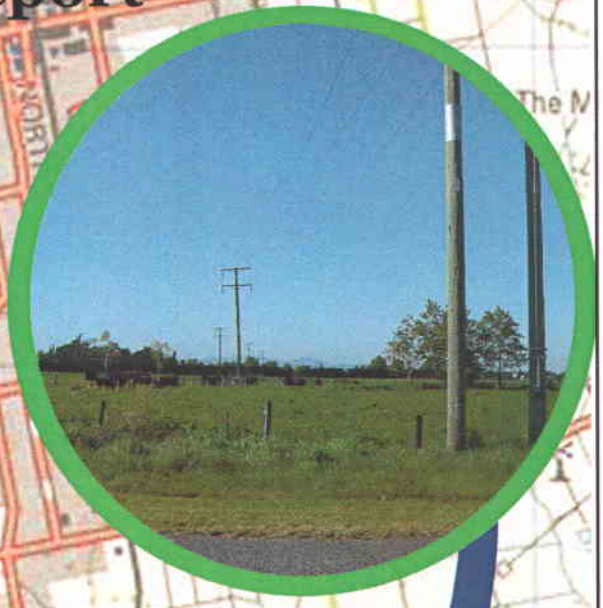
WAIMAKARIRI
DISTRICT COUNCIL

RANGIORA SOUTHERN, WESTERN & EASTERN LINK ROADS

Scheme Assessment Report

Professional Services Contract No. 03/06



OPUS
INTERNATIONAL CONSULTANTS

Waimakariri District Council
Professional Services Contract 03/06

Rangiora Southern, Western and Eastern Link Roads

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Scheme Assessment Report

Prepared By

Bill Rice
Roading Designer

Reviewed By

Bill Thew
Senior Engineer

Opus International Consultants Limited
Christchurch Office
Level 3, Te Waipounamu House
158 Hereford Street, PO Box 1482
Christchurch, New Zealand

Telephone: +64 3 363 5400
Facsimile: +64 3 365 7858

Date: February 2005
Reference: I:\waimakariri dc\dhlha.11 rangiora link roads\reports\appendices\draft sar.doc
Status: FINAL

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1 Introduction

1.1 General

The Waimakariri District Council commissioned Opus International Consultants Ltd to undertake the Rangiora Southern, Western and Eastern Link Roads Scheme Assessment in September 2003. This Scheme Assessment Report considers alignments, preliminary design and estimates for the proposed Link Roads.

The Southern, Western and Eastern Link Roads were proposed in the Rangiora Tranposrt Study, Beca, September 2001. The aims of the proposed Link Roads are:

- To provide alternative routes into Rangiora;
- Reduce congestion on the Rangiora north-to-south strategic route (Ashley/Ivory/Percival/Southbrook); and
- To service the expected household growth to the east and west of the town and industrial development to the south.

This Scheme Assessment Report considers the engineering and environmental aspects of the proposed Link Roads. The key areas addressed in the Scheme Assessment are:

- Proposed link alignments;
- Preferred intersection layouts;
- Construction staging;
- Environmental effects;
- Designation requirements;
- Consent requirements; and
- Scheme costs and economics.

Topographical and Geotechnical Survey have been undertaken for the following sections:

- Western Link (from South Belt to Johns Road);
- Eastern Link (from Lineside Road to Northbrook Road) and;
- Southern Link (as shown on the September 2003 draft Outline Development Plan).

This has been supplemented with aerial photography to carry out the preliminary design for the Link Roads.

A large number of alternatives were considered for the Southern Link, and the junction of:

- The railway crossing;
- State Highway 71;
- The Southern Link; and
- The Eastern Link.

Traffic modelling of some of these alternatives indicated little demand for a link from the West to State Highway 71. Rather, demand was indicated for a link from the West to

Flaxton Road, South of the Fernside Road intersection. Consequently, this report recommends improvements to Fernside Road, between Flaxton Road and Townsend Road, including the intersections with Townsend Road and Flaxton Road.

1.2 Background

The Rangiora area is experiencing strong population growth and this has impacted on the roading infrastructure. The Eastern Arterial, Southern Link Road, and Western Arterial were recommended improvements in the Rangiora Land Transport Study, prepared for Waimakariri District Council by Beca Carter Hollings & Ferner Ltd, September 2001.

The current main north-south route through Rangiora is approaching capacity and needs to be alleviated. The Eastern Arterial would provide a 'purpose-built', limited access, high capacity route. There are also plans for residential subdivisions to the east which could link to this arterial and be constructed as part of the new subdivision roading.

A Western Arterial route would provide an alternative for traffic travelling from and to northern and western Rangiora. It was anticipated that extending Townsend Road and constructing a new Southern Link Road from Fernside Road to SH71 Lineside Road could achieve this. Residential development to the west of the proposed Western Link is indicated on the Western Rangiora Outline Development Plans. The Southern Link was also thought to provide a good access route into the current and proposed Southbrook Industrial Area.

1.3 Projected Population Growth

The projected population figures used were obtained from the Waimakariri District Long Range Future Population Model (April 2004) (LRPM)

1.4 Projected Traffic Growth

Traffic volumes for the proposed link roads are based on output from the greater Christchurch Transportation model. The sub-model for Rangiora was upgraded during this study by Beca Carter Hollings and Ferner Ltd. The upgraded sub-models reflect the projected population trends in the April 2004 LRPM. The model has been developed for 3 different years; 1996, 2011 and 2021.

1.5 Objectives

Waimakariri District Council's objectives for this project are to produce a scheme assessment report that investigates the feasibility of the roads and provides:

- Updated project costs, benefit-cost ratios, recommended start-dates and spreads of expenditure for each alternative including likelihood of Transfund NZ financial assistance;
- Enough information to enable Land Designation Procedures under the RMA to be initiated;

- Sufficient detail to facilitate consultation with property owners;
- Sufficient engineering detail for briefing the consultant selected to prepare Preliminary Designs and revise Project Estimates;
- Estimates generally produced to Scheme Estimate (SE) standards; and
- Comments on RMA Consents and other approvals required

1.6 Corridor Protection

Many of the recommended alignments cross land which is privately owned at the moment. Because large areas of previously undeveloped land have been developed in Rangiora in recent years, it is therefore recommended that the corridors of land required for the proposed roading alignments be protected from future development. This protection would be provided by designating the land as "Future Road" in the District Scheme.

A set of Land Plans has been included in the drawings (drawings numbered 6/535/27/3604/E1 & E2, S1 - S4, W1 & W10 These show the affects of the recommended new roads and improvements on properties. The affects include:

- Property to be acquired;
- Property which will be affected during construction;
- Property which will be severed; and
- Existing road which will be stopped.

2 Site Description

2.1 Introduction

Rangiora and its surrounds are typically flat, and existing roads in the area have tended to be constructed with long straights.

There are several spring fed streams, which flow through the area. As a consequence, the new roads will need to include some significant waterway structures to cross these streams. Details of these structures are included in Appendix K.

Fig 2.1 Map of Rangiora and environs

2.2 Existing Road Network

2.2.1 Rural Approaches to Rangiora

State Highway 71 (Lineside Road) is the major access to Rangiora from the South.

The State Highway starts at the motorway junction. It then runs parallel with, and to the East of the South Island Main Trunk Railway line. It crosses the railway just south of the commercial section of Lineside Road.

The railway crossing is located at the end of a 5.5 km long straight, and is achieved with a sharp "S" bend. The posted recommended speed at the bend is 35 km/h. The road crosses the railway at an angle of 60 degrees.

The State Highway finishes at a point approximately 200 m north of the railway crossing.

The rural sections of this road have a posted speed limit of 100km/h. The cross section consists of 2 x 3.5m wide lanes, with a sealed shoulder on each side.

The geometry and cross section are adequate for its current traffic volumes. However, the projected future traffic volumes suggest that State Highway 71 is a contender for four laning at some stage in the future.

The Flaxton Road Route is an alternative route to the State Highway 71 route, and runs more or less parallel with the State Highway. It comprises Flaxton, Skewbridge, and Island Roads.

This route starts at the motorway interchange, and joins Lineside Road approximately 500m after the end of State Highway 71. It is a two lane two way road with a posted speed limit of 100km/h over its rural sections. There is a semi urban section near the motorway interchange, and a commercial section approaching the Lineside Road intersection.

The cross section of this route varies. Recently improved sections have 3.5 m lanes and sealed shoulders. Other sections have 3.3 m lanes and no shoulders.

The geometry and cross section are appropriate for the present use of this route. They are, however, inferior to those of State Highway 71.

The Rangiora Woodend Road runs from Woodend to Kippenberger Avenue. It forms an access between the growing residential areas of Woodend, and the commercial centre of Rangiora. It also provides an alternative access to the North Eastern areas of Rangiora.

The popularity of this route is likely to increase if the motorway is extended to Woodend, and/or a bypass around Woodend is constructed. This route is a two lane, two way road with a posted speed limit of 100km/h over its rural sections. Its cross section is similar to Flaxton Road.

Oxford Road is the main route into Rangiora from the West, and provides the main link from Rangiora to the lifestyle blocks developing to the West, and to Oxford and Fernside.

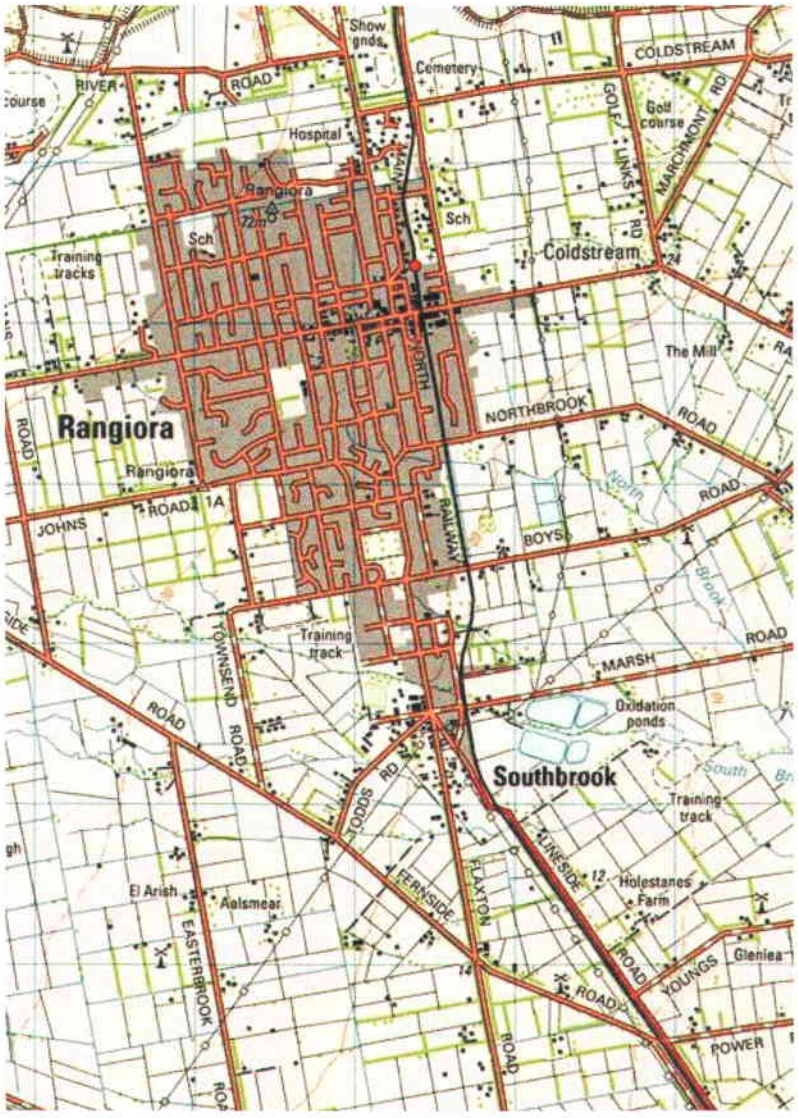
Fernside Road links Oxford Road and Flaxton Road, and provides a bypass around Rangiora for traffic from Oxford Road heading south. It is a two lane, two way road

with minimal shoulder widths. Fernside Road crosses the Flaxton Drain (No. 7) immediately adjacent to the intersection with Flaxton Road.

The intersection with Flaxton Road is at an acute angle. The culvert across the Flaxton Drain (No. 7) carries a weight restriction, and is very narrow.

To the East of Flaxton Road, Fernside Road links to State Highway 71. The intersection between Fernside Road and the State Highway is very close to the Fernside Road railway crossing. This provides insufficient stacking length for long vehicles. This intersection has a poor crash record.

The Northern Access to Rangiora crosses the Ashley River bridge, and continues into Rangiora via Ashley Street.



2.2.2 Urban Connector Roads within Rangiora

From South to North the main route through Rangiora starts at the end of State Highway 71, and follows Lineside Road, Southbrook Road, Percival Street, Ivory Street, and Ashley Street.

Flaxton Road meets this route at the complex six arm intersection between Lineside Road, Flaxton Road, Todds Road, Ellis Road, Southbrook Road and Station Road.

The Rangiora Woodend Road joins Kippenberger Avenue to the East of Rangiora. High Street and Ashley Street, from the north meet the through route at the Red Lion corner. Red Lion corner is further complicated by being the access to the High Street shopping precinct.

An upgrade of the Red Lion corner is proposed by Council.

The North South through route passes through densely developed commercial and residential areas. It serves two conflicting purposes: It is a through route, and it provides access to properties adjacent to it.

These conflicting purposes can result in increased accidents, and a reduction in roadway capacity.

This route is likely to suffer from significant congestion, if the traffic volumes on it continue to grow.

2.3 Southern Rangiora (Fernside Rd)

2.3.1 Land Use and Proposed Developments

The section of Fernside Road which is being studied runs from Flaxton Road to Townsend Road. The land use on both sides of this section is presently rural.

The block of land bounded by Fernside Road, Flaxton Road and Todds Road is zoned rural in the WDC Proposed District Plan. The land use on a strip of this land immediately to the north of Fernside Road is likely to become rural-residential.

Many rural blocks around Rangiora have been subdivided into small holdings or lifestyle blocks. It is likely that there will be pressure to subdivide many of the blocks adjacent to Fernside Road, which are not part of the area outlined for development in the Outline Development Plan.

Fernside Road also forms a link between Flaxton Road and the proposed residential developments to the West of Rangiora.

2.3.2 Geology and Groundwater

The land surrounding Fernside Road is typically flat rural land.

The geology is typically made up of:

- Topsoil on
- Peaty material on
- Gravels.

NOTE: Due to the change in focus part way through the project, minimal investigations have been carried out in this area.

There are a number of spring fed streams in the region, and the ground water table is typically quite high. Fernside Road crosses the following waterways:

- Flaxton Drain (No. 7) immediately beyond the Fernside Road, Flaxton Road intersection; and
- An unnamed stream near to the Fernside Road, Todds Road intersection. Both Fernside Road and Todds Road cross this stream;

2.3.3 Landscape and Environment

Fernside Road passes through a flat rural landscape. This landscape includes the following features:

- Shelter belts on boundaries; and
- Planting associated with five homes on rural properties.

2.4 Southern Rangiora (Ryans Place Extension)

2.4.1 Land Use and Proposed Developments

The existing section of Ryans Place is the first phase of an industrial subdivision, which runs off Flaxton Road. It has the following features:

- Approximately 100m long;
- 16m road reserve.
- Kerb and channel on both sides;
- Footpath on one side;
- No formed cul-de-sac head, enabling it to be readily extended; and
- Existing industrial operations on both sides of the road.

The land between the end of Ryans Place and Lineside Road is currently undeveloped vacant land. However, there are recent industrial subdivisions to the north and west of this block. It is therefore likely that this block will be further developed in the near future.

The proposed Ryans Place extension is totally on privately owned land, in one title.

2.4.2 Geology and Groundwater

No geotechnical investigation has been carried out in this area as part of this report. However, investigations have been carried out for the design of sewer works in this area.

These investigations, along with those conducted elsewhere for this report suggest elsewhere the geology is typically made up of:

- 0.4 m topsoil on
- 0.4 m peaty material on
- Gravels.

The ground water table is typically quite high.

The proposed Ryans Place extension does not cross any significant water courses.

2.4.3 Landscape and Environment

The property to the east of Ryans Place includes the following features:

- A shelter belt on the Eastern boundary;
- High tension overhead power lines and associated pylons to the North; and
- Some portable grain storage silos.

2.5 Southern Rangiora (SH71, Eastern Link, Ryans Place intersection and Railway Crossing)

2.5.1 Land Use and Proposed Developments

This section of State Highway 71 is the southern gateway to Rangiora. The Highway runs parallel with, and then crosses, the South Island Main Trunk Railway line.

There are five distinctive land uses adjacent to the highway and railway line:

1. **The Waimakariri District Council Waste Transfer Station.** This is located to the south west of the railway line. It's sole access is from Flaxton Road.

2. **Small Rural Holdings.** These are located to the south east of the highway. Waimakariri District Council has recently purchased the property which is most affected by this alignment.

3. **The Rangiora Sewage Treatment Plant.** This is located to the east of the highway. It's sole access is from Marsh Road.

4. **Undeveloped Vacant Land.** This is located to the west of the railway line and is the block which the Ryans Place extension will pass through. This is likely to be developed for industrial purposes in the near future.

5. **Commercial Properties.** These are located at the north west of the Highway. The site nearest to the railway crossing currently operates as a car sales yard.

2.5.2 Geology and Groundwater

The land surrounding the proposed realignment and intersections is generally flat and undeveloped.

The exception is the car sales yard to the north west of the realignment, which consists of a paved hard stand area.

No geotechnical investigation has been carried out in this area as part of this report. However, investigations have been carried out for the design of sewer works in this area.

These investigations, along with those conducted elsewhere for this report suggest elsewhere the geology is typically made up of:

- 0.4 m topsoil on
- 0.4 m peaty material on
- Gravels.

There are a number of spring fed streams in the region, and the ground water table is typically quite high.

The highway crosses an existing stream near the northern boundary of the former Smith property.

2.5.3 Landscape and Environment

The realignment and intersections are located in a flat rural and industrial landscape. This landscape includes the following features:

- The existing highway;
- The existing railway line;
- Shelter belts on boundaries;
- Planting adjacent to the waterway;
- Oxidation ponds, and associated industrial style buildings;
- Sealed hard standing area and planting associated with a car sales yard; and
- High tension overhead power lines and associated pylons to the North.

2.6 Western Link (Townsend Road from Fernside Road to South Belt)

2.6.1 Land Use and Proposed Developments

Townsend Road runs from Fernside Road to South Belt. The land use on both sides of Townsend Road is presently rural.

Many rural blocks around Rangiora have been subdivided into small holdings or lifestyle blocks. It is likely that there will be pressure to subdivide many of the blocks adjacent to Townsend Road.

2.6.2 Geology and Groundwater

The land surrounding Townsend Road is typically flat rural land.

The geology is typically made up of:

- 0.2m of topsoil on
- 0.8m of peaty material on
- Gravels.

There are a number of spring fed streams in the region, and the ground water table is typically quite high. Townsend Road crosses the following waterways:

- An unnamed stream approximately 170m north of Fernside Road and;
- South Brook, approximately 150m south of South Belt.

The following watercourses run parallel with Townsend Road:

- An unnamed drain on the Eastern side of Townsend Road, from 500m south of South Brook to the South Brook crossing and;
- An extension of the Pentecost Road drain, on the Western side of Townsend Road, from the South Brook crossing to South Belt.

2.6.3 Landscape and Environment

Townsend Road passes through a flat rural landscape. This landscape includes the following features:

- Shelter belts on boundaries; and
- Planting associated with five homes on rural properties.

2.7 Western Rangiora (West Belt to Townsend Road)

2.7.1 Land Use and Proposed Developments

The proposed new section of the Western Link passes towards the rear of a series of small holdings. These properties front on to Pentecost Road.

There are three properties to the west of the proposed Western Link. Two of these are larger rural holdings. The third property, at the Johns Road end of the alignment, is a residential block.

The land on both sides of the Western Link is zoned rural. Land to the East of Pentecost Road is zoned residential. Properties in this area have been recently subdivided.

The property on the North East quadrant of the West Belt, Johns Rd, Western Link intersection has been subdivided during the preparation of this report. Construction has commenced on homes on some of those new sections.

2.7.2 Geology and Groundwater

The land surrounding The Western Link is typically flat rural land.

The geology is typically made up of:

- 0.2m of topsoil on
- 1.5m of peaty material on
- Gravels.

There are a number of spring fed streams in the region, and the ground water table is typically quite high. The Western Link crosses the Pentecost Drain at South Belt.

2.7.3 Landscape and Environment

The Western Link passes through a series of five small holdings in a flat semi-rural landscape. These properties typically include the following features:

- Shelter belts on boundaries; and
- Planting associated with homes on the properties.

2.8 Eastern Link Part A (Lineside Rd to Northbrook Rd)

2.8.1 Land Use and Proposed Developments

a) Lineside Road to Marsh Road

This section of the Eastern Link passes through land adjacent to the Rangiora Sewage Treatment plant. This land is currently owned by the Waimakariri District Council.

Buildings associated with the operation of the plant have been erected on either side of an accessway between the oxidation ponds and Marsh Road.

It's close proximity to the sewage treatment plant makes this land undesirable for future development.

b) Marsh Road to Northbrook Road

This section of the Eastern link passes through the Spark Brothers dairy farm.

Many of the properties adjacent to this property have been subdivided into small holdings. It is possible that this property could be likewise subdivided in the future.

2.8.2 Geology and Groundwater

The land surrounding this section of The Eastern Link is typically flat rural land.

The geology is typically made up of:

- 0.3m of topsoil on
- 0.5m of peaty material on
- Gravels.

The depth to gravel tends to be deeper towards the north of the alignment.

There are a number of spring fed streams in the region, and the ground water table is typically quite high. This section of the Eastern Link crosses the following water courses:

- South Brook, approximately 100m south of Marsh Road;
- A significant unnamed stream, approximately 400m north of Marsh Road;
- A minor drain approximately 650m north of Marsh Road;
- A minor drain approximately 200m south of Boys Road;
- A minor drain adjacent to Boys Road;
- North Brook, approximately 450m north of Boys Road; and
- A spring fed waterway at Northbrook Road.

2.8.3 Landscape and Environment

Lineside Road to Marsh Road

The Eastern Link passes through land associated with the Rangiora Sewage Treatment Plant. This land is typically flat rural pasture. It includes the following features:

- Oxidation ponds and associated works;
- Shelter belts on boundaries;
- Trees adjacent to South Brook;
- Buildings and access ways associated with the Treatment plant, near to Marsh Road; and
- High tension overhead power lines and associated pylons between Marsh Road and the oxidation ponds.

Marsh Road to Northbrook Road

This section of the Eastern Link passes through the Spark Brothers dairy farm. This property is typically flat, rural pasture. It includes the following features:

- Shelter belts on boundaries;
- High tension overhead power lines and associated pylons near to Marsh Road;
- Trees adjacent to North Brook; and
- Landscape and plantings associated with the home and other buildings at Spark Lane.

2.9 Eastern Link Parts B & C (Northbrook Rd to Coldstream Rd)

Geotechnical investigations elsewhere indicate that the peat depth increases closer to the Ashley River. We would, therefore expect the depth of peat in this area to be in the region of 1.5 to 2.5.

We would expect this land to have a high water table.

The land is typically flat, but includes shelter belts, houses, and ancillary farm buildings.

2.9.1 Eastern Link Part B (North Brook to Kippenberger Ave)

This section of the Eastern Link passes through rural pasture land. The Outline Development Plan makes provision for this land to be zoned residential. This land is expected to be subdivided into residential lots.

2.9.2 Eastern Link Part C (Kippenberger Ave to Coldstream Road)

This section of the Eastern Link passes through rural pasture land.

There has been some recet development along Kippenberger Avenue, including the Lamb and Hayward Funeral Home and Crematorium.

There is likely to be pressure to further develop land in the vicinity of Kippenberger Avenue.

2.9.3 Blackett Street Extension

The Eastern end of the Blackett Street extension passes through rural pasture land. The Western end passes through developed industrial land, and crosses the railway line.

Summary

The new links are generally proposed to be built on land which is on the outskirts of Rangiora.

Much of this land has been subdivided into small rural holdings.

Rangiora is growing quickly. This puts pressure on rural land on the outskirts of town to be further subdivided and developed. Most of the land the new links pass through is likely to come under pressure for further subdivision and development.

The land surrounding Rangiora is typically flat rural land.

The geology of the area is generally made up of topsoil on peaty material on gravel. The depth of peaty material is quite variable, but tends to get deeper nearer to the Ashley River.

There are a number of spring fed streams in the region, and the ground water table is typically quite high.

Generally the landscape consists of rural pasture land, with a number of shelter belts. There are other isolated plantings, often associated with buildings or watercourses.

3 Problem Description

3.1 General

Rangiora has experienced rapid growth in the past few years. This has resulted in significant pressure on the existing road network.

The Long Range Future Population Model indicates that rapid growth is likely to be sustained in Rangiora for some time with further residential subdivisions planned in the east and west as well as an industrial subdivision in the Southbrook area. This will result in further pressure on the road network.

Increased traffic volumes on the existing network will result in:

- Increased congestion;
- Increased travel times;
- Increased accident rate; and
- Reduced amenity value for properties adjoining the network (due to noise, air pollution etc).

Sixty percent of Rangiora's working population commute to Christchurch for work. A similar proportion of those living in rural areas around Loburn and Ashley also work in Christchurch, and so drive through Rangiora. This results in morning and evening peaks on the routes south of Rangiora.

State Highway 71 (Lineside Road) is the primary route between Rangiora and the Northern Motorway. Flaxton Road forms a secondary route.

These two routes converge at the Lineside Road, Flaxton Road, Todds Road, Southbrook Road, Station Road intersection. From there the Southbrook Road, Percival Street, and Ivory Street route is the primary route into and through Rangiora.

This route passes through densely developed commercial and residential areas. It serves two conflicting purposes: It is a through route, and it provides access to properties adjacent to it.

3.2 Traffic Conditions

Level of Service

Road capacity and efficiency is generally stated in terms of the "Level of Service" (LOS) to road users. As the amount of traffic increases the level of service reduces. Level of Service is represented by a six-point scale from "A", excellent service with no vehicle interaction to "F", poor service with HCV interaction resulting in congested traffic travelling at crawl speeds. The LOS are described in "Austroads Roadway Capacity 1998" as follows:

A: Free flow (virtually no delays).

B: Stable flow, reasonable freedom to manoeuvre (slight delays).
C: This is also in the zone of stable flow, but restricted in freedom to manoeuvre to some extent (some delays).
D: Close to limit of stable flow, approaching unstable flow, little control over speed and manoeuvre (tolerable delays).
E: Volumes are at or close to capacity. No freedom to select desired speeds or to manoeuvre. Unstable flow and minor disturbances within the traffic stream will cause breakdown (intolerable delays).
F: Forced flow (excessive delays).

Projected Annualised Average Daily traffic volumes on the main South North route through Rangiora, and their corresponding Levels of Service are shown in table 3.1 below:

Street	2000		2011		2021	
	Volume (AADT)	Level of Service	Projected Volume (AADT)	Level of Service	Projected Volume (AADT)	Level of Service
Lineside Road (South of Southbrook Road	5,800	A	13,000	D	16,000	D
Flaxton Road (South of Lineside Road	3,700	A	5,200	A	4,300	A
Southbrook Road (North of Lineside Road	17,000	D	18,000	E	23,000	E
Percival Street (North of South Brook)	10,000	C	17,000	D	21,000	E
Northbrook Road (West of Ivory Street)	11,000	C	10,000	C	13,000	D
Ivory Street (North of Northbrook Road)	8,600	B	5,700	A	6,600	B
High Street (West of Ivory Street)	5,200	A	10,000	C	12,000	C
Ashley Street (Blackett Street to Kingsbury Avenue)	8,900	B	9,100	B	12,000	C

Table 3.1 Projected Traffic Volumes and Levels of Service

NOTE:

- The above table gives the predicted traffic volumes and Levels of Service assuming none of the proposed links are built.
- Refer to drawing sheet 5604/6/35/27/5604/P501 to 503 for a full summary of predicted traffic volumes.

Summary

The expected population growth in Rangiora will put the existing South North route through Rangiora under increasing pressure.

Lineside Road, Southbrook Road and Percival Street are critical. They are predicted to reach D or E levels of service by 2011. All of them are predicted to reach, or be close to, E level of service by 2021.

These levels of service are likely to be indicated by:

- Significant congestion on the route;
- Excessive delays both on the route, and crossing or entering it;
- Considerable variability of travel times from day to day; and
- Degradation of amenity values in adjacent properties.

4 Data Collection and Analysis

4.1 Topographical Survey

A topographical survey was carried out for the alignments of the link roads proposed in the Outline Development Plan. The following alignments were surveyed:

- Southern Link Part A, from Fernside Road to Flaxton Road, near the entrance to the transfer station;
- Southern Link Part B, from Flaxton Road, near the entrance to the transfer station, to State Highway 71, south of the transfer station;
- State Highway 71, from south of the transfer station to north of the railway crossing;
- Western Link, from South Belt to Johns Road;
- Townsend Road, from Fernside Road to South Belt; and
- Eastern Link Part A, from Lineside Road to Northbrook Road.

All of the links above, except Townsend Road, were surveyed using Global Positioning System equipment.

Townsend Road was surveyed using Total Station equipment.

4.2 Traffic Modelling

The greater Christchurch Transportation model was used as the basis for the traffic modelling for this report.

A sub model for Rangiora was originally developed by Beca, and upgraded to reflect the projected population trends in the Long Range Population Model (2004). Sketches of each scenario modelled are included in Appendix H.

The features of the "Do Minimum" option include:

- An upgrade of the Red Lion corner. Planning and design for this upgrade is being carried at the moment. It is proposed to construct the upgrade in the near future.
- Part B of the Eastern Link to be constructed to developer standard. This will be done, by others as part of the Outline Development Plan.
- SH 71 (Lineside Road) four laned. This is included so as to avoid giving a false bottleneck.

The scenarios modelled are described in Table 4.1 below:

Scenarios	Description
Do Minimum	• Red Lion corner upgraded; • Eastern Link (Part B) constructed between Northbrook Road and Kippenberger Avenue to developer standard; and • SH 71 (Lineside Road) 4 laned.

Scenarios	Description
1	As per Do Minimum plus: • Southern Link, Parts A and B, Ryans Place extension.
2	As per Do Minimum plus: • Southern Link, Parts A and B, Ryans Place extension; • Western Link; and • Right Turn Bay at Fernside Road, Townsend Road Intersection.
3	As per Do Minimum plus: • Western Link; • Right Turn Bay at Fernside Road, Townsend Road Intersection.
4	As per Do Minimum plus: • Eastern Link, Part A.
5	As per Do Minimum plus: • Eastern Link, Part A; • Southern Link, Parts A and B, Ryans Place extension; • Western Link; and • Right Turn Bay at Fernside Road, Townsend Road Intersection.
6	As per Do Minimum plus: • Eastern Link, Part A; • Eastern Link, Part C; • Southern Link, Parts A and B, Ryans Place extension; • Western Link; and • Right Turn Bay at Fernside Road, Townsend Road Intersection.
7	As per Do Minimum plus: • Eastern Link, Part A; • Blackett Street extension; • Southern Link, Parts A and B, Ryans Place extension; • Western Link; and • Right Turn Bay at Fernside Road, Townsend Road Intersection.
8	As per Option 7, except: • Lineside Road 2 Lanes.

Scenarios	Description
9	As per Do Minimum plus: • Eastern Link, Part A; • Blackett Street extension; • Southern Link, Parts A and B, joining Lineside Road south of the transfer station; • Western Link; and • Right Turn Bay at Fernside Road, Townsend Road Intersection.
10	As per Do Minimum plus: • Eastern Link, Part A; • Roundabout at the Fernside Road, Lineside Road intersection; • Western Link; and • Right Turn Bay at Fernside Road, Townsend Road Intersection.

Table 4.1: Transportation Scenarios Do Minimum 1 to 10 Modelled

This modelling indicated little demand on the Southern Link between Flaxton Road and Lineside Road (approximately 600 Vehicles per Day (VPD) in 2021). However, it did indicate a significant demand on Fernside Road between Townsend Road and Flaxton Road (approximately 8000 VPD in 2021).

Three additional options were then modelled as described in Table 4.2 below:

Scenarios	Description
11	As per Do Minimum plus: • Eastern Link Part A; • Blackett Street Extension; • Internal subdivision road from Fernside Road to Flaxton Road. Fernside Road priority; • Ryans Place extended to Lineside Road; • Western Link; • Southern Link now Fernside Road (West of Flaxton Road); and • Rounabout at Fernside Road, Flaxton Road intersection.
12	As per Do Minimum plus: • Eastern Link Part A; • Blackett Street Extension; • Internal subdivision road from Fernside Road to Flaxton Road. Fernside Road priority; • Ryans Place extended to Lineside Road; • Western Link; • Southern Link now Fernside Road (West of Flaxton Road); and • Fernside Road, Flaxton Road intersection realigned. Fernside Road

Scenarios	Description
	priority.
13	As per Do Minimum plus: • Eastern Link Part A; • Blackett Street Extension; • Internal subdivision road from Fernside Road to Flaxton Road. Fernside Road priority; • Ryans Place extended to Lineside Road; • Western Link; • Southern Link now Fernside Road (West of Flaxton Road); and • Fernside Road, Flaxton Rod intersection realigned. Flaxton Road priority.

Table 4.2: Transportation Scenarios 11 to 13 Modelled

Following this phase of the modelling the three intersection arrangements at the Fernside Road, Flaxton Road intersection were ranked according to savings in travel time costs, vehicle operating costs and accident costs. The ranking was as follows:

1. Fernside Road priority
2. Flaxton Road priority
3. Roundabout

4.3 Geotechnical Testing and Assessment

Geotechnical investigations were carried out for the alignments of the link roads proposed in the Outline Development Plan.

The on site investigations consisted of:

- Hand auger holes;
- Scala Penetrometer and; and
- Mechanically excavated test pits.

The following alignments were investigated:

- Southern Link Part A, from Fernside Road to Flaxton Road, near the entrance to the transfer station;
- Southern Link Part B, from Flaxton Road, near the entrance to the transfer station, to State Highway 71, south of the transfer station;
- State Highway 71, from south of the transfer station to north of the railway crossing;
- Western Link, from South Belt to Johns Road;
- Townsend Road, from Fernside Road to South Belt; and
- Eastern Link Part A, from Lineside Road to Northbrook Road.

The results of these investigations are included in Appendix O.

Summary

The initial data collection and analysis concentrated on the areas previously identified as being likely routes for the Southern, Western and Eastern links. Traffic modelling identified a route utilising the existing Fernside Road alignment as the preferred route for the Southern Link. This route is a significant departure from the previously identified route.

This change in focus has meant that minimal survey or geotechnical investigation has been done on the preferred Southern route.

We therefore recommend that further survey and Geotechnical investigations be carried out on the preferred Southern link alignment during the design phase.

5 Preliminary Design Philosophy Statement

5.1 Introduction

This statement describes the criteria, which were used in developing the design and drawings for the Scheme Assessment Report. It also outlines the criteria which we recommend be used to further develop the scheme design and drawings into construction drawings.

5.2 Basis of design

The proposed Link Roads aim to provide alternative routes into Rangiora, and thus:

- Reduce congestion on the Rangiora north-to-south strategic route (Ashley, Ivory, and Percival Streets, and Southbrook Road);
- Reduce the numbers of heavy vehicles travelling through Rangiora to service the new South Brook industrial area; and
- Service the expected household growth to the east and west of the town and industrial development to the south.

The detailed design shall be in accordance with the Scheme Assessment Report.

5.3 Design Standards

The following design standards were used in developing this Scheme Assessment Report:

- Waimakariri District Council Engineering Code of Practice (1999);
- Transit NZ Draft State Highway Geometric Design Manual 2000 SHGDM (2001 plus amendments);
- Transit NZ Manual of Traffic Signs and Markings MOTSAM (2004 plus amendments);
- Austroads Road Design Series – Urban Road Design (2002 plus amendments);
- Austroads Road Design Series – Rural Road Design (2003);
- Austroads Guide to Traffic Engineering Practice – Part 5 Intersections at Grade (1988 plus amendments);
- Austroads Guide to Traffic Engineering Practice - Part 6 Roundabouts (1993 plus amendments);
- Transit NZ Bridge Manual;
- Austroads Waterway Design Guide (1994);
- LTSA Road and Traffic Standards - RTS 10 Road Signs and Markings for Railway Level Crossings (2000);
- LTSA Road and Traffic Standards – RTS 15 Guidelines for Urban – Rural speed Thresholds; and
- Auckland Regional Council Technical Publication No.90 – Erosion and Sediment Control Guidelines for Land Disturbing Activities in the Auckland Region.

5.3.1 Landscape Philosophy

Rangiora and its surrounding farmland sit within a landscape that is described in the "Canterbury Regional Landscape Study" (1993) as 'Low Altitude Plains Landscapes'. This landscape type is described as consisting of *"broad outwash plains and inland basins of recent gravels and silts. Broad, open landscapes with little topographical relief, traversed by wide, braided riverbeds with associated terraces and wetlands. Shallow droughty soils and variable loess cover.*

Because of their relatively simple landforms these landscapes are generally dominated by their agricultural landuse often with regular geometric paddocks, wire fencing, gorse hedges or coniferous shelter. The topography and scale of enclosing hills and mountains and the extent of the plains themselves are critical to their landscape quality. These lowlands are where the majority of Cantabrians live and the plains are dotted with houses, farms, towns and the city of Christchurch. Roads and utilities such as overhead lines are generally prominent features.

Because of the lack of landform variety, it is landcover and landuse patterns that dominate the character of the Plains. The landscape is perceived as un-natural apart from its soils, the limited remnant natural features such as wetlands, forest, shrubland and grassland pockets, and the braided rivers."

The regional landscape study does not note any national or regionally outstanding natural features in the Rangiora area. The landscape around the town does differ from that of the broader Plains landscape in that it is influenced by a higher water table, numerous streams and watercourses and better quality soils. This is particularly evident to the east of the town where several spring-fed streams converge and dairy farming is a dominant landuse. Much of this area was swamp in pre-colonial times.

In terms of an overlying landscape design philosophy for the proposal, Waimakariri District Council does not have a stated landscape criteria for roading. In lieu of this, relevant principles from the Transit NZ "Guidelines for Highway Landscaping" (Manual SP/M020, December 2003) could be applied. These guidelines cover how to improve the aesthetics of roading developments while maintaining necessary road safety standards.

The overall intent of landscape input to the proposal is to maximize the landscape opportunities of the new road links such as views to the town and its rural surroundings, while minimizing landscape constraints such as removal of mature vegetation. Landscape mitigation measures would be designed to enhance the landscape setting of the link roads and limit potential visual effect. These measures would also act to integrate the stormwater control measures and any noise barriers that may be necessary with the local landscape.

An appropriate landscape treatment for the link roads would be designed that is consistent with recent landscape initiatives on Lineside Road on the southeast approach to Rangiroa. The plant species that will be selected for the plantings on the proposed link roads would be of hardy varieties with minimal maintenance requirements. The planted areas will be mulched to limit the need for weeding and to provide protection against drought. It is anticipated that any new plantings would be maintained in the same manner as existing plantings on Lineside Road.

5.3.2 Stormwater Treatment

The key principals to prevent erosion and control sediment during the construction of the new Rangiora Link Road alignments and the installation of several culverts are:

1. Where possible, undertake progressive revegetation.
2. Erosion and sediment control measures are in place throughout the entire construction stage.
3. Where necessary use diversion channels to divert sediment laden runoff to sediment retention ponds and divert clean stormwater runoff away from earthwork sites.
4. Where necessary use sediment retention ponds in order to treat sediment-laden runoff and reduce the volume of sediment entering waterways.
5. Protect sensitive areas such as waterways.
6. Stabilise exposed areas rapidly.

The erosion and sediment control measures proposed were developed by the Auckland Regional Council (ARC) and are documented in the ARC Technical Publication No.90 - Erosion and Sediment Control Guidelines for Land Disturbing Activities in the Auckland Region.

5.4 Southern Link Part A

Alternatives involving a new link from Fernside Road, near Todds Road, to Flaxton Road were considered. The preferred alternative involves utilising the existing Fernside Road pavement wherever possible, and upgrading the Fernside Road, Flaxton Road intersection.

Refer to drawing sheets P001, and P300-311.

5.4.1 Design Speeds

The WDC Engineering code of practice recommends a design speed of 60km/h for arterial roads in Residential or business zones and 100 km/h in all rural areas. This alignment is on the urban rural fringe, and will form a continuation of Fernside Road, and/or Flaxton Road. The preceding sections of both roads are straight flat sections of rural road.

