MOBILITY LAB

# Te Ahu a Turanga

Toll Modelling Assessment

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section 9(2)(a)
23/07/2024

# Executive Summary

This assessment evaluates the potential impact of tolling on the Te Ahu a Turanga project to support decision-making on whether to proceed with tolling. The analysis focuses on a single gantry system, assessing toll tariffs, traffic flows on the toll road and alternative routes, and revenue estimates.

The model has drawn on previous assessment inputs and built upon the methodology used in that assessment. As a result, the model has several limitations, including:

- High-level route-choice estimates i.e., the model does not respond to changing congestion on the toll road or the alternative routes as the toll tariff changes and volumes on each road changes
- Estimates of model parameters drawn from models from other jurisdictions as no detailed calibration of route choice will be undertaken
- Volume and revenue estimates based on daily traffic only, i.e., no estimates separated into individual peak periods
- Demand response was not estimated as part of this assessment
- Other network impacts such as safety, environmental and equity impacts are not part of this assessment

Sensitivity tests were undertaken to attempt to quantify the uncertainty in the model input assumptions. The sensitivity tests produced a broad range of outcomes, indicating the sensivity of the input assumptions as well as the simplicity of the model. These tests informed risk-adjustment factors that were applied to the core traffic flow and revenue forecasts.

Risk-adjusted traffic volumes and revenues were calculated for various toll scenarios, with the recommended toll level of $3.80 for light vehicles and $7.60 for heavy vehicles showing 50$^{th}$ percentile estimates of 6,100 vehicles per day in 2025 and 11,200 vehicles per day in 2045. Revenue estimates for this toll level suggest 50$^{th}$ percentile net revenues of $8.0 million in 2025 and $14.4 million in 2045.

The assessment provides a high-level view of tolling impacts on traffic flows and revenue. The scope and limitations of the assessment should be considered when making decisions on proceeding with tolling Te Ahu a Turanga.

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# Contents



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# 1. Introduction

## 1.1. Purpose

The purpose of this assessment is to evaluate the impact of tolling on the Te Ahu a Turanga project to inform decisions about whether to implement tolls. This assessment focused on analysing the toll tariff for a single gantry system, the resulting traffic flows on the toll road and alternative routes, and the revenue estimates derived from these flows. The modelling exercise did not account for other potential impacts such as travel time/congestion, safety, environmental, or equity considerations.

## 1.2. Scope and Limitations

The purpose of this work is to assess the revenue potential of tolling Te Ahu a Turanga. Further analysis may be required to support more detailed financial analysis. Specifically, this work does not provide 'investment-grade' revenue estimates.

Toll revenue estimates provided as part of the Services are not a statement of absolute revenue suitable for detailed investment decisions, rather they will have an accuracy range commensurate with various factors such as the extent of relevant information provided, the certainty of data and assumptions and level of detail available at the time of preparation.

The assessment is limited to the following:

- Use of existing data utilised in the previous study, including:
  - AADT estimates
  - Travel time saving estimates by origin-destination
  - Distribution of origin-destination trips
- High-level route-choice estimates i.e., the model does not respond to changing congestion on the toll road or the alternative routes as the toll tariff changes and volumes on each road changes
- Estimates of model parameters are drawn from models from other jurisdictions as no detailed calibration of route choice will be undertaken
- Volume and revenue estimates are based on daily traffic only, i.e., no estimates separated into individual peak periods
- Demand response is not estimated as part of this assessment
- Sensitivity tests will be limited to those feasible within the bounds of this study and will therefore not cover a full range of possible outcomes
- Other network impacts such as safety, environmental and equity impacts are not part of this assessment

## 1.3. Approach

Given the time-constraints for this assessment, the agreed approach was to update the previous spreadsheet analysis undertaken in 2020 to include aspects such as road perception factors and an updated route choice method, distributed values of time and undertake sensitivity tests to attempt to quantify the uncertainty in the traffic forecasts.

While this method adds additional detail to the previous assessment, it is still considered a very "high level" assessment. For example, the model is very simplified in its travel time and

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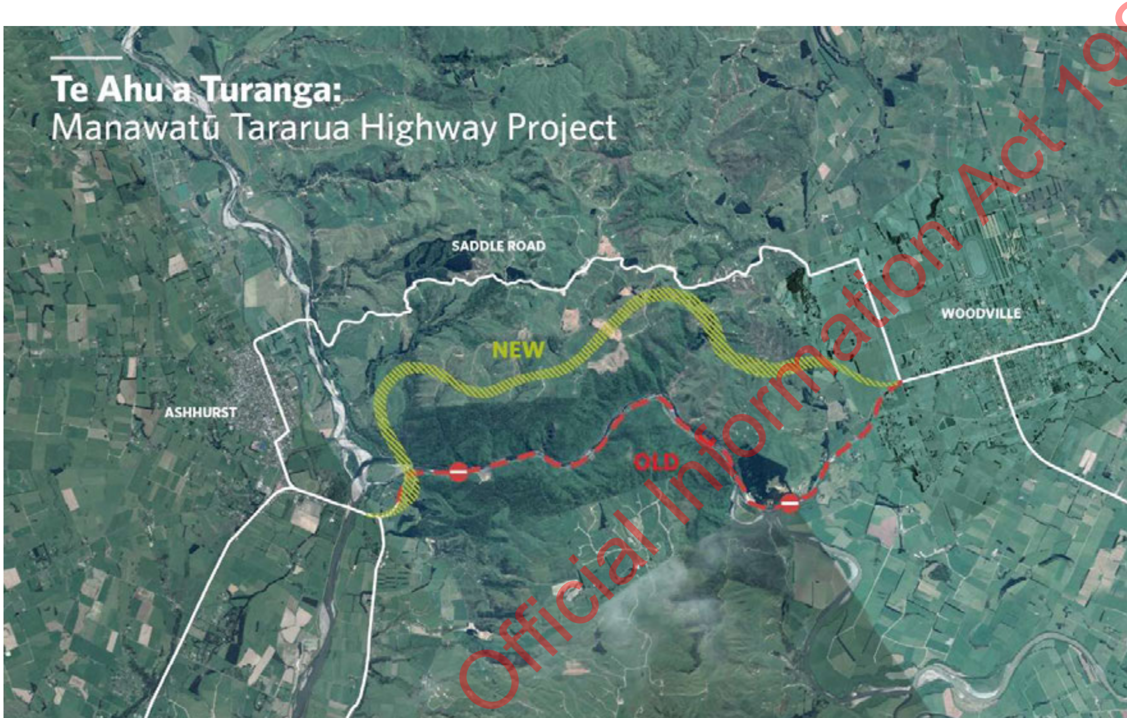
distance estimates and the zone system is very coarse, making for "chunkier" responses in the model.

