# SCOPING REPORT

**Manawatu District Council**
**STRATEGIC ROADING PLAN**

**December 2007**

*Manawatu District Council*

# STRATEGIC ROADING PLAN
# Scoping Report

**December 2007**


Prepared By

Bill Flavell
Senior Engineer, Roading

Reviewed By

Kevin McFarlane
Project Manager

Opus International Consultants Limited
Wanganui Office
Opus House, 104 Guyton Street
PO Box 654
Wanganui, New Zealand

Telephone: (06) 349 6600
Facsimile: (06) 348 4601



Date: 11 December 2007
Reference: G:\Projects\Other\5PN926.01
Status: Final

# Contents

# 1 Introduction

## 1.1 Background

Over the last few years there has been considerable discussion about the network of roading links between Feilding and Palmerston North. Although there are significant options within the network, there has been a desire to rationalise and develop better linkages within a more defined road hierarchy.

In November 2006, a report was produced by the MDC Assets Group Manager to confirm 'in principle' the philosophy behind the development of a comprehensive long term strategic roading link between Feilding and Palmerston North. Within the November 2006 report, it was *not* intended that Council commit to any specific route from Feilding to the proposed ring road at Bunnythorpe until the necessary background detail has been collated and the public had an opportunity to submit feedback on the various options.

The November 2006 report recommended that: -

1. **The proposal to establish a link from Feilding to the Palmerston North Rural Ring Road in the vicinity of Bunnythorpe be approved in principle, and;**

2. **The detailed options be investigated and developed and reported back to Council with the purpose of confirming a preferred option or options before undertaking formal public consultation.**

Some consultation on potential roading options to give effect to parts of the more strategic network has been undertaken in consultation with the Palmerston North City Council's (PNCC) Eastern Growth Corridor (EGC) and the closure of Milson Line arising from the Palmerston North Airport Limited's Notice of Requirement application. The PNCC developed and adopted the *Transportation Management Plan 2002* for the city which incorporated, amongst other objectives, a rural ring road and second bridge crossing of the Manawatu River. The Manawatu District Council was involved in the consultation that was undertaken to develop this plan.

Over the last 2 years PNCC has focused on the EGC, which largely focuses on a road corridor linking Aokautere to Bunnythorpe across the north east of the City. The Council undertook significant consultation on the various options both within the city and Manawatu district. Public meetings were held within the District at the Newbury Hall and at Bunnythorpe.

In late 2006 the Manawatu District Council (MDC) commissioned Opus International Consultants Limited (Opus) to assist in developing a strategic road network providing a link from Feilding to Palmerston North via the existing network and ultimately connecting into the proposed rural ring road around Palmerston North. A public meeting was held in Bunnythorpe in May 2007 to discuss the proposals; this meeting resulted in additional options and further investigation.

This report is the result of that further investigation.

## 1.2 PNCC – MDC Rural Ring Road

Opus has been working with the PNCC to develop the preferred option for a transportation network linking State Highway 57 at Aokautere on the eastern bank of the Manawatu River, crossing the Manawatu River via a new bridge, and linking through to Napier Road (SH3). The basis of this investigation was the PNCC *Transportation Management Plan 2002,* as mentioned above. During the investigation carried out by Opus for PNCC, it was decided that the selection of the link alignment north of SH3 to Kelvin Grove Road would be premature as MDC had not yet decided on its strategic roading network around Bunnythorpe.

This network link for PNCC forms a new eastern by-pass corridor as the first stage of PNCC's objective of completing a strategic 100 km/hr rural ring road around the city.

A preliminary strategy investigation report prepared for the Council in December 2006 was based on the preference that the strategic link between the urban areas should be an integral component of the proposed rural ring road, as well as linking into the current State Highway network that would also be a component of the ring road.

Thus the recommendation for a preferred route was aimed at what would best fit a tie into the rural ring road rather than what best suited, in isolation, a by-pass of Bunnythorpe.

## 1.3 Investigation Report May 2007

In May of 2007, Opus produced an interim investigation report for the Council that formed the basis for a public meeting that was held in Bunnythorpe in May 2007. This report looked at indicative Western, Central and Eastern route options.