We recommend a design speed of 90 km/h for the curved realignment associated with the Fernside Road, Flaxton Road intersection. Our reasons are as follows:

- Flaxton Rod meets the new alignment on the outside of the curve.
- Vehicles turning out of Flaxton Road will experience adverse crossfalls, which can contribute to overturning of high vehicles.
- Adverse crossfall can be reduced by either increasing the curve radius, or decreasing the operating speed.
- A 90 km/h design speed curve provides a reasonable compromise between the conflicting demands of:
  - Providing a high consistent design speed;
  - Minimising adverse crossfall; and
  - Minimising construction and property costs.

5.4.2 Cross Sections

Fernside Road, Flaxton Road Intersection

The cross section for a section of new alignment associated with intersection improvements consists of the following features:

- 3.5m wide Right Turn Bay and tapers;
- 1 x 3.5m traffic lane in each direction;
- 1 x 2.5m shoulder on each side (1.5m wide at Right Turn Bay);
- Curve widening in accordance with section 9.10 of Austroads Rural Road Design Guide;
- Superelevation on curves, or 3% crossfall on straights;
- Drainage to swale;
- 5:1 cut and fill batters; and
- 3.5 m wide "clear zone" on each side.

The clear zone is a zone clear of obstacles which may pose a hazard to an errant vehicle. Such obstacles include steep banks and culvert headwalls. The clear zone is measured from the edge of the traffic lane.

Fernside Road Upgrade

The finished cross section for the upgrading of Fernside Road consists of the following features:

- 1 x 3.5m traffic lane;
- 1 x 1.5m sealed shoulder;
- 1 x 1.0m unsealed shoulder;
- 3.0% cross fall;
- Swale drain; and
- 3.5 m clear zone on each side.

The above features are located centrally about the existing pavement. The existing pavement will be strengthened as necessary. Refer to drawing sheet P101.

The clear zone is a zone clear of obstacles which ma pose a hazard to an errant vehicle. Such obstacles include steep banks and culvert headwalls. The clear zone is measured from the edge of the traffic lane.

5.4.3 Geotechnical Investigation

Gravel was generally found at shallower depths in the southern extremes of the investigations. The investigations in the vicinity of Southern improvements showed the depth to gravel soils between 0.5 and 1.0 m.

CBR results varied throughout the scheme, but were generally higher in the southern part of the scheme.

Laboratory soaked CBR tests provided consistently lower CBR results than the in-situ scala penetrometer tests. It is possible that the fair weather during the investigation period raised inferred CBR results.

The soaked CBR is low (down to 0.5%) in the silts and organic soils over the general area of the investigations.

We estimate that the soaked CBR values will be approximately 12% in the sand / gravel soils. This must be confirmed during the design stage with further testing.

5.4.4 Pavement Design

As high water tables are present on site, we recommend that detailed design should be based upon a testing regime which includes laboratory soaked CBR tests.

Where economically feasible, pavement design should include an option to undercut to the sand / gravel strata, to allow for the assumption of less sensitive CBR values for the pavement design.

Undercut to gravel is likely to be economic in the vicinity of the Southern improvements.

5.4.5 Recommended Testing for Detailed Design

The investigations were intended only for assessment of the general ground conditions suitable for providing robust budget estimates for the scheme assessment. Further testing will be required during detailed design stage to refine the pavement design, and provide greater certainty to earthworks quantities. This testing should include:

- Trial pits at a minimum spacing of 200m, excavated to 2.0m with scala penetrometer tests carried out and samples taken of each material encountered for subsequent laboratory testing;
- Laboratory testing for compressibility / settlement characteristics of any peat deposits encountered;
- In-situ density measurements should be made with nuclear densometer for use in the design of floating pavements;
- Laboratory soaked CBR tests at natural moisture content, from which to draw a statistically relevant 95th percentile design value;
- Benkelman Beams should be carried out on the existing pavements, and unsealed shoulders and; and
- Pavement Pits should be excavated in the existing pavements at tie-in points.

5.4.6 Borrow/Dump Areas

The timing of construction of projects identified in this report is likely to be spread over many years. During that time the willingness, or otherwise of property owners to allow borrow from, or dumping to their properties is likely to change.

Therefore, suitable borrow or dump areas have not been identified as part of this investigation.

5.5 Southern Link Part B

Alternatives involving an extension of the proposed Southern Link Part A from Flaxton Road, across the railway line, to Lineside Road were considered. The preferred alternative, however, involves extending Ryans Place to join Lineside Road, West of the railway line.

Refer to drawing sheets P001, P300, P302 and P303.

5.5.1 Design Speeds

The WDC Engineering code of practice recommends a design speed of 60km/h for arterial roads in Residential or business zones. This alignment is within the industrial zone. It consists of two elements:

- The complex intersection encompassing Lineside Road, SH71, the Southern Link, and a railway crossing.
- A short section of link between that intersection, and an intersection at Flaxton Road.

Due to the complexity of the intersection and proximity of the railway crossing, we recommend that a design speed of 50km/h be used for the Southern Links (Ryans Place).

5.5.2 Intersection Design

There are several factors, which make the intersection of SH71, Lineside Road, and the Southern Links (Ryans Place) complex. They include:

1. It forms the "Gateway " to Rangiora;
2. It is at the boundary of the rural and business zones;
3. It carries high traffic volumes;
4. It is at the end of a long flat, straight section of rural highway;
5. It is bisected by the South Island Main Trunk railway line;
6. The dominant traffic flow is parallel with, but crossing the railway.
7. The current design standards recommend a minimum approach angle of 70 degrees for roads crossing a railway line. The existing road has an approach angle of 60 degrees.

Where drivers are required to process complex information, and to make and implement a series of decisions in quick succession, then the mental workload demanded may exceed the ability of some drivers. This is particularly true for drivers unfamiliar with the layout, or if something unexpected occurs (e.g a vehicle braking or changing lanes suddenly).

It is prudent to allow drivers a little time to "recover" between the implementation of one decision, and requiring them to process information and make the next decision.

We therefore recommend the following standards for this intersection:

1. Locate the Eastern Link intersection at least 200m minimum south of the railway crossing;
2. Provide a simple T intersection at the intersection of Lineside Road and Ryans Place extension;
3. Prohibit right turns from Lineside Road to Ryans Place extension; and
4. Items 2 and 3 are based on predicted traffic volumes of less than 20 vehicles per hour turning into or out of Ryans Place extension. If the actual volumes exceed 70 vph, or drivers experience difficulty with the layout, we recommend channelisation of the intersection to provide the following:
   a. Room for vehicles from the South turning left into Ryans Place extension to move into the appropriate lane 200m before the railway crossing and;
   b. A separate lane for vehicles turning right out of Ryans Place extension. This will delay their merge manoeuvre until after the railway crossing.

5.5.3 Cross Sections

The cross section adopted for the scheme design for the Ryans Place extension is symmetrical about the centreline. It consists of the following features on each side:

- 3.3m traffic lane;

- 2.5m parking lane;
- 3% Crossfall;
- Kerb and Channel;
- 1.5m footpath; and
- 5:1 cut and fill batters.

The above features are to be located centrally in a 20m wide road reserve over the section of Ryans Place to be extended.

5.5.4 Geotechnical Investigation

No Geotechnical investigations were undertaken at Ryans Place extension as part of this report. However investigations have been carried out for the design of sewer works in this area. The following conclusions have been reached by interpolating the sewer work investigations and adjacent investigations.

Gravel depths were generally found to be shallower in the southern extremes of the investigations. The investigations in the vicinity of Southern improvements showed the depth to gravel soils between 0.1 and 1.0 m.

CBR results varied throughout the scheme, but were generally higher in the southern part of the scheme.

Laboratory soaked CBR tests provided consistently lower CBR results than the in-situ scala penetrometer tests. It is possible that the fair weather during the investigation period raised inferred CBR results.

The soaked CBR is low (down to 0.5%) in the silts and organic soils over the general area of the investigations.

We estimate that the soaked CBR values will be approximately 12% in the sand / gravel soils. This must be confirmed during the design stage with further testing.

5.5.5 Pavement Design

As high water tables are present on site, we recommend that detailed design should be based upon a testing regime, which includes laboratory soaked CBR tests.

Where economically feasible, pavement design should include an option to undercut to the sand / gravel strata, to allow for the assumption of less sensitive CBR values for the pavement design.

Undercut to gravel is likely to be economic in the vicinity of the Southern Links.

5.5.6 Recommended Testing for Detailed Design

The investigations were intended only for assessment of the general ground conditions suitable for providing robust budget estimates for the scheme

assessment. Further testing will be required during detailed design stage to refine the pavement design, and provide certainty to the earthworks quantities. This testing should include:

- Trial pits at a minimum spacing of 200m, excavated to 2.0m with scala penetrometer tests carried out and samples taken of each material encountered for subsequent laboratory testing;
- Laboratory testing for compressibility / settlement characteristics of any peat deposits encountered;
- In-situ density measurements should be made with nuclear densometer for use in the design of floating pavements;
- Laboratory soaked CBR tests at natural moisture content, from which to draw a statistically relevant 95th percentile design value; and
- Benkelman Beams should be carried out on the existing pavements; and
- Pavement Pits should be excavated in the existing pavements at tie-in points.

5.5.7 Borrow/Dump Areas

The timing of construction of projects identified in this report is likely to be spread over many years. During that time the willingness, or otherwise of property owners to allow borrow from, or dumping to their properties is likely to change.

Therefore, suitable borrow or dump areas have not been identified as part of this investigation.

5.6 Western Link (from South Belt to Johns Road)

Refer to drawing sheets P001, and P201 - P204.

5.6.1 Design Speeds

The WDC Engineering code of practice recommends a design speed of 60km/h for arterial roads in Residential or business zones. The proposed Western Link will pass through a proposed residential zone. It will form a continuation of Townsend Road, which is a flat, straight rural road, approximately 1.1km long.

We believe that a 60km/h design speed is appropriate for this link, however we recommend that a threshold treatment be installed on Townsend Road, South of the South Belt intersection.

5.6.2 Cross Sections

The cross section adopted for the scheme design for Western Link is symmetrical about the centreline. It consists of the following features on each side:

- 1 x 3.5m traffic lane;
- 1 x 1.5m cycle lane;

- 1 x 2.5m parking lane;
- 3.0% cross fall;
- Kerb and channel;
- 1.5m wide footpath; and
- 5:1 cut and fill batters.

The above features are located centrally in a 30m wide road reserve.

5.6.3 Geotechnical Investigation

The investigations showed the depth to gravel soils between 0.5 and over 1.6 m, generally increasing towards the Ashley river to the north.

Hand auger holes, and scala penetrometer tests were carried out along the Western route. However test pits were not excavated. Therefore samples could not be recovered for subsequent laboratory CBR testing, however Laboratory soaked CBR tests throughout the other investigations provided consistently lower CBR results than the in-situ scala penetrometer tests. It is possible that the fair weather during the investigation period raised inferred CBR results.

The soaked CBR is low (down to 0.5%) in the silts and organic soils over the general area of the investigations.

5.6.4 Pavement Design

Where economically feasible, pavement design should include an option to undercut to the sand / gravel strata, to allow for the assumption of less sensitive CBR values for the pavement design. Undercut to gravel is likely to be a feasible option for Fernside road, with anticipated depths to gravels of less than 0.8 m.

Where undercut to gravel is uneconomic, some form of floating pavement design may be required, possibly incorporating geogrids into the design. Undercut is likely to be required north of South Belt, and possibly down most of Townsend Road, where the depth to gravels may be in excess of 1.0 to 1.5 m.

Lightweight polystyrene fill may be considered as an option over organic silts and peat.

The estimates have been prepared assuming undercut to gravel. This is considered to produce a conservative estimate.

5.6.5 Recommended Testing for Detailed Design

The investigations were intended only for assessment of the general ground conditions suitable for providing robust budget estimates for the scheme assessment. Further testing will be required during detailed design stage to refine the pavement design. This testing should include:

- Trial pits at a minimum spacing of 200m, excavated to 2.0m with scala penetrometer tests carried out and samples taken of each material encountered for subsequent laboratory testing;
- Laboratory testing for compressibility / settlement characteristics of any peat deposits encountered;
- In-situ density measurements should be made with nuclear densometer for use in the design of floating pavements;
- Laboratory soaked CBR tests at natural moisture content, from which to draw a statistically relevant 95th %ile design value;
- Benkelman Beams should be carried out on the existing pavements; and
- Pavement Pits should be excavated in the existing pavements at tie-in points.

5.6.6 Borrow/Dump Areas

The timing of construction of projects identified in this report is likely to be spread over many years. During that time the willingness, or otherwise of property owners to allow borrow from, or dumping to their properties is likely to change.

Therefore, suitable borrow or dump areas have not been identified as part of this investigation.

5.7 Eastern Link Part A (Lineside Rd to Northbrook Rd)

Refer to drawing sheets P001, and P401 to P404.

5.7.1 Design Speeds

The WDC Engineering code of practice recommends a design speed of 100km/h for arterial roads in rural zones. Part A of the Eastern Link is zoned rural.

Part A is approximately 2.7km long, and includes the following intersections:

- T intersection at SH71. This is located approximately 110m south of the Railway crossing, and Lineside Road, Southern Link intersection;
- T intersection at Marsh Road, with Marsh Road staggered;
- Roundabout at Boys Road; and
- Roundabout at Northbrook Road.

Due to the curved alignment near the Lineside Road intersection, and the roundabouts at Boys Road and North Brook Road, a 80km/h design speed has been used for this section. However, starting at the SH71 intersection, the first three curves have the following design speeds, 50km/h, 65km/h, and 80km/h

5.7.2 Cross Sections

The cross section adopted for the scheme design for Part A of the Eastern Link is symmetrical about the centreline. It consists of the following features on each side:

- 1 x 3.5m traffic lane;
- 1 x 1.5m sealed shoulder;
- 1 x 1.0m unsealed shoulder;
- 3.0% cross fall;
- Swale drain; and
- 3.5 m clear zone on each side.

The clear zone is a zone clear of obstacles which ma pose a hazard to an errant vehicle. Such obstacles include steep banks and culvert headwalls. The clear zone is measured from the edge of the traffic lane.

The above features are located centrally in a 30m wide road reserve.

5.7.3 Geotechnical Investigation

The investigations showed the depth to gravel soils between 0.5 and over 2.0 m, generally increasing towards the Ashley River to the north.

CBR results varied throughout the scheme, but were generally higher in the southern part of the scheme.

Laboratory soaked CBR tests provided consistently lower CBR results than the in-situ scala penetrometer tests. It is possible that the fair weather during the investigation period raised inferred CBR results.

The soaked CBR is low (down to 0.5%) in the silts and organic soils over the general area of the investigations.

We estimate that the soaked CBR values will be approximately 12% in the sand / gravel soils. This must be confirmed during the design stage with further testing.

5.7.4 Pavement Design

Where economically feasible, pavement design should include an option to undercut to the sand / gravel strata, to allow for the assumption of less sensitive CBR values for the pavement design. Undercut to gravel is likely to be a feasible option to just beyond Marsh Road, with anticipated depths to gravel of less than 0.9 m.

Where undercut to gravel is uneconomic, some form of floating pavement design may be required, possibly incorporating geogrids into the design. This is likely to be required from approximately half way between Marsh Road and Boyd Road where we anticipate depths to gravel in excess of 1.0 m.

Lightweight polystyrene fill may be considered as an option over organic silts and peat.

5.7.5 Recommended Testing for Detailed Design

The investigations were intended only for assessment of the general ground conditions suitable for providing robust budget estimates for the scheme assessment. Further testing will be required during detailed design stage to refine the pavement design, and to provide certainty to earthworks quantities.. This testing should include:

- Trial pits at a minimum spacing of 200m, excavated to 2.0m with scala penetrometer tests carried out and samples taken of each material encountered for subsequent laboratory testing;
- Laboratory testing for compressibility / settlement characteristics of any peat deposits encountered;
- In-situ density measurements should be made with nuclear densometer for use in the design of floating pavements;
- Laboratory soaked CBR tests at natural moisture content, from which to draw a statistically relevant 95th %ile design value;
- Benkelman Beams should be carried out on the existing pavements; and
- Pavement Pits should be excavated in the existing pavements at tie-in points.

5.7.6 Borrow/Dump Areas

The timing of construction of projects identified in this report is likely to be spread over many years. During that time the willingness, or otherwise of property owners to allow borrow from, or dumping to their properties is likely to change.

Therefore, suitable borrow or dump areas have not been identified as part of this investigation.

5.8 Eastern Link Parts B & C (Northbrook Rd to Coldstream Rd)

Refer t o drawing sheet P002.

Parts B & C of the Eastern Link have only been investigated to a scoping report stage. Survey and geotechnical investigations have not been undertaken. We recommend that the following design criteria be used for a future Scheme Assessment Report:

5.8.1 Design Speeds

Part B (Northbrook Road to Kippenberger Avenue) is in a proposed residential development. The WDC Engineering code of practice recommends a design speed of 60km/h for arterial roads in residential or business zones.

This part of the Eastern link is 900m long. Parts A and C of the Eastern Link are both rural sections, with a suggested design speed of 80km/h

We therefore recommend a design speed for part B of 70km/h, with the curves adjacent to the roundabouts at either end having a design speed of 55km/h.

Part C (Kippenberger Avenue to Coldstream Road) is in a rural environment, and is approximately 1.9km long. It has no intersections. The WDC Engineering code of practice recommends a design speed of 100km/h for arterial roads in rural zones.

We recommend a design speed of 100 km/h for this section, with decreasing speed values for curves approaching the intersections at either end.

5.9 Drainage Structures

5.9.1 General and Site Description

Appendix K of this report contains a schedule of the preferred drainage structure options along the proposed Eastern and Western Links and at the various intersections considered for upgrading. The Scheme Plans, contained in Appendix A, diagrammatically show the proposed drainage structures. This section of the report outlines the general design considerations and features of the drainage structures.

The proposed link roads and intersection upgrades cross many drainage features. The two more significant waterways affected by these works are South Brook and North Brook and for this report these are classified as the 'Major Waterways'. There are other significant waterways, which are typically tributaries to North Brook and South Brook, having smaller catchments. Finally there are minor natural and man-made drainage features affected by this scheme. The topography in the area being considered is very flat. Typically this area drains from west to east discharging ultimately into the Cam River. Most of the significant natural waterways are spring fed and are understood to have flowing water continuously throughout the year.

5.9.2 Hydrology and Peak Flood Flows

Using the Rational Method, a preliminary review of the hydrology for South Brook, North Brook and other less significant catchments was undertaken. The predicted 100 year Average Recurrence Interval (ARI) peak flood flows were predicted for both the current catchments conditions (typically rural with some urbanisation for the North Brook catchment) and for future/further urbanisation of the catchments. An allowance for the spring fed contribution to the waterways was taken into account where appropriate. The predicted 100 year ARI peak flood flows for 'current' and 'future' catchment conditions are tabulated in the drainage structure schedule in Appendix K.

Given the shallow grade of the overall area, and the future industrial and residential development planned, a more detailed study of the hydrology for the area should be undertaken prior to the final design of the drainage structures.

5.9.3 Structure Type

Given the low lying, flat topography of the area and the relatively small, well defined network of waterways, the current most appropriate choice for the drainage structures for waterway crossings of the proposed link roads and various intersection upgrades is culvert type structures.

For significant waterways (South Brook and North Brook and other significant tributaries), given the limited clearance to the proposed road level and associated limited heading up ability (to prevent upstream flooding), reinforced concrete box culverts are the most appropriate, durable, low maintenance option, which can cater for the predicted design flood flows and associated design waterway areas required. These structures require no minimum cover to function structurally (unlike circular pipe structures). The cost of providing reinforced concrete box culverts is similar to that for bridging (an alternative), however, the on going maintenance requirements for bridges makes box culverts the preferred solution. Box culverts with their inverts buried below the stream bed level have similar waterway properties to bridges. Note, circular reinforced concrete or corrugated metal pipe culverts have also been discounted due to their inability to provide suitable waterway area without costly multiple pipe solutions. They also require minimum covers to be established which affects the size of pipes that can be used.

For the smaller natural and man-made drainage features/waterways, reinforced concrete pipe culverts are considered the most cost effective, low maintenance, durable solution for new crossings. This is consistent with what currently exists elsewhere around the area.

The Schedule of Drainage Structures (Appendix K) outlines the prefer culvert types at the various sites.

The culverts should be designed for at least a 50-year design life with 100 years being preferable (cost implications are not significant).

Drainage Structures should be designed for Normal Highway Loading (currently HN-HO 72) as defined by the Transit NZ Bridge Manual.

5.9.4 Preliminary Waterway Design

The moderate grade of the channels means that most proposed culverts for this scheme are likely to be outlet controlled.

For this project the following waterway design criteria (typically adopted for State Highways) is suggested:

1. No heading up above culvert soffit level during the 20 year Average Recurrence Interval (ARI) flood

2. No interruption to traffic (overtopping of the road) or significant damage to the waterway structures and road during the 100 year ARI flood.

For the box culvert structures, given that there is limited ability to head up at these sites, the 100 year ARI flood criteria controls (i.e. it is suggested that the culverts are to be designed to cater for the 100 year ARI flood without heading up above the culvert soffit).

The Schedule of Drainage Structures (Appendix K) outlines the culvert sizes necessary to meet the waterway design requirements above. At normal flows there is sufficient freeboard at the structures at North Brook and South Brook to allow a canoeist to pass (refer drawing sheet 5604/6/535/5604/Sheet P104 in Appendix A).

5.9.5 Construction and Location

For the significant waterways (i.e. where there is constant flowing water), it is proposed that the culverts will be constructed adjacent to but outside the existing channels to allow construction to be carried out in the dry. This simplifies the construction process, minimising costs and any environmental impacts when carrying out the works. Once constructed, the waterway channels would be redirected through the new structures. Where existing structures are present on roads and around intersections proposed for upgrading, it is considered cost effective to construct new structures as opposed to widening the existing structures, given the difficulties associated with dewatering the existing structures for the considerable widening required. The new structures would be constructed adjacent to the existing structures (in the dry), the channels realigned and the existing structures demolished. New structures also have the advantage of providing an extended life.

For the smaller natural and man-made drainage features (which are typically dry), the proposed culverts will be positioned to minimise associated construction costs.

For the preliminary proposed position of drainage structures refer to the scheme plans in Appendix A.

5.9.6 Environmental and Recreational Considerations

For the significant waterways (i.e. where box culverts are proposed) the invert of the culverts are to be buried to ensure that the bed level remains constant and, over time, there is no abrupt changes in the bed gradients should there be any stream degradation.

5.9.7 Future Proofing and Safety Considerations

The lengths of the proposed drainage structures (refer Appendix K) have been chosen on the following basis:

- For the more significant waterways (i.e. where there is constant flowing water) the lengths take into consideration, where appropriate, future urbanisation leading to four laning (future proofing). This is to avoid the difficulties associated with widening structures in the future (as required) with the presence of constantly flowing water.
- For the smaller natural and man-made drainage features (which are typically dry), the proposed culverts lengths are the minimum required as future lengthening can readily be undertaken should and when the need arise.

A 3.5 m wide "clear zone" is provided for on both sides of new and upgraded roads in rural (high speed) environments. The clear zone is a zone clear of obstacles which may pose a hazard to an errant vehicle. Such obstacles include steep banks and culvert headwalls. The clear zone is measured from the edge of the traffic lane.

This is considered cost effective compared with the cost of providing shorter culverts with traffic barrier protection i.e. no guardrailing is proposed where clear zones have been allowed for.

5.10 New Ashley River Crossing

A new bridge crossing of the Ashley River downstream from the existing (in line with the Eastern Link) is likely to cost in excess of $10M and is unlikely to be economically viable in the foreseeable future.

6 Alternatives Considered

6.1 Introduction

Alternative alignments for the Western Link are constrained by connections to existing roads, and by a desire to minimise disruption to property boundaries. Consequently we have only evaluated one alignment for this link.

Fourteen alternatives were considered for the Southern Link and the SH71/Lineside Road/Southern Link intersection. Outline drawings of these alternatives are shown on drawing sheet 3/535/27/5604/A001 to M001 in the full report.

Alternative alignments for the Eastern Link are constrained at the southern end by the nature and location of the Railway Crossing/ SH71 / Southern Link /Eastern Link intersection. Alternative alignments for the remainder of the link are constrained by connections to existing roads, and by a desire to minimise disruption to property boundaries. Two alignments have been evaluated for the Eastern Link Part A (Lineside Rd to Northbrook Rd). One alignment has been evaluated for the length of the Eastern Link Parts B & C (Northbrook Rd to Coldstream Rd).

The alternatives which were considered are described in Appendix M.

7 Preferred Alternative (Alternative P)

Refer to drawing sheet P001.

7.1 Introduction

Alternative alignments for the Western Link are constrained by connections to existing roads, and by a desire to minimise disruption to property boundaries. Consequently we have only evaluated one alignment for this link.

A large number of alternatives have been considered for the Southern Link and the SH71/Lineside Road/Southern Link intersection.

The traffic modelling indicated that there was limited demand for a Southern Link joining Fernside Road (near Todds Road) with Lineside Road (near the transfer station).

The modelling did, however indicate a demand for the existing Fernside Road, Flaxton Road route.

The preferred alternative, therefore, utilises and upgrades that route. It does keep a link from Fernside Road to Flaxton Road. That link is retained in the Outline Development Plan, and becomes a subdivision road within the development of that block of land.

Alternative alignments for the Eastern Link are constrained at the southern end by the nature and location of the Railway Crossing/ SH71 / Southern Link /Eastern Link intersection. Alternative alignments for the remainder of the link are constrained by connections to existing roads, and by a desire to minimise disruption to property boundaries. Two alignments have been evaluated for the Eastern Link Part A (Lineside Rd to Northbrook Rd). One alignment has been evaluated for the length of the Eastern Link Parts B & C (Northbrook Rd to Coldstream Rd).

The Eastern and Western links are covered in Section 5, the Design Philosophy Statement.

7.2 Western Link

Refer to drawing sheet 5604/P201, P202, P203, P204 and P210.

Introduction

There are a number of more or less parallel routes from the North West of Rangiora to the South. All of them, except the Johns Road, Pentecost Road, South Belt, Townsend Road, Fernside Road route, converge on the Percival Street, Southbrook Road route.

The present and future residential developments to the North West of Rangiora are therefore likely to increase pressure on Percival Street and Southbrook Road.

Many of the routes from the North West include an element of "rat running" on minor residential streets. These streets are intended to provide access to residential properties and are often designed for low through volumes, and low speeds.

Increasing the volume of through traffic on these streets is likely to result in increased accidents.

The Johns Road, Pentecost Road, South Belt, Townsend Road route is an indirect route.

A direct link from Fernside Road to Johns Road, utilising Townsend Road, and a new link is proposed to help alleviate the short comings of the present routes.

There are three components of the Western Link, described in Sections 7.2.1 to 7.2.3 below.

7.2.1 Fernside Road, Townsend Road Intersection

Townsend Road joins Fernside Road at a tee intersection. The angle between Fernside Road and Townsend Road is approximately 50 degrees.

The projected traffic volumes for Townsend and Fernside Roads in 2021 are provided in Table 7.2 below:

	2000	2011	2021
Fernside Road (west of Townsend)	800	1,600	2,000
Townsend Road	130	4,100	6,200

Table 7.2: Fernside and Townsend Road Predicted Traffic Volumes (vpd)

Description of Proposal

Refer to Drawing Sheets 5604/P201 and P210.

The right turn bay will have the following features:

- Two 3.5 m wide through lanes (one in each direction);
- One 3.0 m Right Turn Bay;
- 20 m stacking length;
- Fernside Road priority.

Alternative Option

The above proposal gives priority to Fernside Road, which is the minor traffic stream.

A long term alternative was considered, which gives priority to Townsend Road, which is the dominant traffic stream.

This alternative has the following features:

- 75km/hr design speed curves between Fernside Road and Townsend Road;
- Tee Intersection:
  - Townsend Road priority; and
  - Right Turn Bay.
- New 2.0 x 2.0m box culvert crossing of stream; and
- Avoids house on North West quadrant of intersection.

The expected cost of this alternative makes it unlikely to be viable in the foreseeable future. It was, therefore not investigated further.

However, it may be possible to incorporate a new curve and intersection with possible future development of properties to the North West of the Townsend Road, Fernside Road intersection.

Recommendations

1. That the Fernside Road, Townsend Road Right Turn Bay be constructed as a Minor Safety Project.

2. That the long term alternatives to give priority to Townsend Road be investigated further.

7.2.2 Upgrade of Townsend Road

Introduction

Townsend Road is currently a sealed two lane, two way road, with minimal shoulders. The increased traffic volumes are likely to result in deterioriation of the pavement, and break away of the pavement edge.

The absence of shoulders increases the hazards posed to cyclists.

To overcome these problems it is proposed to:

- Carry out an Area Wide Treatment, to overlay and strengthen the existing pavement;
- Widen the seal, to provide support to the edge of the traffic lane, and a shoulder suitable for cyclists.

Description of Proposal

Refer to Drawing sheet 5604/6/535/27/5604/P101, P201, P202.

The Townsend Road improvements will have the following features:

- One 3.5m wide lane in each direction;

- One 1.5m wide sealed shoulder in each direction;
- Existing pavement overlaid with Basecourse; and
- Unsuitable material undercut beyond existing pavement.
  - The extent of suitable pavement material within the existing unsealed shoulder is unknown; and
  - No suitable material beneath the unsealed shoulder has been assumed for the estimate. This is considered a conservative approach.
- A new 2.0 x 2.0m box approximately 170 north of Fernside Road.
  - The existing culvert is too short to accommodate the widened pavement.
  - It is more economical to construct a new culvert "in the dry" than to extend the existing one.

Recommendations

That the Area Wide Treatment and seal widening be carried out as a maintenance operation when the Net Present Value (NPV) of maintenance cost exceeds the upgrading costs.

7.2.3 Western Link (form Townsend Road to Johns Road)

Refer to Drawing Sheets 5604 P202 and P203 starting at the southern end (Townsend Road), this new link has the following features:

- Start of 50 km/hr speed zone, and threshold treatment (refer drawing sheet 5604/P103) approximately 180m south of South Belt;
- Right Turn Bay into South Belt;
- A new 4.0 x 2.5m box culvert crossing South Brook:
  - The available roadway on the existing culvert is very narrow; and
  - The approach taper for the Right Turn Bay extends beyond the existing culvert requiring extra width.
- A new 1.2m dia culvert crossing of the Pentecost Road drain;
- A new urban link with the following cross section, symmetrical about the centreline (refer sheet 5604/P101):
  - 3.5m wide lane in each direction;
  - 1.5m wide cycle lane in each direction;
  - 2.5m wide parking on each side;
  - Kerb and channel on each side; and
  - 1.5m wide footpath on each side.
- Left hand curve:
  - 350m radius;
  - 3% superelevation; and
  - 70km/hr design speed.
- Right hand curve:
  - 350m radius;
  - 3% superelevation; and
  - 70km/hr design speed.

- 300m long straight. In order to minimise property severance, this straight is located immediately adjacent to the rear boundaries of the properties it passes through;
- Right hand curve:
  - 350m radius;
  - 3% superelevation; and
  - 70km/hr design speed.
- Left hand curve:
  - 250m radius;
  - 3% superelevation; and
  - 60km/hr design speed.
- 600mm dia culvert crossing of the Johns Road drain;
- Roundabout at the Johns Road, West Belt intersection. This roundabout will have the following features:
  - 20m dia central island;
  - Single lane circulating roadway;
  - All approaches single lane;
  - All departures single lane; and
  - Shared cycle lane and footpath on all quadrants.

7.3 Southern Links (Fernside Rd)

Refer to drawing sheets P001, P300 to P302, P310, and P311.

The preferred route utilises and upgrades the existing Fernside Road pavement between Townsend Road and Flaxton Road.

There are three components to the improvements to Fernside Road, described in sections 6.2.1 to 6.2.3 below.

7.3.1 Fernside Road Flaxton Road Intersection

Introduction

The predicted traffic volumes (Vehicles per Day) in 2011, and 2021 on Fernside and Flaxton Roads are described in Table 6.1 below:

	2000	2011	2021
Fernside Road (west of Flaxton)	850	5,500	8,300
Flaxton Road	3,700	2,600	3,300

Table 6.1: Predicted Fernside and Flaxton Road Traffic Volumes (vpd)

This existing intersection currently has the following shortcomings if Fernside Road is to carry 8,000 Vehicles per Day:

1. It gives priority to Flaxton Road

- The larger traffic flow has to slow and give way to the smaller flow. This results in delays for a larger number of vehicles.

2. The existing culvert carries a weight restriction

   - This limits the size of vehicles which can use the route.

3. The roadway width over the existing culvert is very narrow

   - This is located close to the throat of the intersection. It limits the manoeuvring space for large vehicles, particularly if vehicles are waiting to turn.

4. The approach and departure tapers are inadequate for 8,000 vpd

   - Vehicles following turning vehicles are delayed;
   - There is an increased risk of accidents.

5. The Flaxton Drain (No. 7) is very close to the traffic lanes

   - There is little room for left turn deceleration or stacking length;
   - This is a hazard, particularly with a large number of turning vehicles.

Two sub options, P1 and P2, were considered to improve this intersection. These are described below:

- Option P1 (priority to Fernside Road) is the preferred; and
- Option P2 (priority to Flaxton Road).

Option P1

(Refer drawing sheet 5604/6/535/27/5604/P301).

Description of Proposal

This option gives priority to Fernside Road Traffic, and has the following features:

1. A 90km/h design speed curve joins Fernside Road and Flaxton Road

   - It is located at the end of two comparatively high speed straights, and a lower design speed would be hazardous;

2. This curve has a radius of 800m, and 3% Superelevation.

   - Smaller Radii curves with steeper superelevation were considered. These were ruled out due to the adverse crossfall for vehicles turning into and out of Flaxton Road.
   - Adverse crossfall can result in vehicles (particularly high commercial vehicles) overturning during turning manoeuvres.

- Larger radii curves with higher design speeds were also considered. These were ruled out due to the higher construction and property costs.

3. Flaxton Road is diverted to join the new Fernside Road curve at right angles;

4. A Right Turn Bay is provided for traffic turning right into Flaxton Road.

5. Two 4.0m x 1.5m Box culverts are provided for Fernside Road and Flaxton Road to cross the Flaxton Drain (No. 7).

This is the preferred alternative because the dominant traffic flow in future years north of the intersection will be on Fernside Road.

Erosion and Sediment Control

For the Southern Links at the Fernside and Flaxton Roads intersection the following erosion and sediment control measures are proposed:

- Runoff diversion channel/bunds are constructed so that clean stormwater is diverted away from earthwork sites and stormwater from earthwork areas is diverted to the sediment retention ponds.
- 2 x sediment retention ponds (33m x 8m x 1.5m deep) at the Fernside and Flaxton Roads intersection.

Silt fences are installed around waterways, stockpile sites and retention ponds to minimise sediment laden water entering waterways.

Alternative P2

(Refer drawing sheet 5604/6/535/27/5604/P311).

Description of Proposal

This option gives priority to Flaxton Road Traffic, and has the following features:

1. Fernside Road is diverted to join the new Flaxton Road at right angles.
2. A slip lane is provided for vehicles turning left into Fernside Road.
3. A Right Turn Bay is provided for traffic turning right into Fernside Road.
4. Two 4.0m x 1.5m Box culverts are provided for Fernside Road and the slip lane to cross the Flaxton Drain (No. 7).

This option is not preferred because it does not provide priority to the dominant traffic flows on Fernside Road north of the intersection in future years.

7.3.2 Upgrade of Fernside Road

Introduction

Fernside Road is currently a sealed two lane, two way road, with minimal shoulders. The increased traffic volumes are likely to result in deterioration of the pavement, and break away of the pavement edge.

The absence of shoulders increases the hazards posed to cyclists.

To overcome these problems it is proposed to:

- Carry out an Area Wide Treatment, to overlay and strengthen the existing pavement;
- Widen the seal, to provide support to the edge of the traffic lane, and a shoulder suitable for cyclists.

Description of Proposal

Refer to Drawing sheet 5604/6/535/27/5604/P101.

The Fernside Road improvements will have the following features:

- One 3.5m wide lane in each direction;
- One 1.5m wide sealed shoulder in each direction;
- Existing pavement overlaid with Basecourse; and
- Unsuitable material undercut beyond existing pavement.
    - The extent of suitable pavement material within the existing unsealed shoulder is unknown; and
    - No suitable material beneath the unsealed shoulder has been assumed for the estimate. This is considered a conservative approach.

Proposed seal widening and Area Wide Treatment of Fernside Road can generally be carried out within the existing road reserve.

The following sections of this link will require some work to be carried out on land which is currently privately owned:

- Flaxton Road, Fernside Road intersection improvements;
- Fernside Road, Todds Road Right Turn Bay; and
- Stream works associated with the Fernside Road, Todds Road Right Turn Bay.

Recommendations

That the Area Wide Treatment and seal widening be carried out as a maintenance operation when the Net Present Value (NPV) of maintenance cost exceeds the upgrading costs.

7.3.3 Todds Road, Fernside Road Right Turn Bay

Introduction

The projected traffic volumes for Todds and Fernside Roads in 2021 are provided in Table 6.2 below:

	2000	2011	2021
Fernside Road	850	5,500	8,300
Todds Road	N/A	1,000	1,900

Table 6.2: Fernside and Todd Road Predicted Traffic Volumes (vpd)

Vehicles turning right into Todds Road are likely to cause delays to following traffic. There is also an increased likelihood of nose to tail crashes.

Both Fernside Road and Todds Road cross an unknown stream near to this intersection.

A proposal in the Outline Development Plan for the property to the East of Todds Road is to include a link to Fernside Road. This link will result in another intersection within approximately 200m of the Todds Road intersection.

A Right Turn Bay is proposed at the Fernside Road, Todds Road intersection, in order to:

- Reduce delays for through traffic; and
- Reduce accidents.

Description of Proposal

Refer to Drawing sheet 5604/6/535/27/5604/P304.

The right turn bay will have the following features:

- Two 3.5m wide through lanes (one in each direction);
- One 3.0m Right Turn Bay;
- 20m stacking length;
- A new 2.5m x 1.5m box culvert beneath Fernside Road;
- It is considered more economical to construct a new culvert in the dry than to extend the existing one; and
- The intersection improvements can be carried out without affecting the existing culvert in Todds Road. However, if Todds Road was to be widened in the future, then a new culvert would be necessary. Upgrading of Todds Road has not been included in this report.

Alternative Option

A link more or less parallel with Todds Road is proposed as part of the development of the property to the East of Todds Road. This link would intersect with Fernside Road within 200m of Todds Road.

Closing the Todds Road, Fernside Road intersection, and replacing it with the new subdivision link will save the expense of:

- Constructing a Right Turn Bay;
- Upgrading and widening Todds Road; and
- Replacing the culvert on Todds Road.

This option has not been investigated further.

Recommendations

That the feasibility of closing the Todds Road intersection, and replacing it with the new subdivision link be investigated further. If that does not prove feasible, we recommend the following:

- That Area Wide Treatment, and seal widening work be carried out as maintenance operations at the same time as similar work on the remainder of Fernside Road;
- That the new culvert on Fernside Road be constructed long enough to accommodate the Right Turn Bay tapers; and
- That the Right Turn Bay be constructed as a minor safety project.

7.4 Southern Links (Ryans Place Extension)

Introduction

The existing section of Ryans Place is the first phase of an industrial subdivision, which runs off Flaxton Road. It has the following features:

- Approximately 60m long;
- 10m seal width;
- 16m road reserve;
- Kerb and channel on both sides;
- Footpath on one side; and
- No formed cul-de-sac head, enabling it to be readily extended;

There are two routes from existing and proposed industrial subdivisions in the South Brook area to State Highway 71:

1. Via Flaxton Road and Lineside Road to the Highway. It involves an acute turn at the Flaxton Road, Lineside Road intersection.
2. Via Flaxton Road, and Fernside Road to the highway.

The intersection of Fernside Road with the highway is very close to the railway line. There is insufficient room for long vehicles to wait at the intersection clear of the railway. This intersection has a poor accident record.

Extending Ryans Place to meet with State Highway 71 (Lineside Road) will provide an alternative route between the industrial area and the State Highway.

The location of a new intersection between Ryans Place and Lineside Road has some drawbacks:

It is very close to the railway crossing;

- It is on the outside of a curve with a large amount of superelevation
  - This will result in adverse cross fall for turning vehicles.
  - Adverse cross fall can contribute to high vehicles overturning.

The predicted traffic volume on Ryans Place in 2021 is 600 Vehicles per Day

Description of Proposal (Ryans Place)

Refer to drawing sheets P001, P302,and P303

The proposed extension of Ryans Place will include the following features:

- **Alignment.** Starting at the Flaxton Road end, the Ryans Place extension will veer slightly to the left near to the existing end of seal. This is done so that the intersection of Ryans Place extension with Lineside Road is clear of the existing curve and associated adverse crossfall.

- **Cross Sections.** The cross section is symmetrical about the centreline. It consists of the following features on each side:
  - 3.3m traffic lane;
  - 2.5m parking lane;
  - 3% Crossfall;
  - Kerb and Channel;
  - 1.5m footpath;
  - 5:1 cut and fill batters; and
  - 20m wide road reserve on the Ryans Place extension.

