

4 December 2017

# ASSESSMENT OF ECONOMIC BENEFITS

***This note provides an outline of economic assessment undertaken for the Peka Peka Connectivity Single Stage Business Case***

## 1 INTRODUCTION

In February 2017 the Mackays to Peka Peka section of the Kapiti Expressway opened to traffic. Waikanae Town centre is situated within the Kapiti Coast District and has historically been centred around the now revoked state highway (Main Street). The implementation of the expressway has resulted in a large portion of north south traffic diverting from the existing State Highway to the expressway.

As part of the Peka Peka Connectivity business case, options are being considered which improve connectivity to Peka Peka and Te Horo. This note outlines the methodology used to assess shortlisted options in terms of transport economic impacts.

## 2 METHODOLOGY

### 2.1 TRANSPORT MODELLING

Transport modelling has been used to assess the effects of the shortlisted options and allow the calculation of benefits for each Option. For this project, two transport models have been referenced:

- The Kapiti Transport Model (KTM) is a Saturn model and has been used to test the options; and
- Wellington Transport Strategic Model (WTSM) has been used to provide the demand for the KTM.

Models were run for the AM, IP and PM peak periods for 2021, 2031 and 2041.

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#### 2.1.1 DO MINIMUM

The Do-Minimum scenario assumes the full Kapiti Expressway is in place including the Mackays to Peka Peka section (already constructed) and Peka Peka to Otaki section (currently under construction).

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#### 2.1.2 OPTIONS TESTED

Two options were modelled in the KTM including:

- Peka Peka Option – (called Option1a)
- Te Horo Option – (called Option2a)

The ramp layout for each option is provided in Figure 1.

Figure 1: Options modelled (Peka Peka = left, Te Horo = right)



Modelled changes in traffic volumes on key section of road are outlined in the Table 1 below.

Table 1: Changes in traffic on the surrounding traffic network

Traffic flows (Vpd)	Do Minimum 2021 (M2PP and PP20)			Peka Peka Option 2021			Te Horo Option 2021		
	AM peak hour	PM peak hour	ADT	AM peak hour	PM peak hour	ADT	AM peak hour	PM peak hour	ADT
Peka Peka Road	164	251	2394	155	186	2221	154	204	2224
SH1/Old Road between Peka Peka and Te Horo	295	304	3323	336	358	4155	169	160	1876
Te Horo Beach Road	299	336	3569	299	336	3569	132	125	1585
School Road	231	267	2719	231	267	2719	231	267	2719
Rutherford Drive	92	166	1376	40	54	609	81	119	1199
Main Street (Waikanae)	824	687	9243	714	605	7727	766	655	8614

The short list options considered as part of the business case include a further variation of the Peka Peka interchange shown in Figure 1. While a further model test was not considered necessary due to the minor nature of the differences between the interchange layouts, a manual assessment of travel time and VOC costs has been made to differentiate between options. The manual adjustment of travel time and vehicle operating cost is based on the following assumptions:

- Peka Peka Option 2 requires vehicles to travel 600m extra at 50km/h and 700m at 100km/h resulting in an additional 1.67 minutes per trip using the southbound onramp.
- Vehicles using the southbound onramp travel an additional 1.3km

These changes were applied to daily traffic using the southbound onramp and subtracted from the results from the modelled Peka Peka interchange option.

### 3 DISCOUNT RATE AND EVALUATION

The following assumptions have been made in the economic assessment:

- 40-year evaluation period (as per EEM standards)
- 6% Discount rate assumed (as per EEM standards)
- Time zero = 2017
- Construction start in 2018 with 3-year timeframe; 33% of spend in 2018, 33% of spend in 2019 and 33% in 2020.
- Benefits realised in 2021

### 4 BENEFIT STREAMS CONSIDERED

The following benefit streams have been assessed and are outlined in more detail below:

- Travel time cost
- Vehicle operating cost

A review of safety records in the study area, including analysis of alternative routes such as Rutherford Drive, Main Road (Waikanae Town Centre), Te Hapua Road and Peka Peka Road has not indicated the presence of any significant safety issues. Consequently, road safety issue is not included in the investment objectives for this Connecting Peka Peka project. Therefore, safety has not been included in the benefit stream for this assessment.

### 5 ECONOMICS

The following section outline key assumption and methodology used to calculate benefits.