## 1.4. Study Area

Te Ahu a Turanga runs between Ashhurst and Woodville, between the old gorge road and Saddle Road. Figure 1-1 shows the design route:

*Figure 1-1: Te Ahu a Turaga Route [https://www.nzta.govt.nz/projects/te-ahu-a-turanga/design-and-route/]*




Alternatives to the new road include Saddle Road to the north, which has a very similar start and end location, and Pahiatua Track, approximately 12 km south, which could serve as an alternative for traffic originating or terminating further south.

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# 2. Modelling Methodology

To increase the detail of the spreadsheet analysis and undertake the assessment, the following enhancements were undertaken:

- Route choice was updated to incorporate vehicle operating costs through a distance component and a road type perception factor to cover aspects like safety / comfort of the new road compared to the rural highway
- Values of Times were estimated from existing transport models, with Census income data used to gauge the requirement for adjustments
- Sensitivity tests to quantify uncertainty

The assessment methodology followed these steps:

- Update spreadsheet model with enhanced detail / functionality
- Define model inputs
- Assess outcomes for a range of toll levels
- Develop sensitivity tests
- Run risk analysis process
- Estimate risk adjusted traffic volumes and revenues

## 2.1. Modelling Input Assumptions

### 2.1.1. Forecast Analysis Years

Two years were used to undertake the assessment; 2025 and 2045, in line with the previous study.

### 2.1.2. Annual Average Daily Traffic and Growth Rate

Traffic flows were provided for 2016, prior to the Gorge closure. The following table presents the traffic volumes by road and vehicle classification:

*Table 2-1: 2016 AADT by Route*

| 2016 AADT (pre gorge closure): | Light Veh | Heavy Veh | Total |
|---|---|---|---|
| Manawatu Gorge | 6,700 | 920 | 7,620 |
| Saddle Road | 135 | 15 | 150 |
| Pahiatua Track | 1,998 | 222 | 2,220 |
| Total | 8,833 | 1,157 | 9,990 |

The traffic growth rate assumed by the previous study was 3% per annum. Further data was investigated to confirm this growth rate. Growth rates from various count site locations, such as SH54, SH3 and SH2, indicated a range of growth rates from 1% to 4%. Therefore, a 3% growth rate was considered reasonable as the core assumption.

### 2.1.3. Origin-Destination Trip Distribution

The previous study utilised a distribution of the trips between defined origins and destinations. This distribution was used as the starting point for this assessment. Through the spreadsheet model development, the distribution was adjusted slightly to better reflect the traffic volumes on the corridors as per the AADT data available.

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The original trip distribution is shown in Table 2-2, while the updated distribution is shown in Table 2-3.

*Table 2-2: Initial OD Proportions*

| | OD Proportions (Total) | | | |
|---|---|---|---|---|
| | **SH2 North** | **Woodville** | **SH2 South** | **Total** |
| **Pohangina** | 2.67% | 2.33% | 1.02% | **6.02%** |
| **SH54 North** | 0.65% | 1.40% | 3.85% | **5.90%** |
| **Ashhurst** | 2.67% | 2.33% | 1.02% | **6.02%** |
| **Fielding** | 3.10% | 2.71% | 1.19% | **7.00%** |
| **SH3 West** | 7.30% | 2.75% | 2.70% | **12.75%** |
| **Palmerston North** | 19.66% | 17.78% | 5.56% | **43.00%** |
| **SH57 South** | 13.40% | 3.00% | 2.90% | **19.30%** |
| **Total** | **49.45%** | **32.30%** | **18.25%** | **100.00%** |

*Table 2-3: Adopted OD Proportions*

| | OD Proportions (Total) | | | |
|---|---|---|---|---|
| | **SH2 North** | **Woodville** | **SH2 South** | **Total** |
| **Pohangina** | 2.28% | 1.99% | 0.88% | **5.15%** |
| **SH54 North** | 0.56% | 1.20% | 3.29% | **5.04%** |
| **Ashhurst** | 2.28% | 1.99% | 0.88% | **5.15%** |
| **Fielding** | 2.65% | 2.31% | 1.87% | **6.84%** |
| **SH3 West** | 6.24% | 2.35% | 5.73% | **14.32%** |
| **Palmerston North** | 16.80% | 15.20% | 10.74% | **42.74%** |
| **SH57 South** | 13.16% | 4.27% | 3.33% | **20.77%** |
| **Total** | **43.97%** | **29.32%** | **26.71%** | **100.00%** |

### 2.1.4. Trip Purpose and Willingness to Pay

Trip purposes and willingness to pay bands were introduced for this assessment. They were sourced from the Tauranga Transport Strategic Model (TTSM). Tauranga has two of the three toll roads in New Zealand. The model has been calibrated to reflect the toll road and alternative route traffic volumes in the region. The trip purpose, willingness to pay band and value of times are shown in Table 2-4:

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*Table 2-4: Trip Purpose and Willingness to Pay Segmentation*

| Purpose | WtP Band | VoT |
|---|---|---|
| HBW | L | 18.29 |
| HBW | M | 28.11 |
| HBW | H | 42.62 |
| EB | L | 35.17 |
| EB | M | 50.81 |
| EB | H | 108.66 |
| Oth | L | 8.66 |
| Oth | M | 14 |
| Oth | H | 23.32 |
| HCV | L | 23.71 |
| HCV | M | 44.24 |
| HCV | H | 79.64 |