Description of Proposal (Intersection – Medium Term, Left in Left out only)

Refer to drawing sheet P302.

This intersection design is based on predicted traffic volumes of less than 20 vehicles per hour turning into or out of Ryans Place extension. If the actual volumes exceed 70 vph, drivers are likely to experience difficulty with the layout. In that instance, we recommend channelisation of the intersection. Refer to section 6.4 (Lineside Road, Eastern Link, Ryans Place intersection plus Railway crossing) for discussion on the channelised intersection.

7.5 Southern Links (Lineside Road, Eastern Link, Railway Crossing, Ryans Place Junction) Long Term

Introduction

This is a complex intersection.

Refer to the Design Philosophy Statement (section 5.5) for a more detailed discussion of the complexities of this junction.

Description of Proposal

Refer to Drawing sheet P302 (medium term) and P303 (long term).

This junction is designed for State Highway 71 having four lanes in the long term. Travelling from south to north, it has the following features:

- Four lanes on State Highway 71;
- Start of 50km/hr speed zone and threshold treatment approximately 200m south of intersection with Eastern Link;
- High speed left turn slip lane southbound from the Eastern Link to the highway;
- Grassed island between the Highway, the Eastern Link and the slip lane
- Right Turn Bay northbound from the Highway to the Eastern Link;
- Right hand curve:
  - 250m Radius;
  - 4% Superelevation; and
  - 70km/h design speed
- Left turn slip lane southbound from the Highway to the Eastern Link;
- Left hand curve:
  - 70m Radius;
  - 6% Superelevation; and
  - 50km/h design speed
- Four lane railway crossing with alarms and barrier arms;
- Channelised "Seagull intersection with Ryans Place. This intersection is similar to the Riccarton Road, Yaldhurst Road intersection at Church Corner. It include the following features:
  - Left turn slip lane into Ryans Place;
  - A right turn lane for traffic from Ryans Place. This lane is protected by an island to prevent merge manoeuvres prior to the railway crossing.
- Right hand curve:
  - 70m Radius;
  - 6% Superelevation; and
  - 50km/h design speed
- Left hand curve:
  - 200m Radius;
  - 4% Superelevation; and

- 65km/h design speed

In addition to a wide sealed shoulder, the following provisions are made for cyclists:

Southbound

- Cycle crossing at the island opposite Ryans Place;
- Cycle lane across the Eastern Link intersection. This starts at the beginning of the left turn slip lane, and extends to the cycle crossing;
- Cycle crossing of the island between the Eastern Link and the slip lane, enabling cyclists to cross perpendicular to the slip lane; and
- Cycle track on the inside of the slip lane curve, to join the sealed shoulder on the straight.

Northbound

- Cycle lane across the Ryans Place intersection. This starts between the Northbound lanes, north of the railway line, and extends beyond the limit lines for the intersection.

7.6 Eastern Link (Part A – Lineside Road to North Book Road)

Refer to drawing sheets 5604/P401 - P404.

Introduction

The Outline Development Plan includes provision for significant residential development to the East of Rangiora.

This development is likely to put increasing pressure on the Percival Street, Southbrook Road route south.

A link from North Brook Road to Lineside Road is proposed to ease the pressure on the Percival Street, South Brook Road route.

Description of Proposal

Refer to drawing sheets 5604/P401 - P404, P406 and P407.

The cross section of Eastern Link (Part A) is symmetrical about the centreline and will have the following features (refer sheet 5604/P102):

- 3.5m wide traffic lane in each direction;
- 1.5m wide sealed shoulder on each side;
- Grassed swale drains on each side; and
- 30m wide road reserve.

Starting at Lineside Road, the alignment of the Eastern Link (Part A) will have the following features:

- Tee intersection with Lineside Road, with:
  - Left turn slip lane from Eastern Link to Lineside Road;
  - Right turn bay from Lineside Rod to Eastern link; and
  - Left turn slip lane from Lineside Road to Eastern link.
- Left hand curve:
  - 100m radius;
  - 5% superelevation; and
  - 50km/hr design speed.
- Relocated access for properties to east;
- Start 70km/hr sped zone;
- Approximately 200m long straight;
- Right hand curve:
  - 250m radius;
  - 3% superelevation; and
  - 65km/hr design speed.
- 4.0 x 2.5m box culvert crossing of South Brook;
- Buildings associated with sewage treatment plant to be relocated;
- New intersection with Marsh Road:
  - Staggered tee intersection;
  - Eastern Link priority; and
  - Right turn bay from Eastern link to Marsh Road West.
- Access to sewage treatment plant relocated to Marsh Road East;
- 3.0 x 2.0m box culvert crossing stream;
- Left hand curve:
  - 500m radius;
  - 3% superelevation; and
  - 80km/hr design speed.
- 600mm dia culvert crossing stream;
- Approximately 200m long straight;
- Roundabout at Boys Road intersection:
  - 20m dia central island;
  - Single lane circulating roadway;
  - All approaches single lane;
  - All departures single lane;
  - Shared cycle lane and footpath on all quadrants;
- 1.05m dia culvert crossing stream;
- Approximately 350m long straight;
- 6.0 x 2.5m box culvert crossing North Brook;
- Left hand curve:
  - 700m radius;
  - 3% superelevation; and
  - 85km/hr design speed.
- Roundabout at North Brook Road intersection:
  - 20m dia central island;
  - Single lane circulating roadway;

- All approaches single lane;
- All departures single lane;
- Shared cycle lane and footpath on all quadrants.

If the Eastern Link (Part B) is not constructed, the roundabout at Northbrook Road will be replaced with a simple tee intersection.

This road bisects an existing dairy farm. If this property is still functioning as a dairy farm when the Eastern Link is constructed, then consideration will need to be given to providing a stock underpass.

A stock underpass has not been included in this report, because it is assumed that the use of this property is likely to change to small holdings by the time the Eastern Link goes ahead.

Erosion and Sediment Control

For the Eastern Link (Part A) the following erosion and sediment control measures are proposed:

- Runoff diversion channel/bunds are constructed so that clean stormwater is diverted away from earthwork sites and stormwater from earthwork areas is diverted to the sediment retention ponds.
- Sediment retention ponds at the following locations:
  - Approximately 350m north of Marsh Road (2 ponds, 16m x 4m x 1.5m deep);
  - Approximately 600m north of Marsh Road (2 ponds 14m x 3.5m x 1.5m deep, 2 ponds 13m x 3.0m x 1.5m deep).
  - Approximately 240m south of Boys Road (2 ponds 14m x 3.0m x 1.5m deep);
  - Immediately south of North Brook (2 ponds 14m x 4.0m x 1.5m deep);
  - Immediately north of North Brook (2 ponds 15m x 4.0m x 1.5m deep).

Silt fences are installed around waterways, stockpile sites and retention ponds to minimise sediment laden water entering waterways.

Recommendations

1. That affected land be designated for "future road" immediately.

2. That this Scheme Assessment Report is updated after five years.

7.7 Eastern Link (Part B – Northbrook Road to Kippenberger Avenue)

Refer to drawing sheets 5604/P404 and P405.

Introduction

This report has only been prepared to a Scoping Report level.

The Outline Development Plan includes a road from Northbrook Road to Kippenberger Avenue. This road is included as part of the future development of this block.

Description of Proposal

It is proposed that this link will be partly provided as a part of the subdivision roading in this block. The road cross section provided as part of the development is shown on drawing sheet 5604/P102. It consists of:

- One 3.5m wide lane in each direction;
- 2.5m wide parking on one side;
- Kerb and channel on one side;
- 1.5m wide footpath on one side.

The full intermediate term cross section is also shown on drawing sheet 5604/P102. It consists of:

- One 3.5m wide lane in each direction;
- One 1.5m wide cycle lane in each direction;
- 2.5m wide parking each side;
- 1.5m wide footpath each side;
- Grassed median;
- 1.0m wide shoulder to median.

Provision is made for a future flush median, and two extra lanes.

The alignment follows the alignment shown on the Outline Development Plan, and is shown on drawing sheets 5604/P404 and P405.

This alignment has significant impacts on properties near Kippenberger Avenue.

Recommendations

1. That the Eastern Link (Part B) be constructed as part of future subdivision roading.

2. That the initial cross section be as per the cross section for financial contribution (developer).

3. That alternative alignments which reduce the impact on properties be evaluated.

7.8 Eastern Link (Part C – Kippenberger Avenue to Coldstream Road)

Introduction

This link has only been evaluated to a scoping report level.

This link is unlikely to be viable on its own. It may be viable if it connected to a new bridge across the Ashley River. However, it is unlikely that a new bridge would be viable in the foreseeable future.

8 Land Requirements

8.1 Property Acquisition

Property acquisition has been scoped based on the acquisition and compensation provisions of part 2 of the Public Works Act 1981. The figures given are confined to compensation, costs and disbursements which owners are legally entitled to claim and do not allow for any of Councils consultancy costs associated with land purchase, valuation or legal fees.

As a rule where the roading alignment would require the removal of or have a significant detrimental affect on dwellings left behind we have budgeted to purchase the entire property and dispose of the balance after completion of the works.

Property valuations used in this assessment were rating valuation figures multiplied by an adjustment factor. The adjustment factor was obtained from Quotable Value New Zealand, and based on recent sales in the area. Typically the adjustment factors were:

- Rural – rating valuation plus 40%
- Rural/residential – rating valuation plus 80%
- Residential – rating valuation plus 80%

The proposed alignment passes through several parcels of land owned by the Waimakariri District Council. The assessment provided treats this land the same as other third parties with full compensation payable to the Council.

No allowance for betterment has been made. It is our view that betterment has to be clearly demonstrable before it can be considered and at this stage there are no obvious examples where betterment would occur.

It is noted that the proposed alignment has not been designated and therefore further development along the proposed alignment is possible. As an example a property on the western link has recently been subdivided and there is the distinct possibility that new houses will be built on the two sections in the new subdivision affected by the alignment.

It is recommended that the proposed alignment be designated as soon as feasibly possible to prevent further development and the inevitable escalation of acquisition costs associated with this.

8.2 Property Acquisition (Southern Links)

Flaxton/Fernside Intersection - Option P1

Refer to drawing sheet 3604/S1.

A small allowance for injurious affect has been made for each of the affected properties that have dwellings for noise, dust etc during construction and the permanent detrimental affects of the works.

An allowance has been made for the sale of the closed road/severance to the adjoining owner J K Fowler. This is at a substantially discounted rate recognising that they are the only possible buyer and that the former roading alignment will not be a particularly attractive buy due to the shape of the land and the fact that a large ditch bisects it. Arguably the acquisition of this land would add no value to Fowlers property and it is conceivable he would not be interested in buying it at any price.

Flaxton/Fernside Intersection - Option P2

Refer to drawing sheet 3604/S2.

A simpler alignment involving fewer properties with less detrimental affects, the property acquisition requirements of this alignment are considered to be unlikely to become problematical. Same comments as above regarding closed road/severance.

Lineside Road Intersection

Refer to drawing sheet 3604/S3.

Allowance has been made for injurious affect claims for the Cliff and Luisetti properties.

The Cliff property has been developed as a car sales yard and it has been assumed that it is leased. Our figures include a sum for negotiation with the lessee as well as the owners.

The allowance on the Luisetti property is for the affect of the works (permanent and temporary) on the silos on the property.

Fernside/Todds Road Intersection

Refer to drawing sheet 3604/S4.

A very minor deviation but proposed works are in close proximity to dwellings and other buildings on two properties and a small allowance has been made for injurious affect claims relating to noise, dust and inconvenience during construction.

8.3 Property Acquisition (Western Link)

New Alignment

Refer to drawing sheet 3604/W1.

This alignment seems straightforward with the new road being kept at the very back of existing lifestyle properties to minimise the affect on them.

Potential issues are the small area of land 'WA' required from the Clarke property. It is likely that this will be resisted as the roading improvements will have an overall negative affect on their property but because of the small amount of land required the compensation entitlement is relatively minor.

There is also the block of land on the corner of West Belt and Johns Road that has recently been subdivided for residential housing. At the time of writing no development is occurring on the two new sections that will be affected by the proposal however this could change at any time with the potential consequence that a virtually new house(s) would have to be purchased and removed.

To avoid this situation it is recommended that consideration be given to acquiring the most affected section (Lot 9, DP 339769) at the present time. If for any reason the project is abandoned the section can be sold at a later time with minimal overall cost having been incurred.

Effect of Rezoning to Residential

We have also been asked to comment on the likely effect of a future rezoning to residential of the properties from which land is required.

The immediate effect of this scenario would of course be a significant increase on the land value of these properties. No detailed analysis has been carried out but based on current residential prices in Rangiora it is expected that the block value of the land (and therefore acquisition costs) would at least double if the properties were rezoned.

It has been suggested that if the land were rezoned developers could be requested to fund or partially fund the cost of this road. It is submitted that in order for this to happen there would have to be a very direct incentive for developers such as direct access from new subdivisions onto the road. If the road is made limited access road the developers may still get some benefit from the improved access of the general area however it is not considered likely that the benefit gained will be sufficient to convince any developer to commit funding to the roading project.

Fernside/Townsend Road Intersection

Refer to drawing sheet 3604/W10.

The cottage on the Cammock property will be significantly affected by the repositioning of the road and we have therefore allowed an amount for injurious affect relating to this dwelling.

8.4 Property Acquisition (Eastern Link)

Eastern Link (Part A)

From a property point of view the notable aspect of the proposal is that it bisects the Sparks bros. diary farm. Without knowing how the farm is run, stocking and production figures etc. it is difficult to draw precise conclusions as to the effect of the proposal on the ongoing efficiency of the farm however it is clear that the proposal will result in a reasonably significant injurious affect claim.

Allowance should also be made for a stock underpass somewhere on the alignment. This will allow the farm to continue to be farmed as one unit and minimise the potential claim.

In examining the issues around this property it appears to us that in the near future the highest and best use of the land may well cross from rural to small holding and we have assumed a potential for this in assessing likely compensation entitlements. Conversely the injurious affect provision is smaller than it might otherwise have been also (on the basis that the affect on a farm suitable for redevelopment into small holdings is reduced).

Eastern Links (Parts B and C)

These links differ from other proposals in that they have a significant detrimental affect on the dwellings of a number of properties. Where the dwelling on a property is to be significantly affected by the proposed alignment we have provided for the purchase of that entire property. In some cases the buildings will not require removal and will be habitable after completion of construction and we have provided for disposal of these properties (at a reduced rate taking into account the detrimental affect of the works on the property).

It is noted that the proposal once again bisects a dairy farm (Inch property), however in this case we have allowed for the purchase of the severed block as it is considered that this would be more cost effective than putting in an underpass. As for the Spark farm not much is known about the operation and management of the Inch farm and it is feasible that the taking of a considerable portion of the farm will lead to a injurious affect claim if the taking of the land makes the farm uneconomic or overcapitalised in terms of buildings and plant. At this stage the allowance for an injurious affect claim is only modest.

Effect of Rezoning to Residential

As for the Western Link we have also been asked to comment on the likely effect of a future rezoning to residential of the properties from which land is required.

Currently properties in this area are on average larger than those in the vicinity of the Western Link and on average have a lower land value (on a $ per m2 basis). The effect of this scenario therefore would likely be even more dramatic with land value of some blocks increasing several fold. Comments regarding developers contributing towards costs of the road are exactly the same as they are for the Western link.

9 Economic Analysis

9.1 Introduction

The economic analysis has been carried out using Transfund's Project Evaluation Manual, Amendment 8, October 2004. The Vehicle Operating Costs (VOC) and Travel Time Costs (TTC) have been derived from the outputs of the traffic modelling carried out by Beca. Outputs used include fuel use and CO_2 to derive VOC and running time and delays to derive TTC, which includes congestion values for the intersections.

The output was run for the 2011 and 2021 years. Values for other years have been interpolated or extrapolated and the benefits and costs annualised.

Capital costs were assumed to occur over 3 years from year 1; proportioned as 20%, 40% and 40%. Spreadsheets for the economic analysis are given in Appendix D.

Accident costs are included in this analysis and were calculated in the 2011 then back-calculated to year zero. This then allowed the accident growth rate, (which is less than the traffic growth) to be applied for the forward years. It is intended that the accident analysis capture the major accident costs/ savings but be on the conservative side to ensure the benefits are not overstated. The accident analysis looks at the major routes only (rather than every link and node in the network). The major routes being those most affected by changes in traffic. This is considered appropriate, as the accident costs are around 6% of total road user costs and benefits are less than 10% of the total benefits. Spreadsheets for the accident analysis are given in Appendix L.

The major accident benefits/disbenefits are assessed to come from a significant change in traffic volume along a link or through an intersection, an upgraded route or intersection, and a higher speed route.

9.2 Southern Links (Fernside Rd)

9.2.1 Travel Time and Vehicle Operating Cost Savings

Travel Time and Vehicle Operating Costs were calculated by using the SIDRA 2.1 intersection modelling software. Two options for the Fernside Road/ Flaxton Road intersection were modelled; P1 and P2 which are discussed in Section 6. The annual travel time costs for 2011 and 2021 are summarised in Table 9.1 below:

Option	TT Savings ($'000s)		VOC Savings ($'000s)		Total ($'000s)		NPV of VOC and TT
	2011	2021	2011	2021	2011	2021	
P1	52	316	81	153	133	470	$2.06M
P2	37	167	60	111	97	278	$1.30M

Table 9.1: Fernside/Flaxton Road Intersection TTC and VOC

For P2 the TTC and VOC savings are due to the installation of a slip lane for the Flaxton Road to Fernside Road northbound traffic. The savings are greatest for P1 as the intersection configuration is altered to give priority to the higher flow of Flaxton Road to Fernside Road for both northbound and southbound traffic.

9.2.2 Accident Analysis

Using typical accident rates for the Options P1 and P2 the following accident savings were assessed:

Option	Annual Accident Savings ($'000s) at year 0	NPV of Accident Savings *
P1	90	$0.96M
P2	56	$0.6M

Table 9.2: Accident Cost

** Savings over 25 year analysis period as a present value.*

The accident savings are due to the existing crossroads intersection being replaced by two "T" intersections. Option P1 has the lowest accident cost due to the safety advantages of a large slip lane at one of the "T" intersections.

9.2.3 Benefit Cost Ratios

The costs and benefits and benefit cost ratios for construction complete by year 2007, are summarised in Table 9.3 below. This assumes a Do Min cost of $0.5M,

(NPV cost of $0.4M), which allows for the culvert strengthening and seal widening at the intersection; see section 2.

Southern Links (Fernside/Flaxton)	Capital Cost	NPV Cost	NPV Benefits			BCR
			TTC &VOC	Accidents	Total	
P1	$2.32M	$1.53M	$2.06M	$0.96M	$3.02M	2.0
P2	$1.5M	$0.84M	$1.30M	$0.6M	$1.90M	2.3

Table 9.3: Southern Links (Fernside Road) NPV Benefit s and BCR

The NPV of benefits and benefit cost ratios for construction complete by years 2007, 2012, 2017 and 2022 are summarised in Table 9.4 below.

Southern Links (Fernside/ Flaxton Int.)	For construction complete at year				
	2007	2012	2017	2022	2027
NPV of Benefits					
P1	$3.0M	$3.3M	$4.2M	$5.3M	$6.5M
P2	$1.9M	$1.9M	$2.4M	$3.0M	$3.6M
Benefit Cost Ratio					
P1	2.0	2.6	3.3	4.1	4.9
P2	2.3	2.9	3.5	4.3	5.1
Incremental BCR of P1 compared to P2	1.6	2.3	3.0	3.8	4.6

Table 9.4: Southern Links (Fernside Road) NPV of Benefits and BCR for forward years

9.3 Southern Links (Ryans Place)

9.3.1 Travel Time and Vehicle Operating Cost Savings

The travel time and vehicle operating savings providing by this route compared to using the alternative routes offered via Flaxton Road and Fernside Road or Flaxton Road/ Lineside Road are $16,000 per year with a NPV of $300,000 over the analysis period.

9.3.2 Accident Analysis

If the Ryans Place extension is constructed it is recommended that the Fernside Road intersection be closed which would include closure of the railway crossing. There have been 2 serious and 1 minor injury accidents involving vehicles hitting trains at the crossing in the last 5 years. The latest accident was in 2002 and involved a truck hitting a train, the previous accidents both involved cars and

occurred in 1999 and 2000. The accident savings associated with closing the intersection are $215,000 per year with a NPV of $2.2M over the analysis period.

9.3.3 Benefit Cost Ratio

The benefit cost ratio for the Ryans Place Extension with and without closure of Lineside Road/ Fernside Road intersection is summarised in Table 9.5 below:

Southern Links (Ryans Place Extension)	Capital Cost	NPV Cost	NPV Benefits			BCR
			TTC &VOC	Accidents	Total	
Closure of Lineside Road/ Fernside Road	$0.5M	$0.42M	$0.3M	$2.2M	$3.02M	6.0
Without closure of Lineside Road/ Fernside Road	$0.5M	$0.42M	$0.3M	nil	$1.90M	0.7

Table 9.5: Southern Links (Ryans Place Extension) NPV Benefit s and BCR

Note that the benefits for this project are mainly derived from the closure of the Lineside Road/ Fernside Road intersection and Fernside Road railway crossing.

9.4 Western Link

9.4.1 Travel Time and Vehicle Operating Cost Savings

The TTC and VOC savings for the Western Link as a standalone project for years 2011 and 2021 and as a Net Present Value (NPV) for construction complete by years 2007, 2012, 2017 and 2022 are summarised in Table 9.6 below:

Annual Benefit at Year 2011	Annual Benefit at Year 2021	NPV of benefits for construction complete at year				
		2007	2012	2017	2022	2027
$30,000	$390,000	$1.25M	$2.49M	$3.72M	$4.96M	$6.19M

Table 9.6: Western Link TTC and VOC benefits

The TTC and VOC benefits are derived from the direct route that the Western Link offers compared to the existing route of Johns Road to Pentecost Road to South Belt to Townsend Road.

9.4.2 Accident Analysis

The accident costs for the total network will increase slightly due to the addition of two intersections, including a roundabout. This will be offset by intersection improvements at Fernside Road and Townsend Road. The net effect is no accident benefits/ disbenefits.

9.4.3 Intangible Benefits

The main intangible effect will be a reduction in traffic volume and noise on the Johns Road to Pentecost Road to South Belt to Townsend Road route which is the main alternative route for the Western Link in the Do Minimum and increasing community interaction by providing a new link.

9.4.4 Benefit Cost Ratios

The costs and benefits and benefit cost ratios for construction complete by year 2007, are summarised in Table 9.3 below. The capital cost shown does not include the financial contribution from the developer.

	Capital Cost	NPV Cost	NPV Benefits			BCR
			TTC &VOC	Accidents	Total	
Western Link	$0.98M	$0.80M	$1.25M	nil	$1.25M	1.6

Table 9.7: Western Link NPV Benefit s and BCR

The NPV of benefits and benefit cost ratios for construction complete by years 2007, 2012, 2017 and 2022 are summarised in Table 9.8 below.

Western Link BCR for construction complete at year				
2007	2012	2017	2022	2027
1.6	3.1	4.7	6.2	7.7

Table 9.8: Western Link Benefit Cost Ratios

9.5 Eastern Link Part A (Lineside Rd to Northbrook Rd)

9.5.1 Travel Time and Vehicle Operating Cost Savings

The TTC and VOC savings for the Eastern Link Part A as a standalone project, (which includes the Outline Development Plan link from Northbrook Road to Kippenberger Ave), for years 2011 and 2021 and as a Net Present Value (NPV) for construction complete by years 2007, 2012, 2017 and 2022 are summarised in Table 9.9 below:

Annual Benefit at Year 2011	Annual Benefit at Year 2021	NPV of benefits for construction complete at year				
		2007	2012	2017	2022	2027
$30,000	$82,000	$2.23M	$4.87M	$7.50M	$10.13M	$12.77M

Table 9.9: Eastern Link Part A, TTC and VOC benefits

The TTC and VOC benefits are derived from the faster and high level of service route that the Eastern Link offers compared to the alternative route of Percival Street/ Southbrook Road which has a high level of side friction. The benefit to Percival/ Southbrook is an easing of the Level of Service from E to D.

9.5.2 Accident Analysis

The accident costs for the total network will increase slightly due to the additional intersections along the route. Although accidents will reduce on Percival/ Southbrook these will transfer to the Eastern Link.

9.5.3 Intangible Benefits

The main intangible effect will be a reduction in traffic volume and noise on Percival Street/ Southbrook Road which is the main alternative route for the Eastern Link Part A in the Do Minimum.

9.5.4 Benefit Cost Ratios

The costs and benefits and benefit cost ratios for construction complete by year 2007, are summarised in Table 9.10 below. The capital cost includes the Eastern Part A link plus its intersection with Lineside Road.

	Capital Cost	NPV Cost	NPV Benefits			BCR
			TTC &VOC	Accidents	Total	
Eastern Link Part A	$6.7M	$5.4M	$2.39M	-$0.16M	$2.23M	0.4

Table 9.10: Eastern Link Part A NPV Benefit s and BCR

The NPV of benefits and benefit cost ratios for construction complete by years 2007, 2012, 2017 and 2022 are summarised in Table 9.11 below:

Eastern Link Part A BCR for construction complete at year				
2007	2012	2017	2022	2027
0.4	0.9	1.4	1.9	2.3

Table 9.11: Eastern Link Part A Benefit Cost Ratios

9.6 Eastern Link Parts B & C (Northbrook Rd to Coldstream Rd)

9.6.1 Travel Time and Vehicle Operating Cost Savings

The TTC and VOC savings for the Eastern Link Part B and C assuming Part A is built, for years 2011 and 2021 and as a Net Present Value (NPV) for year zero are summarised below. An alternative to Part C is a link from Northbrook Road to Blackett- Keir Streets, (Blackett Street Extension), which is also reported in Table 9.12 below:

	Annual Benefit at Year 2011	Annual Benefit at Year 2021	NPV of benefits at year 0
Eastern Part C	nil	-$110,000	-$320,000
Blackett Street Extension	$190,000	$90,000	$940,000

Table 9.12: Eastern Link Part C and Blackett-Keir Extension TTC and VOC benefits

The TTC and VOC benefits for Part C is negative which is due to intersection delays associated with the roundabout at Kippenberger Avenue. The benefits are positive for the Blackett Street Extension due to the attractive link it provides to the town centre however these benefits drop off over time possibly because traffic is directed to the town centre where traffic volumes are high and congestion increases. Hence the benefits are not reported for future years.

9.6.2 Accident Analysis

The accident costs for the total network will increase slightly due to the additional intersections along the route. The net effect is an assessed increase in accident costs of $10,000 per annum at year 0.

9.6.3 Intangible Benefits

The main intangible effect will be a reduction in traffic volume and noise on East Belt which is the main alternative route for the Eastern Link Part C in the Do Minimum.

9.6.4 Benefit Cost Ratios

The costs and benefits and benefit cost ratios for construction complete by year 2007, are summarised in Table 9.13 below. The capital cost shown does not include the financial contribution from the developer for Eastern Part B.

	Capital Cost	NPV Cost	NPV Benefits			BCR
			TTC &VOC	Accidents	Total	
Eastern Link Parts B & C	$2.9M	$2.3M	-$0.3M	-$0.1 M	-$0.4M	negative
Blackett Street Extension	$2.1M	$1.7M	$1.1M	-$0.1 M	$1.0M	0.6

Table 9.13: Eastern Link Part A NPV Benefit s and BCR

9.7 Staging of the Links

Based on the economic analysis for the links as discussed above the following staging scenarios in Table 9.14 are recommended for planning purposes. The approximate year for construction start is also shown which relates to the year that the incremental BCR is 2 to 3.

Stage	Option Description	Capital Costs	NPV Costs	NPV Benefits	Incremental BCR at year 0	Approx Construction Start (BCR = 2 to 3)
1	Western Link	$0.98M	$0.80M	$1.25M	1.6	2009 to 2012
With Southern Links P1 – Preferred Alternative						
2	Southern Links (Fernside Road) P1	$2.32M	$1.53M	$2.5M	1.7	2007 to 2012
3	Eastern Link Part A plus Southern Links (Ryans Place)	$7.2M	$5.8M	$2.2M	0.4	2025 plus
4 &/or 4a	Eastern Link Part B & C or Eastern Link Part B & Blackett St Ext	$2.9M $2.1M	$2.3M $1.7M	-$0.4M $1.2M	negative 0.7	Will not be reached unless a bridge crossing is included
With Southern Links P2						
2	Southern Links (Fernside Road) P2	$1.5M	$0.84M	$1.7M	2.1	2005 to 2008
3	Eastern Link Part A plus Southern Links (Ryans Place)	$7.2M	$5.8M	$1.8M	0.3	2025 plus

4 &/or 4a	Eastern Link Part B & C or Eastern Link Part B & Blackett St Ext	$2.9M $2.1M	$2.3M $1.7M	-$0.4M $0.9M	negative 0.6	Will not be reached unless a bridge crossing is included

Table 9.14: Staging Options and BCRs
**does not included financial contribution (developer)*

The most likely options to achieve funding within the next five years are the Western Link and Southern Links (Fernside Road) where Option P1 is recommended. The eastern link options are unlikely to attract a BCR sufficient for Transfund subsidy within the next 20 years. In order for the Eastern Link to attract traffic it would need to link to a new crossing of the Ashley River, (which would be uneconomic).

Summary and Recommendations

A summary of the benefit cost ratios at year 0 and the years at which the BCR would reach 2 to 3 are tabulated in Table 9.15 & 9.16 below. Table 9.15 provides the BCR's for the projects as standalone and Table 9.16 provides BCR's for the options as stages of a larger project. An approximate year of construction is based on a BCR range of 2 to 3 as this is the likely value at which a Transfund subsidy could be expected when LTMA and Transfund Factors requirements assessment are considered.

Stand Alone Projects	Capital Cost	NPV Cost	NPV Benefits	Incremental BCR at year 0	Approx Construction Start (BCR = 2 to 3)
Southern Links (Fernside Road) P1 P2	 $2.32M $1.5M	 $1.53M $0.84M	 $3.02M $0.6M	 2.0 2.3	2005 to 2010
Southern Links (Ryans Place Extension)	$0.5M	$0.42M	$3.02M*	6.0*	2005
Western Link	$0.98M	$0.80M	$1.25M	1.6	2009 to 2012
Eastern Link Part A	$6.7M	$5.4M	$2.23M	0.4	2025 plus
Eastern Link Parts B & C or Eastern Link Part B & Blackett St Ext	$2.9M $2.1M	$2.3M $1.7M	-$0.4M $1.0M	negative 0.6	Will not be reached unless a bridge crossing is included

Table 9.15: BCR Summary Standalone Options
**assumes Fernside Rail Crossing closed*

Stage	Option Description	Capital Costs	NPV Costs	NPV Benefits	Incremental BCR at year 0	Approx Construction Start (BCR = 2 to 3)
1	Southern Link Ryans Place Extension	$0.5M	$0.42M	$3.02M*	6.0*	2005
2	Western Link	$0.98M	$0.80M	$1.25M	1.6	2009 to 2012
3	Southern Links (Fernside Road) P1	$2.32M	$1.53M	$2.5M	1.7	2007 to 2012
With Southern Links P1 – Preferred Alternative						
3	Eastern Link Part A plus Southern Links (Ryans Place)	$6.7M	$5.4M	$2.2M	0.4	2025 plus
4 &/or 4a	Eastern Link Part B & C or Eastern Link Part B & Blackett St Ext	$2.9M $2.1M	$2.3M $1.7M	-$0.4M $1.2M	negative 0.7	Will not be reached unless a bridge crossing is included
With Southern Links P2						
2	Southern Links (Fernside Road) P2	$1.5M	$0.84M	$1.7M	2.1	2005 to 2008
3	Eastern Link Part A plus Southern Links (Ryans Place)	$7.2M	$5.8M	$1.8M	0.3	2025 plus
4 &/or 4a	Eastern Link Part B & C or Eastern Link Part B & Blackett St Ext	$2.9M $2.1M	$2.3M $1.7M	-$0.4M $0.9M	negative 0.6	Will not be reached unless a bridge crossing is included

Table 9.16: BCR Summary Staged Project

** assumes Fernside Road Crossing Closed*

The most likely projects to achieve funding within the next five years is the the Western Link and Southern Links (Fernside/ Flaxton Intersection) where Alternative P1 is recommended.

The eastern link options are unlikely to attract a BCR sufficient for Transfund subsidy within the next 20 years. In order for the Eastern Link to optimise benefits it would need to link to a new crossing of the Ashley River (this is unlikely to be economic).

Note that Tables 9.15 and 9.16 are for capital works only. It does not include seal widening, AWT or right turn bays. These items are classified as maintenance or minor safety items. The BCR are calculated on the total cost minus the financial contribution (developer) costs.

10 Risk Assessment

Project risk in terms of Threats and Opportunities has been assessed in accordance with Transit New Zealand's Risk Management Process Manual September 2004.

The opportunities and threats are tabulated in Table 1 and 2 in Appendix J respectively. Treatment Plans are introduced on the right hand side of the tables for each identified risk.

10.1 Opportunities

The analysis of the opportunities has shown that the designation of the corridors has a risk rating of 350 and is rated as an "Extreme Opportunity" that should be actively pursued.

Six other opportunities have been identified that have risk ratings ranging from 160 to 280 and are rated as "Very High Opportunities". These should be pursued and enhanced.

The opportunities are relevant to all of the proposed roading links.

10.2 Threats

Three threats related to property and designation were identified with a risk rating of 280 and a rating of "Very High Threat". These include Item 3.2 "Increased cost of land Acquisition", Item 3.3 "Change of land zonings Significantly Increases Land Costs" and Item 4.2 "delay in obtaining designations".

Fourteen other threats have been identified that have risk ratings from 160 to 210 and are also rated as "Very High Threats". Sixteen other threats with risk ratings ranging from 80 to 140 have been identified. These have ratings of "High Threat". One threat has a rating of a Moderate Threat.

The majority of the threats are relevant to all of the proposed roading links, except for numbers 2.5, 2.6, 2.7 and 7.2. Refer to footnotes on Table 2.

Summary

The significant highly rated risk in terms of opportunity and threats relate to Land Designation and Land Purchase. It is recommended that land is designated and purchased at the earliest opportunity. There is a very high risk that land values could escalate as the land zoning changes to residential. This could introduce a prohibitive cost for the future transportation schemes. The highest estimate of cost "risk threat" relates to the depth of undercut required to the underlying gravel strata. Extensive geotechnical testing should be carried out to provide certainty to the project estimate of costs. Appendix J contains the full risk assessment.

11 Land Transport Management Act (LTMA) Requirements and Transfund's Assessment Factors

11.1 Land Transport Management Act

The projects have been assessed in terms of the five LTMA criteria as described in Section 11.1.1 to 11.1.5 below.

11.1.1 Assisting with Economic Development

The proposed projects will provide an effective and efficient roading network that will assist and facilitate economic growth, which will impact on the whole community. The projects will enhance economic development by:

i) Providing links to the proposed industrial area at Southbrook.
ii) Facilitating urban growth, especially to the West and East of Rangiora.
iii) Reducing congestion within Rangiora and hence travel time and frustration for motorists.
iv) Providing better designed routes and intersections.

The "Assisting with Economic Development" criteria is assessed as "High".

11.1.2 Safety and Personal Security

The proposed projects will enhance safety and personal security by:

i) Minimising road accidents, particularly by reducing the congestion on the existing routes and providing improved intersections and road geometry.
ii) Improving walking and cycling safety by providing footpaths, cycleways and widened shoulders for cycling.
iii) The crash rates of vehicles will be reduced on sections to be designated as Limited Access Roads (LAR) because of less turning vehicle movements.

The "Safety and Personal Security" criteria is assessed as "High".

11.1.3 Access and Mobility

The proposed projects will facilitate a high level of access and mobility in a community that enjoys high levels of car ownership by:

i) Developing of new access routes.
ii) Reducing travel times.
iii) Reducing congestion.
iv) Reducing traffic on the existing routes within Rangiora. This will reduce congestion and will make walking and cycling safer on the existing routes. (A walking and cycling strategy can then be developed).

The "Access and Mobility" criteria is assessed as "High".

11.1.4 Public Health

The proposed projects will enhance public health by:

i) Improving air quality (lower carbon dioxide emissions) owing to lower congestion and more efficient travel routes.
ii) Improving vibration, noise and air quality to the population as a whole by moving traffic out of the centre of Rangiora to the new links - which are in areas of a lower population base.
iii) Promoting exercise by the construction of footpaths, cycleways, widen shoulders for cycling. The improved proposed waterway structures in the significant streams will also allow access for canoes.
iv) Improved travel experience owing to lower travel times on more efficient routes, less congestion and wider carriageways.

The "Public Health" criteria is assessed a "Medium".

11.1.5 Environmental Sustainability

An effective, efficient and environmentally sustainable transport system contributes to a high quality natural environment. Environmental sustainability will be enhanced by the proposed projects by:

i) The proposed routes can be designed to facilitate public transport (bus stops) and to reduce congestion on the existing public transport routes.
ii) The proposed routes maximise the use of existing road assets in terms of land and existing infrastructure.
iii) Improving stream water quality by replacing old structures with new structures providing sufficient waterway in the new structures, to provide sufficient capacity during floods. (The larger culverts will also allow canoes to pass through). Water quality will be enhanced by treating run off.
iv) Designation of the proposed transportation routes will "future proof" the links for the benefit of future generations.
v) The proposed improvements can avoid impacts on Waaihi Tapu and Taonga and cultural values.
vi) The improved proposed routes will increase the traffic efficiency and therefore reduce adverse effects on the environment such as carbon dioxide emissions.

The Environmental sustainability is rated as "Medium".

11.2 Transfund Assessment Factors

The projects have been assessed in terms of the three Transfund Assessment Factors as described below:

11.2.1 Seriousness and Urgency

The projects are currently rated as "Low" in terms of urgency in meeting Transfund's objective of providing a safe, integrated, responsive and sustainable land transport system in terms of local and regional objectives. However the rating will change to "High" as development occurs.

11.2.2 Effectiveness

The projects are currently rated as "Low" in terms of effectiveness in contributing to Transfund's objectives and the outcomes of the LTMA. However the rating will change to "High" as the development occurs.

11.2.3 Economic Efficiency

The projects are currently rated as "Low" in terms of economic efficiency in terms of overall monetised and non-monetised benefits achieved. However the rating will change to "Medium" as the development occurs.

Summary and Recommendations

The proposed roading projects have been assessed in terms of the Land Transport Management Act (LTMA) as having a significant impact on the social, economic and environmental well being of the community. They will have positive enhancement effects in terms of the five following LTMA criteria:

i) Assisting Economic Development – this is rated as "High";
ii) Improving Safety and Personal Security – this is rated as "High";
iii) Improving Access and Mobility – this is rated as "High";
iv) Promoting Public Health – this is rated as "Medium"; and
v) Aiding Environmental Sustainability – this is rated as "Medium".

The proposed transportation projects will have the most significant effect on i), ii) and iii) above because of the reduced congestion, lower travel times on more efficient routes and lowered crash rates. Designation of the routes will "future proof" the proposed transportation routes for the benefit of future generations.
The projects have also been assessed in terms of the three Transfund Assessment Factors of:

- Seriousness and urgency;
- Effectiveness; and
- Economic efficiency.

The projects have a current rating of "Low" in terms of these three factors. However the ratings will change to "High" as the development in Rangiora commences.

12 Funding

12.1 Introduction

Funding for the improvements has been described for in terms of the Southern, Western and Eastern Links and the improvements have been divided into the two activity types Capital and Maintenance for funding purposes.

Capital project funding will be Benefit Cost Ratio (BCR) driven to receive the Transfund NZ capital subsidy rate of 59% when the BCR exceeds the BCR hurdle rate (2 to 3 have been adopted) inclusive of LTMA criteria consideration. Maintenance funding for Area Wide Treatment (AWT) and Seal Widening (SW) will be Net Present Value (NPV) driven to receive the Transfund NZ maintenance subsidy rate of 49%.

The right turn bays (RTB's) will qualify for "minor safety" category funding assistance (59%) from Transfund NZ.

The capital projects will be funded by a combination of up to four sources:

i) Roading Development Contribution (RDC), which covers all capital expenditure to cater for growth as identified in the LTCCP to be spread over developers (in accordance with the Local Government Act).
ii) Transfund capital subsidy (59%) when the BCR exceeds the current hurdle rate.
iii) Financial contributions (developer) on Eastern (Northbrook to Kippenberger) and Western (South Belt to Johns Road) Links to cover impacts of the developers who directly benefit from this work (in accordance with the Resource Management Act).
iv) The remainder of the cost (i.e. the total minus i) to iii) above) will be funded by the Council (contributed by the existing rating base).

The maintenance projects will be funded by a combination of up to three sources:

i) Transfund maintenance subsidy (49%) when the NPV becomes negative.
ii) "Minor safety" category contribution (59%) from Transfund for RTB's.
iii) The remainder of the cost (i.e. the total minus i) and ii) above) will be funded by the Council (contributed by the existing rating base).