As a result of the feedback received at that consultation meeting, including the suggestion of alternative options (such as "Centre Road," a paper road), MDC decided to develop six options with a view to short-listing those options to a preferred option that could be presented to the Council and public. (Refer to the plan is Appendix A).

Further discussions took place between MDC/PNCC/Opus and in August 2007 Opus was commissioned to further investigate and produce draft plans for the proposed route options plus additional options that utilised "Centre Road" (a 'paper' road) and Roberts Line. The investigation included the provision of traffic modeling and brief economic analysis for the MDC network that complemented the work Opus carried out for the PNCC. Opus also provided an assessment of property valuation and compensation costs.

To address the current network inefficiencies between Feilding and Palmerston North plus other strategic issues, six principal drivers for the options were presented at the May 2007 public meeting held in Bunnythorpe: -

1. The North East Industrial Area (NEIA);
2. Feilding to Palmerston North City;
3. Milson Line closure;
4. The Eastern Growth Corridor (EGC);
5. Enhancement of the Bunnythorpe residential environment; and

6. Linkages to, and formation of part of, the proposed Rural Ring Road

### 1.4 Scope of the Investigation September/November Report 2007

Since May 2007, the route options previously canvassed have been re-viewed, re-considered and or re-defined.

The scope of this report encompasses the:

- Review and update of the May 2007 report to include feedback from public consultation and recent discussions about the route options considered;
- Production of drawings showing outline plans for six prospective options;
- Production of Option Cost Estimates (based on Transit NZ SMO14 templates);
- Traffic modeling to ascertain Benefit Cost Ratios (BCRs); and
- Assessment of property valuation and compensation costs.

#### 1.4.1 Benefit Cost ratio (BCR)

The Benefit Cost Ratio (BCR) is an indicator used by economists to assess the economic efficiency of a proposed project.

Projects can generate benefits (or dis-benefits) that can be measured using a monetary value (e.g. value of work travel time or vehicle operating costs, statistical value of a human life, benefits from carbon dioxide reduction etc) and a non-monetary value (e.g. cultural or ecological impacts). The latter are not given a numerical value because it may be inappropriate, or impossible, to establish a standard numerical value.

The BCR reconciles the monetary benefits with the estimated expected cost of constructing the project.

It is generally accepted that projects with benefits that exceed the cost are generally considered economically worthwhile or "worthy of execution" i.e. if the **BCR>1.0.**

The BCR[1] is simply the numerical value of the following equation: -

**Present Value of Net Benefits / Present Value of Net Costs = BCR**

It should be noted that the BCRs stated in this report utilise the expected cost estimate for the option as well as the medium growth rate projection for traffic volumes.

#### 1.4.2 Investigation Assumptions

**Design and Drawings**

A basic geometric design (and hence alignment) for each option has been derived from a terrain model based on a number of combined contour models of varying accuracy.

[1] As defined by the LTNZ Economic Evaluation Manual

Decisions on whether roads should be closed (turned into cul-de-sacs) or re-prioritised have not yet been made and will be subject to further discussion, consultation and development during refinement of the preferred option design.

**Cost Estimates**

Basic items such as earthworks and pavement quantities have been derived from the design modeling, but other items have been assessed by "desktop" or drive-over inspection.

The cost estimates are based on full reconstruction of a new road to a 10 metre seal width. Some economies in pavement costs may be possible by widening and strengthening of existing pavements where appropriate, but this will not have significant impact on the overall costs.

The cost estimates are presented as Expected Estimate of construction costs and 95 percentile construction cost estimate. It should be noted that the 95 percentile rough order cost (ROC) estimate is the cost estimated on the basis that no more than one project in twenty should exceed the Expected Estimate at the time of construction.

Cost estimates have been rounded to the nearest $100,000 (one hundred thousand dollars).

**Specialist Investigations**

In preparing this report it should be noted that investigations have not been carried out in specialist disciplines including geotechnical engineering, noise, social impact, ecology, environment, archaeology, cultural impact, hydraulics, consultation, planning and resource consent issues.

These items will be addressed as the preferred option is further developed.