The trip purpose proportions were developed as follows:

- Utilise the TTSM as a starting point
- Analysis the Journey to Work trips that are crossing through the gorge and compare against the AADT observed traffic flows to develop the HBW proportion
- Pro-rata the EB trip proportion down to account for the reduction in HBW trips compared to the TTSM
- Adjust the HCV proportion to match the observed traffic volumes
- Allocate the remaining proportion to the Other trip purpose

This process resulted in the following purpose proportions:

*Table 2-5: Trip Purpose Proportions*

| Purpose | Proportion |
|---|---|
| HBW | 15% |
| EB | 5% |
| Oth | 68% |
| HCV | 12% |

The TTSM was used to split between the low, medium and high willingness to pay segmentations. For light vehicles this was 36%, 30% and 34% for low, medium and high respectively. Heavy vehicles were allocated as 10%, 40% and 50% for low, medium and high.

Previous toll studies have assumed that:

- Tolls will be escalated at the rate of inflation (CPI)
- WtP is likely to escalate based on income
- Average weekly earnings have typically grown at some 1% faster than CPI

As a result, willingness to pay is expected to increase over time in real terms. Therefore, the values of time were escalated at 1% per year (cumulative) to represent this increase in willingness to pay.

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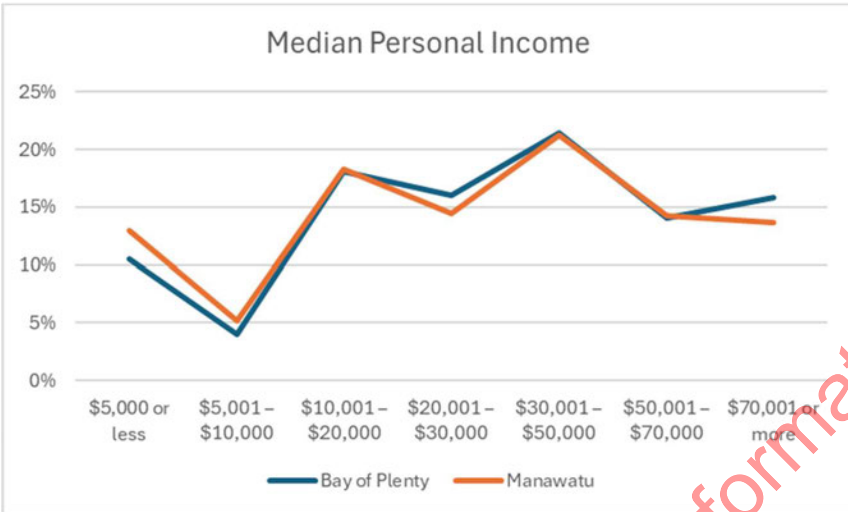
Income data for the Bay of Plenty and Manawatu regions were compared to gauge the appropriateness of adjusting the value of time from those in the TTSM. Median person income bands were used to make the comparison. The percentage of the population for each region is shown in Figure 2-1:

*Figure 2-1: Median Personal Income*




There is a marginal difference between the two regions, with Manawatu having slightly lower proportions at the higher income bands. However, the difference is not significant enough to warrant adjusting the values of time, particularly when considering that a proportion of the traffic using Te Ahu a Turanga will be interregional traffic.

### 2.1.5. Generalised Cost

The generalised cost is used to compare the competing choices between using Te Ahu a Turanga or the existing alternatives.

This study introduced a distance component to the generalised cost. The formula is shown here:

$$GC = travelTime + distance * df * rf + \frac{Toll}{VoT/60}$$

where:

| | |
|---|---|
| travelTime | is the travel time of the route (in minutes) |
| distance | is the distance of the route (in km) |
| df | is a distance factor that represents vehicle operating costs |
| rf | is the road type factor |
| Toll | is the toll tariff (in dollars) |
| VoT | is the Value of Time in $/hr |

The distance factor was set as 0.5 for light vehicles and 1.0 for heavy vehicles. The road type factor was set as 0.7 for Te Ahu a Turanga and 1.0 for the alternatives. The reduced factor for the

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new road represents aspects such as the greater safety and comfort of driving on the newer, higher quality road.

### 2.1.6. Travel Time Savings

The previous study estimated travel time savings for each origin-destination pair. These were adopted for this assessment. The travel time savings are shown in Table 2-6:

*Table 2-6: Travel Time Savings Estimates*

| Origin | Destination | Travel time (min) light | Travel time (min) heavy |
|---|---|---|---|
| Pohangina | SH2 North | -5.3 | -5.3 |
| Pohangina | Woodville | -5.3 | -5.3 |
| Pohangina | SH2 South | -5.3 | -5.3 |
| SH54 North | SH2 North | -5.7 | -5.7 |
| SH54 North | Woodville | -5.7 | -5.7 |
| SH54 North | SH2 South | -5.7 | -5.7 |
| Ashhurst | SH2 North | -7.7 | -7.7 |
| Ashhurst | Woodville | -7.7 | -7.7 |
| Ashhurst | SH2 South | -7.7 | -7.7 |
| Fielding | SH2 North | -8.5 | -8.6 |
| Fielding | Woodville | -8.5 | -8.6 |
| Fielding | SH2 South | -8.5 | -8.6 |
| SH3 West | SH2 North | -8.5 | -8.6 |
| SH3 West | Woodville | -8.5 | -8.6 |
| SH3 West | SH2 South | -8.5 | -8.6 |
| Palmerston North | SH2 North | -9.8 | -9.8 |
| Palmerston North | Woodville | -9.8 | -9.8 |
| Palmerston North | SH2 South | 0.2 | 1.4 |
| SH57 South | SH2 North | -10.9 | -11.9 |
| SH57 South | Woodville | -10.9 | -11.9 |
| SH57 South | SH2 South | 3.1 | 4.3 |

### 2.1.7. Trip Distances

With the addition of distance as a component of route choice. The change in distances between using Te Ahu a Turanga and the alternatives required estimating.

