures were published.

Traffic Management multipliers	2004	NTI Adjusted ODV Values	NTI Adjusted Values (2019-2024) Mean	% change from NTI adjusted figures
Overhead Lines				
(f) Level 1 TTM requirements (average)	$ 800 per km	$1,600 per km	$30,296 per km	⇧ 1794%
(g) Level 2 TTM requirements	$ 1,500 per km	$3,000 per km	$18,572 per km	⇧ 519%
Underground Cables				
(h) Level 1 TTM requirements	$ 6,000 per km	$12,000 per km	$37,508 per km	⇧ 212%
(i) Level 2 TTM requirements	$ 15,000 per km	$30,000 per km	$49,827 per km	⇧ 66%
(j) Level 2 TTM requirements with excavation in the carriageway	$ 40,000 per km	$80,000 per km	$177,416 per km	⇧ 122%

Table 5 - Summary of TTM Costs measured against ODV Handbook published by Commerce Commission, 2004)

The above table is essentially a single point estimate for TTM costs across different road types. It does not take into account the value of the works being undertaken nor the location of the works.

It is also noted that since this ODV data was published in 2004, the classification of road types has been expanded. As part of this data collection, an attempt has been made to allocate current classifications back to the original definition for the purposes of assessing the change in the table above. This has been achieved by assuming that the previously stated Level 1 road classification covers current NZTA CoPTTM Level LV and Level 1 road types (rural roads), and Level 2 equates to Level 2 and Level 3 road types (urban roads and state highways).

4.5 Forecasts

Utilising the findings from the study, projected TTM cost trends have been interpreted in the model through to 2026.

These forecasts suggest that, without intervention, the average cost per day for TTM is expected to rise from circa $785 in 2019, to circa $2,947 in 2026 - an increase of around 275% over the period. The forecasted increase in cost per day between 2024 and 2026 is circa $532, indicating an increase of around 22% in this period.

Project budgets will undoubtedly be affected by the forecasted increase in TTM cost per day.

This is illustrated below.

