

# Mundijong Whitby Railway Grade Separation

Concept Design for Cost Estimate of  
Construction and Indication of Land  
Requirements

Prepared for  
Shire of Serpentine-Jarrahdale

23 June 2017



## Contact Information

**Cardno (WA) Pty Ltd**  
**Trading as Cardno**  
 ABN 77 009 119 000

11 Harvest Terrace, West Perth WA 6005

Telephone: 08 9273 3888  
 Facsimile: 08 9486 8664  
 International: +61 8 9273 3888

wa@cardno.com.au  
 www.cardno.com

## Document Information

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Author(s):



Mitchell Wansbrough  
 Graduate Civil Engineer

Approved By:



Geoff Pereira  
 Project Director – Infrastructure & Property

## Document History

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## Executive Summary

At the request of the Shire of Serpentine Jarrahdale, Cardno has prepared a schematic design to inform an order of magnitude cost estimate and an indication of land acquisition requirements for the grade separation of rail and road along Soldiers Rd / Paterson St / Wright Rd in Mundijong. These arrangement is based upon the outcome of a traffic modelling study undertaken by Cardno for the Mundijong Whitby District Structure Plan.

The proposed modifications comprise;

- > A skewed road crossing arrangement over the existing single rail track at Soldiers Road;
- > A single track rail crossing arrangement over;
  - The extended single carriageway two lane roadway at Whitby Street;
  - Watkins Road;

The proximity of Whitby Street to Watkins Road, has necessitated the grade separation of Watkins Road due to geometry and grade requirements, even though the traffic study did not note this as a requirement. Also note there has been no provision made for the future connection of the abandoned rail spur south which crosses Wright Road. Therefore, this cost estimate has been based on upon the following;

- > The grade separation of Soldiers Road by a skewed bridge structure over the single rail line with 9.0m vertical clearance to accommodate double stacked containers;
- > The rail track at Soldiers Road will remain on the existing vertical alignment with road carriageways elevated, due to known water table constraints;
- > The grade separation of the rail track by a viaduct over a single carriageway road at Whitby Street and Watkins Road with 4.8m vertical clearances to both structures;
- > Road carriageways at Watkins Road and Whitby Street have been maintained on the existing vertical alignment with the rail elevated, again due to known water table constraints; and
- > Road and Rail Inclines and declines are based upon maximum permitted gradients and minimum ramp lengths. This will be subject to confirmation in detailed design.

The Shire of Serpentine Jarrahdale has provided Lidar survey data to Cardno to create schematic design concepts generated through Infracore, using assumed grades, geometry and arrangements for similar structures existing in the metropolitan area. MGA Quantity Surveyors have prepared a cost estimate for these structures based upon exiting rates and pricing data available again for similar structures in the metropolitan area.

Based upon this methodology, the costs associated with the construction of this project are \$17.6 million (excl. GST). This estimate is a Class 4 Conceptual Estimate with an accuracy of +/- 25% in 2017 dollars and only includes construction related costs, and does not include components that are not directly related to construction, i.e:

- > Engineering Design Services
- > Planning; and
- > Land Acquisition.

If a more accurate cost estimate is desired, preliminary design must be undertaken to inform such a task.

This report includes extracts of the Infracore conceptual model with a flythrough for the length of the proposed works also provided with the digital version of this report.



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# 1 Introduction

Based on the outcome of the traffic modelling study undertaken by Cardno for the Mundijong Whitby District Structure Plan, the grade separation of rail and road crossings is required based upon forecast traffic numbers. The study was based upon the crossings provided at Soldiers Road, Watkins Road being retained, whilst the crossing at Keirnan Street being removed. A new crossing was assumed to be provided at the extension of Whitby Street.

Multiple population scenarios were considered in the traffic study, with a summary of the corresponding rail crossing requirements summarised in the **Table 2-1**. An extract from the Mundijong Whitby District Structure Plan is available in **Appendix A** to summarise the rail crossing locations and requirements.

**Table 1-1 Summary of Rail Crossing Requirements for All Scenarios**

Location	Bishop West	Road	Bishop Road East	Norman Road	Soldiers Road	District Centre Road	Whitby Street	Watkins Road
13,624 Population Scenario	<b>Boom Barriers</b>		Flashing Lights	Flashing Lights	<b>Grade Separation</b>	<b>Boom Barriers</b>	Flashing Lights	Flashing Lights
30,000 Population Scenario	<b>Boom Barriers</b>		Flashing Lights	Flashing Lights	<b>Grade Separation</b>	<b>Boom Barriers</b>	<b>Boom Barriers</b>	Flashing Lights
40,000 Population Scenario	<b>Boom Barriers</b>		Flashing Lights	Flashing Lights	<b>Grade Separation</b>	<b>Boom Barriers</b>	<b>Grade Separation</b>	Flashing Lights
50,000 Population Scenario	<b>Boom Barriers</b>		Flashing Lights	Flashing Lights	<b>Grade Separation</b>	<b>Grade Separation</b>	<b>Grade Separation</b>	Flashing Lights

This report outlines the key assumptions and methodology used as the basis for the schematic design, which was in turn used to inform an order of magnitude cost estimate, and an estimate of land requirements.

## 2 Schematic Design for Each Crossing

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The proposed modifications comprise;

- > A skewed road crossing arrangement over the existing single rail track at Soldiers Road;
- > A single track rail crossing arrangement over the extended single carriageway two lane roadway at Whitby Street;
- > A single track rail crossing arrangement over Watkins Road;

The proximity of Whitby Street to Watkins Road has also necessitated the grade separation of Watkins Road although this is not a requirement of the traffic study.

The Shire provided Lidar data has been used to develop a preliminary conceptual model in Infracore, overlaid on Nearmaps imagery to illustrate the key changes to the road network for the Future Year Scenario (2031). A flythrough of this model has also been prepared for the Shire. Plan and perspective views of each crossing arrangement have been included in this report. A sketch has also been included in **Appendix B** to illustrate the land acquisition requirements for different batter scenarios.

### 2.1 Schematic Design Assumptions

The following is a list of key assumptions adopted to develop this schematic design.