12.2 Funding Requirements

The project estimates and proposed funding sources have been summarised in Appendix N. Note that all of the estimates are subject to escalation. Estimates are included as Appendix C.

The project funding breakdown is calculated as follows:

Capital Projects

a) The total calculated project cost estimate;

b) Subtract the financial contributions (developer) based on the minimum developer cross section;
c) Transfund New Zealand subsidy contribution on the difference between a) and b);
d) 80% of the remainder of the total share (following the subtraction of the financial contribution and Transfund subsidy) is paid through the RDC (Roading Development Contribution); and
e) The Waimakariri District Council (WDC) pay 20% of the remainder of the total share (following subtraction of Transfund subsidy in c) above).

Maintenance Projects

a) The total calculated maintenance cost estimate;
b) Transfund New Zealand subsidy contribution;
c) The Waimakariri District Council (WDC) pay the remainder of the total share.

12.3 Summary and Recommendations

Funding can be maximised by dividing the projects into the two funding activities - capital and maintenance.

The capital projects will be funded when a number of criteria are met. It is assumed that a Benefit Cost Ratio (BCR) of 2 to 3 will be sufficient as other criteria such as the Land Transport Management Act (LTMA) criteria and the Transfund assessment factors are medium to high. The projects will facilitate economic growth, reduce congestion by providing direct routes and will enhance the social wellbeing of the community reducing crash rates.

The maintenance projects will be funded from minor safety and when the net present value of the maintenance cost exceeds the cost of the project. The funding of the capital projects will be from four sources:

- The Roading Development Contribution (RDC);
- The Transfund New Zealand subsidy;
- The Financial Contributions (Developer); and
- The Waimakariri District Council (WDC) from the existing rating base.

The funding of the maintenance projects will be from three sources:

- Transfund New Zealand subsidy; and
- The Waimakariri District Council (WDC) from the existing rating base.

13 Recommendations

In order to future proof these links, the following broad recommendations are made:

1. That the projects be programmed in the Long Term Council Community Plans (LTCCPs) with provision for cost escalation;
2. The roading development contributions are provided for in the LTCCP with provision for cost escalation;
3. That all land affected by the alignments of Alternative P (option P1) for the Southern, Western and Eastern links be designated for "Future Road" immediately to "future proof" the scheme;
4. That Waimakariri District Council put in place a programme to purchase the required property at the earliest opportunity; and
5. That the components of the Western Link, Southern Links, and Eastern Link be constructed as it becomes economic to do so.
6. That further Geotechnical testing is undertaken at the design stage This testing should include:

    - Trial pits at a minimum spacing of 200m, excavated to 2.0m with scala penetrometer tests carried out and samples taken of each material encountered for subsequent laboratory testing;
    - Laboratory testing for compressibility / settlement characteristics of any peat deposits encountered;
    - In-situ density measurements should be made with nuclear densometer for use in the design of floating pavements;
    - Laboratory soaked CBR tests at natural moisture content, from which to draw a statistically relevant 95th percentile design value;
    - Benkelman Beams should be carried out on the existing pavements, and unsealed shoulders; and
    - Pavement Pits should be excavated in the existing pavements at tie-in points

    Additional Recommendations specific to each link are outlined below.

13.1 Southern Links (Fernside Road)

1. That the revised Southbrook roading layout be included in the Southbrook Outline Development Plan
2. That closing the Todds Road, Fernside Road intersection, in conjunction with future subdivision roading, be investigated.
3. That Geotechnical investigations and topographical survey be undertaken in the area of the Fernside Road, Flaxton Road intersection. This will provide more certainty to earthworks quantities, and estimates.
4. That the Scheme Assessment Report be updated after five years.

13.2 Southern Links (Ryans Place)

1. That options of developer funding for the Ryans Place extension be explored.
2. That alternative alignments of the Ryans Place extension, resulting in less adverse crossfall at the intersection with Lineside Road, be evaluated prior to designating.
3. That the Scheme Assessment Report be updated after five years.

That closing the Fernside Road, State Highway 71 intersection and railway crossing be investigated in conjunction with the new Ryans Place extension.

13.3 Eastern Link (Part A)

That the Scheme Assessment Report be updated after five years.

13.4 Eastern Link (Part B)

That alternative alignments avoiding properties on Kippenberger Avenue be evaluated.

13.5 Eastern Link (Part C)

That alternative alignments avoiding properties on Kippenberger Avenue be evaluated.

WAIMAKARIRI
DISTRICT COUNCIL

RANGIORA SOUTHERN, WESTERN & EASTERN LINK ROADS

SCHEME ASSESSMENT REPORT

Appendix A - Drawings

DRAWING INDEX

SHEET NUMBER	SHEET TITLE	REV
	TYPICAL SECTIONS, DRAINAGE & DETAILS	
6/535/27/5604 P000	INDEX	
P001	ALTERNATIVE P: OVERALL PLAN – SHEET 1	
P002	ALTERNATIVE P: OVERALL PLAN – SHEET 2	
P101	TYPICAL CROSS SECTION–SOUTHERN & WESTERN LINK	
P102	TYPICAL CROSS SECTION–EASTERN LINK	
P103	THRESHOLD TREATMENT DETAIL	
P104	TYPICAL CULVERT & EROSION CONTROL CROSS SECTIONS	

"000" SERIES = ALL LINKS: OVERALL DRAWINGS
"100" SERIES = TYPICAL SECTIONS, DRAINAGE & GENERAL DETAILS
"200" SERIES = WESTERN LINK – INTERSECTION LAYOUTS
"300" SERIES = SOUTHERN LINK – INTERSECTION LAYOUTS
"400" SERIES = EASTERN LINK – INTERSECTION LAYOUTS
"500" SERIES = PREDICTED TRAFFIC VOLUMES

WESTERN LINK			
6/535/27/5604	P201	ALTERNATIVE P: FERNSIDE RD/TOWNSEND RD INTERSECTION	
	P202	ALTERNATIVE P: TOWNSEND RD/SOUTHBELT–WESTERN LINK INTERSECTION	
	P203	ALTERNATIVE P: JOHNS RD/WESTERN LINK INTERSECTION	
	P204	ALTERNATIVE P: LONGITUDINAL SECTION STA 0–1020	
	P210	ALTERNATIVE P: FERNSIDE RD/TOWNSEND RD INTERSECTION–LONG TERM ALTERNATIVE	

PREDICTED TRAFFIC VOLUMES			
6/535/27/5604	P501	ALTERNATIVE P: PREDICTED TRAFFIC VOLUMES – SHEET 1	
	P502	ALTERNATIVE P: PREDICTED TRAFFIC VOLUMES – SHEET 2	
	P503	ALTERNATIVE P: PREDICTED TRAFFIC VOLUMES – SHEET 3	

SOUTHERN LINK			
6/535/27/5604	P300	ALTERNATIVE P1: FERNSIDE PRIORITY – OVERALL PLAN	
	P301	ALTERNATIVE P1: FERNSIDE RD/FLAXTON RD INTERSECTION	
	P302	ALTERNATIVE P : RYANS PL/LINSIDE RD INTERSECTION–MEDIUM TERM	
	P303	ALTERNATIVE P : RYANS PL/LINESIDE RD/EASTERN LINK–LONG TERM	
	P304	ALTERNATIVE P : FERNSIDE RD/TODDS RD INTERSECTION – LONG TERM	
	P310	ALTERNATIVE P2: FLAXTON RD PRIORITY–OVERALL PLAN	
	P311	ALTERNATIVE P2: FERNSIDE RD/FLAXTON RD INTERSECTION	

ALL LINKS: OVERALL DRAWINGS			
6/535/27/5604	A001	ALTERNATIVE A: OVERALL PLAN	
	B001	ALTERNATIVE B: OVERALL PLAN	
	C001	ALTERNATIVE C: OVERALL PLAN	
	D001	ALTERNATIVE D: OVERALL PLAN	
	E001	ALTERNATIVE E: OVERALL PLAN	
	F001	ALTERNATIVE F: OVERALL PLAN	
	G001	ALTERNATIVE G: OVERALL PLAN	
	H001	ALTERNATIVE H: OVERALL PLAN	
	J001	ALTERNATIVE J: OVERALL PLAN	
	K001	ALTERNATIVE K: OVERALL PLAN	
	L001	ALTERNATIVE L: OVERALL PLAN	
	M001	ALTERNATIVE M: OVERALL PLAN	

LAND PLANS			
6/535/27/3604	E1	ALTERNATIVE P: EASTERN LINK–SHEET 1	
	E2	ALTERNATIVE P: EASTERN LINK–SHEET 2	
	S1	ALTERNATIVE P1: FERNSIDE RD/FLAXTON RD	
	S2	ALTERNATIVE P2: FERNSIDE RD/FLAXTON RD	
	S3	ALTERNATIVE P : RYANS PL. TO LINESIDE RD	
	S4	ALTERNATIVE P : FERNSIDE RD/TODDS RD	
	W1	ALTERNATIVE P: WESTERN LINK	
	W10	ALTERNATIVE P: FERNSIDE RD/TOWNSEND RD INT.	

EASTERN LINK			
6/535/27/5604	P401	ALTERNATIVE P: LINESIDE RD/EASTERN LINK INTERSECTION	
	P402	ALTERNATIVE P: MARSH RD/EASTERN LINK INTERSECTION	
	P403	ALTERNATIVE P: BOYS RD/EASTERN LINK INTERSECTION	
	P404	ALTERNATIVE P: NORTHBROOK RD/EASTERN LINK INTERSECTION	
	P405	ALTERNATIVE P: KIPPENBERGER AVE/EASTERN LINK INTERSECTION	
	P406	ALTERNATIVE P: LONGITUDINAL SECTION STA 0–1440	
	P407	ALTERNATIVE P: LONGITUDINAL SECTION STA 1440–2840	

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN			
DRAWN	R Hopgood	TT	10-04
APPROVED			02/05

WAIMAKARIRI DISTRICT COUNCIL

OPUS INTERNATIONAL CONSULTANTS
Christchurch Civil Engineering
PO Box 1482
Christchurch, New Zealand
Tel: +64 3 363 5400
Fax: +64 3 365 7858

TITLE	WAIMAKARIRI DISTRICT COUNCIL RANGIORA LINK ROADS SOUTHERN, WESTERN & EASTERN LINKS INDEX
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FEATURE IDENTIFIER	6/535/27
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SHEET	000
REVISION	

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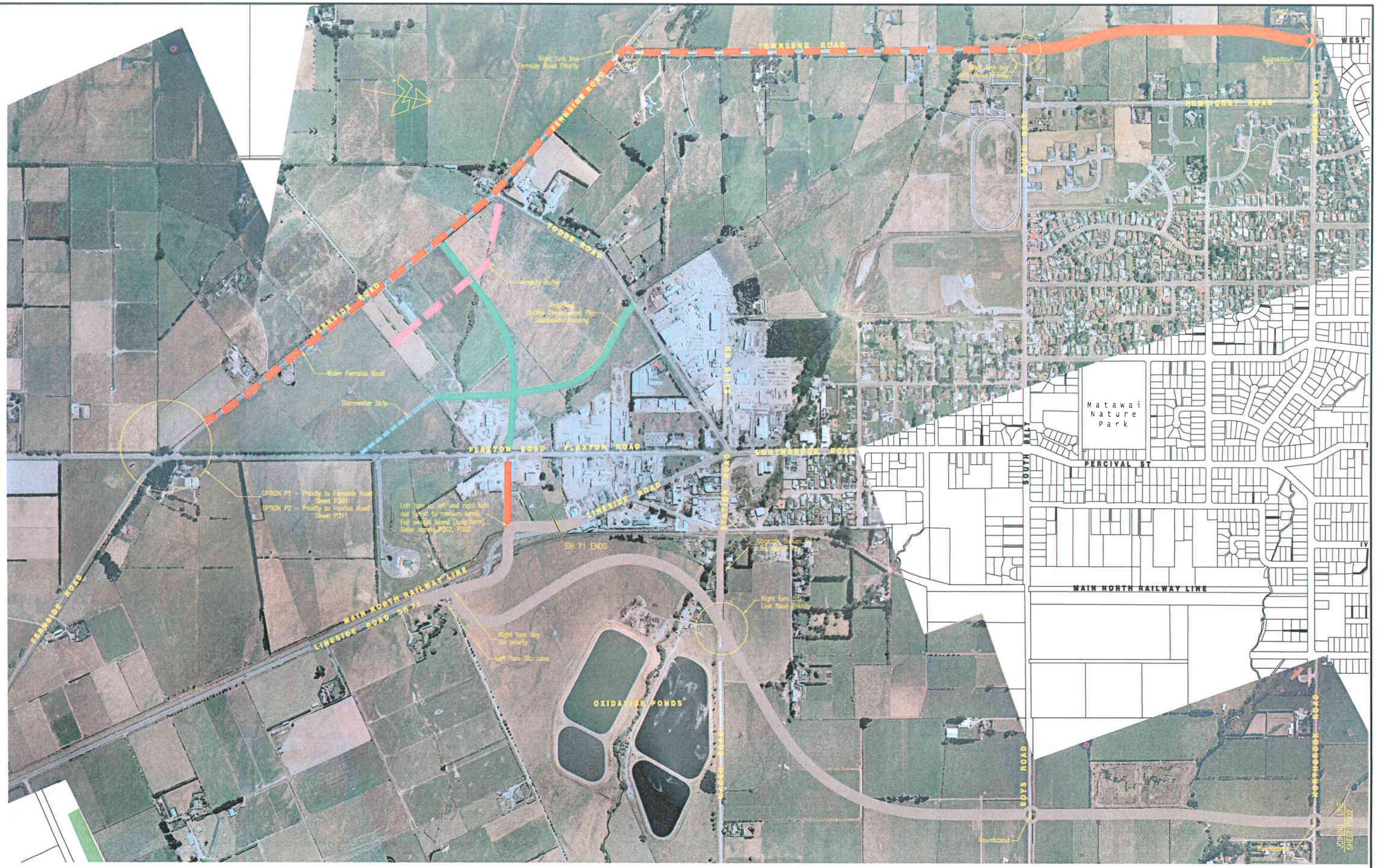

KEY

- New link by WDC – Medium term
- Upgraded link by WDC – Medium term
- New link by WDC – Long term
- Southbrook ODP roads – by others

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN	B Rice	TT	10/04
DRAWN	R Hopgood	TT	10/04
APPROVED			2/05

WAIMAKARIRI DISTRICT COUNCIL

OPUS INTERNATIONAL CONSULTANTS
Christchurch Civil Engineering
PO Box 1482
Christchurch, New Zealand
Tel: +64 3 363 5400
Fax: +64 3 365 7858

TITLE: WAIMAKARIRI DISTRICT COUNCIL
RANGIORA LINK ROADS
SOUTHERN, WESTERN & EASTERN LINKS

ALTERNATIVE P – OVERALL PLAN – SHEET 1

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SCALE	PLOT DATE	FEATURE IDENTIFIER	CODE	SHEET	REVISION
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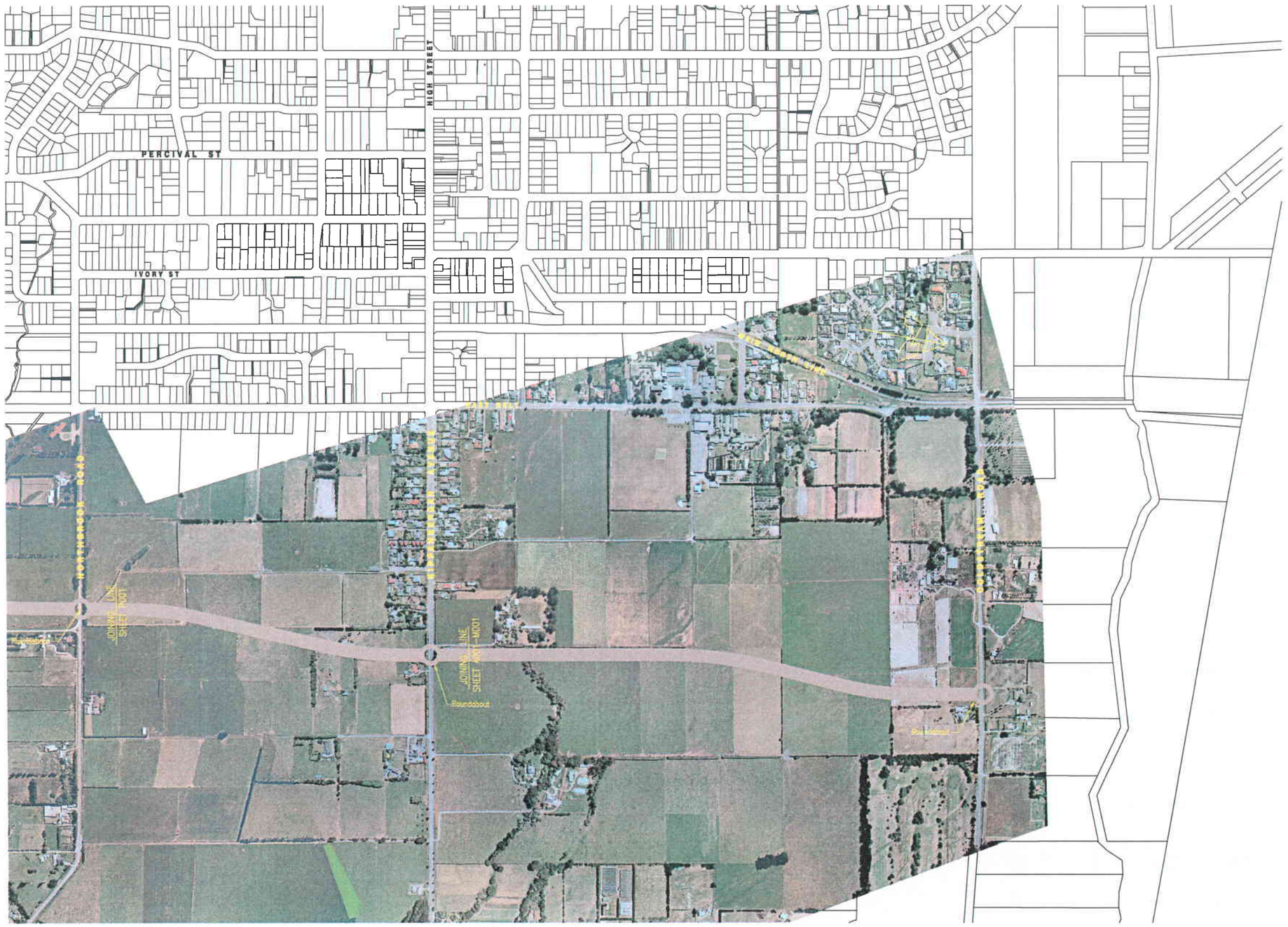

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN	B Rice	TT	10/04
DRAWN	R Hopgood	TT	10/04
APPROVED			2/05

WAIMAKARIRI DISTRICT COUNCIL

Christchurch Civil Engineering
PO Box 1482
Christchurch, New Zealand
Tel: +64 3 363 5400
Fax: +64 3 365 7858
OPUS INTERNATIONAL CONSULTANTS

TITLE: WAIMAKARIRI DISTRICT COUNCIL
RANGIORA LINK ROADS
SOUTHERN, WESTERN & EASTERN LINKS

ALTERNATIVE P – OVERALL (EASTERN LINK) PLAN – SHEET 2

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SCALE	PLOT DATE	FEATURE IDENTIFIER	CODE	SHEET	REVISION
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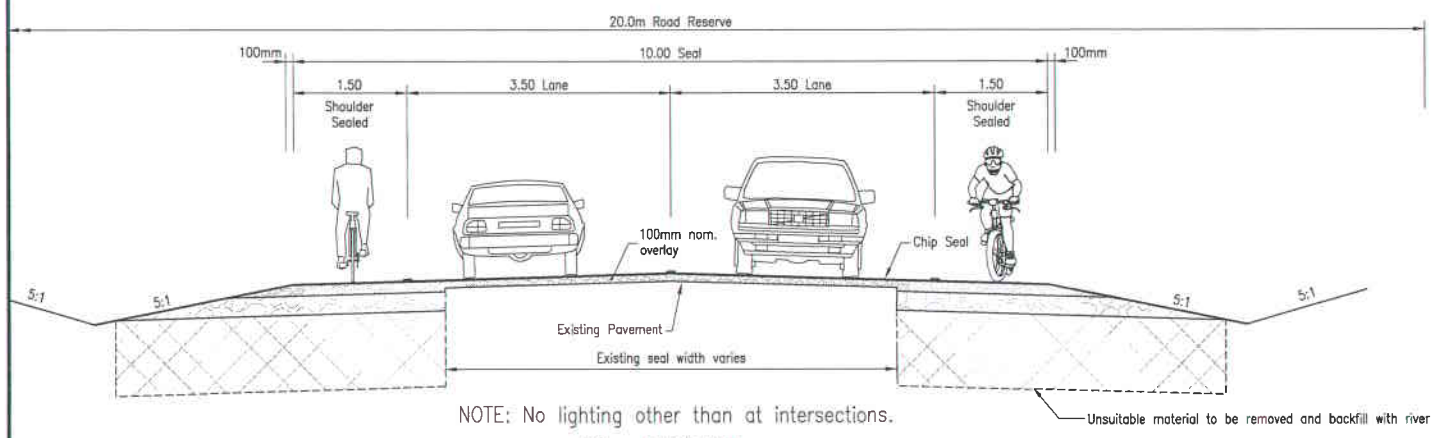
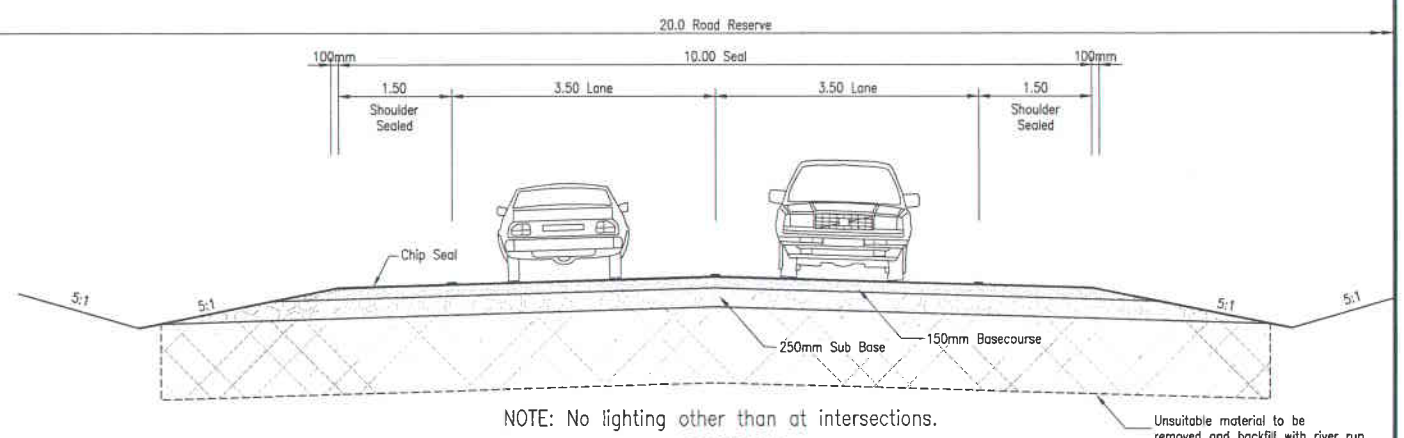


NOTE: No lighting other than at intersections.

20m RESERVE

EXISTING PAVEMENT

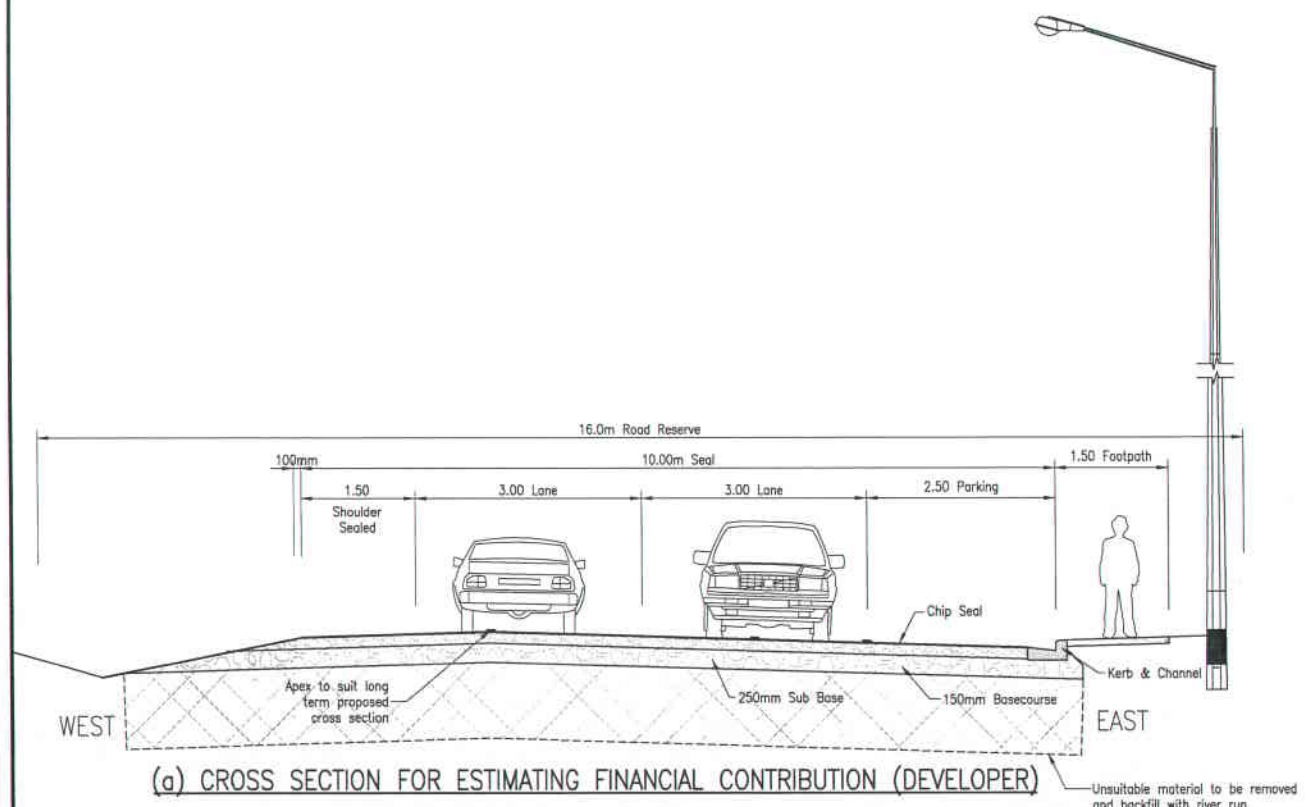


NOTE: No lighting other than at intersections.

20m RESERVE

NEW CONSTRUCTION

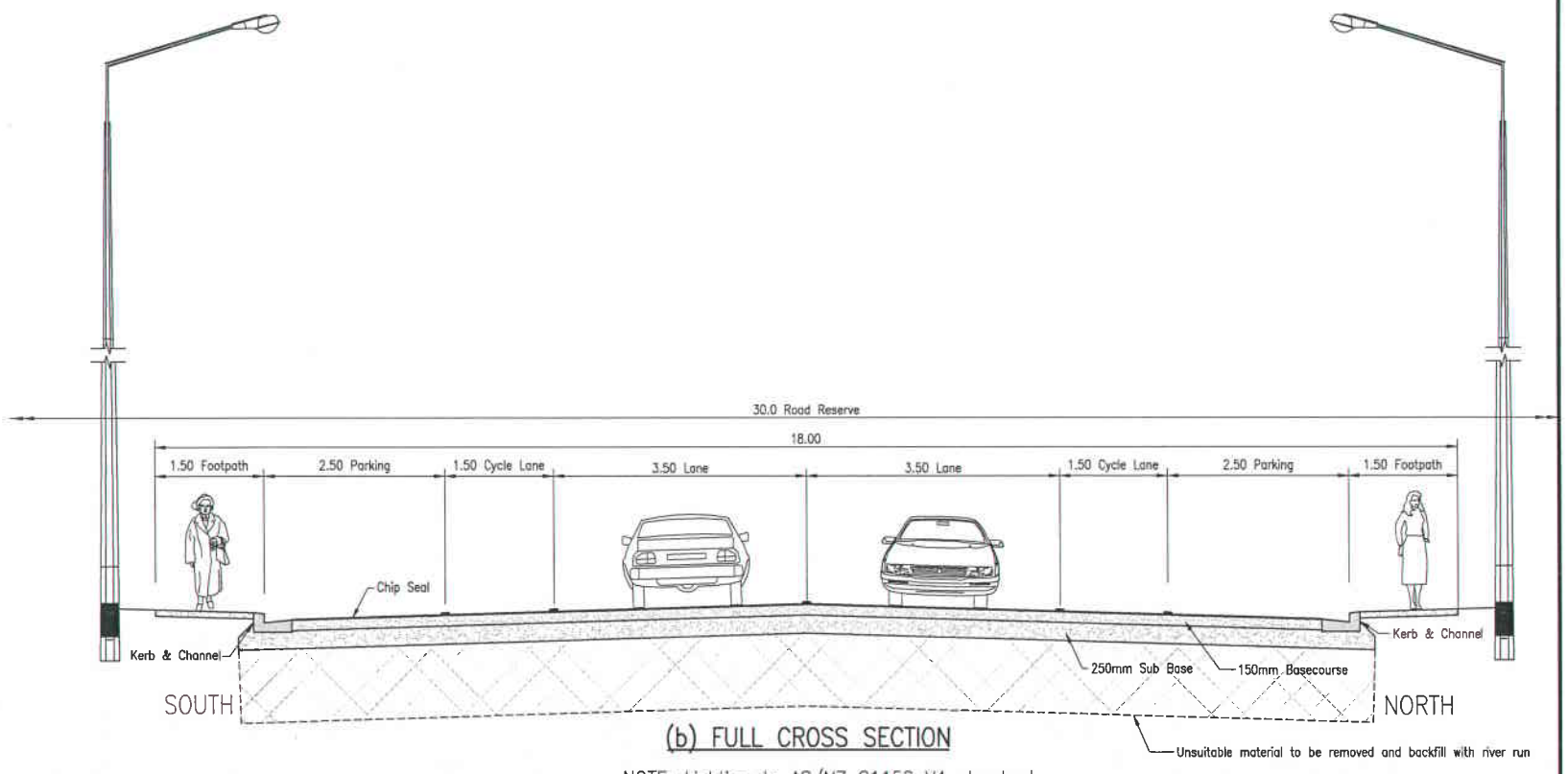
SOUTHERN AND WESTERN LINKS – RURAL
FERNSIDE ROAD TO SOUTH BELT



(a) CROSS SECTION FOR ESTIMATING FINANCIAL CONTRIBUTION (DEVELOPER)

NOTE: Lighting to NZS 6701 standard

16m RESERVE



(b) FULL CROSS SECTION

NOTE: Lighting to AS/NZ S1158 V4 standard

30m RESERVE

WESTERN LINK–URBAN
SOUTH BELT TO JOHNS ROAD

NOTE: Metal course depth to be confirmed in final design

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN	B RICE	TT	10/04
DRAWN	R HOPGOOD	TT	10/04
APPROVED			2-05

WAIMAKARIRI DISTRICT COUNCIL

OPUS INTERNATIONAL CONSULTANTS
Christchurch Civil Engineering
PO Box 1482
Christchurch, New Zealand
Tel: +64 3 363 5400
Fax: +64 3 365 7858

TITLE: WAIMAKARIRI DISTRICT COUNCIL
RANGIORA LINK ROADS
SOUTHERN, WESTERN & EASTERN LINKS

SOUTHERN & WESTERN LINKS
TYPICAL CROSS SECTIONS

STATUS	FILE				
SCHEME					
SCALE	PLOT DATE	FEATURE IDENTIFIER	CODE	SHEET	REVISION
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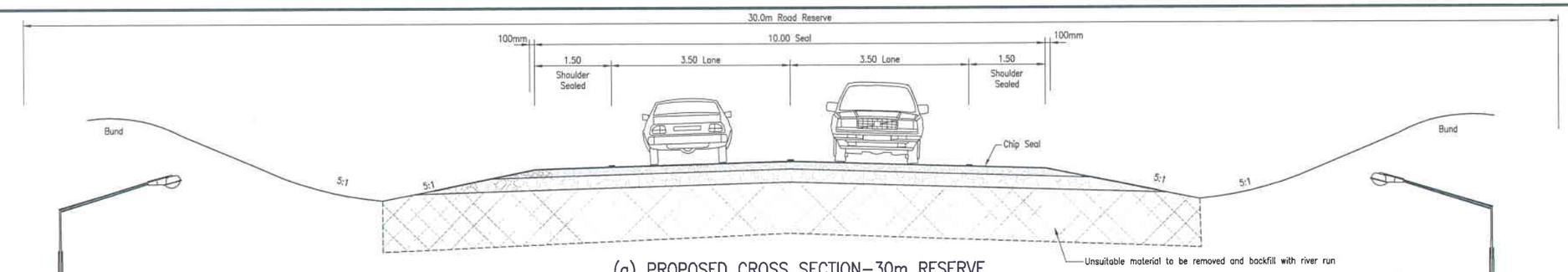
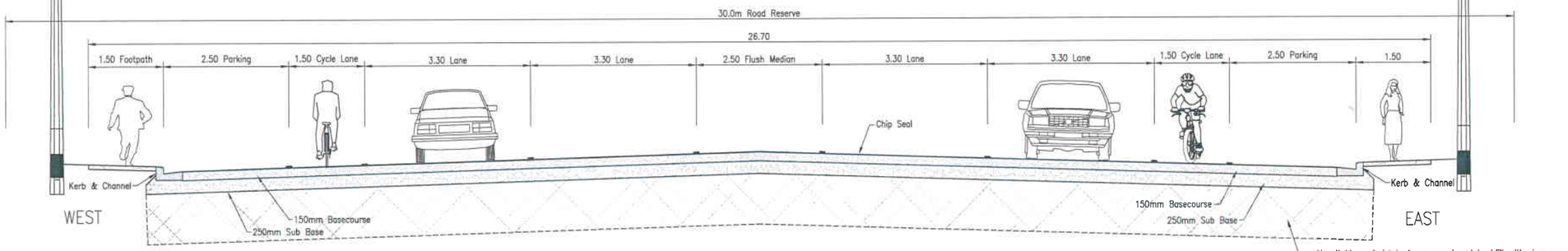


(a) PROPOSED CROSS SECTION–30m RESERVE

NOTE: No lighting other than at intersections

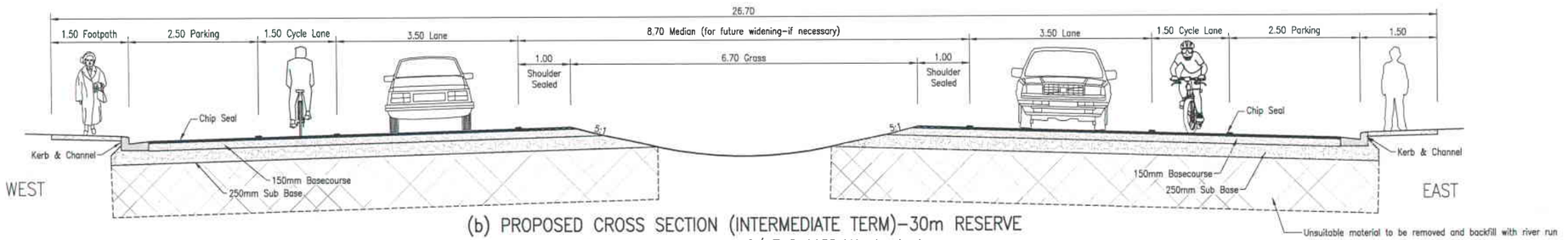
EASTERN LINK – RURAL

LINESIDE TO NORTHBROOK & KIPPENBERGER TO COLDSTREAM



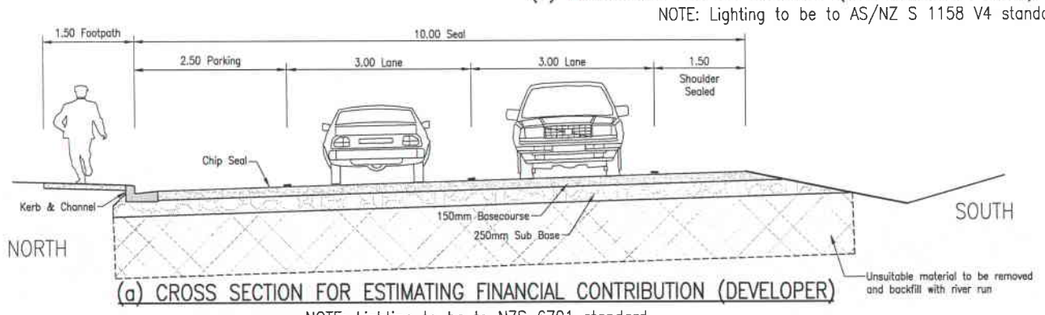
(c) PROPOSED CROSS SECTION (LONG TERM)–30m RESERVE

NOTE: Lighting to be to AS/NZ S 1158 V3 standard



(b) PROPOSED CROSS SECTION (INTERMEDIATE TERM)–30m RESERVE

NOTE: Lighting to be to AS/NZ S 1158 V4 standard



(a) CROSS SECTION FOR ESTIMATING FINANCIAL CONTRIBUTION (DEVELOPER)

NOTE: Lighting to be to NZS 6701 standard

EASTERN LINK – URBAN

NORTHBROOK TO KIPPENBERGER

NOTE: Metal course depth to be confirmed in final design

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN	B Rice	TT	10/04
DRAWN	R Hopgood	TT	10/04
APPROVED			2-05

WAIMAKARIRI DISTRICT COUNCIL

OPUS INTERNATIONAL CONSULTANTS
Christchurch
Civil Engineering
PO Box 1482
Christchurch, New Zealand
Tel: +64 3 363 5400
Fax: +64 3 365 7858

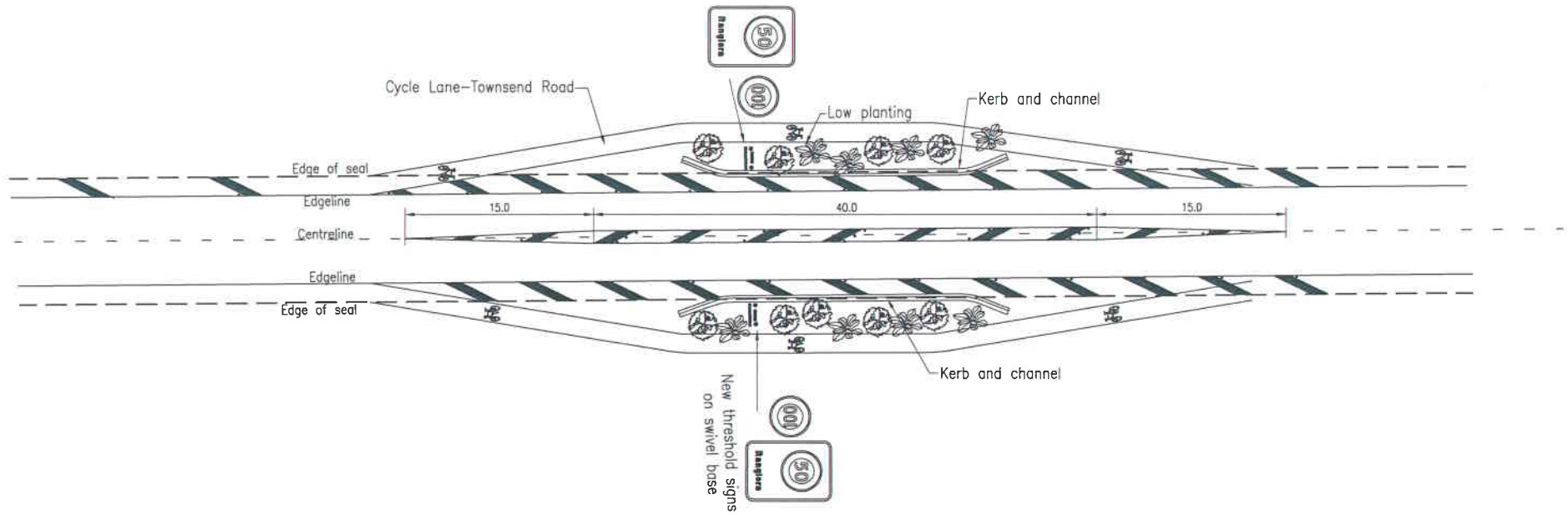
TITLE: WAIMAKARIRI DISTRICT COUNCIL
RANGIORA LINK ROADS
SOUTHERN, WESTERN & EASTERN LINKS

EASTERN LINK
TYPICAL CROSS SECTIONS

STATUS	FILE				
SCHEME					
SCALE	PLOT DATE	FEATURE IDENTIFIER	CODE	SHEET	REVISION
1:50	11/02/05 @ 13:20	6/535/27	5604	P102	

GRAPHIC SCALES 300mm 200 100 50 0 10mm

g:\waimakariri dc\dhlha.11 rangiora link roads\drawings\typical details\p102-cross_sectn.dwg – P102 ORIGINAL SHEET SIZE A1 [840x594]



PLAN
Scale 1:250

				BY	CHECKED	DATE
			DESIGN			
			DRAWN	R Hopgood	TT	11-03
			APPROVED			2-05
AMENDMENT	APP'D	DATE	This drawing and its contents are the property of Opus International Consultants Limited. Any unauthorised employment or reproduction, in full or in part, is forbidden.			