To undertake this, a network of the region was established from OpenStreetMap data. From this, two different networks were developed, one with only the two alternatives (Saddle Road and Pahiatua Track) and one with Te Ahu a Turanga with the alternatives severed. These two networks were then used to calculate the shortest path between each pre-defined origin-destination pair. The networks are shown in Figure 2-2 and Figure 2-3.

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*Figure 2-2: Existing Network*

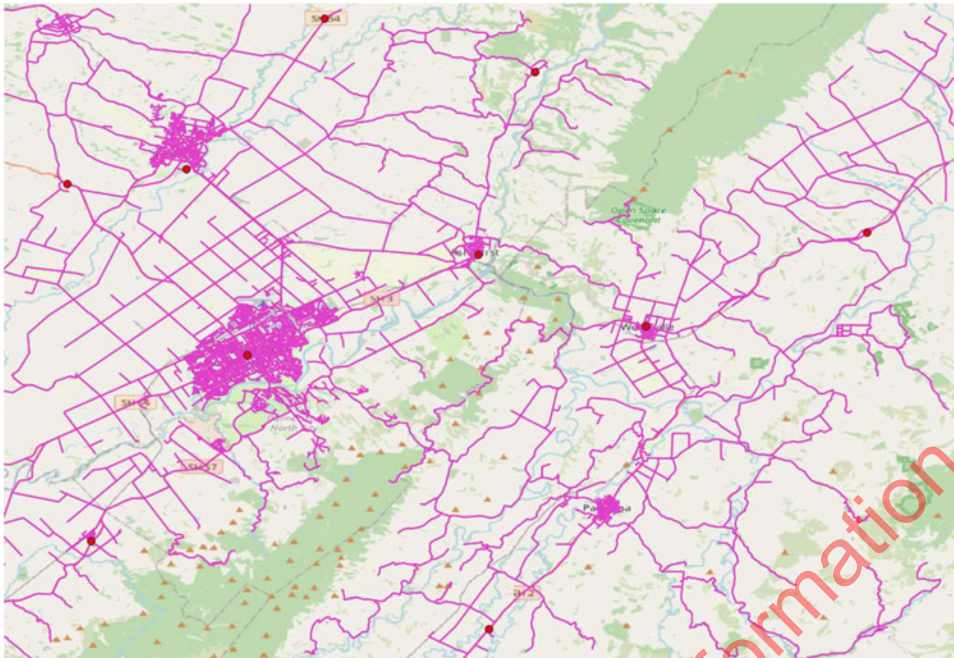
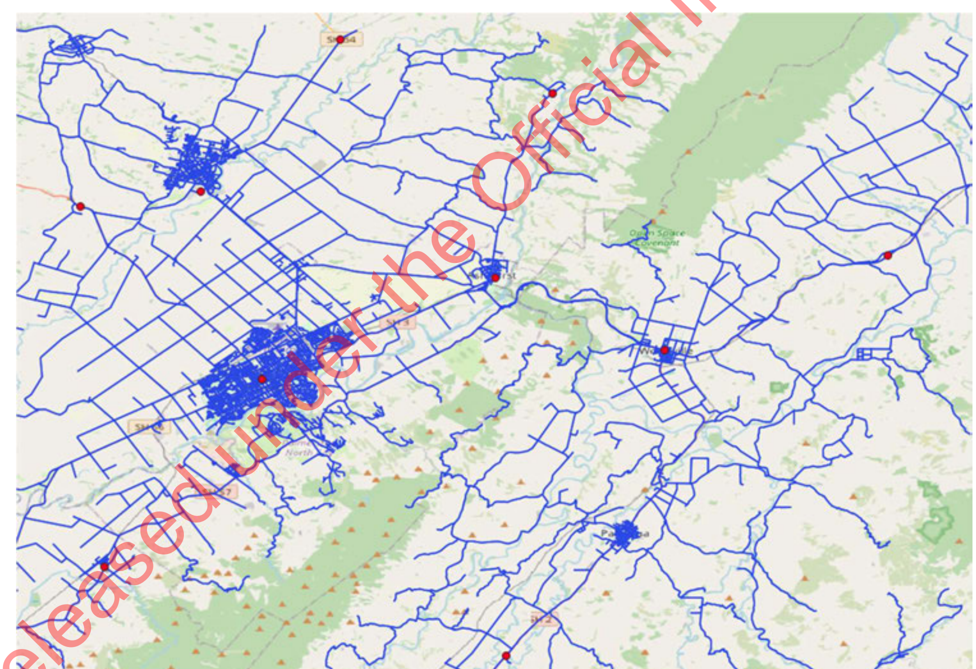


*Figure 2-3: New network with alternatives removed*



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## 2.1.8. Toll Transaction Cost

A transaction cost of $0.80 has been advised by Waka Kotahi. This is assumed to be the average cost for each vehicle that uses the toll road.

### 2.1.9. Revenue Leakage

Revenue leakage represents the traffic that does not pay for the toll road. This includes non-compliance as well as those that are exempt from paying the toll.

Previous studies have suggested that this is between 2-3%. This assessment has adopted 2% as the core assumption.

### 2.1.10. Heavy Vehicle Toll Multiplier

To maintain consistency with the Northern Gateway Toll Road, the heavy vehicle toll has been set as two times the light vehicle toll.

## 2.2. Risk Analysis

Key input parameters have been identified that could impact the forecast traffic flows. The scale of impact of these uncertainties were estimated by re-running the model with adjusted parameters. The uncertainties were combined in a monte-carlo simulation to develop a 5$^{th}$, 50$^{th}$ and 95$^{th}$ percentile estimate of traffic flows and revenue.

This process involved the following tasks:

- Identify key input assumptions
- Create a lower and upper bound input for each parameter
- Assess the scale of change each change in input has on the forecasts
- Create a triangular distribution for each parameter using the core, lower and upper bound factors
- Run a monte-carlo simulation that combines the impact of the parameters
- Calculate the 5$^{th}$, 50$^{th}$ and 95$^{th}$ percentile factors
- Apply the factors to the core forecast to develop a range of outcomes

The key risk themes are as follows:

- Growth
- Value of Time / Willingness to Pay
- Willingness to Pay escalation
- Road Type Factor
- Distance Weighting
- Travel Time Savings
- Revenue leakage
- Transaction Cost

The full set of input parameters, with the core, low and high parameters are shown in Table X in the Appendix.