- > The construction of the Whitby Street extension will have been completed prior to the grade separation works.
- > Road and Rail Inclines and declines are based upon maximum permitted gradients and minimum ramp lengths.
  - 2% grade for rail.
  - 5% grade for road.
- > Bridge vertical geometry was based upon the following;
  - The grade separation of Soldiers Road by a skewed bridge structure over the single rail line with 9.0m vertical clearance to accommodate double stacked containers;
  - The grade separation of the rail track by a viaduct over a single carriageway road at Whitby Street and Watkins Road with 4.8m vertical clearances to both structures;
- > Typical road and rail cross-section details were adopted as follows:
  - Rail:
    - > 4m wide rail
    - > Crowned with 3% crossfall
    - > 1m wide shoulders graded at 1:2
  - Road:
    - > 7m wide pavement
    - > Crowned with 3% crossfall
    - > 2m wide shoulders at 3%
- > All grade separation batters assumed as 1:3 from shoulders to existing levels.
  - 1:3 batters have been selected based on the grounds of common/best practice.
  - This slope is within the typical angle of repose for soil, negating the need for stabilisation. If steeper batters are adopted going forward, stabilisation in the form of mortared rock (or a similar alternative) would be required at a significant cost, but would need to be assessed against the cost savings associated in the reduction of imported fill material and land acquisition.



- Batters flatter than the assumed 1:3 would require increased land acquisition requirements, contributing to increased project costs. Section 5 contains further discussion on land acquisition requirements.

## 2.2 Road over Rail Grade Separation of Soldiers Road

The grade separation of Soldiers Road consists of a single carriageway, two lane bridge with 1.5m shoulders skewed over the single rail track at the Soldiers Road crossing. This bridge is to be a reinforced concrete bridge, similar to that at Sevenoaks Street and Railway Parade in Welshpool (see **Figure 3-1**).

**Figure 2-1 Road over Rail Crossing at Sevenoaks St & Railway Parade**



The Soldiers Road will incline (assumed 5% vertical grade) to the bridge structure with a 9.0m vertical clearance over the rail to accommodate double stacked containers. The rail track at Soldiers Road will remain on the existing vertical alignment with the road carriageways elevated over. This is in part due to water table constraints.

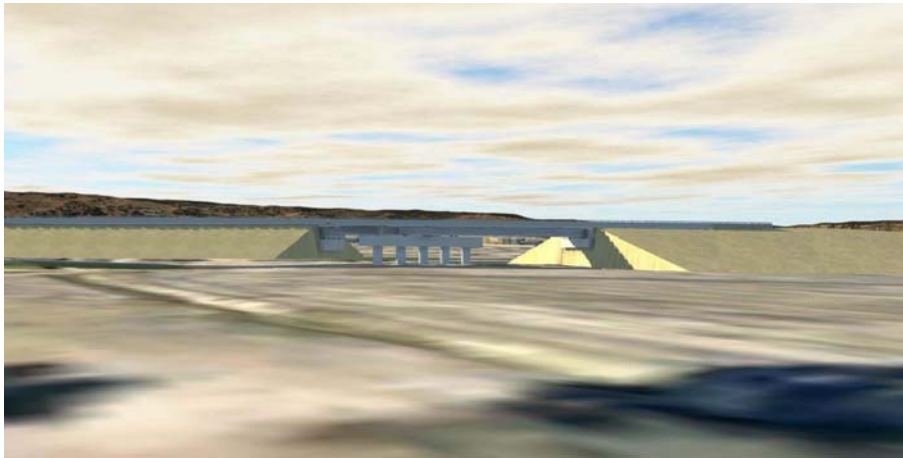
The **Figure 3-2** and **Figure 3-3** show a plan and perspective view of the proposed separation.

Due to the maximum assumed 5% decline of Soldiers Road, the Future District Centre Road (location shown in **Appendix A**) must incline to tie into the future intersection of this road with Soldiers Road. This is shown in **Figure 3-4**.

**Figure 2-2 Plan view of the Soldiers Road grade separation**



**Figure 2-3** Perspective view of the Soldiers Road grade separation



**Figure 2-4** Intersection of Future District Centre Road and Soldiers Rd



### **2.3 Rail over Road Grade Separation of Whitby St and Watkins Rd**

The proximity of Whitby Street to Watkins Road has necessitated the grade separation of Watkins Road, although this was not a requirement of the traffic study. Grade separation will be achieved by rail viaduct with 4.8m vertical clearance provided over each roadway. Road carriageways at Watkins Road and Whitby Street have been maintained on the existing vertical alignment with the rail elevated, again due to known water table constraints.

The structures assumed in the schematic design are of reinforced concrete construction similar to that at Hamilton Road in Spearwood (see **Figure 3-6**), passing orthogonally over the roads. **Figure 3-7** to **Figure 3-12** shows plan and perspective views of each proposed Structure of this type.