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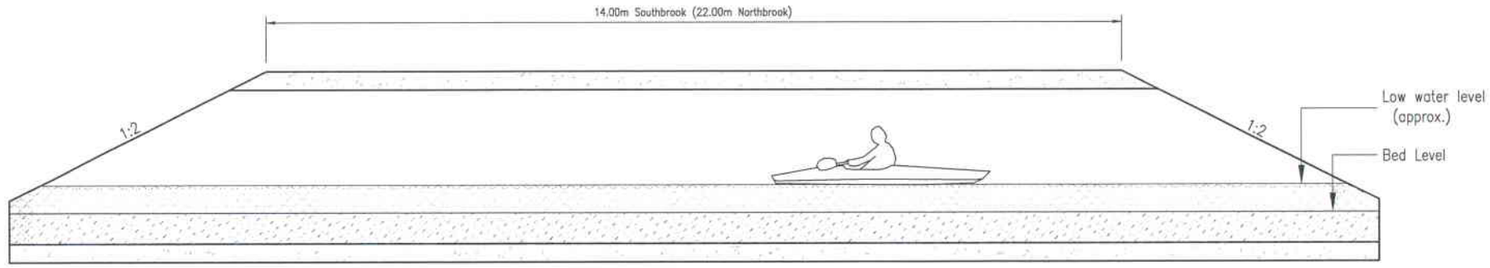
PO Box 1482
Christchurch, New Zealand
Tel: +64 3 363 5400
Fax: +64 3 365 7858

TITLE: WAIMAKARIRI DISTRICT COUNCIL
RANGIORA LINK ROADS
SOUTHERN, WESTERN & EASTERN LINKS
THRESHOLD TREATMENT DETAIL PLAN

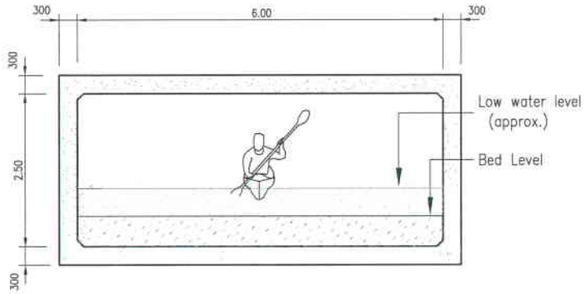
STATUS	FILE				
SCHEME	6DHLHA.11				
SCALE	PLOT DATE	FEATURE IDENTIFIER	CODE	SHEET	REVISION
1:250@A1 1:500@A3	11/02/05 @ 13:19	6/535/27	5604	P103	

GRAPHIC SCALES 300mm 200 100 50 0 10mm 11/02/2005 13:50

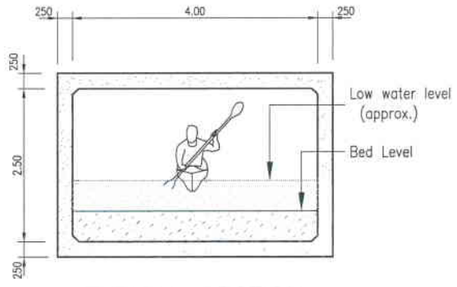
g:\waimakariri dc\dhlha.11 rangiora link roads\drawings\typical details\p103-threshold treatment detail.dwg – p103 ORIGINAL SHEET SIZE A1 [840x594]



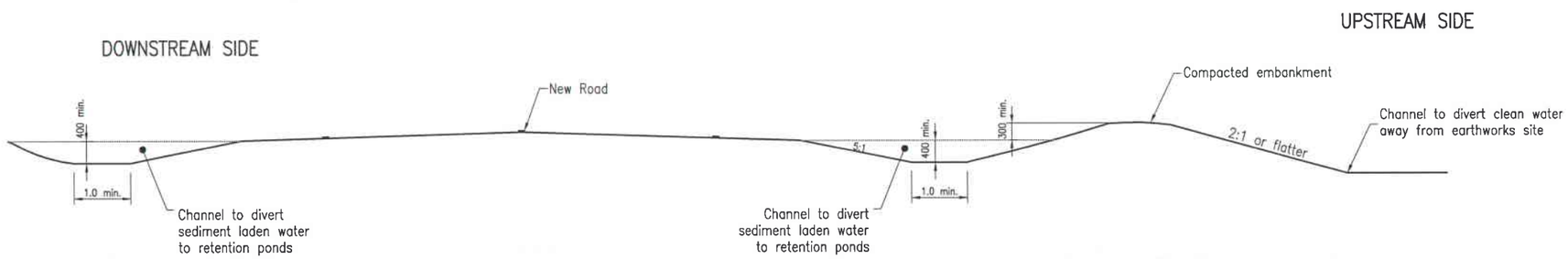
LONGITUDINAL SECTION



TYPICAL SECTION
NORTHBROOK



TYPICAL SECTION
SOUTHBROOK



TYPICAL CROSS SECTION
EROSION & SEDIMENT CONTROL SECTION

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN	B Rice	TT	11/04
DRAWN	R Hopgood	TT	11/04
APPROVED			2-05

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OPUS INTERNATIONAL CONSULTANTS
Christchurch
Civil Engineering
PO Box 1482
Christchurch, New Zealand
Tel: +64 3 363 5400
Fax: +64 3 365 7858

TITLE: WAIMAKARIRI DISTRICT COUNCIL
RANGIORA LINK ROADS
SOUTHERN, WESTERN & EASTERN LINKS

EASTERN LINK
TYPICAL CULVERT & EROSION CONTROL

STATUS	FILE				
SCHEME					
SCALE	PLOT DATE	FEATURE IDENTIFIER	CODE	SHEET	REVISION
1:50 @A1 1:100@A3	11/02/05 @ 13:19	6/535/27	5604	P104	

GRAPHIC SCALES

g:\waimakariri dc\dtlha.11 rangiora link roads\drawings\typical details\p104-culvert & erosion.dwg – P104 ORIGINAL SHEET SIZE A1 [840x594]

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN	B Rice	TT	10/04
DRAWN	R Hopgood	TT	10/04
APPROVED			2-05

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OPUS INTERNATIONAL CONSULTANTS
Christchurch Civil Engineering
PO Box 1482
Christchurch, New Zealand
Tel: +64 3 363 5400
Fax: +64 3 365 7858

TITLE: WAIMAKARIRI DISTRICT COUNCIL
RANGIORA LINK ROADS
WESTERN LINK

ALTERNATIVE P: FERNSIDE RD–TOWNSEND RD INTERSCTN PLAN

STATUS	SCHEME	FILE	6DHLHA.11		
SCALE	1:1000@A1 1:2000@A3	PLOT DATE	11/02/05 @ 13:18	FEATURE IDENTIFIER	6/535/27
				CODE	5604
				SHEET	P201
				REVISION	

GRAPHIC SCALES 300 mm 200 100 50 0 10 mm

11/02/2005 13:52

g:\waimakariri dc\dhlha.11 rangiora link roads\drawings\option p\western link\p201-fernside-townsend-intersection.dwg – P201-TOWNSEND-FERNSIDE-INTERSETCION ORIGINAL SHEET SIZE A1 [840x594]

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN	B Rice	TT	10/04
DRAWN	R Hopgood	TT	10/04
APPROVED			2-05

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OPUS INTERNATIONAL CONSULTANTS
Christchurch Civil Engineering
PO Box 1482
Christchurch, New Zealand
Tel: +64 3 363 5400
Fax: +64 3 365 7858

TITLE: WAIMAKARIRI DISTRICT COUNCIL
RANGIORA LINK ROADS
WESTERN LINK

ALT. P: TOWNSEND RD–SOUTH BELT–WESTERN LINK INT. PLAN

STATUS	SCHEME	FILE	6DHLHA.11			
SCALE	1:1000@A1 1:2000@A3	PLOT DATE	11/02/05 @ 11:25	FEATURE IDENTIFIER	CODE	SHEET	REVISION
				6/535/27	5604	P202	

GRAPHIC SCALES 300 mm 200 100 50 0 10 mm

11/02/2005 11:37

g:\waimakariri dc\dhlha.11 rangiora link roads\drawings\option p\western link\p202-townsend-south belt .dwg ORIGINAL SHEET SIZE A1 [840x594]

300mm
200
100
50
0 10mm

11/02/2005 13:54

GRAPHIC SCALES

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN	B Rice	TT	10/04
DRAWN	R Hopgood	TT	10/04
APPROVED			2-05

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OPUS INTERNATIONAL CONSULTANTS
Christchurch Civil Engineering
PO Box 1482
Christchurch, New Zealand
Tel: +64 3 363 5400
Fax: +64 3 365 7858

TITLE: WAIMAKARIRI DISTRICT COUNCIL
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WESTERN LINK

ALTERNATIVE P: JOHNS RD–WESTERN LINK INTERSECTION PLAN

STATUS	SCHEME		FILE	6DHLHA.11		
SCALE	PLOT DATE	FEATURE IDENTIFIER	CODE	SHEET	REVISION	
1:1000@A1 1:2000@A3	11/02/05 @ 13:15	6/535/27	5604	P203		

g:\waimakariri dc\dhlha.11 rangiora link roads\drawings\option p\western link\p203-johns rd-west belt.dwg – P203-JOHNS RD-WEST BELT ORIGINAL SHEET SIZE A1 (840x594)

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN	B Rice	TT	10/04
DRAWN	R Hopgood	TT	10/04
APPROVED			2-05

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OPUS INTERNATIONAL CONSULTANTS
Christchurch Civil Engineering
PO Box 1482
Christchurch, New Zealand
Tel: +64 3 363 5400
Fax: +64 3 365 7858

TITLE: WAIMAKARIRI DISTRICT COUNCIL
RANGIORA LINK ROADS
WESTERN LINK

ALTERNATIVE P: FERNSIDE–TOWNSEND RD INTERSECTION LONG TERM ALTERNATIVE PLAN

STATUS	FILE				
SCHEME	6DHLHA.11				
SCALE	PLOT DATE	FEATURE IDENTIFIER	CODE	SHEET	REVISION
1:1000@A1 1:2000@A3	11/02/05 @ 13:14	6/535/27	5604	P210	

GRAPHIC SCALES 300 mm 200 100 50 0 10 mm

11/02/2005 13:55

g:\waimakariri dc\dhlha.11 rangiora link roads\drawings\option p\western link\p210-fernside-townsend-alternative.dwg - P210-TOWNSEND-FERNSIDE-INTERSETCION-ALTERNATIVE ORIGINAL SHEET SIZE A1 [840x594]

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN	B Rice	TT	10/04
DRAWN	F Sanders	TT	10/04
APPROVED			2-05

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OPUS INTERNATIONAL CONSULTANTS
Christchurch Civil Engineering
PO Box 1482
Christchurch, New Zealand
Tel: +64 3 363 5400
Fax: +64 3 365 7858

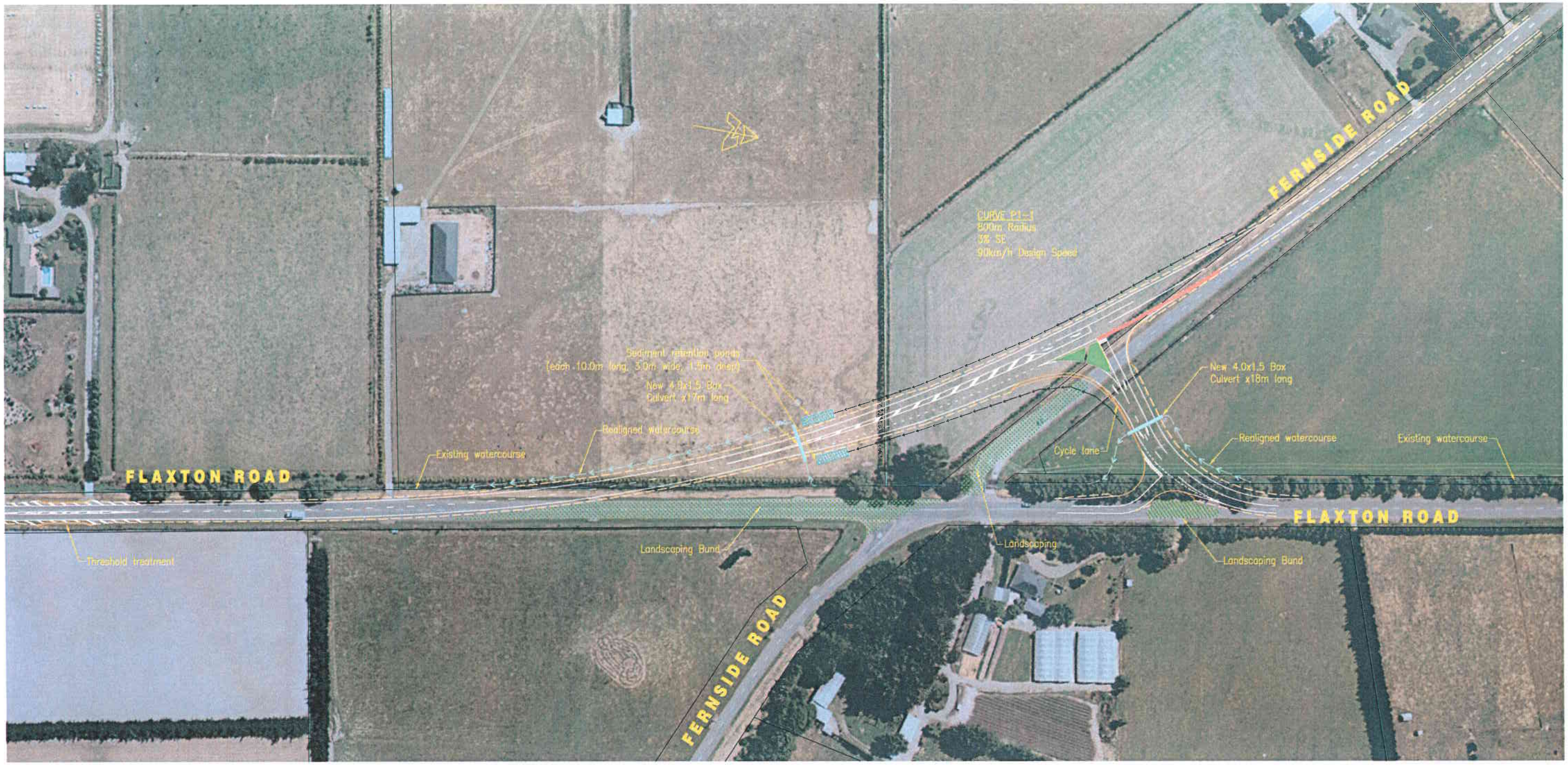
TITLE: WAIMAKARIRI DISTRICT COUNCIL
RANGIORA LINK ROADS
SOUTHERN LINK

OPTION P1: FERNSIDE ROAD PRIORITY OVERALL PLAN – SOUTHERN LINK

STATUS	FILE				
SCHEME	6DHLHA.11				
SCALE	PLOT DATE	FEATURE IDENTIFIER	CODE	SHEET	REVISION
1:2500@A1 1:5000@A3	11/02/05 @ 13:13	6/535/27	5604	P300	

GRAPHIC SCALES 300 mm 200 100 50 0 10 mm 11/02/2005 12:55

g:\waimakariri dc\dhlha.11 rangiora link roads\drawings\option p\southern link\p300-fernside priority-overall.dwg - P300 ORIGINAL SHEET SIZE A1 [840x594]



				BY	CHECKED	DATE
			DESIGN	B Rice	TT	10-04
			DRAWN	F Sanders	TT	10-04
			APPROVED			2-05
AMENDMENT	APP'D	DATE				

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OPUS INTERNATIONAL CONSULTANTS
Christchurch Civil Engineering
PO Box 1482
Christchurch, New Zealand
Tel: +64 3 363 5400
Fax: +64 3 365 7858

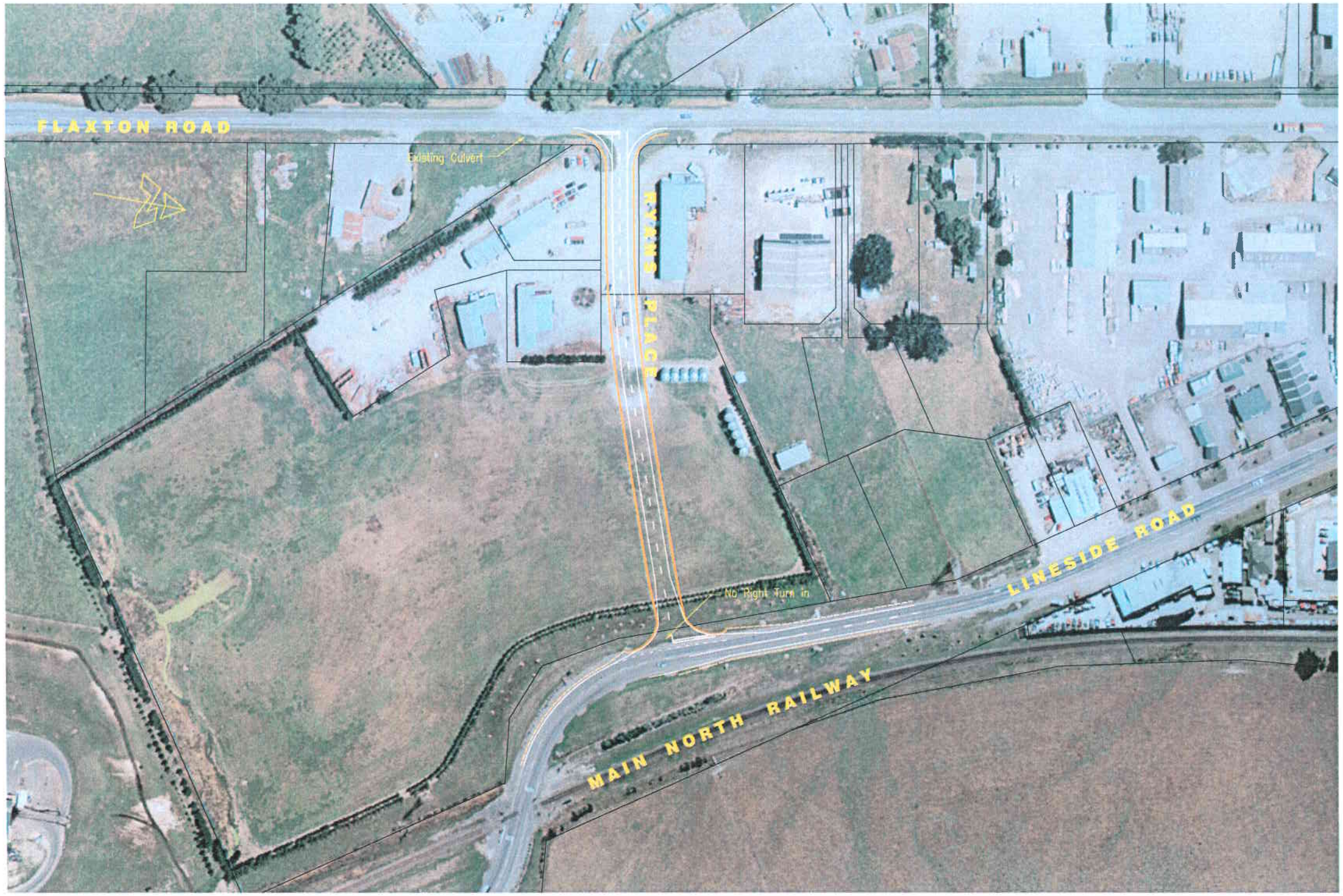
TITLE: WAIMAKARIRI DISTRICT COUNCIL
RANGIORA LINK ROADS
SOUTHERN LINK

OPTION P1: FERNSIDE-FLAXTON INTERSECTION PLAN

STATUS	FILE				
SCHEME	6DHLHA.11				
SCALE	PLOT DATE	FEATURE IDENTIFIER	CODE	SHEET	REVISION
1:1000@A1 1:2000@A3	11/02/05 @ 13:11	6/535/27	5604	P301	

GRAPHIC SCALES 300 mm 200 100 50 0 10 mm 11/02/2005 14:00

g:\waimakariri dc\dhlha.11 rangiora link roads\drawings\option p\southern link\p301-opt.p1 - fernside-flaxton.dwg - P.301 ORIGINAL SHEET SIZE A1 [840x594]



AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN	B Rice	TT	10/04
DRAWN	R Hopgood	TT	10/04
APPROVED			2-05

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OPUS INTERNATIONAL CONSULTANTS
Christchurch Civil Engineering
PO Box 1482
Christchurch, New Zealand
Tel: +64 3 363 5400
Fax: +64 3 365 7858

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RANGIORA LINK ROADS
SOUTHERN LINK

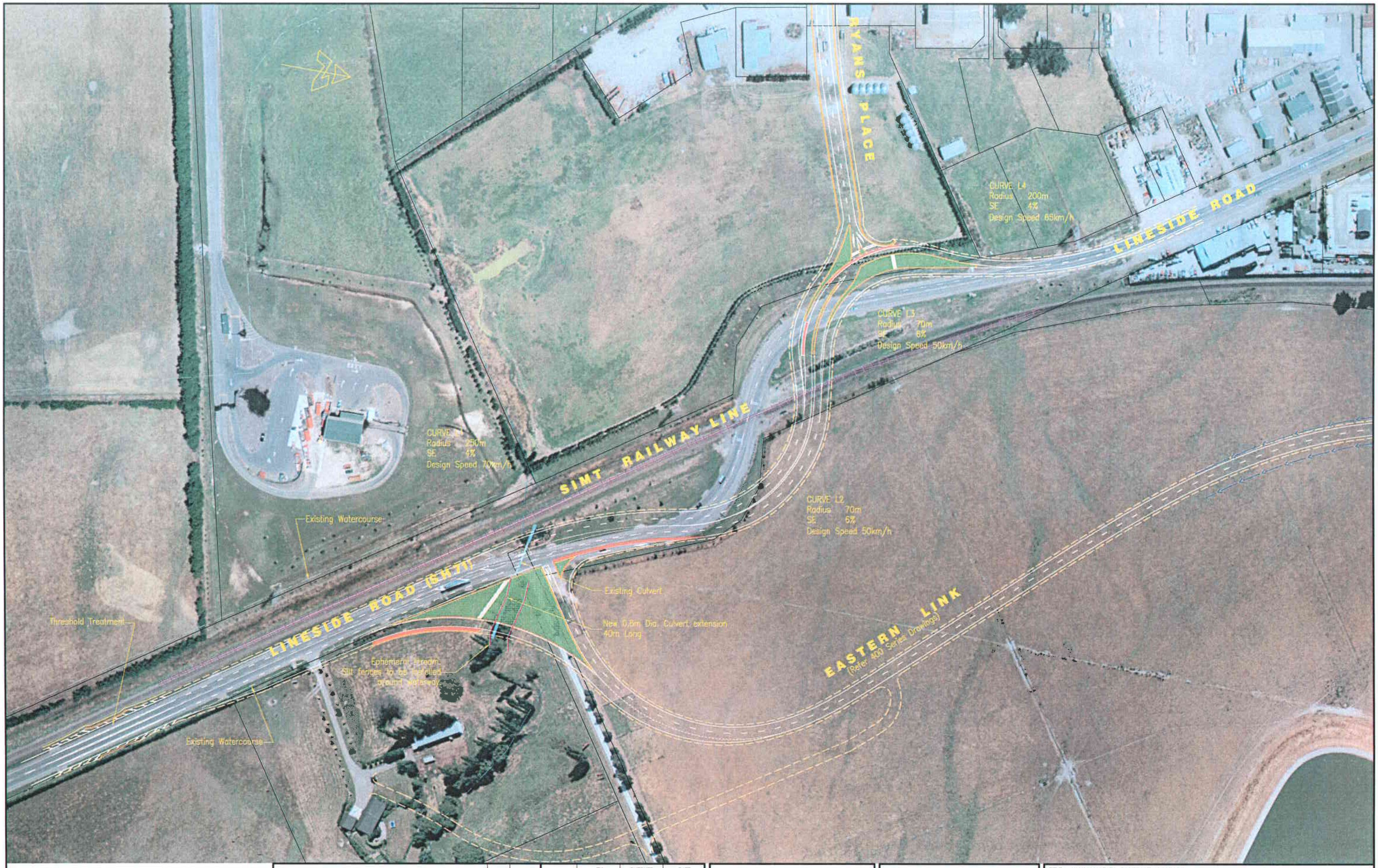
ALTERNATIVE P: RYANS PL–LINESIDE RD INTERSECTION PLAN – MEDIUM TERM

STATUS	FILE				
SCHEME	6DHLHA.11				
SCALE	PLOT DATE	FEATURE IDENTIFIER	CODE	SHEET	REVISION
1:1000@A1 1:2000@A3	11/02/05 @ 13:10	6/535/27	5604	P302	

GRAPHIC SCALES 300 mm 200 100 50 0 10 mm

11/02/2005 14:02

g:\waimakariri dc\dhlha.11 rangiora link roads\drawings\option p\southern link\p302-ryans-lineside-short-term.dwg – P302 ORIGINAL SHEET SIZE A1 [840x594]



AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN	B Rice	TT	10/04
DRAWN	R Hopgood	TT	10/04
APPROVED			2-05

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OPUS INTERNATIONAL CONSULTANTS
Christchurch Civil Engineering
PO Box 1482
Christchurch, New Zealand
Tel: +64 3 363 5400
Fax: +64 3 365 7858

TITLE: WAIMAKARIRI DISTRICT COUNCIL
RANGIORA LINK ROADS
SOUTHERN LINK

OPTION P: RYANS PL–LINESIDE RD–EASTERN LINK PLAN – LONG TERM

STATUS		FILE				
SCHEME		6DHLHA.11				
SCALE	PLOT DATE	FEATURE IDENTIFIER	CODE	SHEET	REVISION
1:1000@A1 1:2000@A3	11/02/05 @ 13:09	6/535/27	5604	P303	

GRAPHIC SCALES
300 mm
200
100
50
0 10 mm
11/02/2005 14:04

g:\waimakariri dc\dhlha.11 rangiora link roads\drawings\option p\southern link\p303-ryans-lineside-long-term.dwg – P303 ORIGINAL SHEET SIZE A1 [840x594]

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN	B Rice	TT	10/04
DRAWN	R Hopgood	TT	10-04
APPROVED			2-05

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OPUS INTERNATIONAL CONSULTANTS
Christchurch Civil Engineering
PO Box 1482
Christchurch, New Zealand
Tel: +64 3 363 5400
Fax: +64 3 365 7858

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RANGIORA LINK ROADS
SOUTHERN LINK

ALTERNATIVE P: FERNSIDE RD–TODDS RD INTERSECTION PLAN – LONG TERM

STATUS	FILE				
SCHEME	6DHLHA.11				
SCALE	PLOT DATE	FEATURE IDENTIFIER	CODE	SHEET	REVISION
1:1000@A1 1:2000@A3	11/02/05 @ 13:08	6/535/27	5604	P304	

GRAPHIC SCALES 300 mm 200 100 50 0 10 mm 11/02/2005 14:06

g:\waimakariri dc\dhlha.11 rangiora link roads\drawings\option p\southern link\p304-todds-fernside-intersection.dwg – PJ04-FERNSIDE_TODDS RD-INTERSETCION ORIGINAL SHEET SIZE A1 (840x594)

300 mm
200
100
50
0 10 mm

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN	B Rice	TT	10-04
DRAWN	F. Sanders	TT	10-04
APPROVED			2-05

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OPUS INTERNATIONAL CONSULTANTS
Christchurch Civil Engineering
PO Box 1482
Christchurch, New Zealand
Tel: +64 3 363 5400
Fax: +64 3 365 7858

TITLE: WAIMAKARIRI DISTRICT COUNCIL
RANGIORA LINK ROADS
SOUTHERN LINK

OPTION P2: FLAXTON ROAD PRIORITY
OVERALL PLAN

STATUS	FILE				
SCHEME	6DHLHA.11				
SCALE	PLOT DATE	FEATURE IDENTIFIER	CODE	SHEET	REVISION
1:2500@A1 1:5000@A3	11/02/05 @ 13:07	6/535/27	5604	P310	

11/02/2005 14:09

GRAPHIC SCALES

g:\waimakariri dc\dhlha.11 rangiora link roads\drawings\option p\southern link\p310-opt p2.dwg - P310 ORIGINAL SHEET SIZE A1 (840x594)

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN	B Rice	TT	10-04
DRAWN	F Sanders	TT	10/04
APPROVED			2-05

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OPUS INTERNATIONAL CONSULTANTS
Christchurch Civil Engineering
PO Box 1482
Christchurch, New Zealand
Tel: +64 3 363 5400
Fax: +64 3 365 7858

TITLE: WAIMAKARIRI DISTRICT COUNCIL
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SOUTHERN LINK

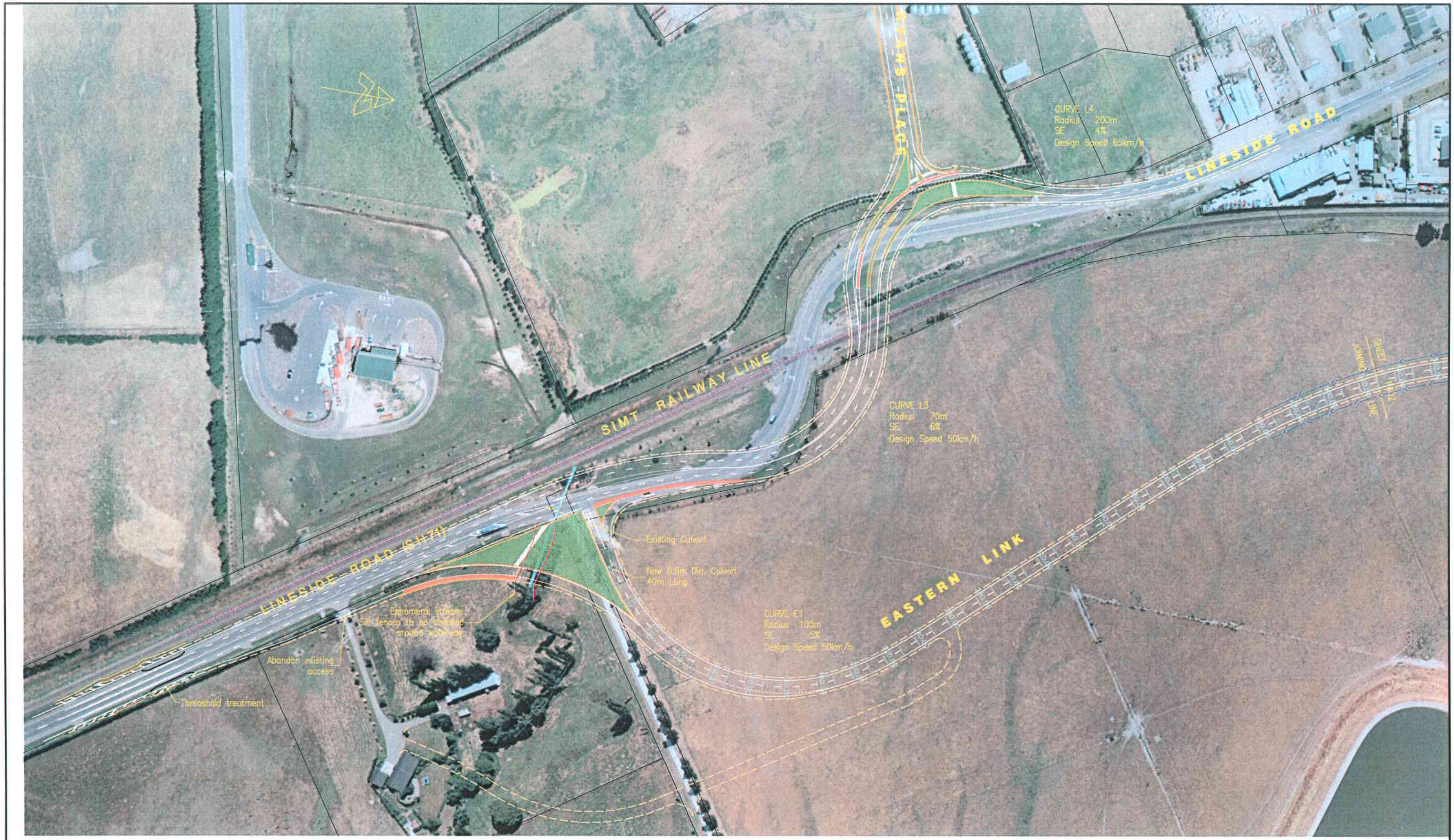
OPTION P2: FERNSIDE-FLAXTON ROAD INTERSECTION PLAN

STATUS	FILE				
SCHEME	6DHLHA.11				
SCALE	PLOT DATE	FEATURE IDENTIFIER	CODE	SHEET	REVISION
1:1000@A1 1:2000@A3	11/02/05 @ 13:05	6/535/27	5604	P311	

GRAPHIC SCALES 300 mm 200 100 50 0 10 mm

11/02/2005 14:11

g:\waimakariri dc\dhlha.11 rangiora link roads\drawings\option p\southern link\p311-opt_p2-flaxton-priority.dwg - P311 ORIGINAL SHEET SIZE A1 [840x594]



AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN	B. Rice	TT	10/04
DRAWN	R Hopgood	TT	10/04
APPROVED			2-05

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OPUS INTERNATIONAL CONSULTANTS
Christchurch Civil Engineering
PO Box 1482
Christchurch, New Zealand
Tel: +64 3 363 5400
Fax: +64 3 365 7858

TITLE: WAIMAKARIRI DISTRICT COUNCIL
RANGIORA LINK ROADS
EASTERN LINK

ALTERNATIVE P: LINESIDE RD–EASTERN LINK INTERSCTN PLAN

STATUS	FILE				
SCHEME	6DHLHA.11				
SCALE	PLOT DATE	FEATURE IDENTIFIER	CODE	SHEET	REVISION
1:1000@A1 1:2000@A3	11/02/05 @ 13:00	6/535/27	5604	P401	

GRAPHIC SCALES 300 mm 200 100 50 0 10 mm

11/02/2005 14:13

g:\waimakariri dc\dhlha.11 rangiora link roads\drawings\option p\eastern link\p401- lineside rd.dwg - P401 LINESIDE ORIGINAL SHEET SIZE A1 (840x594)

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN	B Rice	TT	10/04
DRAWN	R Hopgood	TT	10/04
APPROVED			2-05

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OPUS INTERNATIONAL CONSULTANTS
Christchurch Civil Engineering
PO Box 1482
Christchurch, New Zealand
Tel: +64 3 363 5400
Fax: +64 3 365 7858

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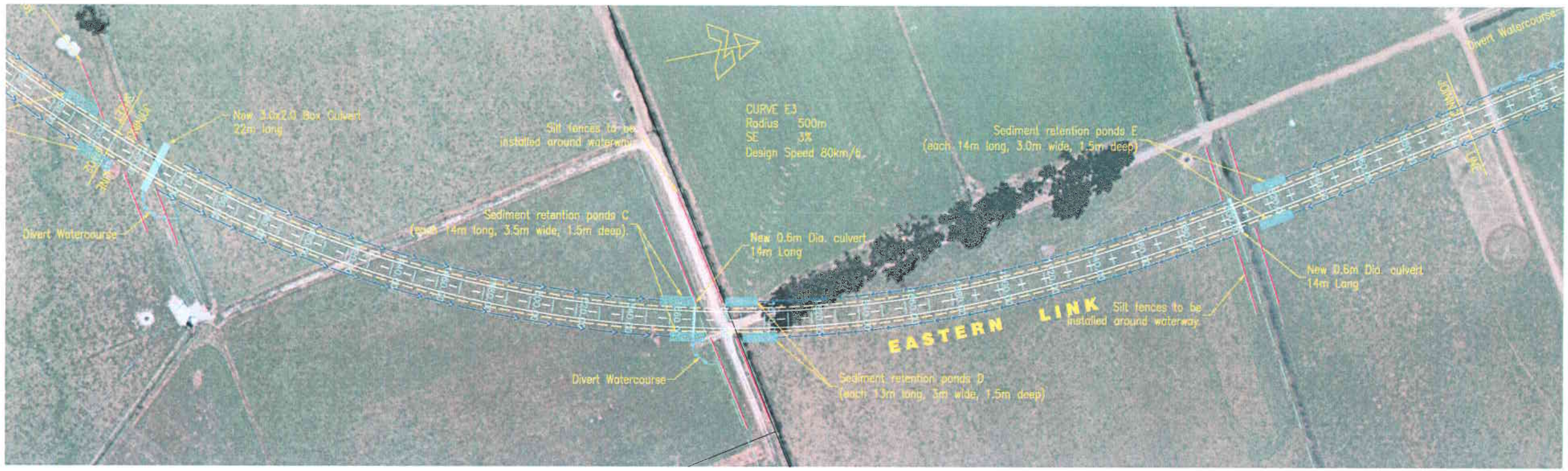
EASTERN LINK

ALTERNATIVE P: MARSH RD–EASTERN LINK INTERSECTION PLAN

STATUS	FILE				
SCHEME	6DHLHA.11				
SCALE	PLOT DATE	FEATURE IDENTIFIER	CODE	SHEET	REVISION
1:1000@A1 1:2000@A3	11/02/05 @ 12:58	6/535/27	5604	P402	

GRAPHIC SCALES
300 mm
200
100
50
0 10 mm
11/02/2005 14:15

g:\waimakariri dc\dhlha.11 rangiora link roads\drawings\option p\eastern link\p402- marsh rd.dwg – P402 ORIGINAL SHEET SIZE A1 [840x594]



AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN	B. Rice	TT	10/04
DRAWN	R Hopgood	TT	10/04
APPROVED			2-05

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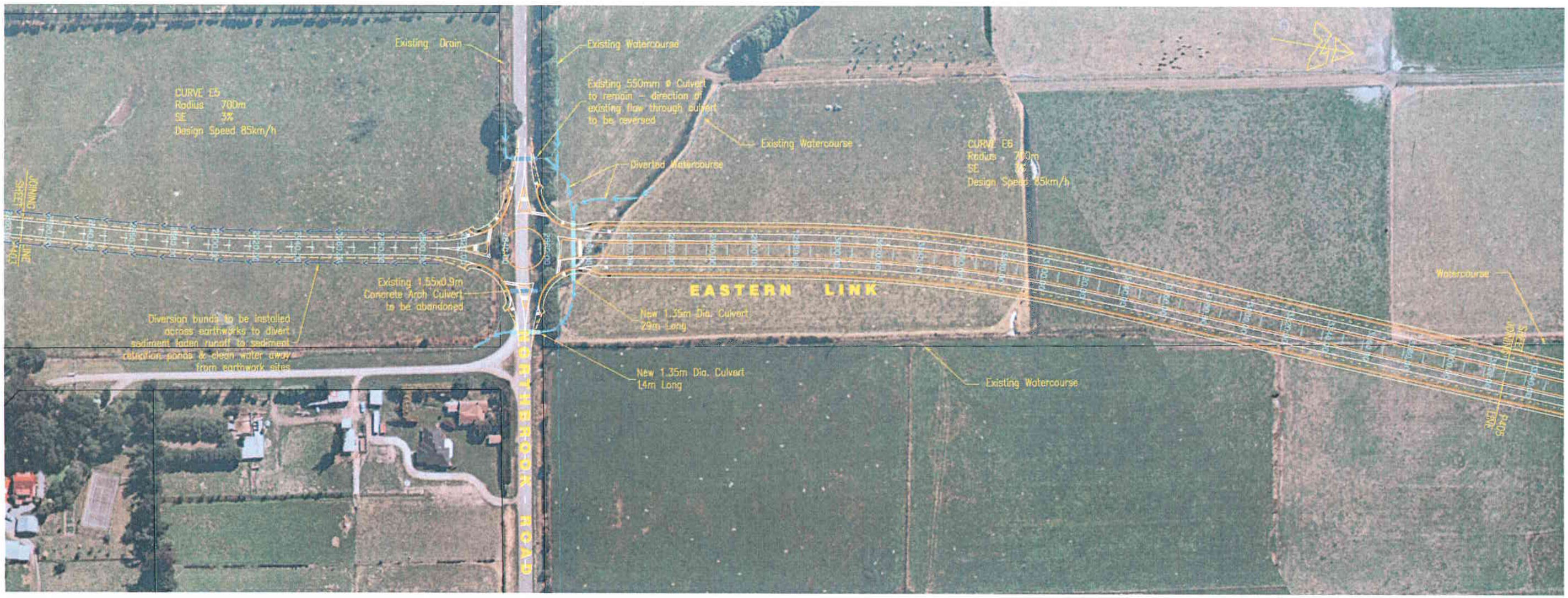
OPUS INTERNATIONAL CONSULTANTS
Christchurch Civil Engineering
PO Box 1482
Christchurch, New Zealand
Tel: +64 3 363 5400
Fax: +64 3 365 7858