# 2 Strategic Roading Plan: Route Refinement

## 2.1 General

There are numerous options available for routes improving or creating an arterial link between Feilding and Palmerston North, including routes around or through Bunnythorpe. These options must also be assesses to see how they meet the six Principal Drivers of the MDC discussed at the public meeting held in Bunnythorpe in May 2007.

The routes selected in the December 2006 and May 2007 studies were not considered in detail and indicated the general concept only. In order to determine the cost estimates for the six options investigated in this report, a basic horizontal and vertical alignment was designed for each to enable the calculation of earthwork volumes, land areas etc. Other factors to be considered in the determination of the options to be further evaluated include such things as property severance, structures (such as bridges and culverts), and minimisation or elimination of speed restriction zones.

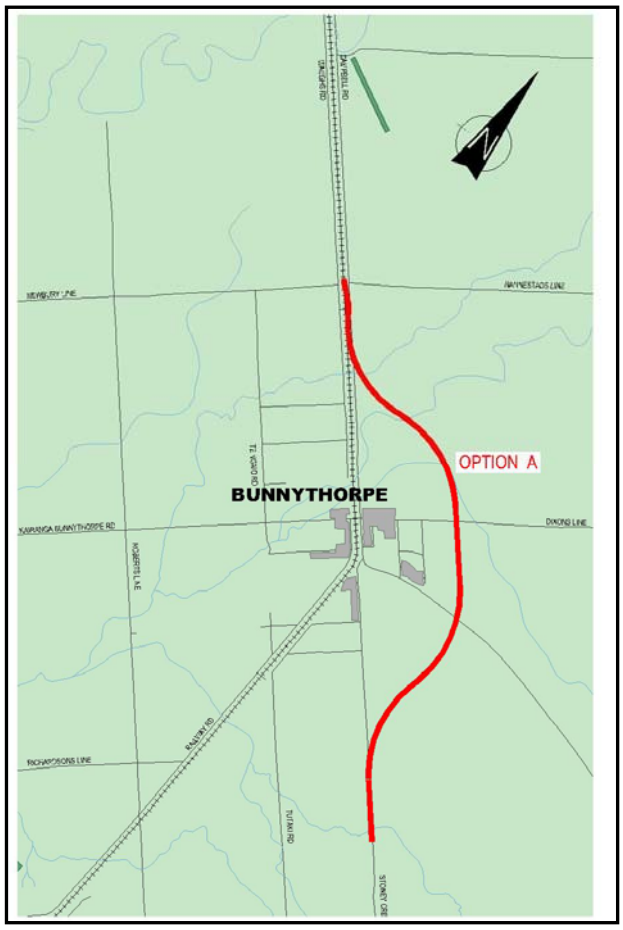
Each option encompasses the minimum distance required for connectivity to the existing roading network and additional works will be required to bring the link roads up to the same standard. For example, upgrading Campbell Road from Feilding to the start of Option A, and similarly, the upgrading of Stoney Creek Road from the end of Option A to Kelvin Grove Road (MDC/PNCC boundary) will generate a future cost. Options B to F would at some point need to cross the North Island Main Trunk railway line (NIMT) to provide a link to the EGC and Aokautere via a second bridge crossing of the Manawatu River.

The six options, A to F, are described below.

## 2.2 Option A: Bunnythorpe Eastern Bypass (Campbell Road to Stoney Creek Road)

### Description

This alignment takes Campbell Road around to the east of the Bunnythorpe sub-station at some point between Redmayne and Blackler Roads, crosses Ashhurst Road before swinging south to connect into the proposed future link to the second crossing bridge over the Manawatu River, possibly via Stoney Creek Road or Tutaki Road. The siting of the bridge and related approaches is subject to a PNCC scheme assessment investigation at the present time. At this point no particular route has been confirmed but the definition of this option has used Stoney Creek Road.




Due to the "greenfields" nature of this route it is not feasible to construct this alignment in stages.