**Figure 2-5 Rail over Road crossing at Hamilton Rd in Spearwood**



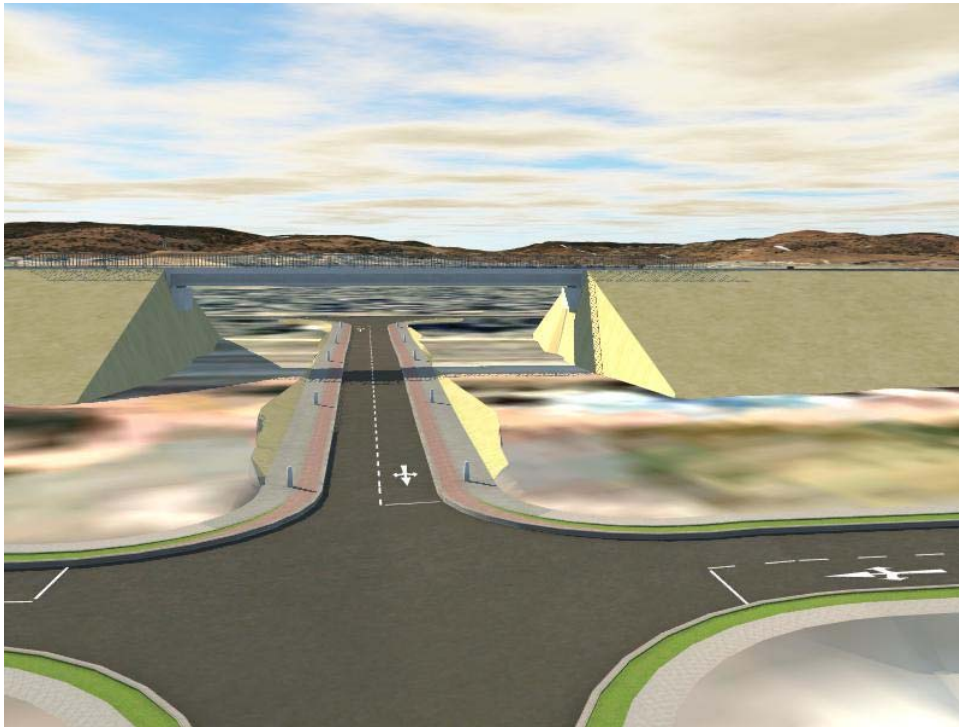
Infraworks has been utilised to overlay conceptual road and rail arrangements over Nearmaps images. These arrangements are included in the following in plan and perspective views. Not the arrangements are indicative for estimating purposes only and subject to confirmation by detailed engineering. The arrangements provided comprise;

- Grade separation of Rail over Whitby Road (**Figures 3-6 and Figure 3-7**)
- Grade separation of Rail over Watkins Road (**Figures 3-8 and Figure 3-9**)
- Modified Roundabout at Kiernan Street with the discontinuation at Soldiers Road (**Figure 3-10**)

**Figure 2-6 Plan view of Whitby Road grade separation**



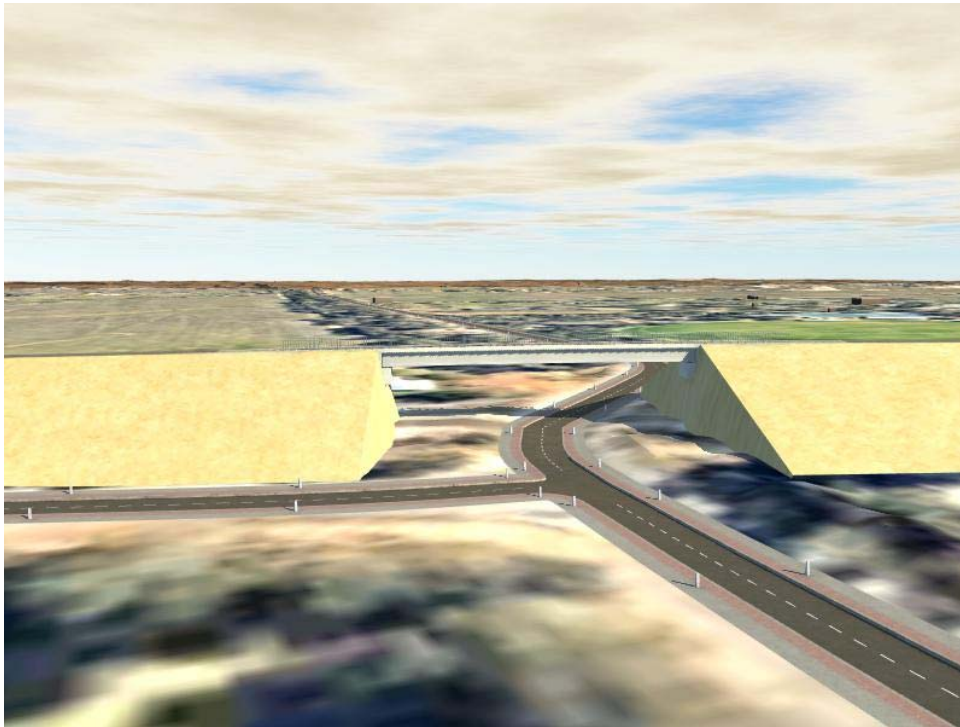
**Figure 2-7 Perspective view of the Whitby Road grade separation**



**Figure 2-8 Plan view of the Watkins Road grade separation**



**Figure 2-9 Perspective view of the Watkins Road grade separation**



#### **2.4 Keirnan St / Soldiers Rd intersection alteration.**

One of the outcomes of the Mundijong Whitby District structure plan was that the Keirnan Street railway crossing should be removed. To achieve this, the existing intersection will need to be modified, which would involve closing off the eastern leg of Keirnan Street as shown in **Figure 3-5**.

It has been assumed that this intersection alteration works will be completed prior to the grade separation works, and has therefore not been included in this cost estimate.

**Figure 2-10 Keirnan Street / Soldiers Rd / Paterson St Modification**



## 3 Cost Estimate of Construction and Indication of Land Requirements

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### 3.1 Cost Estimate of Construction

Cardno has engaged MGA Quantity Surveyors to provide a cost estimate for the construction of this project, based on the schematic design, and key design parameters provided by Cardno. MGA are Quantity Surveyors experienced in the cost estimation of Infrastructure Projects. In preparing these cost estimates, MGA has drawn upon rates and costs associated with projects of similar type and complexity located in the metropolitan area.

In addition to the parameters, concepts and assumptions discussed in the preceding sections of this report, the following key assumptions and considerations have also been incorporated into this cost estimate.

- > The works shall be completed as one project. General Items such as preliminaries and the like have been priced on this basis.
- > Only new pavement / rail is required to achieved the required vertical geometry, and includes adjoining roads / intersections impacted by this. Where this is not required, the existing infrastructure is to be retained. Other road alterations / extensions are considered to be complete prior to the commencement of these works.
- > Fill volumes are based on this concept design with the assumed constraints outlined in this report. These have been calculated in 12D and were provided to MGA.
- > Typical stormwater drainage designs from similar works have been use to inform costings. Assumed stormwater drainage is required on approach to the road bridges only.
- > The cost of traffic management has been based on the road closure of Soldiers Road, with a likely detour route via Bishop Rd and Taylor Rd. Therefore traffic management costs do not included temporary access tracks, and only includes setting up of the road closure and maintenance of this.
- > No allowance has been made to demolish / relocate existing structures and amenities. Section 3.3.1 contains further discussion on this matter.
- > A provisional allowance has been made to relocate existing services. Section 3.3.2 contains further discussion on this matter.