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# 3. Toll Outcomes

This section describes two sets of analysis:

- Incremental toll change for 2025 and 2045 for the core input assumptions
- Risk Adjusted outcomes for selected toll levels

## 3.1. Incremental Toll Analysis

The incremental toll analysis was run by adding a toll of $0.05 and extracting the traffic flow estimates for each of the toll levels.

The following figures show the net revenue (i.e., adjusting for revenue leakage and transaction costs) for each increment. The x-axis shows the light vehicle toll, with the heavy vehicle toll being two times this amount. The vehicle diversion rate from Te Ahu a Turanga as the toll increases.

*Figure 3-1: 2025 Incremental Toll Analysis*

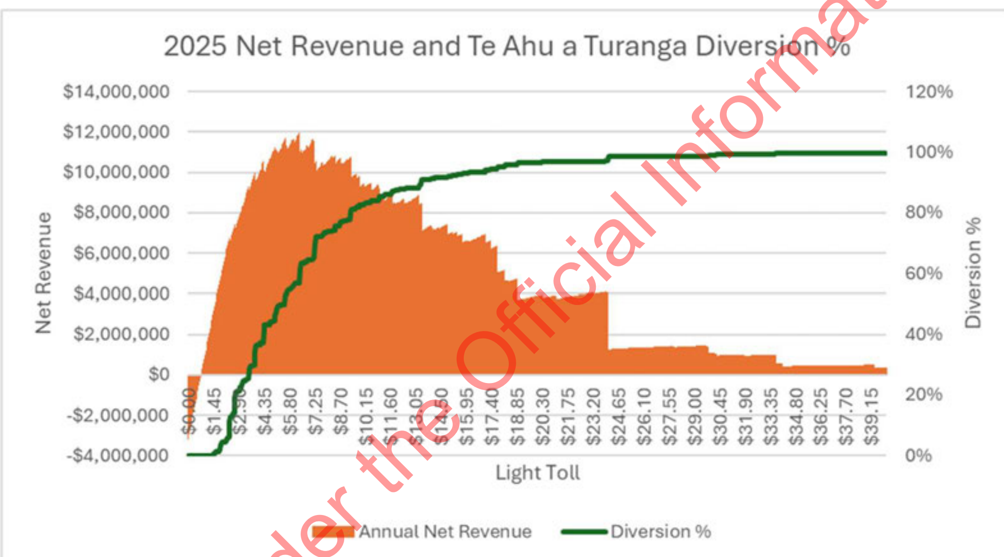
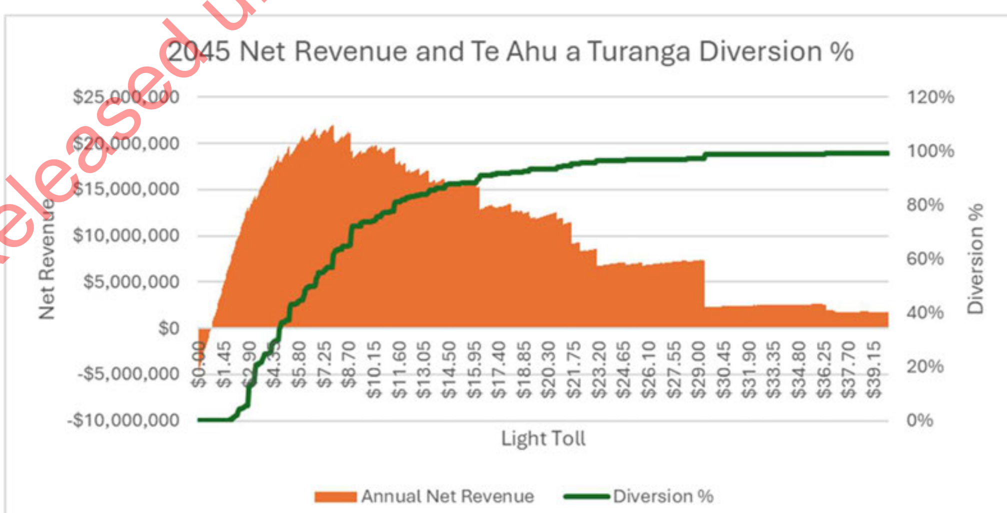



*Figure 3-2: 2045 Incremental Toll Analysis*

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The model has predicted the following:

- Revenue maximisation at a light toll of $6.35 in 2025 and $7.75 in 2045
- Diversion of approximately 50% at tolls of approximately $5.40 and $6.60 in 2025 and 2045 respectively
- Traffic flows on Saddle Road reach current day volumes of approximately 3,000 vehicles per day at tolls of approximately $4.30 and $3.45 in 2025 and 2045
- At $2.60 (current toll price of the Northern Gateway Toll Road) there is diversion of approximately 14% in 2025 and 5% in 2045
- Due to the simplicity of the model, with a coarse "zone system", the responses show some "jaggedness", where different user groups in the various zones start to divert from the toll road

## 3.2. Risk Adjusted Outcomes

Following the initial assessment of traffic flows and revenues, a range of toll tariffs were taken forward for developing risk adjusted outcomes:

- $2.80 / $5.60 – toll range that is similar to existing New Zealand toll roads
- $3.80 / $7.60 – recommended toll price to balance revenue and outcomes
- $4.30 / $8.60 – alternative to the recommended
- $4.75 / $9.50 – an internationally benchmarked toll level

Each of these scenarios were run through the risk assessment and adjustment process. The full set of factors for each scenario are provided in the Appendix.