TITLE: WAIMAKARIRI DISTRICT COUNCIL
RANGIORA LINK ROADS
EASTERN LINK
ALTERNATIVE P: BOYS RD–EASTERN LINK INTERSECTION PLAN

STATUS	FILE				
SCHEME	6DHLHA.11				
SCALE	PLOT DATE	FEATURE IDENTIFIER	CODE	SHEET	REVISION
1:5000@A1 1:2000@A3	11/02/05 @ 12:57	6/535/27	5604	P403	

GRAPHIC SCALES
300 mm
200
100
50
0 10 mm
11/02/2005 14:18

g:\waimakariri dc\dhlha.11 rangiora link roads\drawings\option p\eastern link\p403-boys rd.dwg – P403 ORIGINAL SHEET SIZE A1 [840x594]



AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN	B Rice	TT	10/04
DRAWN	R Hopgood	TT	10/04
APPROVED			2/05

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Christchurch Civil Engineering
PO Box 1482
Christchurch, New Zealand
Tel: +64 3 363 5400
Fax: +64 3 365 7858

TITLE: WAIMAKARIRI DISTRICT COUNCIL
RANGIORA LINK ROADS
EASTERN LINK

ALTERNATIVE P: NORTHBROOK RD–EASTERN LINK INTERSCTN PLAN

STATUS	FILE				
SCHEME	6DHLHA.11				
SCALE	PLOT DATE	FEATURE IDENTIFIER	CODE	SHEET	REVISION
1:1000@A1 1:2000@A3	11/02/05 @ 12:57	6/535/27	5604	P404	

GRAPHIC SCALES
300 mm
200
100
50
0 10 mm
11/02/2005 14:20

g:\waimakariri dc\dhlha.11 rangiora link roads\drawings\option p\eastern link\p404–northbrook rd.dwg ORIGINAL SHEET SIZE A1 [840x594]

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN	B Rice	TT	10/04
DRAWN	R Hopgood	TT	10/04
APPROVED			2/05

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OPUS INTERNATIONAL CONSULTANTS
Christchurch Civil Engineering
PO Box 1482
Christchurch, New Zealand
Tel: +64 3 363 5400
Fax: +64 3 365 7858

TITLE: WAIMAKARIRI DISTRICT COUNCIL
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EASTERN LINK

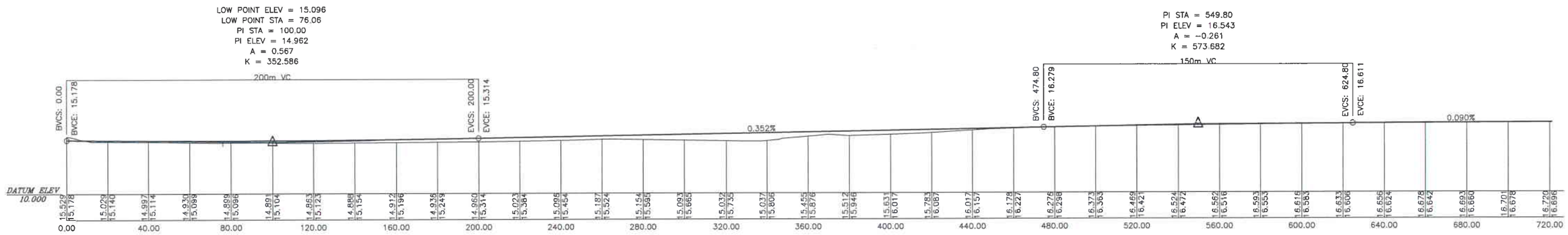
ALTERNATIVE P: KIPPENBERGER AVE–EASTERN LINK INTSCTN PLAN

STATUS	FILE				
SCHEME	6DHLHA.11				
SCALE	PLOT DATE	FEATURE IDENTIFIER	CODE	SHEET	REVISION
1:1000@A1	11/02/05 @ 12:54	6/535/27	5604	P405	

GRAPHIC SCALES 300 mm 200 100 50 0 10 mm

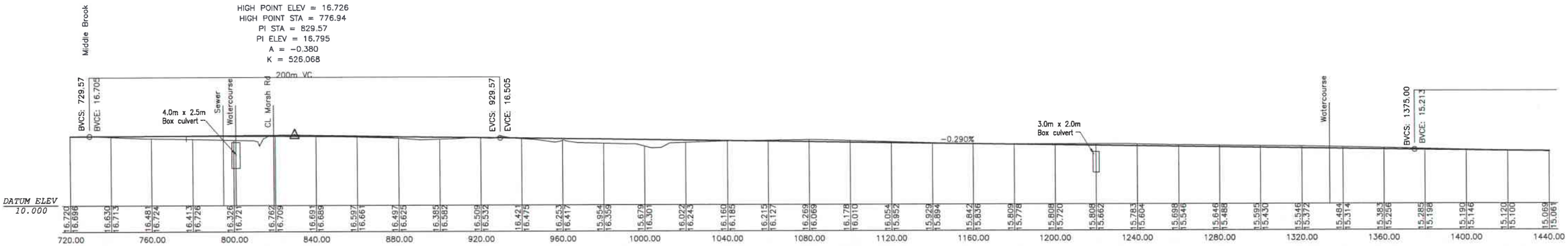
11/02/2005 14:23

g:\waimakariri dc\dhlha.11 rangiora link roads\drawings\option p\eastern link\p405-kippenberger rd.dwg – P405 KIPPENBERGER ORIGINAL SHEET SIZE A1 [840x594]



LONGITUDINAL SECTION

SCALES: HORZ. 1:1000(A1) 1:2000(A3)
VERT. 1:200(A1) 1:400(A3)



LONGITUDINAL SECTION

SCALES: HORZ. 1:1000(A1) 1:2000(A3)
VERT. 1:200(A1) 1:400(A3)

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN	B Rice	TT	10/04
DRAWN	R Hopgood	TT	10/04
APPROVED			2/05

WAIMAKARIRI DISTRICT COUNCIL

Christchurch Civil Engineering
PO Box 1482
Christchurch, New Zealand
Tel: +64 3 363 5400
Fax: +64 3 365 7858
OPUS INTERNATIONAL CONSULTANTS

TITLE: WAIMAKARIRI DISTRICT COUNCIL
RANGIORA LINK ROADS
EASTERN LINK

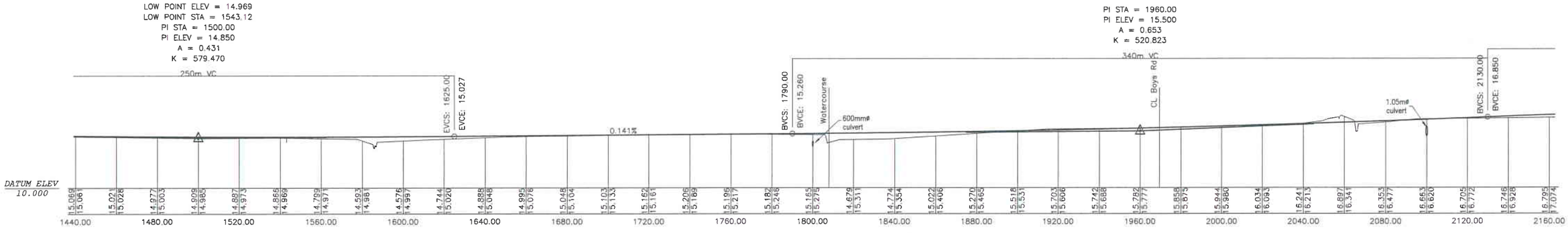
ALTERNATIVE P: LONGITUDINAL SECTION
FROM STA 00 TO 1440

STATUS	FILE				
SCHEME	6DHLHA.11				
SCALE	PLOT DATE	FEATURE IDENTIFIER	CODE	SHEET	REVISION
1:1000@A1 1:2000@A3	11/02/05 @ 12:55	6/535/27	5604	P406	

13/02/2005 8:31

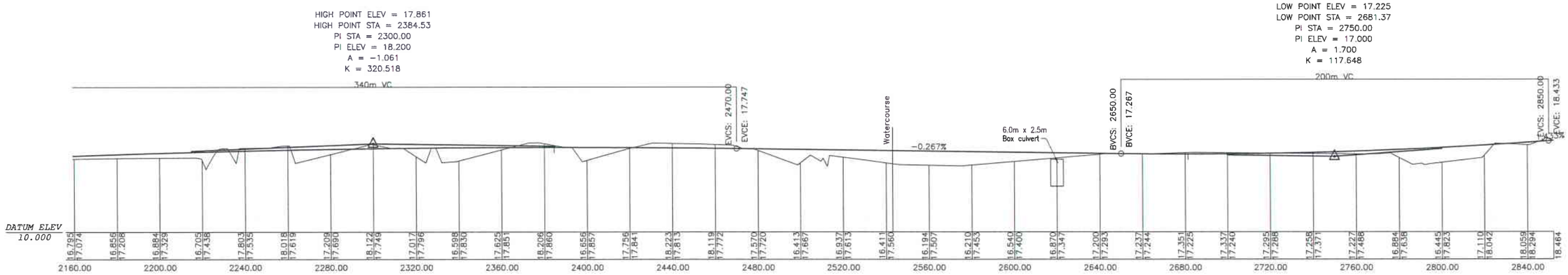
GRAPHIC SCALES

g:\waimakariri dc\dhlha.11 rangiora link roads\drowings\option p\eastern link\p406-long-sectn.dwg – P406-LONG-SECT ORIGINAL SHEET SIZE A1 [840x594]



LONGITUDINAL SECTION

SCALES: HORZ. 1:1000(A1) 1:2000(A3)
VERT. 1:200(A1) 1:400(A3)



LONGITUDINAL SECTION

SCALES: HORZ. 1:1000(A1) 1:2000(A3)
VERT. 1:200(A1) 1:400(A3)

Existing GL
Finished GL
STATION

LEGEND

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN	B Rice	TT	10/04
DRAWN	R Hopgood	TT	10/04
APPROVED			2/05

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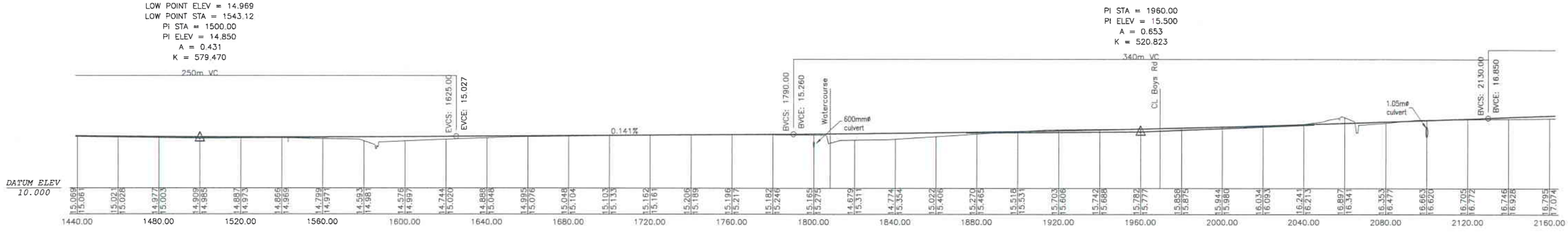
OPUS INTERNATIONAL CONSULTANTS
Christchurch Civil Engineering
PO Box 1482
Christchurch, New Zealand
Tel: +64 3 363 5400
Fax: +64 3 365 7858

TITLE: WAIMAKARIRI DISTRICT COUNCIL
RANGIORA LINK ROADS
EASTERN LINK
ALTERNATIVE P: LONGITUDINAL SECTION
FROM STA 1440 TO 2840

STATUS	FILE				
SCHEME	6DHLHA.11				
SCALE	PLOT DATE	FEATURE IDENTIFIER	CODE	SHEET	REVISION
1:1000@A1 1:2000@A3	11/02/05 @ 12:55	6/535/27	5604	P407	

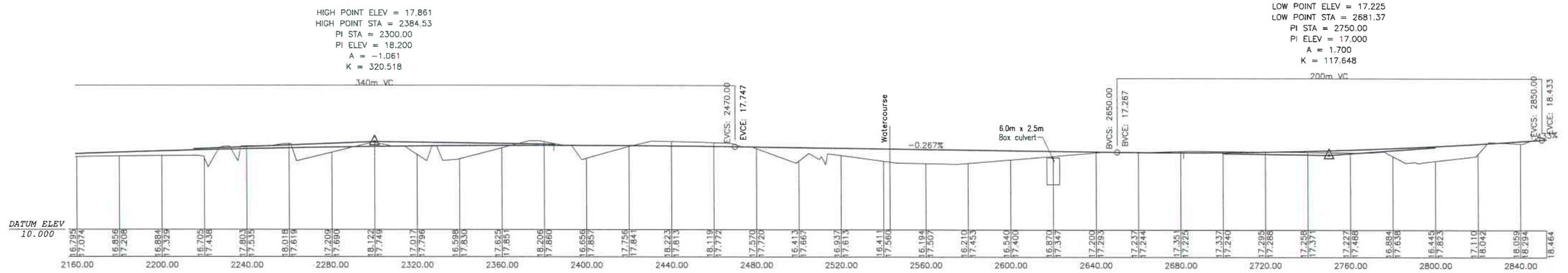
GRAPHIC SCALES
300mm 200 100 50 0 10mm
13/02/2005 8:32

g:\waimakariri dc\dhlha.11 rangiora link roads\drawings\option p\eastern link\p407-long-sectn.dwg – P407-LONG-SECT ORIGINAL SHEET SIZE A1 [840x594]



LONGITUDINAL SECTION

SCALES: HORZ. 1:1000(A1) 1:2000(A3)
VERT. 1:200(A1) 1:400(A3)



LONGITUDINAL SECTION

SCALES: HORZ. 1:1000(A1) 1:2000(A3)
VERT. 1:200(A1) 1:400(A3)

Existing GL
Finished GL
STATION

LEGEND

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN	B Rice	TT	10/04
DRAWN	R Hopgood	TT	10/04
APPROVED			2/05

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OPUS INTERNATIONAL CONSULTANTS
Christchurch Civil Engineering
PO Box 1482
Christchurch, New Zealand
Tel: +64 3 363 5400
Fax: +64 3 365 7858

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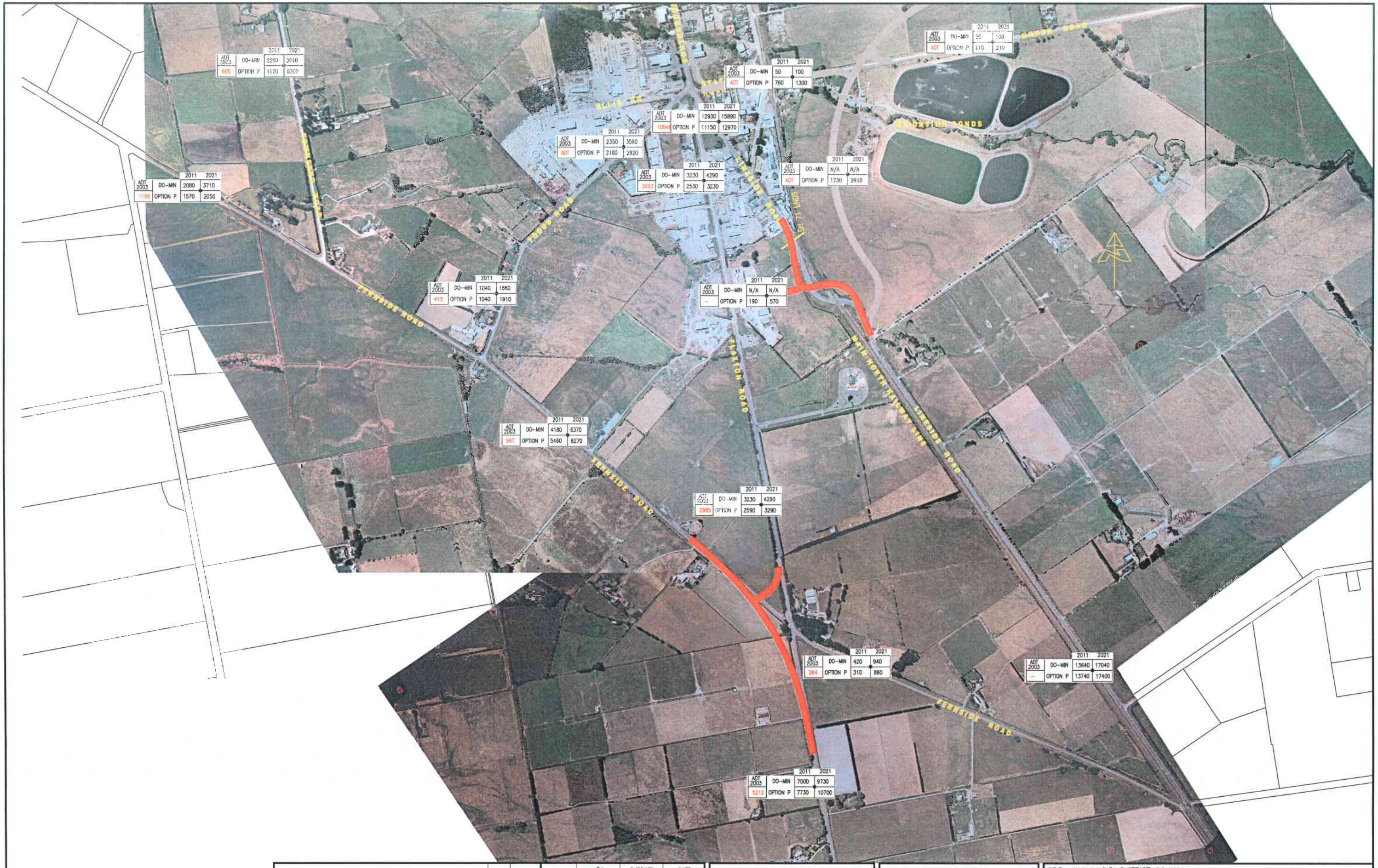
RANGIORA LINK ROADS
EASTERN LINK

ALTERNATIVE P: LONGITUDINAL SECTION FROM STA 1440 TO 2840

STATUS		FILE				
SCHEME		6DHLHA.11				
SCALE	PLOT DATE	FEATURE IDENTIFIER	CODE	SHEET	REVISION
1:1000@A1 1:2000@A3	11/02/05 @ 12:55	6/535/27	5604	P407	

GRAPHIC SCALES
300mm 200 100 50 0 10mm
11/02/2005 14:21

g:\waimakariri dc\dhlha.11 rangiora link roads\drawings\option p\eastern link\p407-long-sectn.dwg – P407-LONG-SECT ORIGINAL SHEET SIZE A1 [840x594]



	BY	CHECKED	DATE
DESIGN	B Rice	TT	09-04
DRAWN	R Hopgood	TT	09-04
APPROVED			2/05

AMENDMENT | APP'D | DATE

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OPUS INTERNATIONAL CONSULTANTS
Christchurch Civil Engineering
PO Box 1482
Christchurch, New Zealand
Tel: +64 3 363 5400
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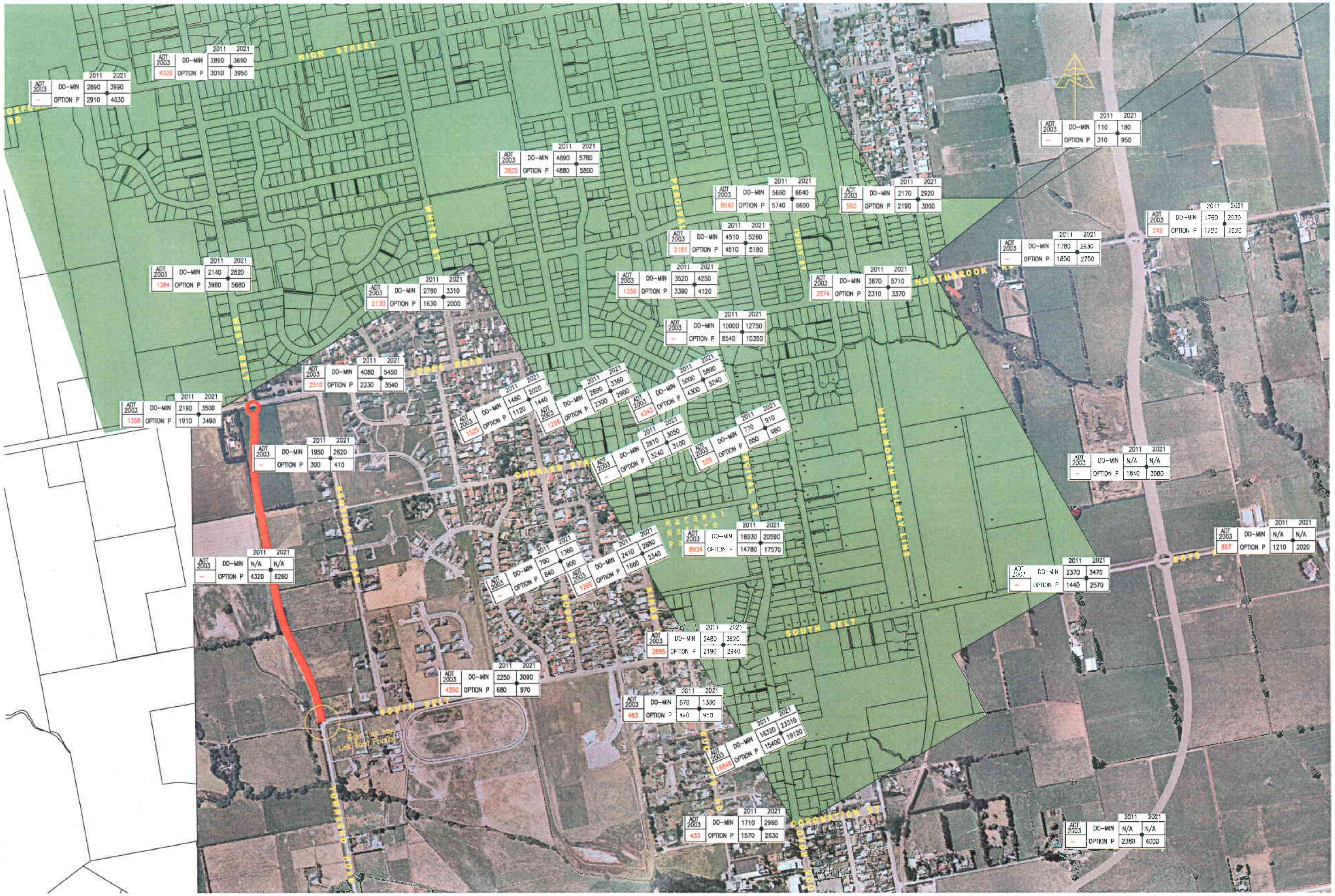
TITLE: WAIMAKARIRI DISTRICT COUNCIL
RANGIORA LINK ROADS
SOUTHERN, WESTERN & EASTERN LINKS

ALTERNATIVE P: PREDICTED TRAFFIC VOLUMES PLAN SHEET 1 OF 3

STATUS	FILE				
SCHEME	6DHLHA.11				
SCALE	PLOT DATE	FEATURE IDENTIFIER	CODE	SHEET	REVISION
1:5000	14/02/05 @ 13:14	6/535/27	5604	P501	



AMENDMENT	APP'D	DATE		BY	CHECKED	DATE
			DESIGN	B Rice	TT	09-04
			DRAWN	R Hopgood	TT	09-04
			APPROVED			2/05

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Christchurch Civil Engineering
PO Box 1482
Christchurch, New Zealand
Tel: +64 3 363 5400
Fax: +64 3 365 7858

TITLE WAIMAKARIRI DISTRICT COUNCIL
RANGIORA LINK ROADS
SOUTHERN, WESTERN & EASTERN LINKS

ALTERNATIVE P: PREDICTED TRAFFIC VOLUMES
PLAN SHEET 2 OF 3

STATUS	SCHEME	FILE	6DHLHA.11		
SCALE 1:5000	PLOT DATE 14/02/05 @ 13:12	FEATURE IDENTIFIER 6/535/27	CODE 5604	SHEET P502	REVISION

GRAPHIC SCALES 0 10mm 50 100 200 300mm

14/02/2005 13:14

g:\waimakariri dc\dhlha.11 rangiora link roads\drawings\option p\traffic volumes\6_535_27_5604_p502.dwg – TRAFFIC VOLUMES (2) ORIGINAL SHEET SIZE A1 [840x594]

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN	B Rice	TT	09-04
DRAWN	R Hopgood	TT	09-04
APPROVED			2/05

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Christchurch Civil Engineering
PO Box 1482
Christchurch, New Zealand
Tel: +64 3 363 5400
Fax: +64 3 365 7858

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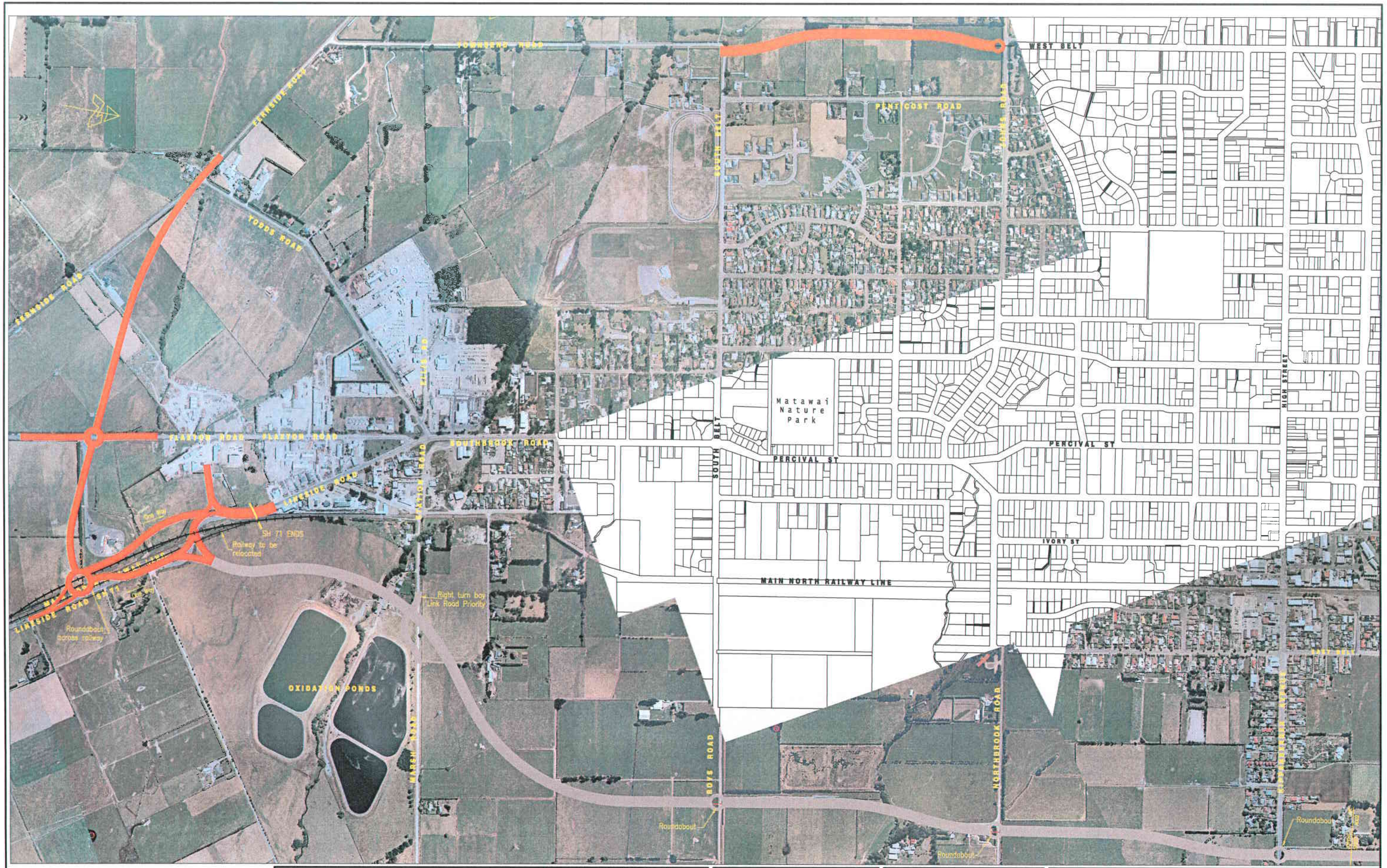
SOUTHERN, WESTERN & EASTERN LINKS

ALTERNATIVE P: PREDICTED TRAFFIC VOLUMES PLAN SHEET 3 OF 3

STATUS	FILE				
SCHEME	6DHLHA.11				
SCALE	PLOT DATE	FEATURE IDENTIFIER	CODE	SHEET	REVISION
1:5000	14/02/05 @ 13:18	6/535/27	5604	P503	

GRAPHIC SCALES 300 mm 200 100 50 0 10 mm 14/02/2005 13:19

q:\waimakariri dc\dhlha.11 rangiora link roads\drawings\option p\traffic volumes\6_535_27_5604_p503.dwg – TRAFFIC VOLUMES (3) ORIGINAL SHEET SIZE A1 (840x594)



KEY

- New Link by WDC – Medium Term
- Upgraded link by WDC – Medium Term
- New Link by WDC – Long Term

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN	B Rice	TT	10/04
DRAWN	B Rice	TT	10/04
APPROVED			2/05

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Christchurch Civil Engineering
PO Box 1482
Christchurch, New Zealand
Tel: +64 3 363 5400
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SOUTHERN, WESTERN & EASTERN LINKS

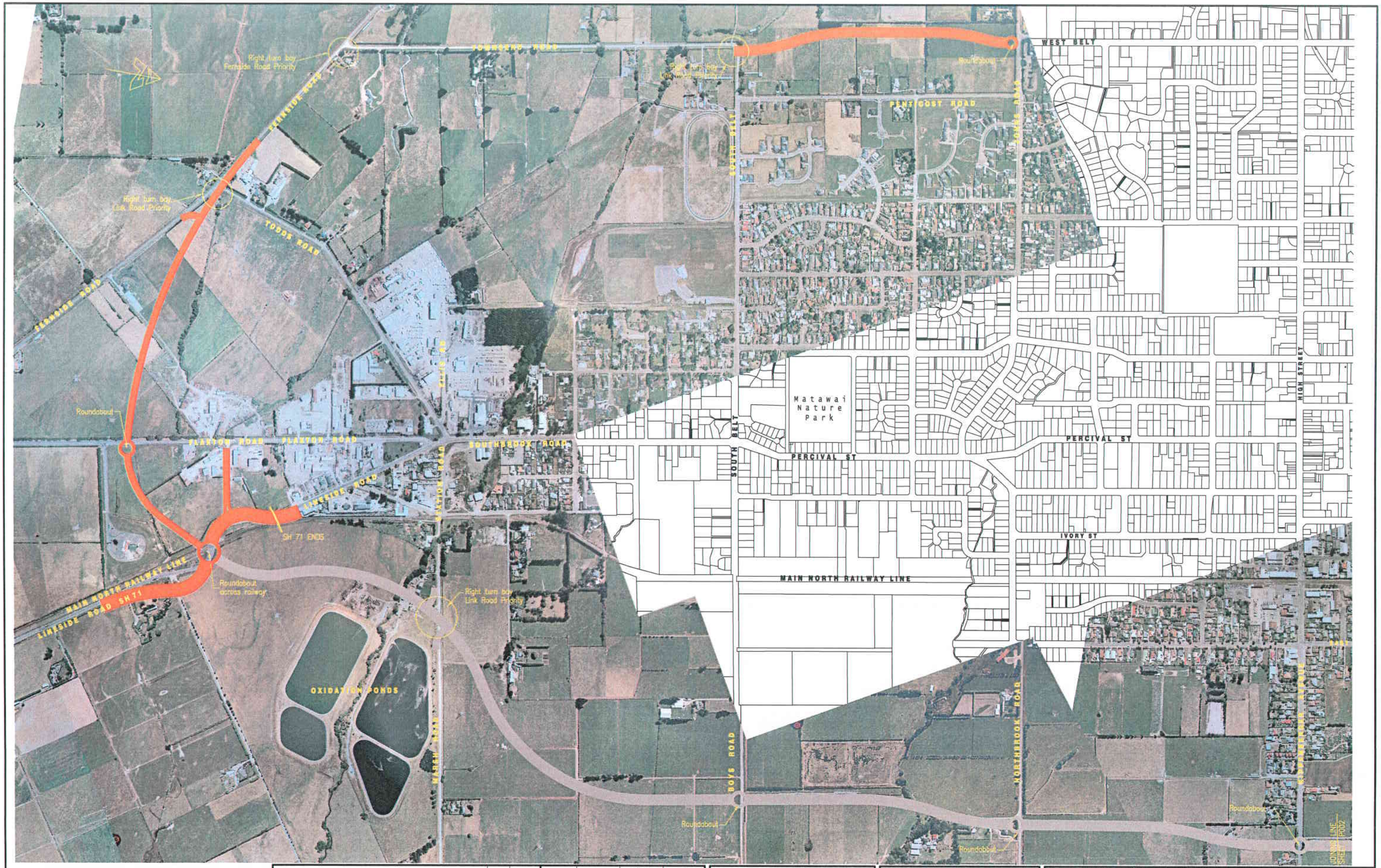
ALTERNATIVE A – OVERALL PLAN

STATUS	FILE				
SCHEME	6DHLHA.11				
SCALE	PLOT DATE	FEATURE IDENTIFIER	CODE	SHEET	REVISION
1:5000@A1 1:10,000@A3	11/02/05 @ 12:52	6/535/27	5604	A001	

GRAPHIC SCALES 300 mm 200 100 50 0 10 mm

13/02/2005 8:54

g:\waimakariri dc\dhlha.11 rangiora link roads\drawings\overall links\alt a.dwg – OVERALL – OPT. A ORIGINAL SHEET SIZE A1 [840x594]



KEY

New Link by WDC – Medium Term

Upgroded link by WDC – Medium Term

New Link by WDC – Long Term

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN	B Rice	TT	10/04
DRAWN	R Hopgood	TT	10/04
APPROVED			2/05

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Christchurch Civil Engineering
PO Box 1482
Christchurch, New Zealand
Tel: +64 3 363 5400
Fax: +64 3 365 7858
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RANGIORA LINK ROADS
SOUTHERN, WESTERN & EASTERN LINKS

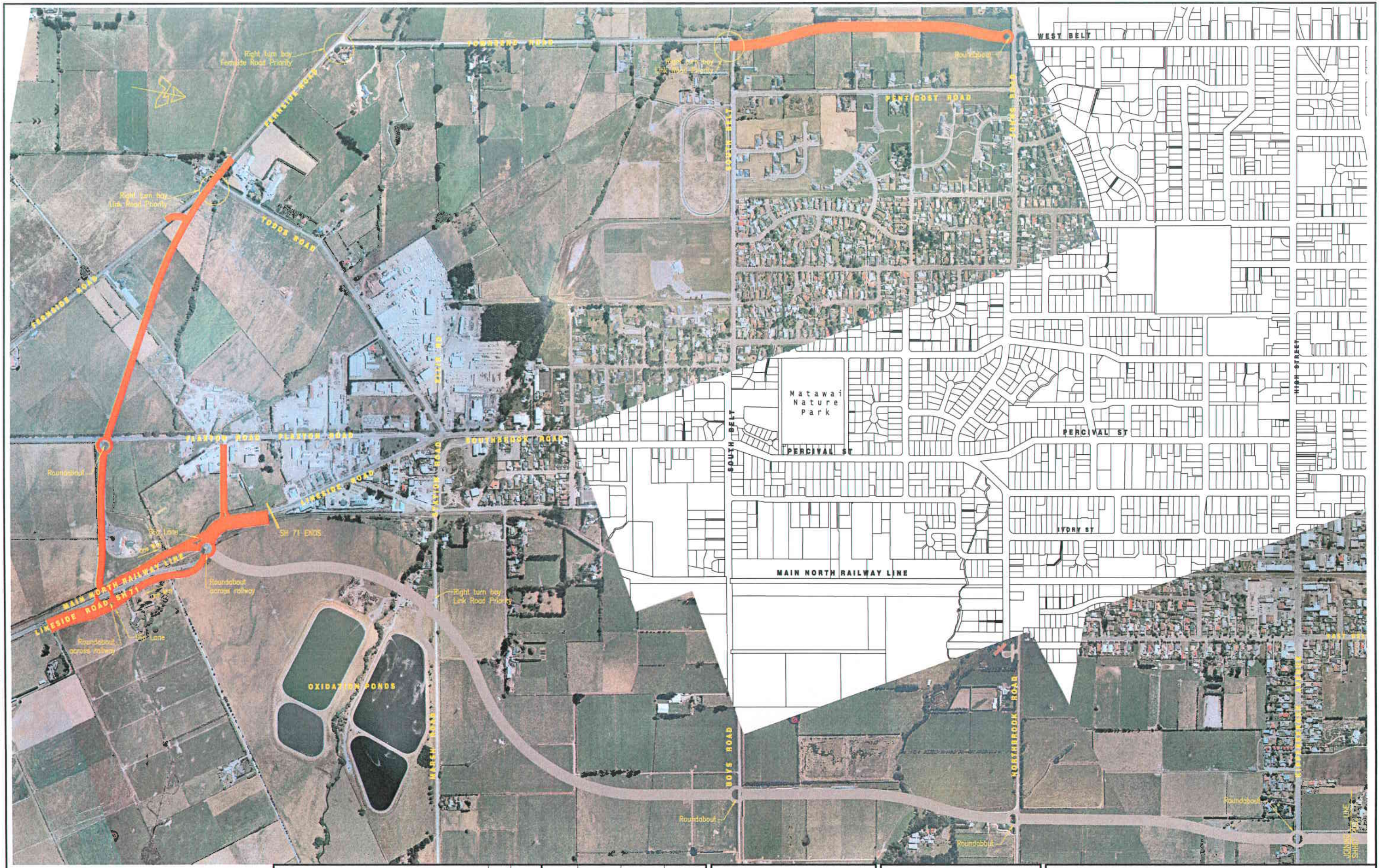
ALTERNATIVE B – OVERALL PLAN

STATUS	FILE				
SCHEME	6DHLHA.11				
SCALE	PLOT DATE	FEATURE IDENTIFIER	CODE	SHEET	REVISION
1:5000@A1 1:10,000@A3	11/02/05 @ 12:47	6/535/27	5604	B001	

GRAPHIC SCALES 300 mm 200 100 50 0 10 mm

13/02/2005 8:57

g:\waimakariri dc\dhlha.11 rangiora link roads\drawings\overall links\alt_b.dwg – B001 ORIGINAL SHEET SIZE A1 [840x594]



300mm
200
100
50
0
10mm

13/02/2005 9:01

GRAPHIC SCALES

KEY

New Link by WDC – Medium Term

Upgraded link by WDC – Medium Term

New Link by WDC – Long Term

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN	B Rice	TT	10/04
DRAWN	R Hopgood	TT	10/04
APPROVED			2/05

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OPUS INTERNATIONAL CONSULTANTS