#### 5.1 TRAVEL TIME BENEFITS

The following assumptions have been made in calculation of travel time benefits:

- Travel cost of \$22.72 adopted (as per Rural Other: all period) – This is considered a conservative value as the expressway qualifies as strategic, however much of the travel change involves use of rural routes.
- No congestion (CRV) have been included as the network is generally operating without congestion around the proposed interchanges.

- Update Factor of 1.45 adopted in line with EEM 2016 update
- Daily expansion factors of AM: 1.85, IP: 10.3 and PM: 2.0 have been adopted based on model
- Annualisation factor of 280 has been – due to the nature of the project benefits are likely to be realised on all days not only on weekdays. A small allowance has been made for weekends and holidays.

## 5.2 VEHICLE OPERATING COSTS

The following assumptions have been made in calculation of VOC benefits:

- Vehicle operating cost of 30.3 c/km/veh adopted (as per Rural Other 50km/h, grade 0%) – This is considered a conservative value as the expressway qualifies as strategic, however much of the travel change involves use of rural routes.
- Update Factor of 0.98 adopted in line with EEM 2016 update
- Daily expansion factors of AM: 1.85, IP: 10.3 and PM: 2.0 have been adopted based on model
- Annualisation factor of 280 has been – due to the nature of the project benefits are likely to be realised on all days not only on weekdays. A small allowance has been made for weekends and holidays.

## 5.3 COSTS

Bond CM prepared costings for each of the options. The total estimated costs for the options are shown in Table 2. Option 1 contains a range which includes with and without the bridging option for stormwater mitigation.

**Table 2 Total cost estimates**

COST ESTIMATE	PEKA PEKA OPTION 1 (\$M)	PEKA PEKA OPTION 2 (\$M)
Bonds estimate	17.1 – 23.2	5.9
Additional costs	2.5-3.5	3.1
<b>TOTAL OPTION COSTS</b>	<b>19.6 – 26.7</b>	<b>9.0</b>

For the purposes of economic assessment, the Operational costs have been assumed as the following:

- Annual operational cost of 1% of CAPEX
- Every 10 years, a more substantial maintenance intervention is required at 4% of CAPEX (e.g. reseal or storm water remedial work)

Total costs in Net Present Value is provided in

**Table 3 NPV costs**

COST ESTIMATE	PEKA PEKA OPTION 1 (\$M)	PEKA PEKA OPTION 2 (\$M)
Capital Cost	19.6 – 26.7	9.0

Operational costs (40 years)	9.0 – 12.5	4.1
NPV costs	20.4 – 28.3	9.4

## 5.4 BENEFIT COST RATIO

The results of the economic evaluation are shown in Table 4.

**Table 4: Economic evaluation of option**

COST ESTIMATE	PEKA PEKA OPTION 1 (\$M)	PEKA PEKA OPTION 1 HIGH RANGE (\$M)	PEKA PEKA OPTION 2 (\$M)
Benefits (NPV)	\$42,530,000	\$42,530,000	\$34,220,000
Costs (NPV)	\$20,380,000	\$28,280,000	\$9,380,000
BCR	2.1	1.5	3.6

Peka Peka Option 1 has a BCR of between 1.5 - 2.1 and Peka Peka Option 2 has a BCR of 3.6

An incremental analysis has been carried out between Option 2 (lower cost) against Option 1, which provides a higher level of overall benefits. Results are provided in Table 5.

**Table 5: Incremental benefit cost ratio**

INCREMENTAL BCR	OPTION 1
Additional Benefits (NPV)	\$8,310,000
Additional Costs (NPV)	\$11,000,000
<b>Incremental BCR</b>	0.8

The incremental analysis suggests the additional money associated with Option 1 over and above the Option 2, provides a benefit cost ratio of less than 1. The additional costs outweigh the additional benefits associated with Option 1.

## 5.5 SENSITIVITY TESTS

Some sensitivity testing has been undertaken to assess changes to some underlying assumptions made in the assessment. Results are outlined in the Table 5 and indicate that Option 1 ranges between a BCR of 1.6 to 2.8.

**Table 6: Sensitivity testing**

SENSITIVITY TEST	BENEFITS	COSTS	BCR
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Travel times based on Rural Strategic	\$43,390,000	\$20,380,000	2.1
Travel times based on Urban Strategic	\$32,010,000	\$20,380,000	1.6
Cost increase 25%	\$42,530,000	\$25,475,000	1.7
Costs reduce by 25%	\$42,530,000	\$15,285,000	2.8