Along with the sensitivity tests that have been described, a further test suggested by the Peer Reviewer to gauge the sensitivity of the model itself. When comparing the competing costs of taking the toll road or the alternatives, the model simply compares the competing costs and if the cost of taking the toll road is lower than the alternative, that user group and origin-destination pair get assigned to the toll road. To quantify this sensitivity, two tests were undertaken, a test where the toll road had to have a cost that was 10% better than the alternative, or a cost that was up to 10% lower. At a toll level of $3.80, the test indicated an increase in traffic volume of 20% and a decrease of 30% for the two tests. This indicated that the model may be more sensitive in decreasing traffic volumes compared to increasing.

### 3.2.1. Traffic Volumes

The following tables presents the risk adjusted traffic flows for each scenario:

*Table 3-1: Risk Adjusted AADTs*

| | | $2.80 / $5.60 | | | $3.80 / $7.60 | | | $4.30 / $8.60 | | | $4.75 / $9.50 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Risk | Light | Heavy | Total | Light | Heavy | Total | Light | Heavy | Total | Light | Heavy | Total |
| 2025 | 5th | 6,051 | 1,118 | 7,169 | 3,656 | 765 | 4,421 | 3,135 | 749 | 3,884 | 2,947 | 805 | 3,752 |
| 2025 | 50th | 7,849 | 1,450 | 9,299 | 5,062 | 1,059 | 6,121 | 4,659 | 1,114 | 5,772 | 4,295 | 1,173 | 5,468 |
| 2025 | 95th | 10,196 | 1,883 | 12,079 | 6,757 | 1,413 | 8,170 | 6,656 | 1,591 | 8,247 | 6,051 | 1,653 | 7,704 |
| 2045 | 5th | 7,253 | 1,096 | 8,349 | 6,517 | 1,254 | 7,771 | 5,310 | 1,099 | 6,410 | 5,270 | 1,205 | 6,475 |
| 2045 | 50th | 10,117 | 1,529 | 11,645 | 9,369 | 1,803 | 11,172 | 7,929 | 1,641 | 9,571 | 7,958 | 1,821 | 9,779 |
| 2045 | 95th | 13,468 | 2,035 | 15,503 | 13,013 | 2,504 | 15,517 | 11,313 | 2,342 | 13,655 | 11,616 | 2,657 | 14,273 |

The AADT on Te Ahu a Turanga for the recommended toll is shown in Figure 3-3:

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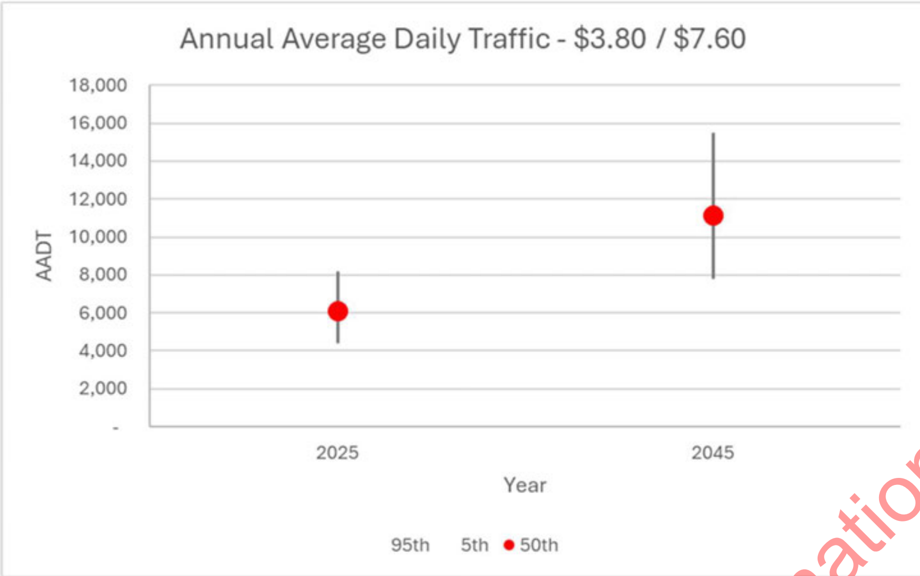
*Figure 3-3: Recommended Toll Risk Adjusted AADT*




The model has predicted the following:

- 50th percentile estimates of 6,100 and 11,200 vehicles per day in 2025 and 2045 respectively
- 5th percentile estimates of 4,400 and 7,800 vehicles per day in 2025 and 2045 respectively
- 95th percentile estimates of 8,200 and 15,500 vehicles per day in 2025 and 2045 respectively

### 3.2.2. Revenue Estimates

Gross revenue has been calculated by multiplying the number of vehicles by their respective toll tariff, less the revenue leakage percentage.

The annual gross revenue estimates for the recommended toll are shown in Figure 3-4:

*Figure 3-4: Recommended Toll Risk Adjusted Annual Gross Revenue*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The model predicted the following:

- 50th percentile estimates of $9.8m and $17.6m gross revenue in 2025 and 2045 respectively
- 5th percentile estimates of $7.0m and $12.2m gross revenue in 2025 and 2045 respectively
- 95th percentile estimates of $13.1m and $24.7m gross revenue in 2025 and 2045 respectively

Net revenue has been calculated as the gross revenue, less the transaction cost multiplied by the number of vehicles predicted on the toll road.

Annual net revenue for the recommended toll is shown in Figure 3-5:

*Figure 3-5: Recommended Toll Risk Adjusted Annual Net Revenue*


The model suggested the following net revenues for 2025 and 2045:

- 50th percentile estimates of $8.0m and $14.4m net revenue in 2025 and 2045 respectively
- 5th percentile estimates of $5.6m and $9.7m net revenue in 2025 and 2045 respectively
- 95th percentile estimates of $10.9m and $20.5m net revenue in 2025 and 2045 respectively

Gross and net revenue for each of the risk adjusted scenarios has been included in the Appendix.

### 3.2.3. Consideration of Demand Response

As described, this model does not account for demand response, i.e., changes in the number of trips through the Gorge. This includes potential increases in trips due to the development of Te Ahu a Turanga compared to the pre-Gorge closure period, as well as potential decreases in trips resulting from the increased travel costs associated with tolling the road.