Based upon the methodology outlined in this report, the construction cost of this project is estimated to be \$17.6 million (excl. GST) (2017 AUD). A copy of MGA's cost estimate is available in **Appendix C** and includes MGA's commentary / assumptions on quantities / line items. A summary of this estimate is outlined in **Table 4-1**.

This estimate is a Class 4 Conceptual Estimate with an accuracy of +/- 25% in 2017 dollars and only includes construction related costs, and does not included components that are not directly related to construction, i.e:

- > Engineering Design Services
- > Planning.
- > Land Acquisition.

As requested by the Shire, the cost estimate is split into two sections:

- > Road Over Rail; and
- > Rail Over Road

As noted above, the cost estimate is based on the assumption that the works will be completed as one portion of works. Preliminaries and Provisionals have been attributed to each section on a pro-rata basis.

**Table 3-1 Cost Estimate Summary (Excl. GST in 2017 AUD)**

Description	Amount
<b>Road over Rail</b>	
General Items	\$855,992
Roadworks / Railworks	
Earthworks	\$1,881,482
Drainage	\$312,913
Pavement & Surfacing	\$517,499
Traffic Facilities	\$68,549
Bridge Works	
Drainage	\$10,770
Pavement & Surfacing	\$3,718
Traffic Facilities	\$105,553
Bridge & Major Infrastructure	\$743,477
Miscellaneous	\$27,022
Provisional Sums	\$268,690
<b>SUB-TOTAL - Road Over Rail</b>	<b>\$4,795,665</b>
<b>Rail Over Road</b>	
General Items	\$2,472,127
Roadworks / Railworks	
Earthworks	\$5,268,679
Pavement & Surfacing	\$205,110
Bridge Works	
Traffic Facilities	\$81,920
Bridge & Major Infrastructure	\$1,252,577
Miscellaneous	\$2,750,785
Provisional Sums	\$775,982
<b>SUB-TOTAL - Rail Over Road</b>	<b>\$12,807,180</b>
<b>PROJECT TOTAL (excl. GST) (2017 AUD)</b>	<b>\$17,602,845</b>

### 3.2 Indication of Land Use Requirements

For the purpose of this indication of land use requirements, 1:3 embankment batters have been assumed based on the grounds of common/best engineering practices (i.e. this slope is within the typical angle of repose for soil, negating the need for stabilisation such as mortared rock). It is also generally a good fit within the existing road / rail reserve. At this conceptual phase, Cardno deems that the selection of 1:3 embankment batters achieves a good balance between cost effective construction and minimising land acquisition requirements.

Cardno has also review impact of 1:2 and 1:4 embankment batters. Drawing CW979100-00-001-A has been produced (see Appendix B) to show the horizontal extents of these three batter scenarios and highlights land acquisition requirements on an 'area-by- lot basis.

**Table 3-1** summarises the land requirements from each Lot, for each scenario. To clarify, the land acquisition area requirements produced for this report are based on the conceptual design and existing ground levels from client-provided Lidar data. These requirements shall be confirmed at detail design.

**Table 3-2 Land Requirements Comparison (m<sup>2</sup>)**

Batter Slope	1:2	1:3	1:4
Lot 1 – Bishop Road	358	1,406	1,597
Lot 26	679	1,473	2,286
Lot 2	2,802	4,502	6,408
Lot 9000 – 9000 Taylor Road	1,726	1,897	2,063
Rail Reserve (adjacent Lot 26)	2,966	5,279	7,409
Lot 500	-	-	971
Lot 1 Roman Road	-	-	2,527
Lot 2 Roman Road	-	-	446
Lot 9503 Watkins Road	-	-	1,184
Lot 801 Wright Road	-	53	228
Lot 252 Wright Road	-	-	225
<b>Total (m2)</b>	<b>8,531</b>	<b>14,557</b>	<b>24,891</b>

### 3.3 Impact on Existing Infrastructure

#### 3.3.1 Structures, Dwellings and other Amenities

A review of the extents of batters shown in Appendix C indicates that existing infrastructure along Paterson Street will be impacted by this grade separation (potentially with the exception of 1:2 batters scenario). This should be confirmed in detailed design.

Demolition / Relocation of the following infrastructure should be considered as these items would likely be impacted by the proposed grade separation works:

- > Mundijong Train Station
  - The Australind stops at this station. Relocation to a site beyond the extents of the proposed grade separation extents should be considered.
- > Playground, Skate Park and Other Amenities at Mundijong Railway Park.
- > War Memorial opposite Serpentine-Jarrahdale Community Resource Centre
- > Street Parking along Paterson Street.
- > Household at Lot 9503 Watkins Road.

Costs associated these demolition / relocation works are not included in this report.

#### 3.3.2 Existing Services

Cardno has reviewed Western Power’s Network Capacity Mapping Tool, Water Corporation’s Esinet and ATCO Gas’s Reticulation Mapping. Water mains and overhead high voltage power and lighting runs along Paterson Street from Mundijong Road to Keirnan Street, and should not be impacted by the proposed grade separation works. An ATCO Gas High Pressure Main extends north of Keirnan Road along Soldiers Road, and would likely require relocation. Services Relocation requirements should assessed at detailed design.

Screenshots indicating Western Power, Water Corporation, and ATCO Gas asset locations are available in Appendix D.

A provisional allowance has been included in this cost estimate for the relocation of services impacted by the proposed grade separation requirements.



## 4 Conclusion

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Based on the outcomes of a traffic study completed for the Mundijong Whitby District Structure plan, which detailed the need for grade separated rail / road crossings , Cardno has developed a conceptual design using Infracore to inform a +/-25% construction cost estimate, as well as an indication of land acquisition requirements.

Based on the assumptions and methodology discussed in this report, Cardno advises that the estimated cost of construction is \$17.6 million +/-25% (excl. GST in 2017 AUD), and the land acquisition requirements are estimated to be 13,200 m<sup>2</sup> (based on 1:3 embankment batters).