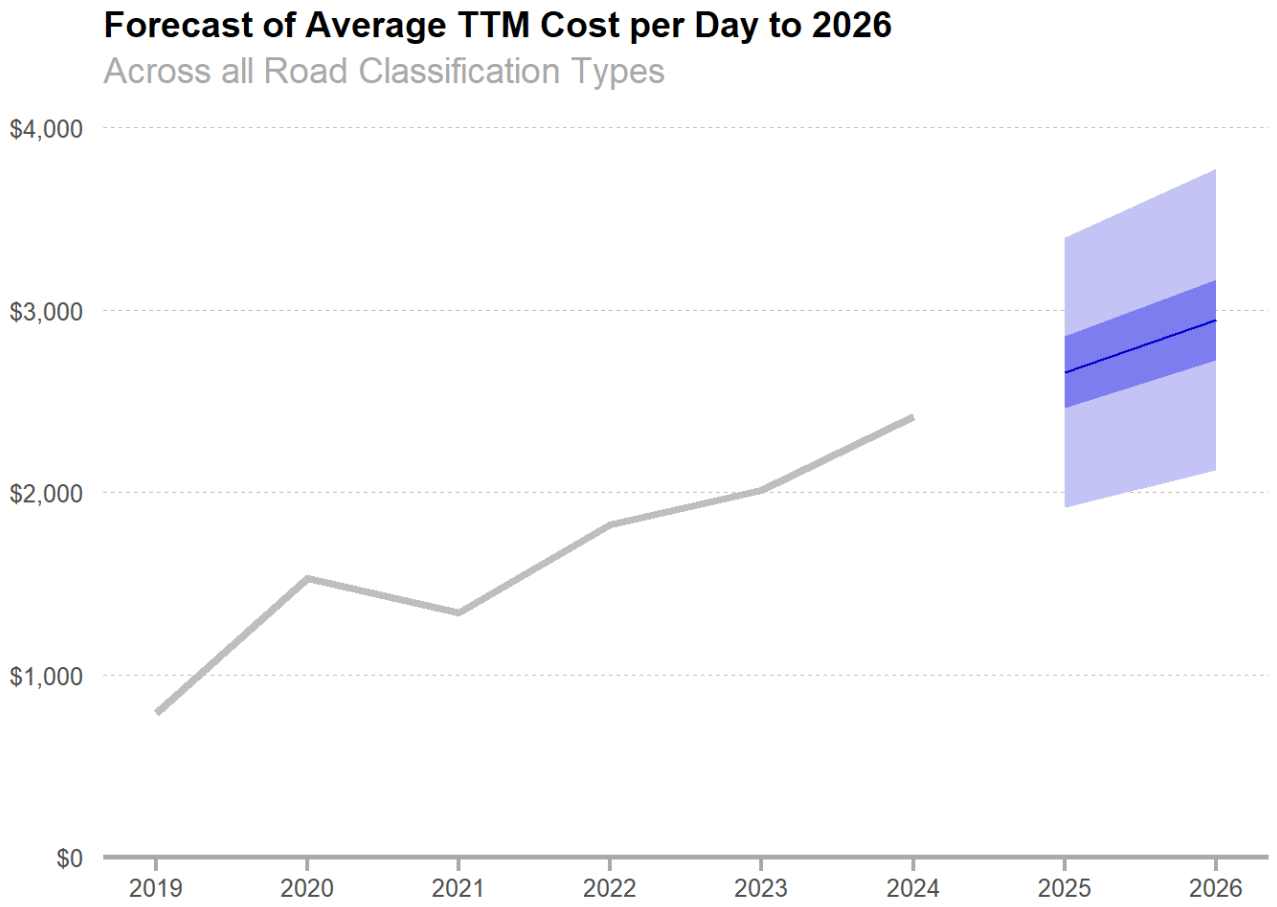

Figure 12 - Time series forecast of average TTM costs per day for 2025-2026, showing the mean, 50% prediction intervals (dark blue), and 95% prediction intervals (light blue).

4.5.1 Limitations on forecasting

During the study, forecasting the costs further into the future were considered, however this was found to result in large margins of error. Without detailed and extensive historic trend data, predicting long-term cost behaviours is challenging and the ability to account for seasonality factors is lost.

Assumptions of past consistency may lead to skewed predictions, and the lack of historical context makes interpreting unique past events challenging. Furthermore, restricted data hampers robust scenario planning, complicating future predictions.

Due to these limitations, it is only appropriate to provide forecasts for 2025-2026.

5 Concerns and Future Policy Impacts

Discussions with the EDBs have highlighted concerns regarding the existing TTM requirements, which are clearly demonstrated by the data trends.

Changes to a risk-based approach to TTM through the NZGTTM are shifting attention to better manage and mitigate risks at road work sites. The aim is to streamline and modernise current practices through enhanced reporting requirements for suppliers and contractors to ensure more comprehensive documentation of TTM-related events.

No investigation of the cost impact that these changes will have were considered as part of this study. However, we would note that costs will likely be influenced in several ways with the introduction of these changes:

1. Initial increase: There is often an initial rise in costs due to the need for training, adaptation, and restructuring to comply with new regulations or procedures.

2. Investment in infrastructure: Organisations may need to invest in technology, systems, or infrastructure to meet new requirements, contributing to short-term cost increases.

3. Administrative burden: New policies may result in increased administrative tasks, documentation, and reporting, potentially leading to additional costs.

4. Efficiency gains: In the longer term, policy changes typically lead to more streamlined processes, improved efficiency, and ultimately cost reductions as the new practices become standardised.

5. Risk management: Enhanced risk management procedures may prevent costly incidents, mitigating future expenses.

6. Market adaptation: Over time, suppliers and services adjust to new standards, often leading to competitive pricing and cost stabilisation.

The EDBs will need to balance immediate costs against potential long-term benefits and savings when adapting to these new policies.

6 Conclusions and Recommendations

Our analysis of the TTM costs has highlighted several critical and concerning trends. Our findings, based on the indexation-adjusted and modified data, suggests that TTM costs over the past five years have increased at a greater rate than the NTI that the costs were measured against. This trend is consistent across the key metrics assessed, including TTM costs as a percentage of overall project costs, variances by region, work scope, road type, costs per kilometre, and the daily costs associated with TTM duration.

This analysis underscores the critical need to monitor TTM costs closely. With recent NZGTTM coming into effect, EDBs must remain informed and proactive in addressing potential cost impacts.

Whilst the analysis clearly indicates that TTM costs have risen and are likely to continue rising, we would encourage and recommend the collection and analysis of further data to support informed decision-making.