### Principal Drivers

This route meets the drivers through the following:

- Direct connectivity to the Manawatu Gorge/Hawkes Bay region;
- Direct connectivity to Aokautere via the EGC (new second bridge);
- 100 km/hr travel speed bypass of Bunnythorpe;
- Forms an eastern leg of the rural ring road concept;
- Greenfields site; and
- No need for grade-separated[2] crossing of the NIMT.

This route fails to meet the drivers by:

- Indirect connectivity to the North East Industrial Area (NEIA);
- Increased distance between Feilding and Palmerston North; and
- Increased maintenance of an additional route to the existing network.

[2] Grade separated i.e. the road goes over or under the railway line

**Cost Estimate**

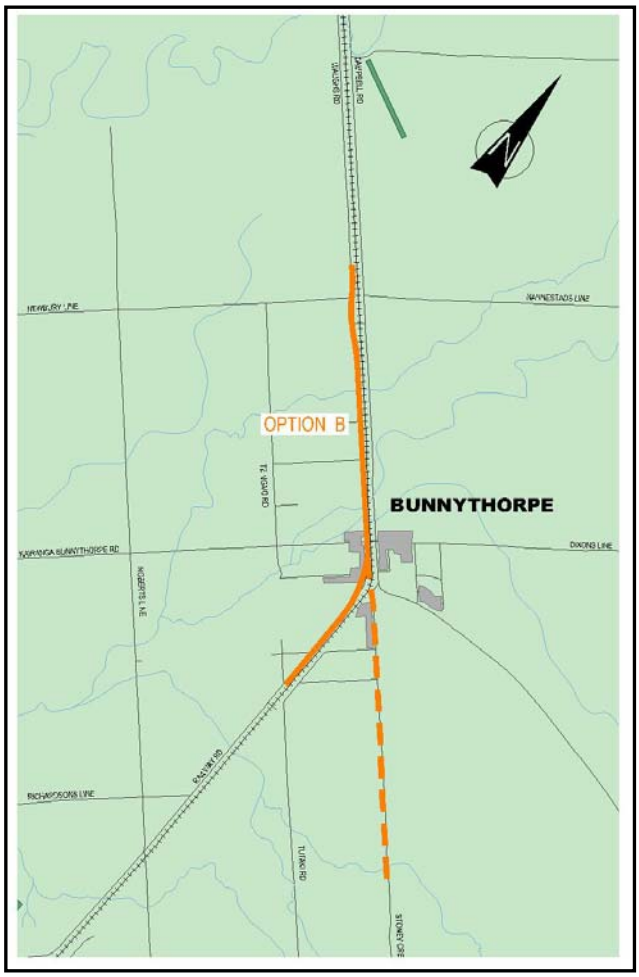
| Option | Expected Estimate (Option Estimate) | 95%ile ROC |
|---|---|---|
| | $million | $million |
| A | 15.7 | 18.2 |

**Table 1 – Cost Estimates for option A**

**BCR**

The BCR for Option A = 0.25

## 2.3 Option B: Waughs Road to Railway Road




### Description

This alignment widens and extends Waughs Road to the south, through Bunnythorpe to join Railway Road. At a later date it could be connected via an overbridge immediately south of Bunnythorpe to Stoney Creek Road if required (shown dotted).

The route consists of the following components which may form stages of the route implementation:

- Reconstruction and extension of Waughs Road through to Railway Road.

### Principal Drivers

This route meets the drivers through the following:

- o Direct connectivity to the North East Industrial Area (NEIA);
- o Utilises, in the main, the existing roading network; and
- o Forms an eastern leg of the rural ring road concept.

This route fails to meet the drivers by:

- o Severing the residential area of Bunnythorpe;
- o High impact on residential properties in Bunnythorpe; and
- o Requires a 50 km/hr zone through Bunnythorpe.