Going forward into detailed design, further consideration of costs associated with Land acquisition and infrastructure demolition / relocation works should be incorporated to inform detailed design.



APPENDIX

A

CROSSING LOCATIONS &  
REQUIREMENTS







**Table 1-0 Summary of Rail Crossing Requirements for All Scenarios**

Location	Bishop Road West	Bishop Road East	Norman Road	Soldiers Road	District Centre Road	Whitby Street	Watkins Road
13,624 Population Scenario	<b>Boom Barriers</b>	Flashing Lights	Flashing Lights	<b>Grade Separation</b>	<b>Boom Barriers</b>	Flashing Lights	Flashing Lights
30,000 Population Scenario	<b>Boom Barriers</b>	Flashing Lights	Flashing Lights	<b>Grade Separation</b>	<b>Boom Barriers</b>	<b>Boom Barriers</b>	Flashing Lights
40,000 Population Scenario	<b>Boom Barriers</b>	Flashing Lights	Flashing Lights	<b>Grade Separation</b>	<b>Boom Barriers</b>	<b>Grade Separation</b>	Flashing Lights
50,000 Population Scenario	<b>Boom Barriers</b>	Flashing Lights	Flashing Lights	<b>Grade Separation</b>	<b>Grade Separation</b>	<b>Grade Separation</b>	Flashing Lights



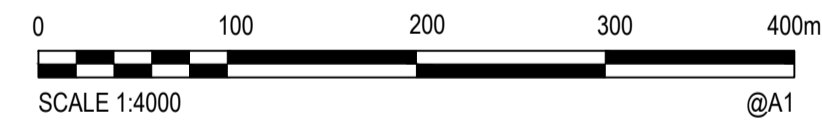
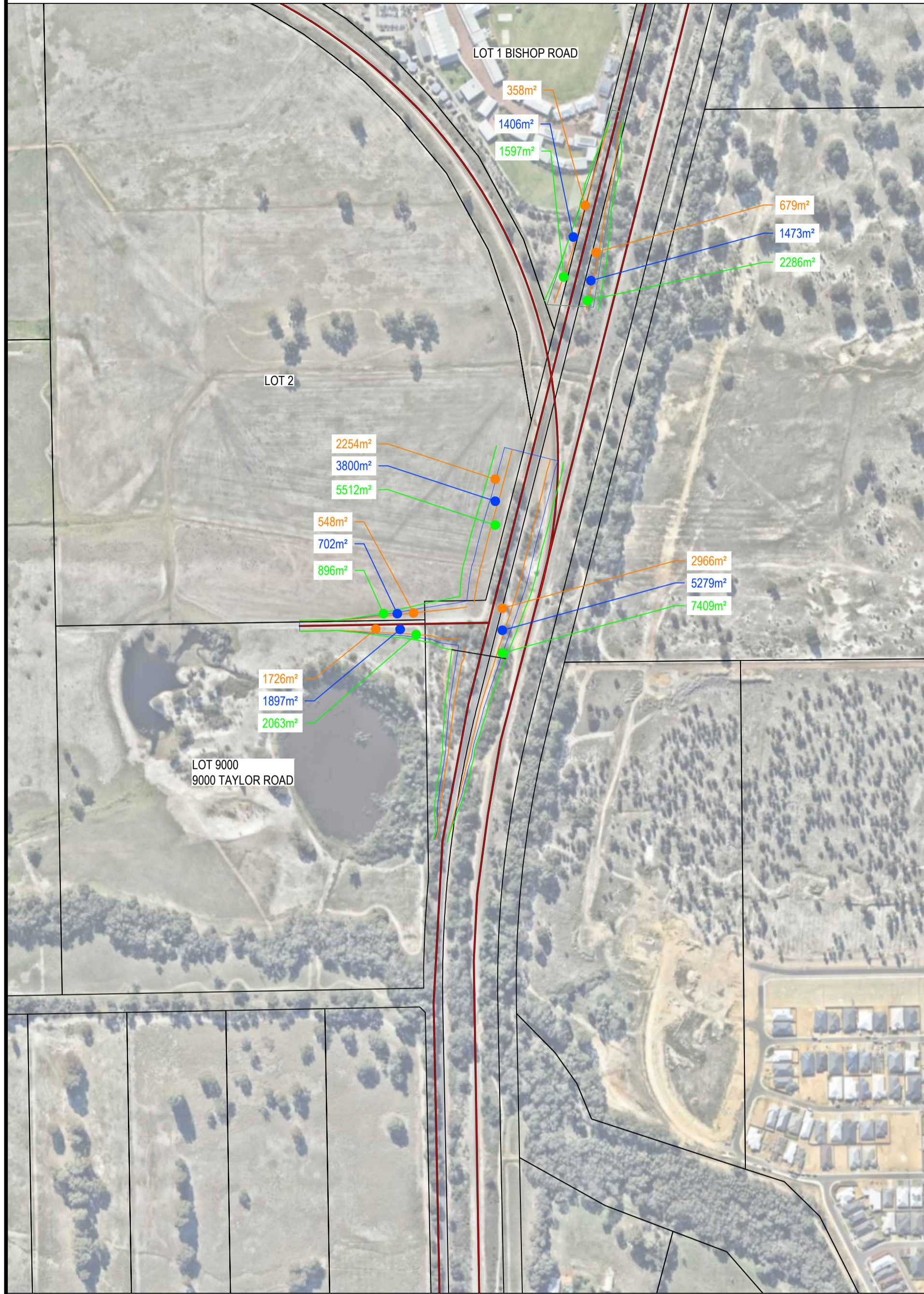


APPENDIX

# B

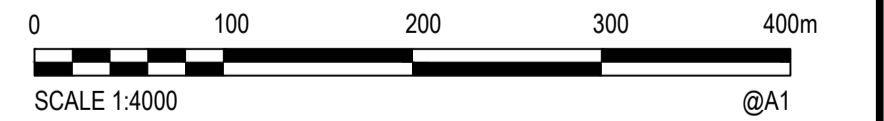
PRELIMINARY BATTER EXTENTS





**LEGEND**

- 1 IN 2 BATTERS
- 1 IN 3 BATTERS (MATCHES VOLUMES)
- 1 IN 4 BATTERS



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**Cardno**  
Shaping the Future