Christchurch Civil Engineering

PO Box 1482
Christchurch, New Zealand

Tel: +64 3 363 5400
Fax: +64 3 365 7858

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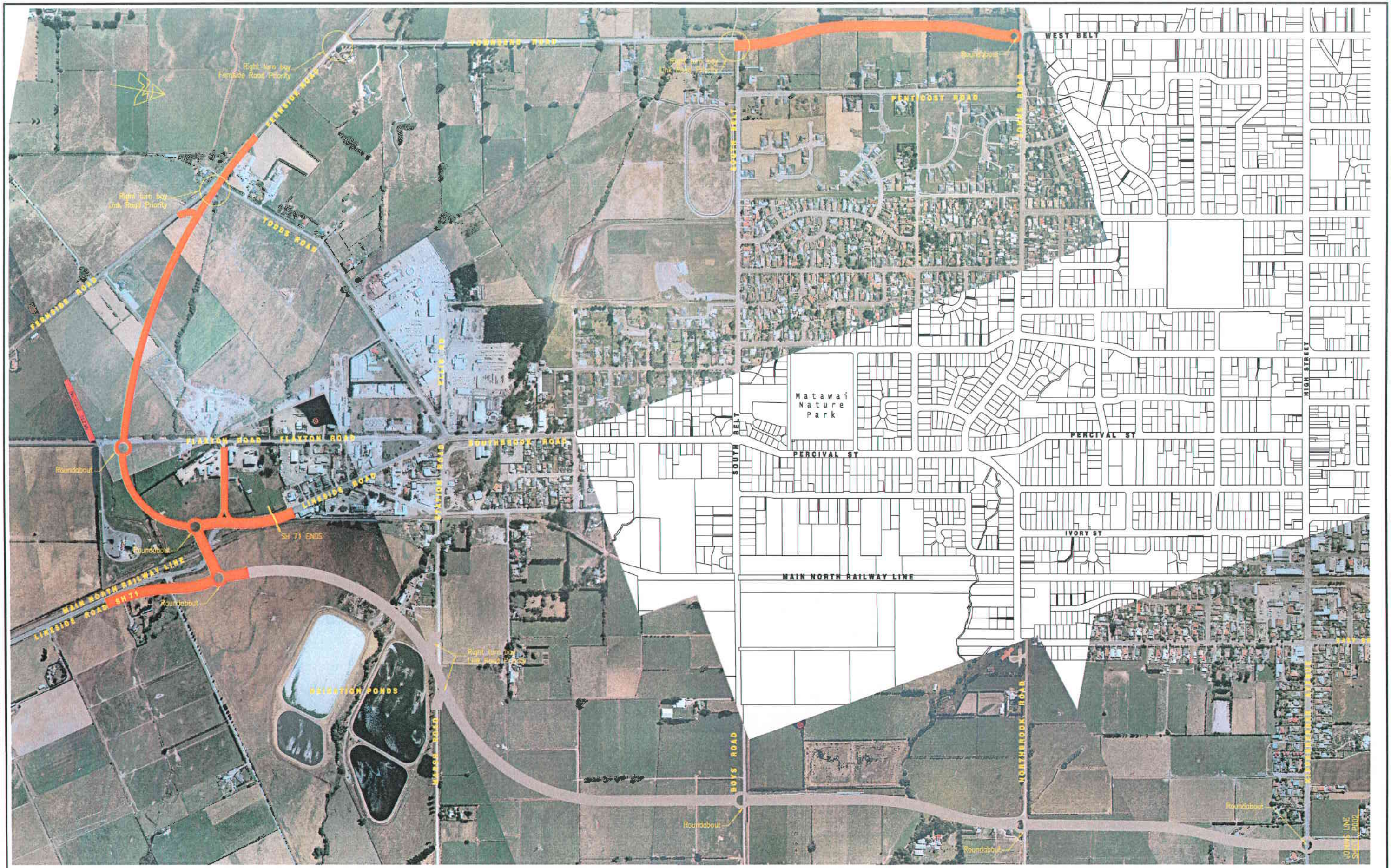
SOUTHERN, WESTERN & EASTERN LINKS

ALTERNATIVE C – OVERALL PLAN

STATUS	FILE				
SCHEME	6DHLHA.11				
SCALE	PLOT DATE	FEATURE IDENTIFIER	CODE	SHEET	REVISION
1:5000@A1 1:10,000@A3	11/02/05 @ 12:45	6/535/27	5604	C001	

g:\waimakariri dc\dhlha.11 rangiora link roads\drawings\overall links\olt_c.dwg – C001 ORIGINAL SHEET SIZE A1 [840x594]



KEY

New Link by WDC – Medium Term

Upgraded link by WDC – Medium Term

New Link by WDC – Long Term

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN	B Rice	TT	10/04
DRAWN	R Hopgood	TT	10/04
APPROVED			2/05

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OPUS INTERNATIONAL CONSULTANTS

Christchurch Civil Engineering

PO Box 1482
Christchurch, New Zealand

Tel: +64 3 363 5400
Fax: +64 3 365 7858

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RANGIORA LINK ROADS
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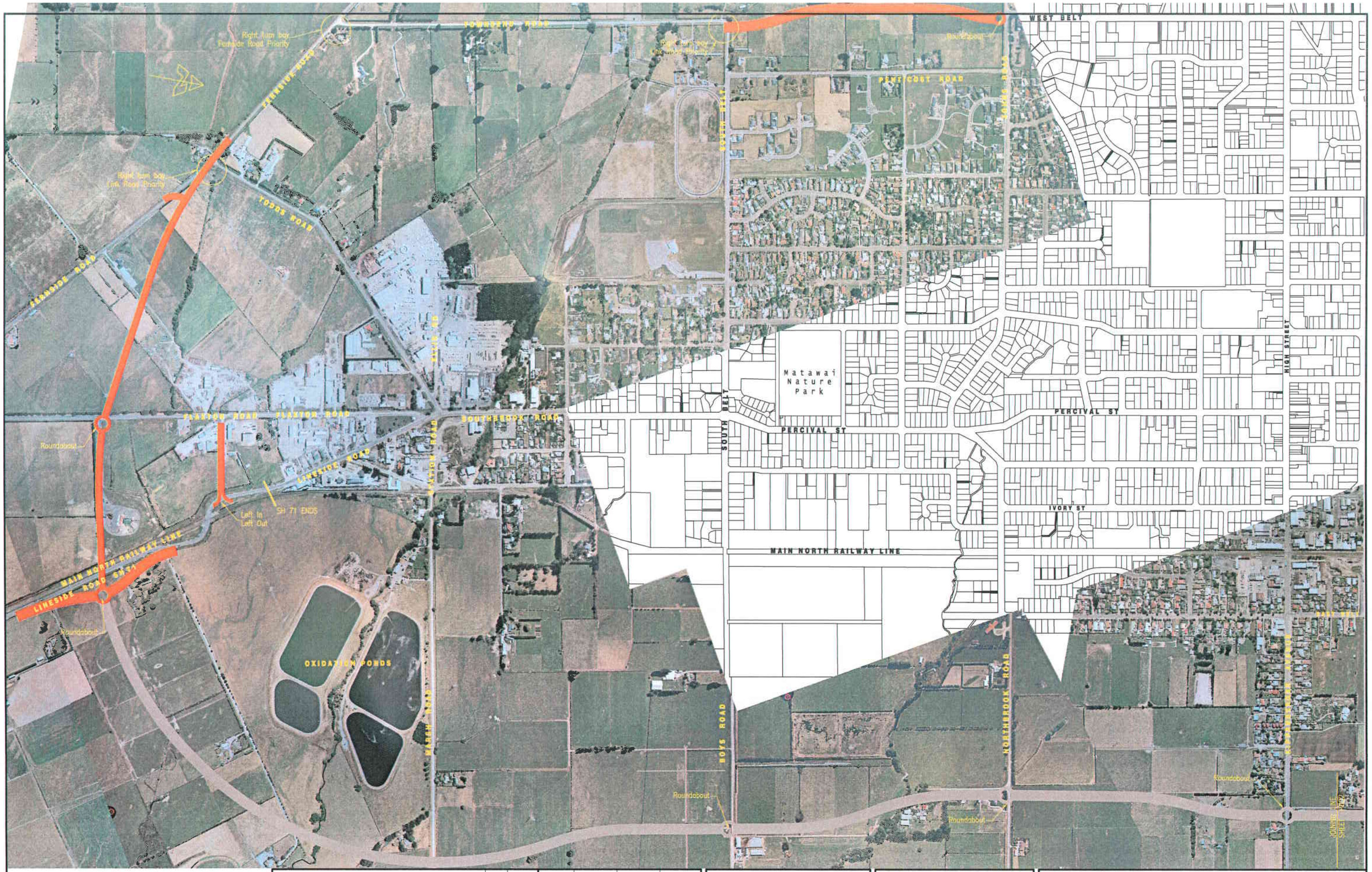
ALTERNATIVE D – OVERALL PLAN

STATUS	FILE				
SCHEME	6-DHLHA.11				
SCALE	PLOT DATE	FEATURE IDENTIFIER	CODE	SHEET	REVISION
1:5000@A1 1:10,000@A3	11/02/05 @ 12:43	6/535/27	5604	D001	

GRAPHIC SCALES 350 mm 200 100 50 0 10 mm

13/02/2005 9:04

g:\waimakariri dc\dhlha.11 rangiora link roads\drawings\overall links\alt_d.dwg – D001 ORIGINAL SHEET SIZE A1 (840x594)



0 10mm 50 100 200 300mm

13/02/2005 9:07

GRAPHIC SCALES

KEY

New Link by WDC – Medium Term

Upgraded link by WDC – Medium Term

New Link by WDC – Long Term

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN	B Rice	TT	10/04
DRAWN	R Hopgood	TT	10/04
APPROVED			2/05

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OPUS INTERNATIONAL CONSULTANTS

Christchurch Civil Engineering

PO Box 1482
Christchurch, New Zealand

Tel: +64 3 363 5400
Fax: +64 3 365 7858

TITLE: WAIMAKARIRI DISTRICT COUNCIL
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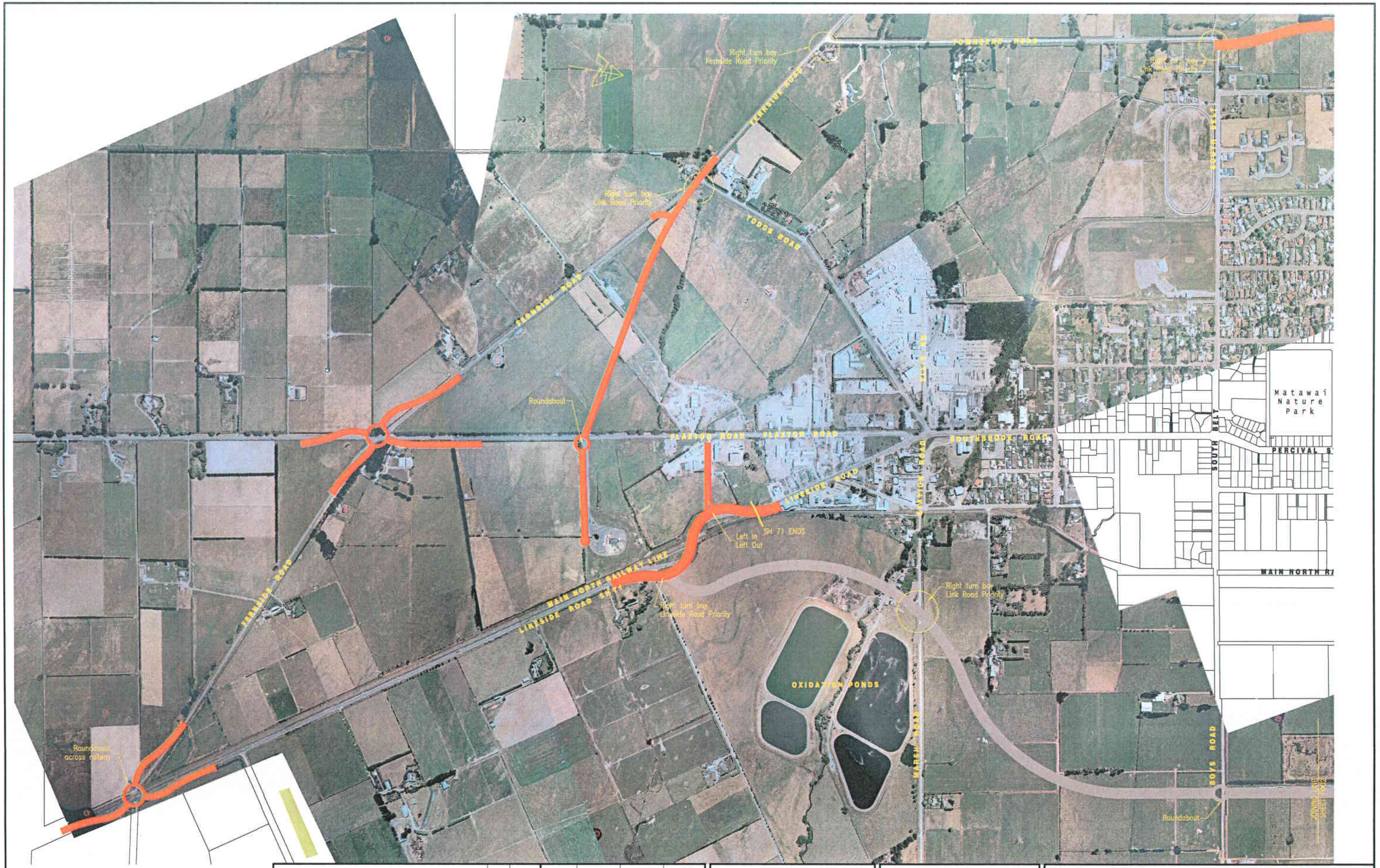
SOUTHERN, WESTERN & EASTERN LINKS

ALTERNATIVE E – OVERALL PLAN

STATUS	FILE				
SCHEME	6DHLHA.11				
SCALE	PLOT DATE	FEATURE IDENTIFIER	CODE	SHEET	REVISION
1:5000@A1 1:10,000@A3	11/02/05 @ 12:41	6/535/27	5604	E001	

g:\waimakariri dc\dhlha.11 rangiora link roads\drawings\overall links\alt_e.dwg – E001 ORIGINAL SHEET SIZE A1 [840x594]



KEY

New Link by WDC – Medium Term

Upgraded link by WDC – Medium Term

New Link by WDC – Long Term

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN	B Rice	TT	10/04
DRAWN	R Hopgood	TT	10/04
APPROVED			2/05

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OPUS INTERNATIONAL CONSULTANTS
Christchurch Civil Engineering
PO Box 1482
Christchurch, New Zealand
Tel: +64 3 363 5400
Fax: +64 3 365 7858

TITLE: WAIMAKARIRI DISTRICT COUNCIL
RANGIORA LINK ROADS
SOUTHERN, WESTERN & EASTERN LINKS

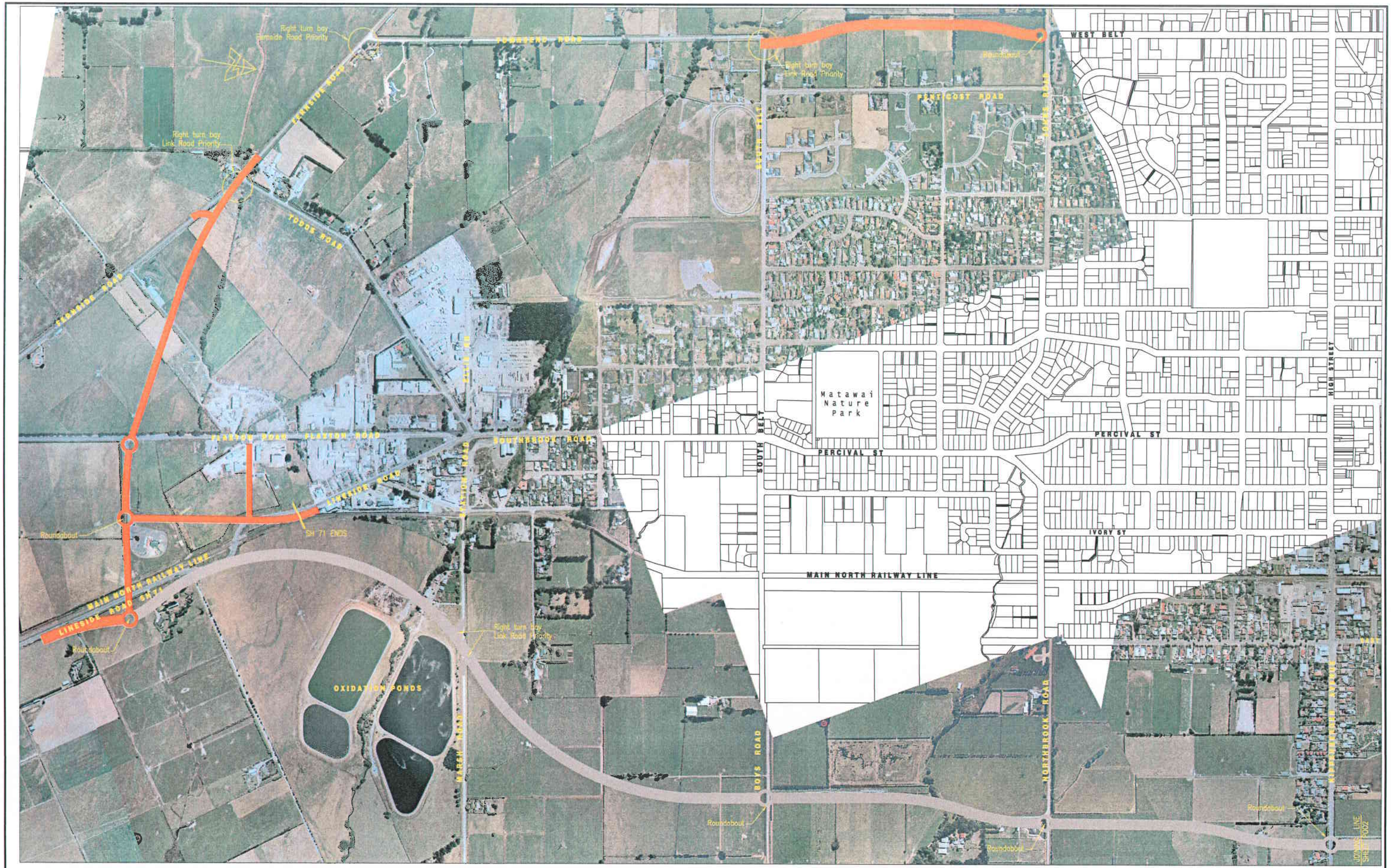
ALTERNATIVE F – OVERALL PLAN

STATUS	FILE			
SCHEME	6DHLHA.11			
SCALE	PLOT DATE	FEATURE IDENTIFIER	CODE	SHEET	REVISION
1:5000@A1 1:10,000@A3	11/02/05 @ 12:39	6/535/27	5604	F001	

GRAPHIC SCALES 300mm 200 100 50 0 10mm

13/02/2005 9:10

g:\waimakariri dc\dhlha.11 rangiora link roads\drawings\overall links\alt_f.dwg – F001 ORIGINAL SHEET SIZE A1 (840x594)



KEY

New Link by WDC – Medium Term

Upgraded link by WDC – Medium Term

New Link by WDC – Long Term

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN	B. Rice	TT	10/04
DRAWN	R Hopgood	TT	10/04
APPROVED			2/05

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Christchurch Civil Engineering
PO Box 1482
Christchurch, New Zealand
Tel: +64 3 363 5400
Fax: +64 3 365 7858

TITLE: WAIMAKARIRI DISTRICT COUNCIL
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SOUTHERN, WESTERN & EASTERN LINKS

ALTERNATIVE G – OVERALL PLAN

STATUS	SCHEME	FILE	6DHLHA.11			
SCALE	1:5000@A1 1:10,000@A3	PLOT DATE	11/02/05 @ 12:49	FEATURE IDENTIFIER	CODE	SHEET	REVISION
				6/535/27	5604	G001	

GRAPHIC SCALES 300 mm 200 100 50 0 10 mm

11/02/2005 13:43

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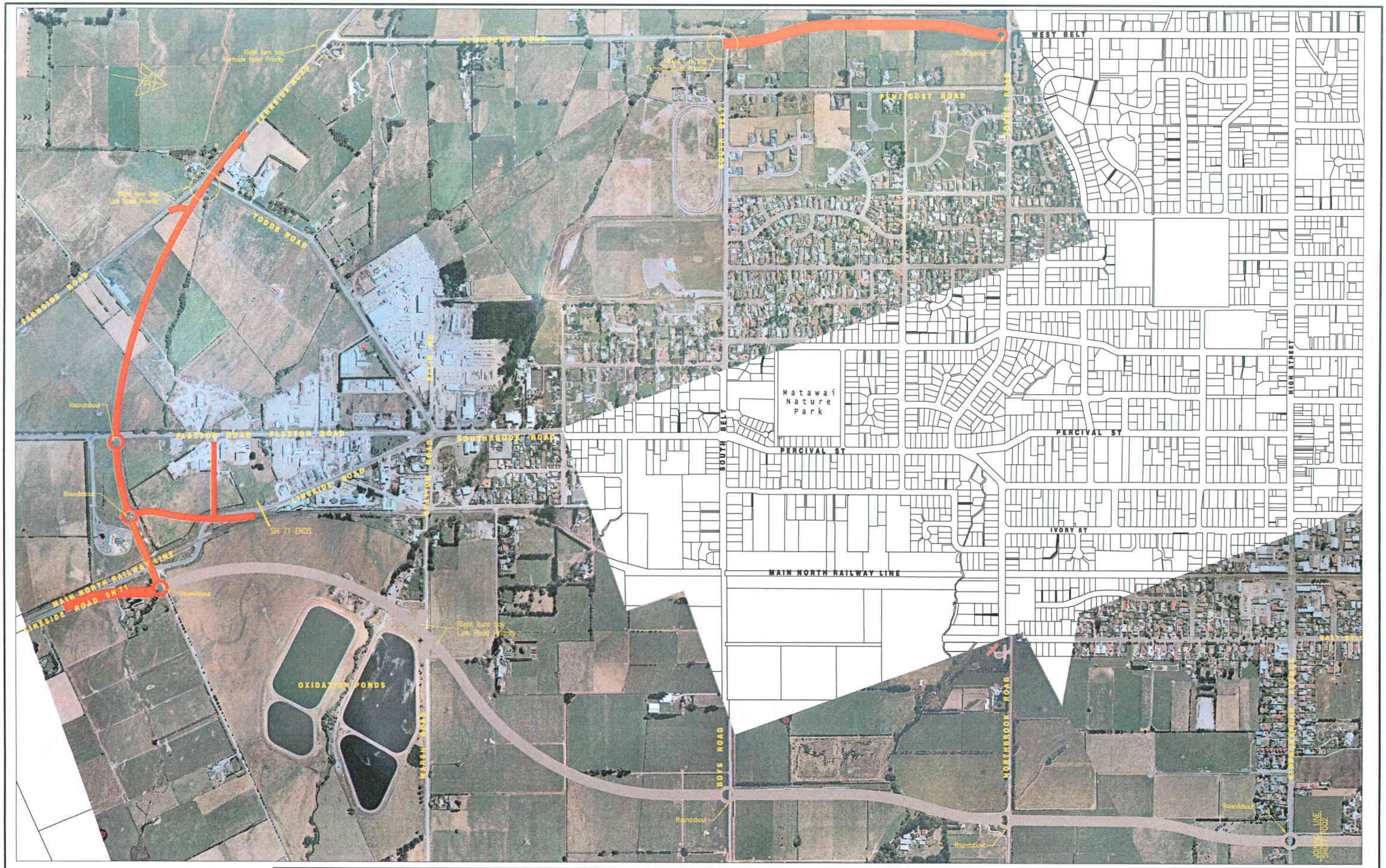

KEY

New Link by WDC – Medium Term

Upgraded link by WDC – Medium Term

New Link by WDC – Long Term

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN	B Rice	TT	10/04
DRAWN	R Hopgood	TT	10/04
APPROVED			2/05

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Christchurch Civil Engineering

PO Box 1482
Christchurch, New Zealand

Tel: +64 3 363 5400
Fax: +64 3 365 7858

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ALTERNATIVE H – OVERALL PLAN

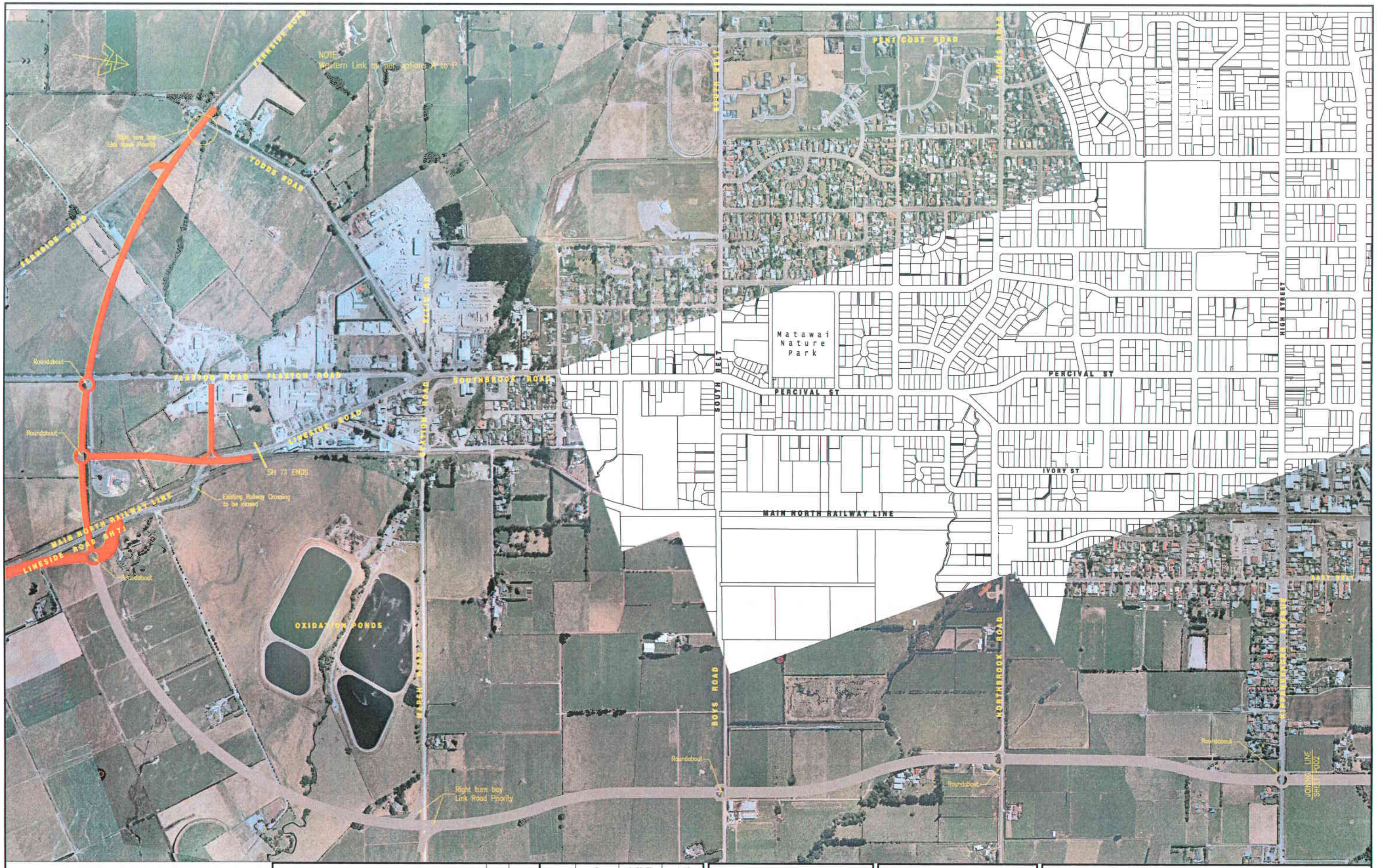
STATUS	FILE				
SCHEME	6DHLHA.11				
SCALE	PLOT DATE	FEATURE IDENTIFIER	CODE	SHEET	REVISION
1:5000@A1 1:10,000@A3	11/02/05 @ 12:37	6/535/27	5604	H001	

GRAPHIC SCALES

300mm 200 100 50 0 10mm

13/02/2005 9:13

g:\waimakariri dc\dhlha.11 rangiora link roads\drawings\overall links\alt_h.dwg – H001 ORIGINAL SHEET SIZE A1 (840x594)



KEY

New Link by WDC – Medium Term

Upgraded link by WDC – Medium Term

New Link by WDC – Long Term

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN	B Rice	TT	10/04
DRAWN	R Hopgood	TT	10/04
APPROVED			2/05

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OPUS INTERNATIONAL CONSULTANTS
Christchurch Civil Engineering
PO Box 1482
Christchurch, New Zealand
Tel: +64 3 363 5400
Fax: +64 3 365 7858

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SOUTHERN, WESTERN & EASTERN LINKS

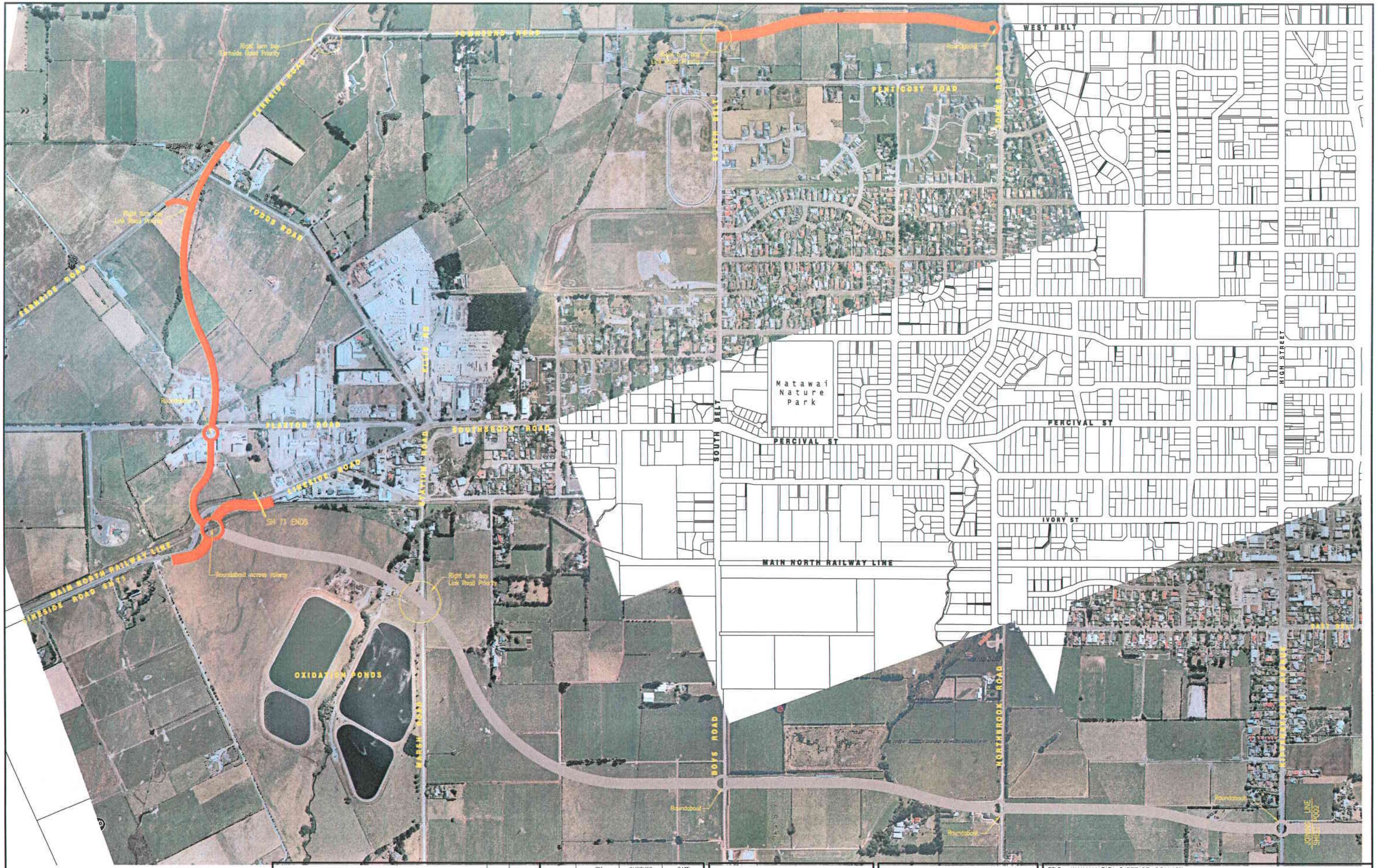
ALTERNATIVE J – OVERALL PLAN

STATUS	FILE				
SCHEME	6DHLHA.11				
SCALE	PLOT DATE	FEATURE IDENTIFIER	CODE	SHEET	REVISION
1:5000@A1 1:10,000@A3	11/02/05 @ 12:36	6/535/27	5604	J001	

GRAPHIC SCALES 300 mm 200 100 50 0 10 mm

13/02/2005 9:16

g:\waimakariri dc\dhlha.11 rangiora link roads\drawings\overall links\alt_j.dwg – Dll ORIGINAL SHEET SIZE A1 [840x594]



KEY

New Link by WDC – Medium Term

Upgraded link by WDC – Medium Term

New Link by WDC – Long Term

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN	B Rice	TT	10/04
DRAWN	R Hopgood	TT	10/04
APPROVED			2/05

WAIMAKARIRI DISTRICT COUNCIL

Christchurch Civil Engineering
PO Box 1482
Christchurch, New Zealand
Tel: +64 3 363 5400
Fax: +64 3 365 7858
OPUS INTERNATIONAL CONSULTANTS

TITLE: WAIMAKARIRI DISTRICT COUNCIL
RANGIORA LINK ROADS
SOUTHERN, WESTERN & EASTERN LINKS

ALTERNATIVE K – OVERALL PLAN

STATUS	FILE				
SCHEME	6DHLHA.11				
SCALE	PLOT DATE	FEATURE IDENTIFIER	CODE	SHEET	REVISION
1:5000@A1 1:10,000@A3	11/02/05 @ 12:34	6/535/27	5604	K001	

GRAPHIC SCALES

13/02/2005 9:18

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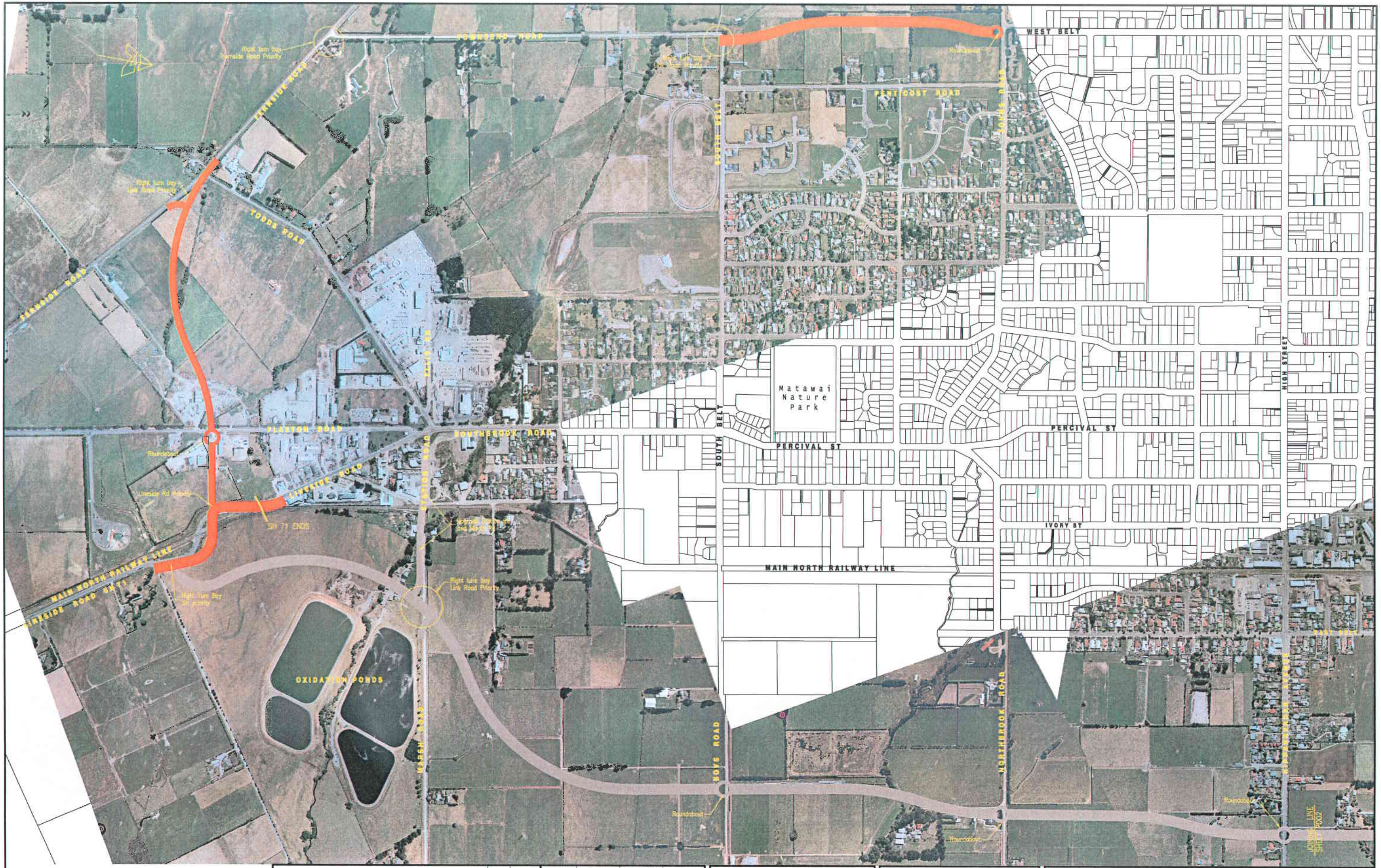

KEY

New Link by WDC – Medium Term

Upgraded link by WDC – Medium Term

New Link by WDC – Long Term

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN	B Rice	TT	10/04
DRAWN	R Hopgood	TT	10/04
APPROVED			0/05

WAIMAKARIRI DISTRICT COUNCIL

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PO Box 1482
Christchurch, New Zealand

Tel: +64 3 363 5400
Fax: +64 3 365 7858

TITLE: WAIMAKARIRI DISTRICT COUNCIL
RANGIORA LINK ROADS
SOUTHERN, WESTERN & EASTERN LINKS

ALTERNATIVE L – OVERALL PLAN

STATUS	FILE				
SCHEME	6DHLHA.11				
SCALE	PLOT DATE	FEATURE IDENTIFIER	CODE	SHEET	REVISION
1:5000@A1 1:10,000@A3	11/02/05 @ 12:19	6/535/27	5604	L001	

GRAPHIC SCALES

13/02/2005 9:21

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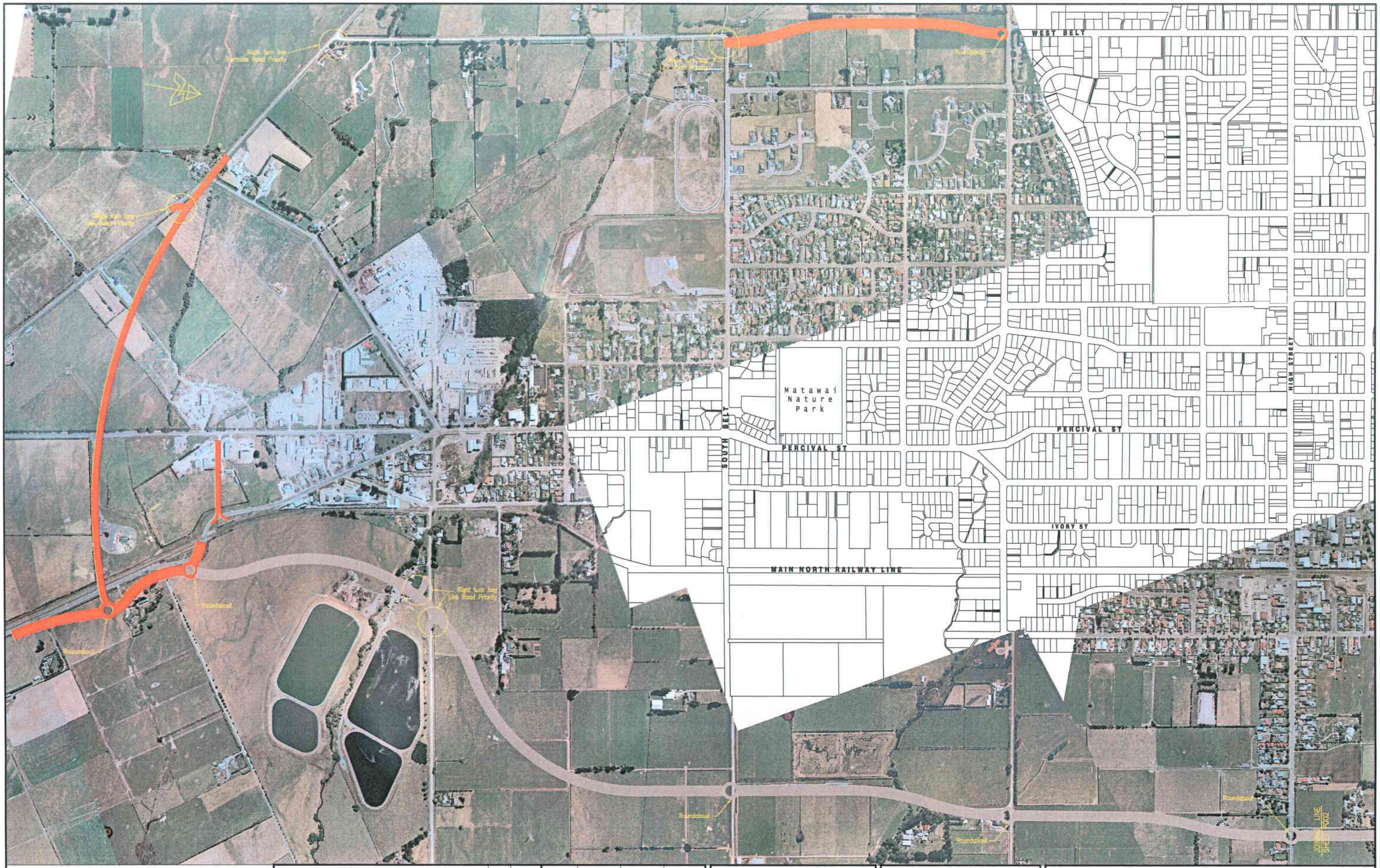