### Cost Estimate

| Option | Expected Estimate (Option Estimate) | 95%ile ROC |
|---|---|---|
| | $million | $million |
| B | 14.5 | 16.4 |

**Table 2 – Cost Estimates for option B**

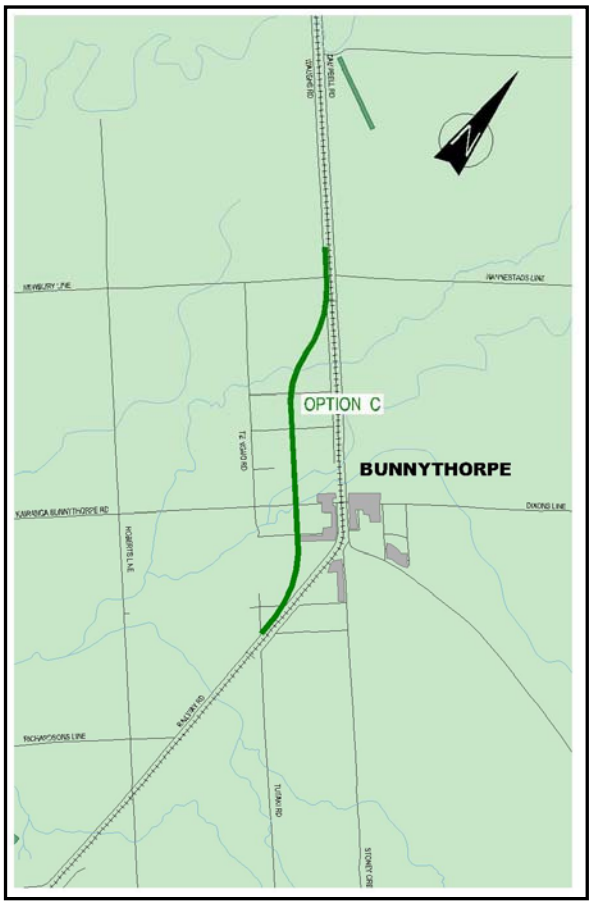
### BCR

The BCR for Option B = 0.52

## 2.4 Option C: Waughs Road via "Centre Road" (a paper road) to Railway Road

**Description**

Option C utilises a paper road, "Centre Road," to provide the link between Waughs Road to Kairanga Bunnythorpe Road then on to linking in with Railway Road.




- Construction of new link from Waughs Road to "Centre Road";
- Construction of "Centre Road" through to Railway Road; and
- Construction of tee intersection or roundabout at "Centre Road"/Kairanga Bunnythorpe Road intersection.

**Principal Drivers**

This route meets the drivers through the following:

- Direct access to the NEIA;
- Utilises, in the main, the existing roading network, albeit a paper road;
- Forms an eastern leg of the rural ring road;
- Bypasses Bunnythorpe residential area generally; and
- Could be 100 km/hr travel speed throughout (limited access arterial)

This route fails to meet the drivers by:

- No direct connectivity to the EGC, and thus Aokautere, will require a future crossing of the NIMT to do so. (Note: the connection to Railway Road can be readily adapted to include a grade-separated crossing of the railway line).

**Cost Estimate**

| Option | Expected Estimate (Option Estimate) | 95%ile ROC |
|---|---|---|
| | $million | $million |
| C | 13.8 | 16.2 |

**Table 3 – Cost Estimates for option C**

**BCR**

The BCR for Option C = 0.55

## 2.5 Option D: Waughs Road to K-B Road/Te Ngaio Road and Railway Road

### Description

This option reconstructs and extends Waughs Road through to Kairanga Bunnythorpe Road and then links from Kairanga Bunnythorpe Road through to Railway Road by reconstructing Te Ngaio Road.

- Reconstruction and extension of Waughs Road through to Kairanga Bunnythorpe Road (using in part MDC owned property);
- Reconstructing Te Ngaio Road from Kairanga Bunnythorpe Road to Railway Road; and
- Construct tee intersection (or roundabout) at Te Ngaio Road/Kairanga Bunnythorpe Road intersection.


Alternative Alignment: the alignment shown on the Option D drawing shows Kairanga Bunnythorpe Road having the priority with Te Ngaio Road being the side road. An alternative is to give priority to Te Ngaio Road by linking the Waughs Road extension to Te Ngaio Road via a large radius curve. Kairanga Bunnythorpe Road to the west would then be the side road.

### Principal Drivers

This route meets the drivers through the following:

- Direct access to the NEIA;
- Provides direct link from Feilding to Palmerston North;
- Utilises, in the main, the existing roading network;
- Forms an eastern leg of the rural ring road concept;
- Bypasses Bunnythorpe residential area; and
- 100 km/hr travel speed throughout.