Cardno (WA) Pty Ltd | ABN 77 009 119 000  
11 Harvest Terrace  
West Perth WA 6005  
Tel: 08 9273 3888 Fax: 08 9486 8664  
Web: www.cardno.com.au

SHIRE OF SERPENTINE JARRAHDALE PRELIMINARY BATTER EXTENT INTO ADJACENT LOTS			
Date	Scale	Size	
13/06/2017	1:4000m	A1	
Drawing Number	Revision		
CW979100-00-001	B		



APPENDIX

C

COST ESTIMATE



## MAIN SUMMARY

### SHIRE OF SERPENTINE JARRAHDAL MUNDIJONG ROAD GRADE SEPARATION

SCHEDULE No. 1 - GENERAL ITEMS - ROAD OVER RAIL		\$855,992.42
SCHEDULE No. 2 - ROADWORKS		
SERIES 300 - EARTHWORKS	\$1,881,482.22	
SERIES 400 - DRAINAGE	\$312,913.27	
SERIES 500 - PAVEMENT & SURFACING	\$517,498.70	
SERIES 600 - TRAFFIC FACILITIES	\$68,549.10	
SCHEDULE No. 2A - BRIDGE WORKS - ROAD OVER RAIL		
SERIES 400 - DRAINAGE	\$10,769.80	
SERIES 500 - PAVEMENT & SURFACING	\$3,718.26	
SERIES 600 - TRAFFIC FACILITIES	\$105,552.73	
SERIES 800 - BRIDGES & MAJOR STRUCTURES	\$743,476.95	
SERIES 900 - MISCELLANEOUS	\$27,022.08	
SCHEDULE No. 3 - PROVISIONAL SUMS	\$268,689.51	
		<hr/>
		\$3,939,672.63
GST EXCLUSIVE AMOUNT - ROAD OVER RAIL		\$4,795,665.04
ESTIMATED GST PAYABLE		\$479,566.50
<b>TOTAL OF TENDER INDICATION</b>		<hr/> <b>\$5,275,231.55</b> <hr/>

## MAIN SUMMARY

### SHIRE OF SERPENTINE JARRAHDAL MUNDIJONG ROAD GRADE SEPARATION

SCHEDULE No. 1 - GENERAL ITEMS - RAIL OVER ROAD	\$2,472,127.39
SCHEDULE No. 2 - ROADWORKS - RAIL OVER ROAD	
SERIES 300 - EARTHWORKS	\$5,268,678.58
SERIES 500 - PAVEMENT & SURFACING	\$205,110.39
SCHEDULE No. 2B - BRIDGE WORKS - RAIL OVER ROAD	
SERIES 600 - TRAFFIC FACILITIES	\$81,919.76
SERIES 800 - BRIDGES & MAJOR STRUCTURES	\$1,252,576.96
SERIES 900 - MISCELLANEOUS	\$2,750,784.92
SCHEDULE No. 3 - PROVISIONAL SUMS	\$775,981.99
	<u>\$10,335,052.60</u>
GST EXCLUSIVE AMOUNT - RAIL OVER ROAD	\$12,807,180.00
ESTIMATED GST PAYABLE	<u>\$1,280,718.00</u>
<b>TOTAL OF TENDER INDICATION</b>	<b><u>\$14,087,898.00</u></b>



**SCHEDULE No. 1 - GENERAL ITEMS**

Item	Description	Unit	Qty	Rate	Amount
<b><u>CONDITIONS OF CONTRACT</u></b>					
<b>GENERAL CONDITIONS OF CONTRACT</b>					
GCC.01	Insurances in accordance with the General Conditions of Contract	Item	1	\$98,491.82	\$98,491.82
GCC.02	Contractor's superintendence during the execution of the Works	Item	1	\$992,600.00	\$992,600.00
GCC.03	All charges, costs and obligations relating to the General Conditions of Contract not provided for elsewhere	Item	1	\$28,000.00	\$28,000.00
<b>SPECIAL CONDITIONS OF CONTRACT</b>					
SCC.01	All charges, costs and obligations relating to the Special Conditions of Contract not provided for elsewhere	Item	1	\$122,500.00	\$122,500.00
<b><u>SERIES 100 - GENERAL REQUIREMENTS</u></b>					
<b>102 SURVEY INFORMATION</b>					
102.01	Survey information, control and setting out of the works	Item	1	\$105,000.00	\$105,000.00
<b>103 SITE FACILITIES</b>					
<u>Contractors Site Facilities</u>					
103.01	Provision of Contractor's site facilities	Item	1	\$93,070.00	\$93,070.00
103.02	Maintenance of Contractor's site facilities	Item	1	\$16,800.00	\$16,800.00
103.03	Removal of Contractor's site facilities	Item	1	\$7,000.00	\$7,000.00
<b>105 WATER SUPPLIES</b>					
105.01	Supply of water	Item	1	\$106,750.00	\$106,750.00
<b><u>SERIES 200 - MANAGEMENT REQUIREMENTS</u></b>					
<b>202 - TRAFFIC</b>					
202.01	Traffic management	Item	1	\$25,000.00	\$25,000.00
202.02	Traffic control devices	Item	1	\$63,000.00	\$63,000.00

Item	Description	Unit	Qty	Rate	Amount
202.03	Traffic controllers	Item	1	\$93,030.00	\$93,030.00
<b>203 - OCCUPATIONAL SAFETY AND HEALTH</b>					
203.01	Occupational safety and health including safety plans and safety audits	Item	1	\$108,150.00	\$108,150.00
<b>204 - ENVIRONMENT</b>					
204.04	Waste disposal	Item	1	\$0.00	\$0.00
204.08	Project Signboard	Item	1	\$6,000.00	\$6,000.00
To Summary					<b>\$1,865,391.82</b>