KEY

New Link by WDC – Medium Term

Upgraded link by WDC – Medium Term

New Link by WDC – Long Term

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN	B Rice	TT	10/04
DRAWN	R Hopgood	TT	10/04
APPROVED			2/05

WAIMAKARIRI DISTRICT COUNCIL

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Christchurch Civil Engineering

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Christchurch, New Zealand

Tel: +64 3 363 5400
Fax: +64 3 365 7858

TITLE: WAIMAKARIRI DISTRICT COUNCIL
RANGIORA LINK ROADS
SOUTHERN, WESTERN & EASTERN LINKS

ALTERNATIVE M – OVERALL PLAN

STATUS	FILE				
SCHEME	6DHLHA.11				
SCALE	PLOT DATE	FEATURE IDENTIFIER	CODE	SHEET	REVISION
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GRAPHIC SCALES

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50
0 10 mm

13/02/2005 9:24

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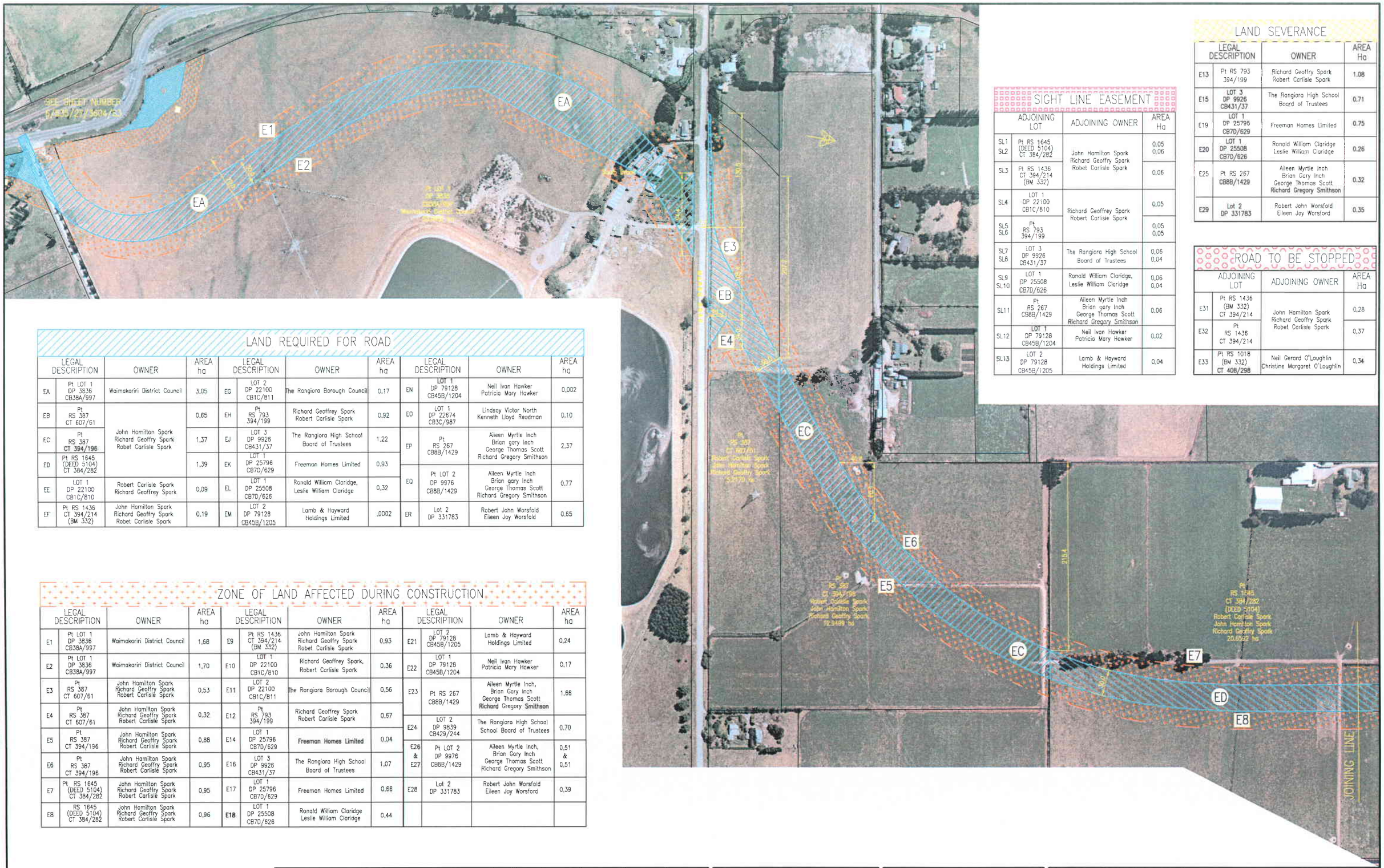

LAND REQUIRED FOR ROAD

	LEGAL DESCRIPTION	OWNER	AREA ha
EA	Pt LOT 1 DP 3836 CB38A/997	Waimakariri District Council	3.05
EB	Pt RS 387 CT 607/61	John Hamilton Spark Richard Geoffry Spark Robet Carlisle Spark	0.65
EC	Pt RS 387 CT 394/196		1.37
ED	Pt RS 1645 (DEED 5104) CT 384/282		1.39
EE	LOT 1 DP 22100 CB1C/810	Robert Carlisle Spark Richard Geoffrey Spark	0.09
EF	Pt RS 1436 CT 394/214 (BM 332)	John Hamilton Spark Richard Geoffry Spark Robet Carlisle Spark	0.19
EG	LOT 2 DP 22100 CB1C/811	The Rangiora Borough Council	0.17
EH	Pt RS 793 394/199	Richard Geoffrey Spark Robert Carlisle Spark	0.92
EJ	LOT 3 DP 9926 CB431/37	The Rangiora High School Board of Trustees	1.22
EK	LOT 1 DP 25796 CB7D/629	Freeman Homes Limited	0.93
EL	LOT 1 DP 25508 CB7D/626	Ronald William Claridge, Leslie William Claridge	0.32
EM	LOT 2 DP 79128 CB45B/1205	Lamb & Hayward Holdings Limited	.0002
EN	LOT 1 DP 79128 CB45B/1204	Neil Ivan Hawker Patricia Mary Hawker	0.002
EO	LOT 1 DP 22674 CB3C/987	Lindsay Victor North Kenneth Lloyd Readman	0.10
EP	Pt RS 267 CB8B/1429	Aileen Myrtle Inch Brian gary Inch George Thomas Scott Richard Gregory Smithson	2.37
EQ	Pt LOT 2 DP 9976 CB8B/1429	Aileen Myrtle Inch Brian gary Inch George Thomas Scott Richard Gregory Smithson	0.77
ER	Lot 2 DP 331783	Robert John Worsfold Eileen Joy Worsford	0.65

ZONE OF LAND AFFECTED DURING CONSTRUCTION

	LEGAL DESCRIPTION	OWNER	AREA ha
E1	Pt LOT 1 DP 3836 CB38A/997	Waimakariri District Council	1.68
E2	Pt LOT 1 DP 3836 CB38A/997	Waimakariri District Council	1.70
E3	Pt RS 387 CT 607/61	John Hamilton Spark Richard Geoffry Spark Robert Carlisle Spark	0.53
E4	Pt RS 387 CT 607/61	John Hamilton Spark Richard Geoffry Spark Robert Carlisle Spark	0.32
E5	Pt RS 387 CT 394/196	John Hamilton Spark Richard Geoffry Spark Robert Carlisle Spark	0.88
E6	Pt RS 387 CT 394/196	John Hamilton Spark Richard Geoffry Spark Robert Carlisle Spark	0.95
E7	Pt RS 1645 (DEED 5104) CT 384/282	John Hamilton Spark Richard Geoffry Spark Robert Carlisle Spark	0.95
E8	RS 1645 (DEED 5104) CT 384/282	John Hamilton Spark Richard Geoffry Spark Robert Carlisle Spark	0.96
E9	Pt RS 1436 CT 394/214 (BM 332)	John Hamilton Spark Richard Geoffry Spark Robet Carlisle Spark	0.93
E10	LOT 1 DP 22100 CB1C/810	Richard Geoffrey Spark, Robert Carlisle Spark	0.36
E11	LOT 2 DP 22100 CB1C/811	The Rangiora Borough Council	0.56
E12	Pt RS 793 394/199	Richard Geoffrey Spark Robert Carlisle Spark	0.67
E14	LOT 1 DP 25796 CB7D/629	Freeman Homes Limited	0.04
E16	LOT 3 DP 9926 CB431/37	The Rangiora High School Board of Trustees	1.07
E17	LOT 1 DP 25796 CB7D/629	Freeman Homes Limited	0.66
E18	LOT 1 DP 25508 CB7D/626	Ronald William Claridge Leslie William Claridge	0.44
E21	LOT 2 DP 79128 CB45B/1205	Lamb & Hayward Holdings Limited	0.24
E22	LOT 1 DP 79128 CB45B/1204	Neil Ivan Hawker Patricia Mary Hawker	0.17
E23	Pt RS 267 CB8B/1429	Aileen Myrtle Inch, Brian Gary Inch George Thomas Scott Richard Gregory Smithson	1.66
E24	LOT 2 DP 9839 CB429/244	The Rangiora High School School Board of Trustees	0.70
E26 & E27	Pt LOT 2 DP 9976 CB8B/1429	Aileen Myrtle Inch, Brian Gary Inch George Thomas Scott Richard Gregory Smithson	0.51 & 0.51
E28	Lot 2 DP 331783	Robert John Worsfold Eileen Joy Worsford	0.39

SIGHT LINE EASEMENT

	ADJOINING LOT	ADJOINING OWNER	AREA Ha
SL1 SL2	Pt RS 1645 (DEED 5104) CT 384/282	John Hamilton Spark Richard Geoffry Spark Robet Carlisle Spark	0.05 0.06
SL3	Pt RS 1436 CT 394/214 (BM 332)		0.06
SL4	LOT 1 DP 22100 CB1C/810	Richard Geoffrey Spark Robert Carlisle Spark	0.05
SL5 SL6	Pt RS 793 394/199		0.05 0.05
SL7 SL8	LOT 3 DP 9926 CB431/37	The Rangiora High School Board of Trustees	0.06 0.04
SL9 SL10	LOT 1 DP 25508 CB7D/626	Ronald William Claridge, Leslie William Claridge	0.06 0.04
SL11	Pt RS 267 CB8B/1429	Aileen Myrtle Inch Brian gary Inch George Thomas Scott Richard Gregory Smithson	0.06
SL12	LOT 1 DP 79128 CB45B/1204	Neil Ivan Hawker Patricia Mary Hawker	0.02
SL13	LOT 2 DP 79128 CB45B/1205	Lamb & Hayward Holdings Limited	0.04

LAND SEVERANCE

	LEGAL DESCRIPTION	OWNER	AREA Ha
E13	Pt RS 793 394/199	Richard Geoffry Spark Robert Carlisle Spark	1.08
E15	LOT 3 DP 9926 CB431/37	The Rangiora High School Board of Trustees	0.71
E19	LOT 1 DP 25796 CB7D/629	Freeman Homes Limited	0.75
E20	LOT 1 DP 25508 CB7D/626	Ronald William Claridge Leslie William Claridge	0.26
E25	Pt RS 267 CB8B/1429	Aileen Myrtle Inch Brian Gary Inch George Thomas Scott Richard Gregory Smithson	0.32
E29	Lot 2 DP 331783	Robert John Worsfold Eileen Joy Worsford	0.35

ROAD TO BE STOPPED

	ADJOINING LOT	ADJOINING OWNER	AREA Ha
E31	Pt RS 1436 (BM 332) CT 394/214	John Hamilton Spark Richard Geoffry Spark Robet Carlisle Spark	0.28
E32	Pt RS 1436 CT 394/214		0.37
E33	Pt RS 1018 (BM 332) CT 408/298	Neil Gerard O'Loughlin Christine Margaret O'Loughlin	0.34

AMENDMENT	APP'D	DATE
R1 Areas amended	BR	02/05

	BY	CHECKED	DATE
DESIGN	B Rice	TT	04-04
DRAWN	R Hapgood	TT	07/04
APPROVED			2/05

WAIMAKARIRI DISTRICT COUNCIL

OPUS INTERNATIONAL CONSULTANTS
Christchurch Civil Engineering
PO Box 1482 Christchurch, New Zealand
Tel: +64 3 363 5400 Fax: +64 3 365 7858

TITLE: WAIMAKARIRI DISTRICT COUNCIL
RANGIORA LINK ROADS
SOUTHERN, WESTERN & EASTERN LINKS
OPTION P – EASTERN LINK
LAND PLAN – SHEET 1

STATUS	FILE				
SCHEME	6DHLHA.11				
SCALE	PLOT DATE	FEATURE IDENTIFIER	CODE	SHEET	REVISION
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11/02/2005 11:38

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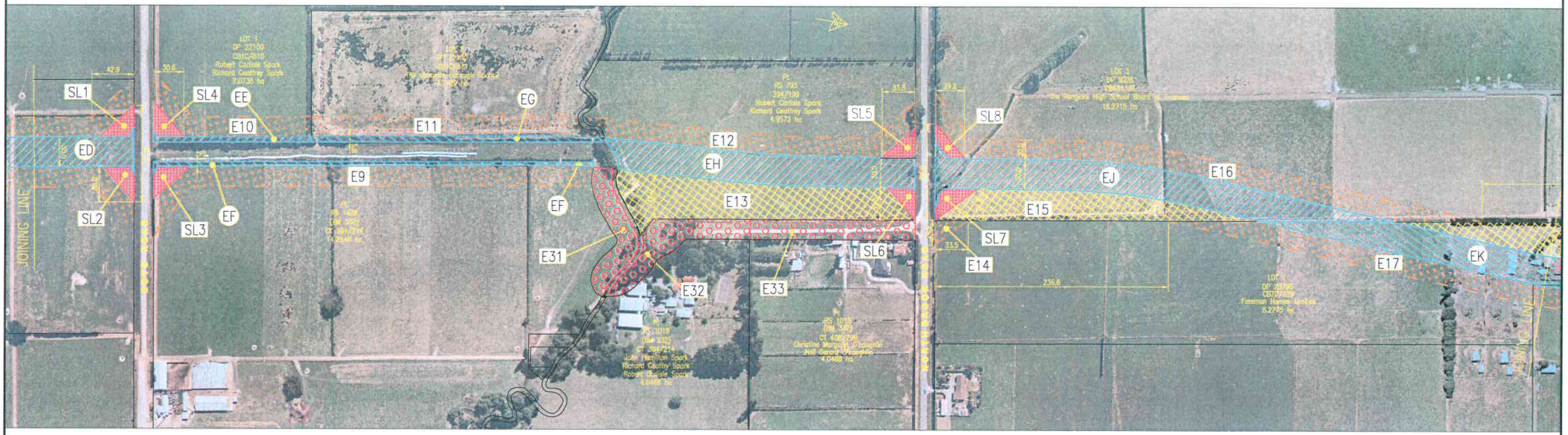

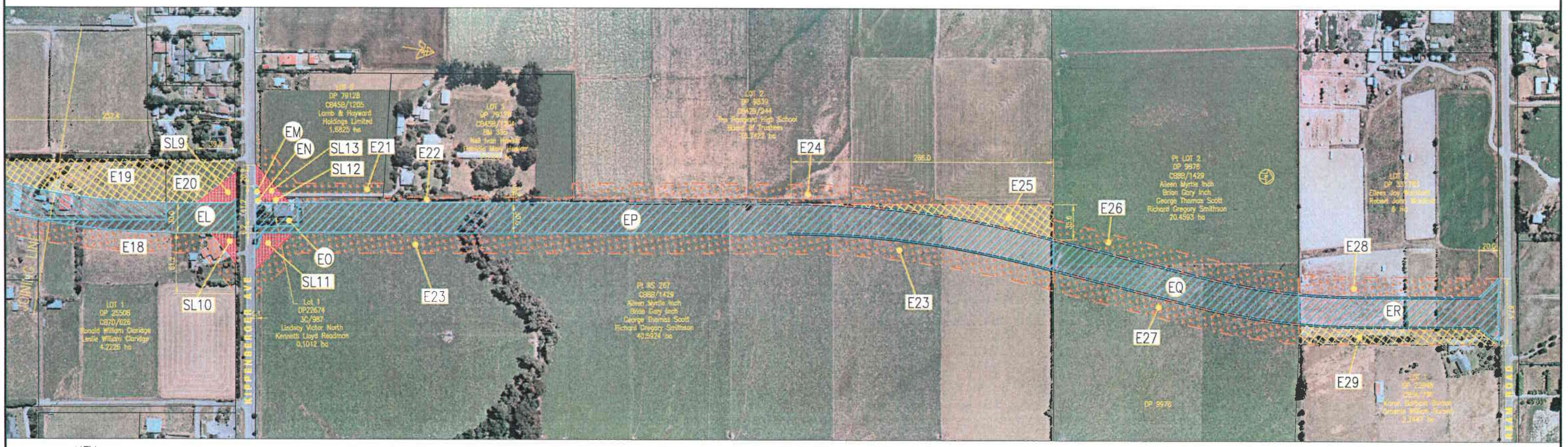

KEY

- LAND REQUIRED FOR ROAD
- AREA OF LAND AFFECTED DURING CONSTRUCTION
- SIGHT LINE EASEMENT
- LAND SEVERANCE
- ROAD TO BE STOPPED

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN	B Rice	TT	04-04
DRAWN	R Hopgood	TT	07/04
APPROVED			2/05

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OPUS INTERNATIONAL CONSULTANTS
Christchurch Civil Engineering
PO Box 1482
Christchurch, New Zealand
Tel: +64 3 363 5400
Fax: +64 3 365 7858

TITLE: WAIMAKARIRI DISTRICT COUNCIL
RANGIORA LINK ROADS
SOUTHERN, WESTERN & EASTERN LINKS
OPTION P – EASTERN LINK
LAND PLAN – SHEET 2

STATUS	FILE				
SCHEME	6DHLHA.11				
SCALE	PLOT DATE	FEATURE IDENTIFIER	CODE	SHEET	REVISION
1:2000@A1 1:4000@A3	11/02/05 @ 11:41	6/535/27	3604	E2	

GRAPHIC SCALES

11/02/2005 11:44

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LAND REQUIRED FOR ROAD

	LEGAL DESCRIPTION	OWNER	AREA ha
SA	RS 1540 (BM 335) CB20B/887	June Margaret Beck Rodney Euan Beck	0.32
SB	Pt LOT 1 DP 30226 CB13F/287	Ian Jarman Ltd.	0.43
SC	LOT 3 DP 301523 6396	Andrew Roderick McIntosh Michelle Andrea McIntosh Sheila Esther McIntosh	0.12

ZONE OF LAND AFFECTED DURING CONSTRUCTION

	LEGAL DESCRIPTION	OWNER	AREA ha
S1	RS 1540 (BM 335) CB20B/887	June Margaret Beck Rodney Euan Beck	0.49
S2	Pt LOT 1 DP 30226 CB13F/287	Ian Jarman Ltd.	0.63
S3	LOT 3 DP 301523 6396	Andrew Roderick McIntosh Michelle Andrea McIntosh Sheila Esther McIntosh	0.15

LAND SEVERANCE

	LEGAL DESCRIPTION	OWNER	AREA ha
S4	RS 1540 (BM 335) CB20B/887	June Margaret Beck Rodney Euan Beck	0.09
S5	Pt LOT 1 DP 30226 CB13F/287	Ian Jarman Ltd.	0.16
S6	LOT 3 DP 301523 6396	Andrew Roderick McIntosh Michelle Andrea McIntosh Sheila Esther McIntosh	0.14

ROAD TO BE STOPPED

	ADJOINING LOT	ADJOINING OWNER	AREA ha
S7	LOT 4 DP 82779 CB47D/576	John Kenneth Fowler	0.29
S8	LOT 1 DP 3024030 97107	Lesley Dawn Dickie Eric Edward Dickie	0.13

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN		B. Rice	04-04
DRAWN	R. Hopgood	B. Rice	07/04
APPROVED			2/05

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OPUS INTERNATIONAL CONSULTANTS
Christchurch Civil Engineering
PO Box 1482
Christchurch, New Zealand
Tel: +64 3 363 5400
Fax: +64 3 365 7858

TITLE: WAIMAKARIRI DISTRICT COUNCIL
RANGIORA LINK ROADS
SOUTHERN LINK

OPTION P1: FERNSIDE RD/FLAXTON RD INTERSECTION LAND PLAN

STATUS	FILE			
SCHEME	6DHLHA.11			
SCALE 1:1000 @ A1, 1:2000 @ A3	PLOT DATE 11/02/05 @ 11:47	FEATURE IDENTIFIER 6/535/27	CODE 3604	SHEET S1	REVISION

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LAND REQUIRED FOR ROAD

	LEGAL DESCRIPTION	OWNER	AREA ha
SJ	LOT 3 DP 301523 6396	Andrew Roderick McIntosh Michelle Andrea McIntosh Sheila Esther McIntosh	0.31
SK	LOT 4 DP 82779 CB47D/576	John Kenneth Fowler	0.04

ZONE OF LAND AFFECTED DURING CONSTRUCTION

	LEGAL DESCRIPTION	OWNER	AREA ha
S21	LOT 4 DP 82779 CB47D/576	John Kenneth Fowler	0.05
S22	LOT 3 DP 301523 6396	Andrew Roderick McIntosh Michelle Andrea McIntosh Sheila Esther McIntosh	0.22

LAND SEVERANCE

	LEGAL DESCRIPTION	OWNER	AREA ha
S23	LOT 3 DP 301523 6396	Andrew Roderick McIntosh Michelle Andrea McIntosh Sheila Esther McIntosh	0.13

ROAD TO BE STOPPED

	ADJOINING LOT	ADJOINING OWNER	AREA ha
S24	Pt LOT 1 DP 30226 CB13F/287	Ian Jarman Ltd.	0.24

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN	B Rice	TT	04-04
DRAWN	R Hopgood	TT	07/04
APPROVED			2/05

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Christchurch Civil Engineering
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Christchurch, New Zealand
Tel: +64 3 363 5400
Fax: +64 3 365 7858

TITLE: WAIMAKARIRI DISTRICT COUNCIL
RANGIORA LINK ROADS
SOUTHERN LINK

OPTION P2: FERNSIDE RD/FLAXTON RD INTERSECTION LAND PLAN

STATUS	FILE				
SCHEME	6DHLHA.11				
SCALE 1:1000 @ A1, 1:2000 @ A3	PLOT DATE 11/02/05 @ 11:50	FEATURE IDENTIFIER 6/535/27	CODE 3604	SHEET S2	REVISION

GRAPHIC SCALES 300mm 200 100 50 0 10mm 11/02/2005 11:51

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LAND REQUIRED FOR ROAD

	LEGAL DESCRIPTION	OWNER	AREA ha
SQ	Pt LOT 3 DP 63407 CB 38A/998	Luisetti Properties Ltd.	0.44
SR	LOT 2 DP 302077 8274	Jan Louise Cliff Garry Charles Cliff Gavin Mark Abbott	0.02
SS	Pt LOT 1 DP 3836 CB 38A/997	Waimakariri District Council	0.22
ST	Pt LOT 1 DP 55890		0.08
SU	LOT 1 DP 300912	Richard John Elliot Smith	0.14

ZONE OF LAND AFFECTED DURING CONSTRUCTION

	LEGAL DESCRIPTION	OWNER	AREA ha
S31	Pt LOT 3 DP 63407 CB 38A/998	Luisetti Properties Ltd.	0.24
S32	Pt LOT 3 DP 63407 CB 38A/998	Luisetti Properties Ltd.	0.31
S33	LOT 2 DP 302077 8274	Jan Louise Cliff Garry Charles Cliff Gavin Mark Abbott	0.07
S34	Pt LOT 1 DP 3836 CB 38A/997	Waimakariri District Council	0.46
S35	LOT 1 DP 300912	Richard John Elliot Smith	0.24

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN	R Hopgood	B Rice	04-04
DRAWN	R Hopgood	B Rice	07/04
APPROVED			2/05

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Christchurch Civil Engineering
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Christchurch, New Zealand
Tel: +64 3 363 5400
Fax: +64 3 365 7858

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RANGIORA LINK ROADS
SOUTHERN LINK

OPTION P: RYANS PLACE TO LINESIDE ROAD LAND PLAN

STATUS	SCHEME	FILE	6DHLHA.11			
SCALE	1:1000 @ A1 1:2000 @ A3	PLOT DATE	11/02/05 @ 11:52	FEATURE IDENTIFIER	CODE	SHEET	REVISION
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11/02/2005 11:52

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SOUTHERN IMPROVEMENTS

LAND REQUIRED FOR ROAD				ZONE OF LAND AFFECTED DURING CONSTRUCTION			
	LEGAL DESCRIPTION	OWNER	AREA ha		LEGAL DESCRIPTION	OWNER	AREA ha
SA	Pt RS 1257 CT 382/191	?	0.02	S1	Pt RS 1257 CT 382/191	?	0.38
SB	LOT 1 DP 54158 CB32F/582	Gail Susan Thompson David Lee Thompson	0.02	S2	LOT 1 DP 54158 CB32F/582	Gail Susan Thompson David Lee Thompson	0.37
SC	Pt RS 1439	Elizabeth Claire Cammock John Desmond Cammock Keith George Hales	0.01	S3	Pt RS 1439	Elizabeth Clare Cammock John Desmond Cammock Keith George Cammock	0.20

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN			
DRAWN	R Hopgood		10-04
APPROVED			2/05

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Christchurch, New Zealand
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TITLE: WAIMAKARIRI DISTRICT COUNCIL
RANGIORA LINK ROADS
SOUTHERN LINK

ALTERNATIVE P: FERNSIDE RD/TODDS RD INTERSECTION LAND PLAN

STATUS		FILE				
SCHEME		6DHLHA.11				
SCALE	PLOT DATE	FEATURE IDENTIFIER	CODE	SHEET	REVISION	
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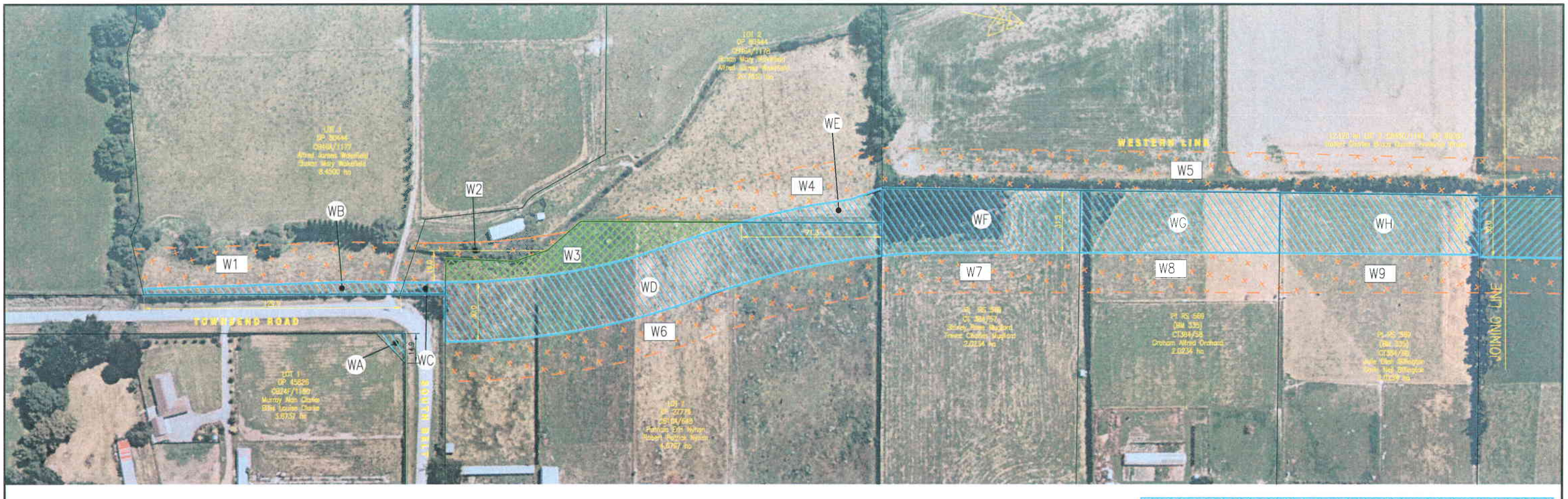

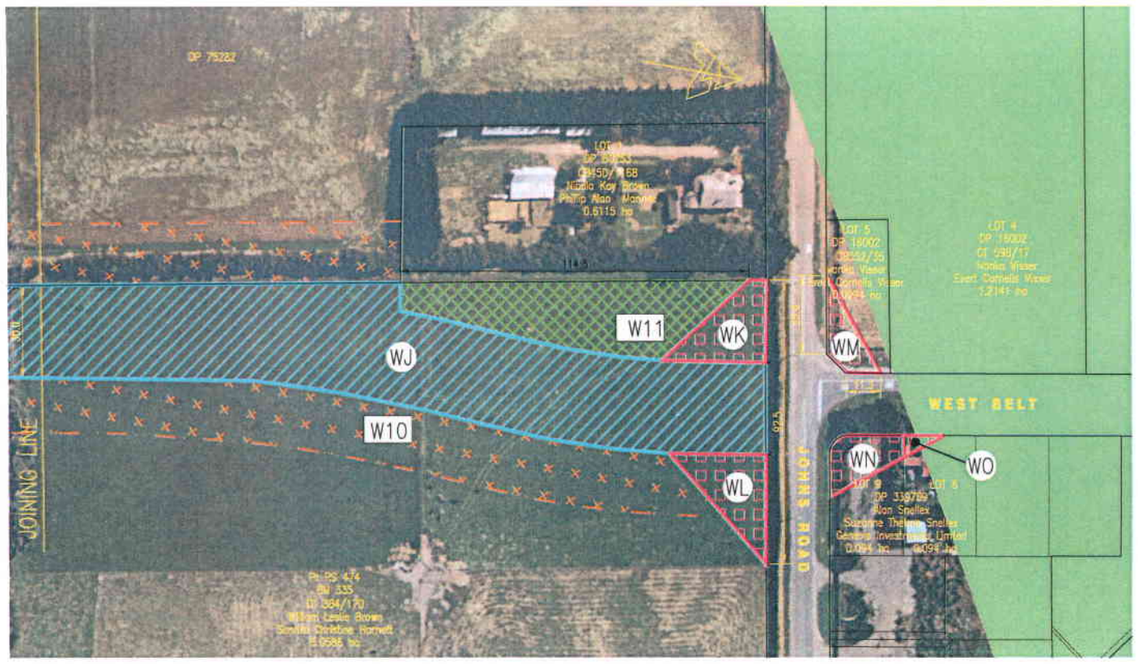

LAND SEVERANCE

	LEGAL DESCRIPTION	OWNER	AREA Ha
W3	LOT 1 DP 27779 CB10A/648	Patricia Erin Nyhan Robert Patrick Nyhan	0.19
W11	Pt RS 474 BM 335 CT 384/170	William Leslie Brown Sandra Christine Harnett	0.20

SIGHT LIGHT EASEMENT

	LEGAL DESCRIPTION	OWNER	AREA Ha
WK WL	Pt RS 474 BM 335 CT 384/170	William Leslie Brown Sandra Christine Harnett	0.05 0.06
WM	LOT 5 DP 16002 CB552/35	Evert Cornelius Visser Ivanka Visser	0.03
WN	LOT 9 DP 339769	Alan Snellex Suzanne Thelma Snellex Genesis Investments Limted	0.03
WO	LOT 8 DP 339769	Alan Snellex Suzanne Thelma Snellex Genesis Investments Limted	0.005

LAND REQUIRED FOR ROAD

	LEGAL DESCRIPTION	OWNER	AREA Ha		LEGAL DESCRIPTION	OWNER	AREA Ha
WA	LOT 1 DP 45826 CB24F/1150	Murray Alan Clarke Billie Louise Clarke	0.01	WG	Pt RS 569 (BM 335) CT384/58	Graham Alfred Orchard	0.31
WB	LOT 1 DP 80444 CB46A/1177	Alfred James Wakefield Susan Mary Wakefield	0.06	WH	Pt RS 569 (BM 335) CT384/60	Gavin Neil Billington Julie Ellen Billington	0.31
WC	LOT 2 DP 80444 CB46A/1178	Alfred James Wakefield Susan Mary Wakefield	0.01	WJ	Pt RS 474 BM 335 CT 384/170	William Leslie Brown Sandra Christine Harnett	0.79
WD	LOT 1 DP 27779 CB10A/648	Patricia Erin Nyhan Robert Patrick Nyhan	0.62				
WE	LOT 2 DP 80444 CB46A/1178	Alfred James Wakefield Susan Mary Wakefield	0.06				
WF	Pt RS 569 CT 384/57	Shirley Rose Mugford Trevor Charles Mugford	0.32				

ZONE OF LAND AFFECTED DURING CONSTRUCTION

	LEGAL DESCRIPTION	OWNER	AREA Ha		LEGAL DESCRIPTION	OWNER	AREA Ha
W1	LOT 1 DP 80444 CB46A/1177	Susan Mary Wakefield Alfred James Wakefield	0.28	W7	Pt RS 569 CT 384/57	Shirley Rose Mugford Trevor Charles Mugford	0.20
W2	LOT 2 DP 80444 CB46A/1178	Susan Mary Wakefield Alfred James Wakefield	0.09	W8	Pt RS 569 (BM 335) CT 384/58	Graham Alfred Orchard	0.20
W4	LOT 2 DP 80444 CB46A/1178	Susan Mary Wakefield Alfred James Wakefield	0.22	W9	Pt RS 569 (BM 335) CT 384/60	Julie Ellen Billington Gavin Neil Billington	0.20
W5	LOT 2 DP 80253 CB45D/1169	Quintin Frederick Bruce Robert Charles Bruce	0.86	W10	Pt RS 474 BM 335 CT 384/170	William Leslie Brown Sandra Christine Harnett	0.45
W6	LOT 1 DP 27779 CB10A/648	Robert Patrick Nyhan Patricia Erin Nyhan	0.45				

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN	B Rice		04-04
DRAWN	R Hopgood		07/04
APPROVED			2/05

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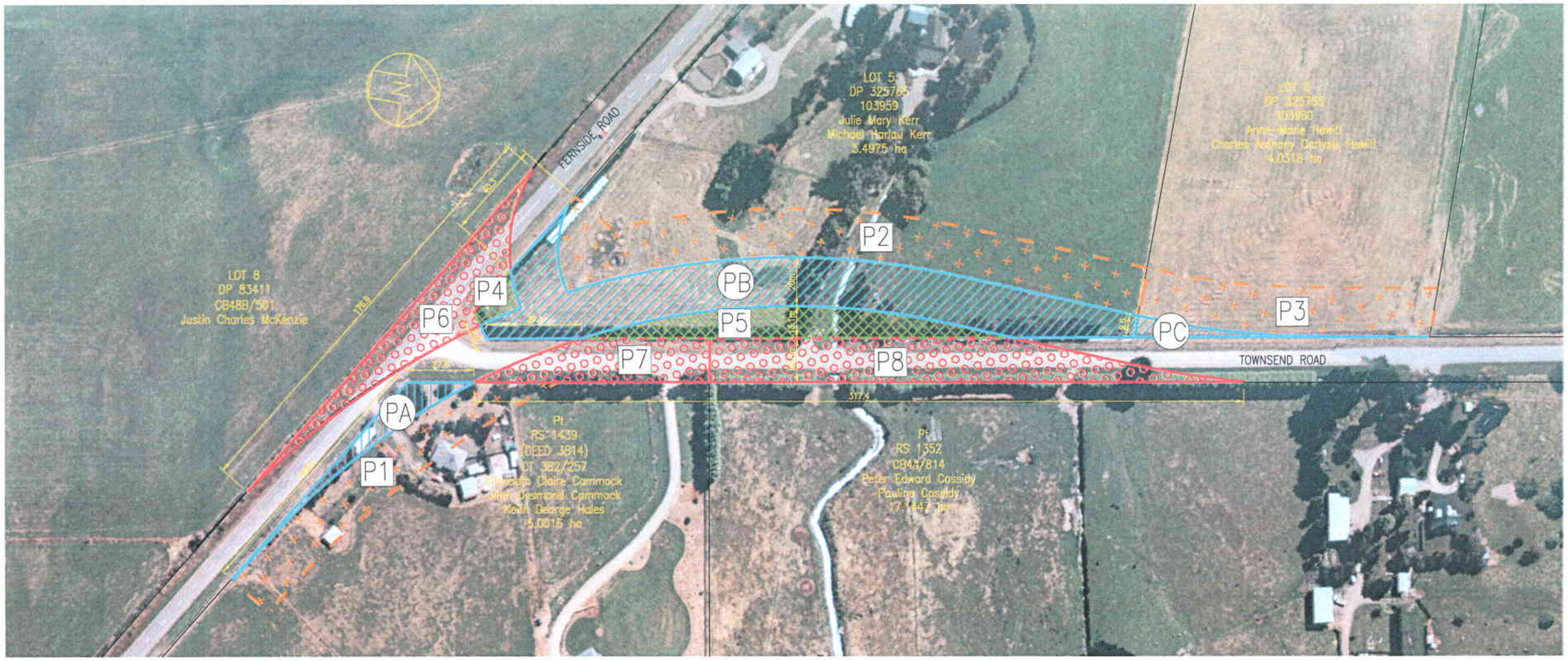
TITLE: WAIMAKARIRI DISTRICT COUNCIL
RANGIORA LINK ROADS
SOUTHERN, WESTERN & EASTERN LINKS
OPTION P – WESTERN LINK
LAND PLAN

STATUS	FILE				
SCHEME	6DHLHA.11				
SCALE	PLOT DATE	FEATURE IDENTIFIER	CODE	SHEET	REVISION
1:1000 @ A1 1:2000 @ A3	11/02/05 @ 12:06	6/535/27	3604	W1	

GRAPHIC SCALES

13/02/2005 9:26

g:\waimakariri dc\dhlha.11 rangiora link roads\drawings\option p\land plans\land-plan-west-w1.dwg ORIGINAL SHEET SIZE A1 [840x594]



LAND REQUIRED FOR ROAD

	LEGAL DESCRIPTION	OWNER	AREA ha
PA	Pt RS 1439 CT 382/257	Elizabeth Claire Cammock John Desmond Cammock Keith George Hales	0.06
PB	LOT 5 DP 325765 103959	Julie Mary Kerr Michael Harlau Kerr	0.54
PC	LOT 6 DP 325765 103960	Anne-Marie Hewitt Charles Anthony Carlyle Hewitt	0.03

ZONE OF LAND AFFECTED DURING CONSTRUCTION

	LEGAL DESCRIPTION	OWNER	AREA ha
P1	Pt RS 1439 CT 382/257	Elizabeth Claire Cammock John Desmond Cammock Keith George Hales	0.27
P2	LOT 5 DP 325765 103959	Julie Mary Kerr Michael Harlau Kerr	0.51
P3	LOT 6 DP 325765 103960	Anne-Marie Hewitt Charles Anthony Carlyle Hewitt	0.24

LAND SEVERANCE

	LEGAL DESCRIPTION	OWNER	AREA ha
P4	LOT 5 DP 325765 103959	Julie Mary Kerr Michael Harlau Kerr	0.02
P5	LOT 5 DP 325765 103959	Julie Mary Kerr Michael Harlau Kerr	0.15

ROAD TO BE STOPPED

	ADJOINING LOT	ADJOINING OWNER	AREA ha
P6	Lot 8 DP 83411 CB48B/501	Justin Charles McKenzie	0.19
P7	Pt RS 1439 CT 382/257	Elizabeth Claire Cammock John Desmond Cammock Keith George Hales	0.14
P8	Pt RS 1352 CB4A/814	Peter Edward Cassidy Pauline Cassidy	0.30

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN	R Hopgood	B Rice	04-04
DRAWN	R Hopgood	B Rice	09/04
APPROVED			2/05

WAIMAKARIRI DISTRICT COUNCIL

OPUS INTERNATIONAL CONSULTANTS
Christchurch Civil Engineering
PO Box 1482
Christchurch, New Zealand
Tel: +64 3 363 5400
Fax: +64 3 365 7858

TITLE: WAIMAKARIRI DISTRICT COUNCIL
RANGIORA LINK ROADS
WESTERN LINK

OPTION P: FERNSIDE RD/TOWNSEND RD INTERSECTION LAND PLAN

STATUS	FILE				
SCHEME	6DHLHA.11				
SCALE	PLOT DATE	FEATURE IDENTIFIER	CODE	SHEET	REVISION
1:1000@A1 1:2000@A3	11/02/05 @ 12:11	6/535/27	3604	W10	

GRAPHIC SCALES 300 mm 200 100 50 0 10 mm 13/02/2005 9:27

g:\waimakariri dc\dhlha.11 rangiora link roads\drawings\option p\land plans\land-plan_w10-fernside-townsend-alt.dwg – W10 Fernside Townsend Land Plan ORIGINAL SHEET SIZE A1 [840x594]