This route fails to meet the drivers by:

- No direct connectivity to the EGC, and thus Aokautere, will require a future crossing of the NIMT to do so (Note: the connection to Railway Road can be readily adapted to include a grade-separated crossing of the railway line).

### Cost Estimate

| Option | Expected Estimate (Option Estimate) | 95%ile ROC |
|---|---|---|
| | $million | $million |
| D | 14.5 | 16.8 |

**Table 4 – Cost Estimates for option D**

**BCR**

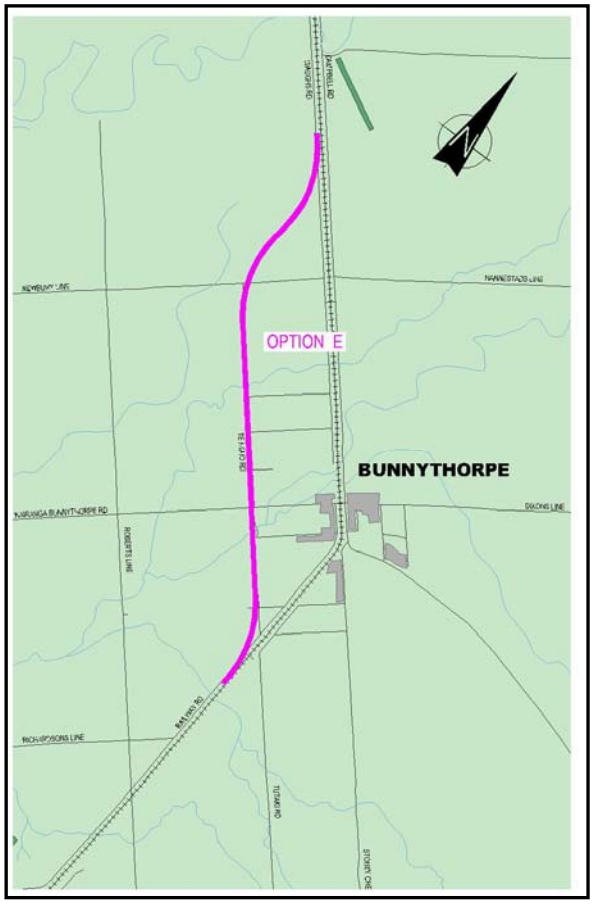
The BCR for Option D = 0.67

## 2.6 Option E: Waughs Road via Te Ngaio Road to Railway Road

### Description

This option utilises a new link from Waughs Road through to Te Ngaio Road, reconstructs Te Ngaio Road through to Railway Road.

- Construction of a new link from Waughs Road to Te Ngaio Road;
- Reconstruction of Te Ngaio Road through to Railway Road; and
- Construct tee intersection or roundabout at Te Ngaio Road/Kairanga Bunnythorpe Road intersection.




### Principal Drivers

This route meets the drivers with:

- Direct access to the NEIA;
- Utilises in the main the existing roading network;
- Forms an eastern leg of the rural ring road concept;
- Bypasses Bunnythorpe residential area; and
- 100 km/hr travel speed throughout

This route fails to meet the drivers by:

- No direct connectivity to the EGC and thus Aokautere; this will require a future crossing of the NIMT to do so (Note: the connection to Railway Road can be readily adapted to include a grade-separated crossing of the railway line and connecting to either Roberts Line south of the railway line or linking across to Tutaki Road).