Previous toll studies that added significant capacity to a journey, but also imposed tolls, have shown that induced demand is largely mitigated through trip suppression. However, in the

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context of Te Ahu a Turanga, the increase in capacity from the pre-Gorge closure to the new opening is not expected to be as substantial, which may reduce the anticipated induced demand. Additionally, the impact of demand suppression might be less significant due to the limited number of alternative travel and activity destinations in the region.

It is challenging to accurately determine the potential demand response within the constraints of this assessment. Therefore, any decisions regarding tolling should carefully consider this uncertainty.

### 3.2.4. Consideration of Principled Toll Avoiders

There is likely a group of the population that avoid using and paying for toll roads out of principle, rather than for financial, travel time or other reasons. It is estimated that this is likely to impact predictions with tolls of less than $1.00. With tolls more than this, it is likely that the values of time that have been calibrated in the TTSM inherently account for this, having been compared against observed traffic flows on the toll roads and the alternatives.

# 4. Conclusion

The Te Ahu a Turanga tolling assessment indicates potential for revenue generation, but also highlights substantial uncertainties. The predicted revenue at higher toll levels suggests a balance between maximising income and limiting traffic diversion. However, scope and limitations of the assessment, such as the exclusion of demand response and other impacts, means the results should be interpreted cautiously.

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# Appendix

## Sensitivity Test Parameters

| Test | Theme | Parameter | Core | Low | High |
|---|---|---|---|---|---|
| 1 | Growth Rate | Growth Rate | 3% | 1% | 5% |
| 2 | VoT | HBW-L | 18.29 | 12.80 | 23.78 |
| 2 | VoT | HBW-M | 28.11 | 19.68 | 36.54 |
| 2 | VoT | HBW-H | 42.62 | 29.83 | 55.41 |
| 2 | VoT | EB-L | 35.17 | 24.62 | 45.72 |
| 2 | VoT | EB-M | 50.81 | 35.57 | 66.05 |
| 2 | VoT | EB-H | 108.66 | 76.06 | 141.26 |
| 2 | VoT | Oth-L | 8.66 | 6.06 | 11.26 |
| 2 | VoT | Oth-M | 14.00 | 9.80 | 18.20 |
| 2 | VoT | Oth-H | 23.32 | 16.32 | 30.32 |
| 2 | VoT | HCV-L | 23.71 | 16.60 | 30.82 |
| 2 | VoT | HCV-M | 44.24 | 30.97 | 57.51 |
| 2 | VoT | HCV-H | 79.64 | 55.75 | 103.53 |
| 3 | WtP Escalation | WtP Escalation | 1% | 0% | 1.50% |
| 4 | Road Type Factor | Te Ahu a Turanga | 0.7 | 0.9 | 0.5 |
| 5 | Distance Weighting | Te Ahu a Turanga | 0.7 | 0.4 | 1.1 |
| 5 | Distance Weighting | Rural | 1.0 | 0.5 | 1.5 |
| 6 | Travel Time Savings Estimate | light-Pohangina-SH2 North | -5.3 | -3.7 | -6.9 |
| 6 | Travel Time Savings Estimate | light-Pohangina-SH2 North | -5.3 | -3.7 | -6.9 |
| 6 | Travel Time Savings Estimate | light-Pohangina-SH2 North | -5.3 | -3.7 | -6.9 |
| 6 | Travel Time Savings Estimate | light-Pohangina-SH2 North | -5.7 | -4.0 | -7.4 |
| 6 | Travel Time Savings Estimate | light-Pohangina-SH2 North | -5.7 | -4.0 | -7.4 |
| 6 | Travel Time Savings Estimate | light-Pohangina-SH2 North | -5.7 | -4.0 | -7.4 |
| 6 | Travel Time Savings Estimate | light-Pohangina-SH2 North | -7.7 | -5.4 | -10.0 |
| 6 | Travel Time Savings Estimate | light-Pohangina-SH2 North | -7.7 | -5.4 | -10.0 |
| 6 | Travel Time Savings Estimate | light-Pohangina-SH2 North | -7.7 | -5.4 | -10.0 |
| 6 | Travel Time Savings Estimate | light-Pohangina-SH2 North | -8.5 | -6.0 | -11.1 |
| 6 | Travel Time Savings Estimate | light-Pohangina-SH2 North | -8.5 | -6.0 | -11.1 |
| 6 | Travel Time Savings Estimate | light-Pohangina-SH2 North | -8.5 | -6.0 | -11.1 |
| 6 | Travel Time Savings Estimate | light-Pohangina-SH2 North | -8.5 | -6.0 | -11.1 |
| 6 | Travel Time Savings Estimate | light-Pohangina-SH2 North | -8.5 | -6.0 | -11.1 |
| 6 | Travel Time Savings Estimate | light-Pohangina-SH2 North | -8.5 | -6.0 | -11.1 |
| 6 | Travel Time Savings Estimate | light-Pohangina-SH2 North | -9.8 | -6.9 | -12.7 |
| 6 | Travel Time Savings Estimate | light-Pohangina-SH2 North | -9.8 | -6.9 | -12.7 |
| 6 | Travel Time Savings Estimate | light-Pohangina-SH2 North | 0.2 | 0.3 | 0.1 |
| 6 | Travel Time Savings Estimate | light-Pohangina-SH2 North | -10.9 | -7.6 | -14.2 |
| 6 | Travel Time Savings Estimate | light-Pohangina-SH2 North | -10.9 | -7.6 | -14.2 |
| 6 | Travel Time Savings Estimate | light-Pohangina-SH2 North | 3.1 | 4.0 | 2.2 |