**SCHEDULE OF PRICES**  
**FOR**  
**SHIRE OF SERPENTINE JARRAHDALE**

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	Current Rates
<b>1.0</b>	<b>CONTRACTOR'S PRELIMS</b>				
<b>1.1</b>	<b>CONTRACTOR'S PRELIMS</b>				
	<b>Insurances</b>	Item	1.0	\$ 98,491.82	\$98,491.82
<b>1.01</b>	<b>Supervision</b>	Item			
	Construction Manager	Hr	700.0	\$ 125.00	\$87,500.00
	Site Engineer	Hr	4200.0	\$ 103.00	\$432,600.00
	Site Supervisor	Hr	5250.0	\$ 90.00	\$472,500.00
	Survey				\$0.00
<b>1.02</b>	<b>Site Establishment</b>	Item			
	Mobilisation	Hr	160.0	\$ 100.00	\$16,000.00
	Demobilisation	Hr	120.0	\$ 100.00	\$12,000.00
	Site Access & Laydown Areas	Hr	32.0	\$ 60.00	\$1,920.00
	Site Fencing & Hoardings	Hr	40.0	\$ 60.00	\$2,400.00
	Setting out the works	Item			\$ 105,000.00
	Provision, maintenance and removal of Contractor's site facilities	Item	140.0	\$ 250.00	\$35,000.00
<b>1.03</b>	<b>Site Running Costs</b>	Item			
	Contractors Accommodation	weekly	35.0	\$ 1,250.00	\$43,750.00
	Contractors Ablutions	weekly	70.0	\$ 250.00	\$17,500.00
	Compliance with QA Requirements/ Aboriginal Heritage/ OH&S and Environmental Requirements	hr	1050.0	\$ 103.00	\$108,150.00
	Site Office Equipment including Communications	item	1.0	\$ 10,000.00	\$10,000.00
	Rubbish Removal	item	105.0	\$ 60.00	\$6,300.00
	Site Security	item			\$0.00
	Accommodation for project duration	item			\$0.00
<b>1.04</b>	<b>Plant &amp; Equipment</b>	Item			
	Site Vehicles	weekly	35.0	\$ 500.00	\$17,500.00
	Dust Control - Water Usage	Kl	26250.0	\$ 2.20	\$57,750.00
	Dust Control - Cart Hire	weekly	70.0	\$ 700.00	\$49,000.00
<b>1.05</b>	<b>Fees &amp; Charges</b>	Item			
	As Constructed Information	Item			\$ 31,500.00
<b>1.06</b>	<b>Charges for complying with the Specification and Drawings not provided elsewhere in the schedule</b>	Item			
1.1.6.1	Compliance with testing requirements not included elsewhere in the schedule. (Contractor to detail items below)	Item			<b>\$0.00</b>
	NATA Registered Testing	Item			\$73,500.00
		Item			\$0.00
		Item			\$0.00
1.1.6.2	Charges for complying with the Conditions of Contract, Specification and drawings not included elsewhere in the schedule. (Contractor to detail items below)	Item			
		Item			\$0.00
		Item			\$0.00
		Item			\$0.00
<b>1.07</b>	<b>Traffic Management</b>	Item			
	Traffic Management	Item	1.0	\$ 25,000.00	\$25,000.00
	Traffic control devices	Days	420.0	\$ 150.00	\$63,000.00

	Traffic controllers	hr	294.0	\$ 145.00	\$42,630.00
		hr	840.0	\$ 60.00	\$50,400.00
	Project Sign Boards	No	4.0	\$ 1,500.00	\$6,000.00
	Construction and removal of Side Tracks	m2	0.0	\$ 500.00	\$0.00
<b>1.1</b>	<b>CONTRACTOR'S PRELIMS</b>		<b>Total Carried to Summary</b>		<b>\$1,865,391.82</b>

<b>Schedule No. 2A - BRIDGE WORKS</b>					
Item	Description	Unit	Qty	Rate	Amount
<b>SERIES 400 - DRAINAGE</b>					
<b>407 - KERBING</b>					
407.01	Combined Envirokerb kerb and drainage system; 150mm thick mass concrete base; 10mm nominal thick cementitious grout below and behind; expansion joint assemblies	m	24	\$147.63	\$3,543.11
407.01.1	LH Envirodeck end rodding unit complete with 200mm base outlet; 200mm pvc downpipe, 11.25 degree elbow and pvc pipe to connect to street gulley pit	No.	4	\$1,806.67	\$7,226.70
To Summary					\$10,769.80
<b>SERIES 500 - PAVEMENT &amp; SURFACING</b>					
<b>504 - ASPHALT SURFACING</b>					
<u>BRIDGEWORKS</u>					
504.11	Tack coat	m <sup>2</sup>	144	\$0.85	\$122.58
504.12	40mm dense graded asphalt on bridge decks	m <sup>2</sup>	144	\$24.97	\$3,595.68
To Summary					\$3,718.26
<b>SERIES 600 - TRAFFIC FACILITIES</b>					
<b>601 - SIGNS</b>					
<u>SINGLE POST SIGNS</u>					
601.01	Supply and install new signs on single posts	No.	8	\$375.49	\$3,003.96
<b>603 - ROAD SAFETY BARRIER SYSTEMS</b>					
<u>BARRIER</u>					
603.01	Galvanised W-Beam/ Modified Thriebeam transition beam	m	8	\$570.91	\$4,567.24
603.01.2	Galvanised Thriebeam Nested barrier	m	8	\$502.81	\$4,022.44
603.03	Galvanised Regular Performance Level 4 Rail RHS traffic barrier system for structure	m	24	\$890.98	\$21,383.40
603.03.1	Galvanised 4 Rail RHS traffic barrier system/ Thriebeam Nested transition	m	8	\$890.98	\$7,127.80
603.03.2	Expansion joint in guardrail	No.	4	\$964.75	\$3,859.00
<b>604 - PAVEMENT MARKING</b>					
<u>ROAD PAVEMENT MARKINGS</u>					