### Cost Estimate

| Option | Expected Estimate (Option Estimate) | 95%ile ROC |
|---|---|---|
| | $million | $million |
| E | 14.6 | 16.9 |

**Table 5 – Cost Estimates for option E**

### BCR

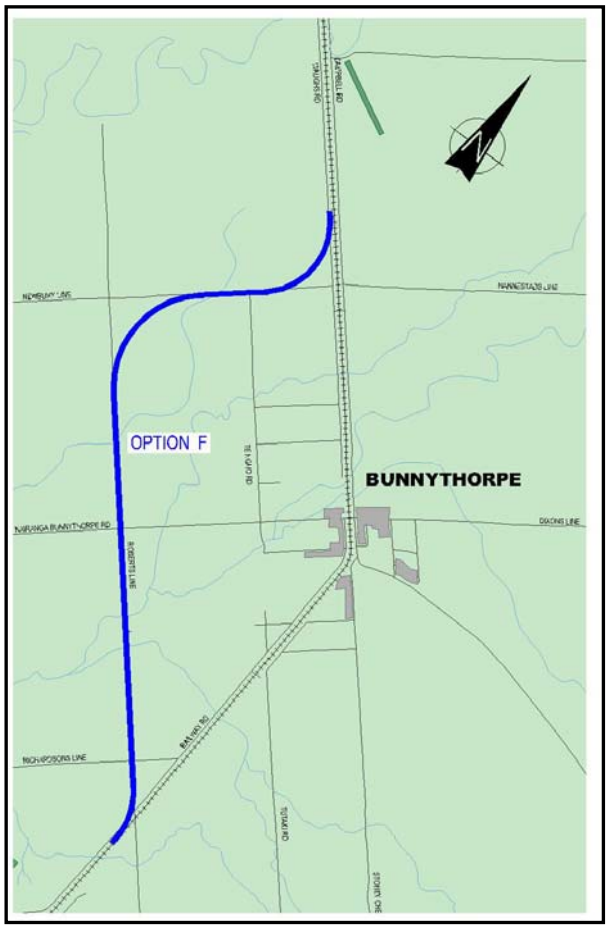
The BCR for Option E = 0.25

## 2.7 Option F: Waughs Road via Newbury Line to Roberts Line and Railway Road

**Description**

Option F Links Waughs Road through to Roberts Line via Newbury Line and then down to Railway Road.

- Construction of new link from Waughs Road to Roberts Line via Newbury Line;
- Reconstruction of Roberts Line through to Railway Road; and
- Construct tee intersection or roundabout at Roberts Line/Kairanga Bunnythorpe Road intersection.




**Principal Drivers**

This route meets the drivers through the following:

- Direct access to the NEIA;
- Direct link from Feilding to Palmerston North;
- Utilises in the main the existing roading network;
- Forms an eastern leg of the rural ring road concept;
- Bypasses Bunnythorpe residential area ; and
- 100 km/hr travel speed throughout

This route fails to meet the drivers by:

- No direct connectivity to the EGC and thus Aokautere; this will require a crossing of the NIMT to do so. The route is 2 km longer than other routes due to the start being further north on Waughs Road and the finish closer to Palmerston North than other options. (Note: the connection to Railway Road can be readily adapted to include a grade-separated crossing of the railway line).

**Cost Estimate**

| Option | Expected Estimate (Option Estimate) | 95%ile ROC |
|---|---|---|
| | $million | $million |
| F | 17.1 | 19.9 |

**Table 6 – Cost Estimates for option F**

**BCR**

The BCR for Option F = -0.02

## 2.8 Options Summary

The following table summarises whether the respective options meet or fail the Council's six principal drivers.

1. The North East Industrial Area (NEIA);
2. Feilding to Palmerston North City;
3. Milson Line closure;
4. The Eastern Growth Corridor (EGC);
5. Enhancement of the Bunnythorpe residential environment; and
6. Linkages to, and formation of part of, the proposed Rural Ring Road

| | Principal Drivers | | | | | |
|---|---|---|---|---|---|---|
| **Option** | **1** | **2** | **3** | **4** | **5** | **6** |
| A | N | Y | N | Y | Y | Y |
| B | N | Y | Y | Y | N | Y |
| C | Y | Y | Y | Y | Y | Y |
| D | Y | Y | Y | Y | Y | Y |
| E | Y | Y | Y | Y | Y | Y |
| F | Y | Y | Y | Y | Y | Y |

**Table 7: Options Summary for Principal Drivers**

It should be noted that the six drivers are not listed in order of priority.

# 3 Option Cost Estimates

A desk top evaluation of cost estimates was carried out in the May 2007 investigation. The option alignments described in this update report have been derived from a terrain data model based on a number of combined contour models of varying accuracy.