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| | | | | | |
|---|---|---|---|---|---|
| 6 | Travel Time Savings Estimate | heavy-Pohangina-SH2 North | -5.3 | -3.7 | -6.9 |
| 6 | Travel Time Savings Estimate | heavy-Pohangina-SH2 North | -5.3 | -3.7 | -6.9 |
| 6 | Travel Time Savings Estimate | heavy-Pohangina-SH2 North | -5.3 | -3.7 | -6.9 |
| 6 | Travel Time Savings Estimate | heavy-Pohangina-SH2 North | -5.7 | -4.0 | -7.4 |
| 6 | Travel Time Savings Estimate | heavy-Pohangina-SH2 North | -5.7 | -4.0 | -7.4 |
| 6 | Travel Time Savings Estimate | heavy-Pohangina-SH2 North | -5.7 | -4.0 | -7.4 |
| 6 | Travel Time Savings Estimate | heavy-Pohangina-SH2 North | -7.7 | -5.4 | -10.0 |
| 6 | Travel Time Savings Estimate | heavy-Pohangina-SH2 North | -7.7 | -5.4 | -10.0 |
| 6 | Travel Time Savings Estimate | heavy-Pohangina-SH2 North | -7.7 | -5.4 | -10.0 |
| 6 | Travel Time Savings Estimate | heavy-Pohangina-SH2 North | -8.6 | -6.0 | -11.2 |
| 6 | Travel Time Savings Estimate | heavy-Pohangina-SH2 North | -8.6 | -6.0 | -11.2 |
| 6 | Travel Time Savings Estimate | heavy-Pohangina-SH2 North | -8.6 | -6.0 | -11.2 |
| 6 | Travel Time Savings Estimate | heavy-Pohangina-SH2 North | -8.6 | -6.0 | -11.2 |
| 6 | Travel Time Savings Estimate | heavy-Pohangina-SH2 North | -8.6 | -6.0 | -11.2 |
| 6 | Travel Time Savings Estimate | heavy-Pohangina-SH2 North | -8.6 | -6.0 | -11.2 |
| 6 | Travel Time Savings Estimate | heavy-Pohangina-SH2 North | -9.8 | -6.9 | -12.7 |
| 6 | Travel Time Savings Estimate | heavy-Pohangina-SH2 North | -9.8 | -6.9 | -12.7 |
| 6 | Travel Time Savings Estimate | heavy-Pohangina-SH2 North | 1.4 | 1.8 | 1.0 |
| 6 | Travel Time Savings Estimate | heavy-Pohangina-SH2 North | -11.9 | -8.3 | -15.5 |
| 6 | Travel Time Savings Estimate | heavy-Pohangina-SH2 North | -11.9 | -8.3 | -15.5 |
| 6 | Travel Time Savings Estimate | heavy-Pohangina-SH2 North | 4.3 | 5.6 | 3.0 |
| | Revenue Leakage | Revenue Leakage | 2% | 3% | 1% |
| | Transaction Cost | Transaction Cost | $0.80 | $0.70 | $0.90 |

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## Risk Adjustment Factors

| | | $2.80 / $5.60 | | | $3.80 / $7.60 | | | $4.30 / $8.60 | | | $4.75 / $9.50 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Risk | Volume Adjustments | Revenue Leakage | Transaction Cost | Volume Adjustments | Revenue Leakage | Transaction Cost | Volume Adjustments | Revenue Leakage | Transaction Cost | Volume Adjustments | Revenue Leakage | Transaction Cost |
| 2025 | 5th | 0.83 | 0.97 | 0.87 | 0.58 | 0.97 | 0.87 | 0.57 | 0.97 | 0.87 | 0.62 | 0.97 | 0.87 |
| 2025 | 50th | 1.08 | 0.98 | 0.80 | 0.80 | 0.98 | 0.80 | 0.84 | 0.98 | 0.80 | 0.90 | 0.98 | 0.80 |
| 2025 | 95th | 1.40 | 0.99 | 0.73 | 1.07 | 0.99 | 0.73 | 1.20 | 0.99 | 0.73 | 1.27 | 0.99 | 0.73 |
| 2045 | 5th | 0.55 | 0.97 | 0.87 | 0.63 | 0.97 | 0.87 | 0.56 | 0.97 | 0.87 | 0.62 | 0.97 | 0.87 |
| 2045 | 50th | 0.77 | 0.98 | 0.80 | 0.91 | 0.98 | 0.80 | 0.84 | 0.98 | 0.80 | 0.93 | 0.98 | 0.80 |
| 2045 | 95th | 1.02 | 0.99 | 0.73 | 1.26 | 0.99 | 0.73 | 1.19 | 0.99 | 0.73 | 1.36 | 0.99 | 0.73 |

## Gross Revenue

| Year | Risk | $2.80 / $5.60 | $3.80 / $7.60 | $4.30 / $8.60 | $4.75 / $9.50 |
|---|---|---|---|---|---|
| 2025 | 5th | $ 8,242,000 | $ 7,000,000 | $ 7,078,000 | $ 7,690,000 |
| 2025 | 50th | $ 10,764,000 | $ 9,758,000 | $ 10,590,000 | $ 11,284,000 |
| 2025 | 95th | $ 14,080,000 | $ 13,115,000 | $ 15,236,000 | $ 16,008,000 |
| 2045 | 5th | $ 9,394,000 | $ 12,183,000 | $ 11,470,000 | $ 12,959,000 |
| 2045 | 50th | $ 13,194,000 | $ 17,635,000 | $ 17,244,000 | $ 19,707,000 |
| 2045 | 95th | $ 17,686,000 | $ 24,664,000 | $ 24,774,000 | $ 28,963,000 |

## Net Revenue

| Year | Risk | $2.80 / $5.60 | $3.80 / $7.60 | $4.30 / $8.60 | $4.75 / $9.50 |
|---|---|---|---|---|---|
| 2025 | 5th | $ 5,973,000 | $ 5,601,000 | $ 5,849,000 | $ 6,503,000 |
| 2025 | 50th | $ 8,051,000 | $ 7,972,000 | $ 8,906,000 | $ 9,688,000 |
| 2025 | 95th | $ 10,859,000 | $ 10,937,000 | $ 13,037,000 | $ 13,954,000 |
| 2045 | 5th | $ 6,752,000 | $ 9,724,000 | $ 9,441,000 | $ 10,910,000 |
| 2045 | 50th | $ 9,795,000 | $ 14,374,000 | $ 14,451,000 | $ 16,853,000 |
| 2045 | 95th | $ 13,553,000 | $ 20,527,000 | $ 21,133,000 | $ 25,157,000 |

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