The alignment design based on the terrain data available has enabled the calculation of a number of various quantifiable items that were assumed in the earlier reports. Whilst there is a greater degree of certainty in the estimates, there still has not been any specialist investigations (see section 1.4.2 above) carried out that may impact on the cost estimates such as for example pavement depth, subgrade improvement layers, depth of undercutting in soft areas. Also, there has been no contact with Utility Owners such as power and telecommunications to determine costs for neither the relocation of any existing services nor the provision of new services locations.

The following Option Estimate figures, based on the Transit New Zealand SM014 document, include for construction, property, contingencies, and consultancy fees and are based on full geometric and pavement reconstruction (i.e. new road standard). The estimates have been based on "new road" standard in order to give valid comparison to the new routes such as the Eastern Bypass and the "Centre Road." Cost reductions are achievable, though minimal, on the other options if the existing roads are widened only on existing horizontal and vertical alignments.

The alignments, and hence project estimates identified in this report, do not represent the total work and costs required to construct an arterial link between Feilding and Palmerston North city and the wider environs encompassed by the rural ring road concept. – see note in section 2.1 also.

The costs for each option are summarised in the following table:

| Option | Expected Estimate (Option Estimate) | 95%ile ROC |
|---|---|---|
| | $million | $million |
| A | 15.7 | 18.2 |
| B | 14.8 | 16.5 |
| C | 13.8 | 16.2 |
| D | 14.5 | 16.8 |
| E | 14.6 | 16.9 |
| F | 17.1 | 19.9 |

**Table 8: Expected & 95 Percentile Rough Order Cost Estimates**

# 4 Assessment of Property Costs

Property acquisition costs and compensation estimates have been completed solely on a desktop basis. Affected properties comprise a mix of rural, lifestyle and residential (urban) sites. Market sales and rateable value information have been analysed to determine average land rates which have been applied to section lengths along each route.

Compensation has been determined on the basis that the acquisition of land will be completed pursuant to the Public Works Act 1981 and the estimates for each option represent the Net Property Cost in accordance with the Transit New Zealand Cost Estimation Manual SM014 (SM014).

# 5 Economic Evaluation of Options

Traffic modeling and economic evaluations have been carried out to determine the option benefit cost ratios (BCRs).

The Benefit Cost Ratio is defined in section 1.4.1 of this report.

The details of the traffic modeling and economic analysis are included in Appendix B and the BCRs are summarised in Table 9 below.

| Option | Medium Growth BCR |
|---|---|
| A | 0.25 |
| B | 0.52 |
| C | 0.55 |
| D | 0.67 |
| E | 0.25 |
| F | -0.02 |

**Table 9: BCR Summary**

# 6 Conclusions and Recommendations

## 6.1 Conclusions

All alignment options achieve most of the principal drivers of the MDC to some extent, but three options in particular satisfy these items to a greater degree.

Options A and B appear to be the least preferred due to either the remoteness from Palmerston North (Option A) or the impact and cost of going through Bunnythorpe (Option B).

Option F, whilst providing a good link to the city and the NEIA, increases the length of road required to be constructed in the first instance. Also, this alignment is not considered to be conducive to an attractive link to the EGC and second bridge.

Option C is deemed to be the preferred option of the six as it provides for an arterial route and at the same time allows for Waughs road and Te Ngaio Road to remain as local and/or collector roads.

If, during option development, Option C is deemed to suffer a fatal flaw[3], then two other options (D and E) are potentially worthy of more detailed assessment as 'fall back" options.

## 6.2 Recommendations

Therefore, it is recommended that Manawatu District Council:

1 Put forward Option C for further assessment, specialist investigation, and public consultation with options D and E to remain as "fall back" options if required.

[3] A fatal flaw is defined as a clear failure of any option to: -

- Meet any one of the project principal drivers;
- Meet the requirements of the Resource Management Act;
- Meet the requirements of the Land Transport Management Act; and
- Be constructed (i.e. engineering issues which cannot be overcome).

# Appendix A

# Plan of the Scheme Options

# Appendix B

# Economic Evaluation Report