Item	Description	Unit	Qty	Rate	Amount
604.01	Line type - Edge	m	542	\$119.18	\$64,592.85
	To Summary				\$105,552.73
	<u>STRUCTURAL EXCAVATION</u>				
	<u>Abutment footing excavation:</u>				
801.01	Abutment footing excavation not exceeding 2.0m deep commencing at finished ground level	m <sup>3</sup>	360	\$34.10	\$12,276.56
	<u>Retaining Walls</u>				
801.05	Retaining wall footing excavation not exceeding 2m deep commencing at existing ground level	m <sup>3</sup>	43	\$30.31	\$1,297.25
	<b>820 - CONCRETE FOR STRUCTURES</b>				
	<u>ABUTMENTS AND APPROACH SLABS</u>				
	<u>Plain Insitu Concrete Class 20 MPa (N)</u>				
820.01	Allow for all charges relating to the supply and installation of cast insitu plain concrete Class N20 as a 50mm blinding layer under abutment footings.	m <sup>3</sup>	12	\$363.67	\$4,364.00
820.04	Allow for all charges relating to the supply and installation of cast insitu plain concrete Class N20 as a 50mm blinding layer under approach slab.	m <sup>3</sup>	24	\$363.67	\$8,728.00
	<u>Reinforced Insitu Concrete Class 40MPa (S)</u>				
820.06	Allow for all charges relating to cast reinforced concrete class S40 for abutment footing.	m <sup>3</sup>	240	\$921.22	\$221,092.10
820.11	Allow for all charges relating to cast reinforced concrete Class S40 for approach slab.	m <sup>3</sup>	128	\$847.44	\$108,472.59
	<u>RETAINING WALLS</u>				
	<u>Plain Insitu Concrete Class 20 MPa (N)</u>				
820.13	50mm Blinding layer under retaining wall footing	m <sup>3</sup>	7	\$363.67	\$2,618.40
	<u>Reinforced Insitu Concrete Class 40MPa (S)</u>				
820.19	Retaining wall footing	m <sup>3</sup>	29	\$921.22	\$26,531.05
	<u>DECK</u>				
	<u>Reinforced Insitu Concrete Class 40MPa (S)</u>				
820.21	Allow for all charges relating to cast reinforced concrete for the deck of class S40.	m <sup>3</sup>	29	\$921.22	\$26,531.05
	<b>821 - FORMWORK</b>				
	<u>Formwork Class 2</u>				
821.02	Allow for all charges relating to the supply and installation of formwork at the base, wall, wingwalls slab and plinths as per the drawings and the technical specification.	m <sup>2</sup>	0	\$0.00	Incl
	<u>Formwork Class 4</u>				

Item	Description	Unit	Qty	Rate	Amount
821.01	Allow for all charges relating to the supply and installation of formwork at the sides of the abutment footing as per the drawings and the technical specification.	m <sup>2</sup>	0	\$0.00	Incl
821.02	Allow for all charges relating to the supply and installation of formwork at the base, wall, wingwalls slab and plinths as per the drawings and the technical specification.	m <sup>2</sup>	0	\$0.00	Incl
821.08	Allow for all charges relating to the supply and installation of formwork at the sides of the approach slab as per the drawings and the technical specification.	m <sup>2</sup>	0	\$0.00	Incl
<u>RETAINING WALLS</u>					
<u>Formwork Class 4</u>					
821.15	Sides of retaining wall footing	m <sup>2</sup>	0	\$0.00	Incl
<u>DECK</u>					
<u>Formwork Class 3</u>					
821.20	Allow for all charges relating to the supply and installation of formwork at the sides of the sides of deck and upstand as per the drawings and the technical specification.	m <sup>2</sup>	0	\$0.00	Incl
<b>822 - STEEL REINFORCEMENT</b>					
<u>ABUTMENTS AND APPROACH SLABS</u>					
<u>Reinforcing Bars</u>					
822.01	Allow for all charges relating to the supply and fabrication of rebar up to 36mm in diameter for the abutment footing as per the drawings and the technical specification.	t	0	\$0.00	Incl
822.02	Allow for all charges relating to the supply and fabrication of rebar up to 36mm in diameter for base, wall, wingwalls slab and plinths as per the drawings and the technical specification.	t	0	\$0.00	Incl
822.06	Allow for all charges relating to the supply and fabrication of rebar up to 36mm in diameter for the approach slab as per the drawings and the technical specification.	t	0	\$0.00	Incl
<u>RETAINING WALLS</u>					
<u>Reinforcing Bars</u>					
822.29	Bars 16 - 36 diameter in retaining wall footing	t	0	\$0.00	Incl
<u>DECK</u>					
<u>Reinforcing Bars</u>					
822.32	Allow for all charges relating to the supply and fabrication of rebar up to 36mm in diameter for the deck and upstand as per the drawings and the technical specification.	t	0	\$0.00	Incl
<b>828 - PRECAST CONCRETE MEMBERS</b>					

Item	Description	Unit	Qty	Rate	Amount
<b>828 - PRECAST CONCRETE MEMBERS</b>					
<u>Precast Prestressed Concrete "I" Beams</u>					
828.01	12m Long "I" beam	No.	2	\$81,371.74	\$162,743.47
<u>Precast Concrete Retaining Wall Panels</u>					
828.02.4	Supply and Installation of Precast concrete retaining wall panels at Approach slab to Bridge. Rate to included costs associated with any joints between panels	No	36	\$3,361.31	\$121,007.13
829.01	Supply and Installation of Parapet panels	No.	24	\$1,472.10	\$35,330.34
<b>860 - BRIDGE BEARINGS</b>					
<u>BRIDGE BEARINGS</u>					
860.01	? Diameter x ? elastomeric laminated rubber bearing including galvanised ? O.D. x ? CHS socket cast into concrete, ? diameter galvanised dowel ? long, dry pack mortars, forming horizontal recess, etc.	No.	4	\$1,702.50	\$6,810.00
<u>APPROACH SLAB BEARINGS</u>					
860.03	Approach slab bearing comprising ? x ? x ? polyethylene sheet (HDPE), ? x ? x ? rubber bearing pad, galvanised dowel cap cast into approach slab and ? diameter galvanised dowel ? long cast into deck slab all as Drawing ?	No.	4	\$1,418.75	\$5,675.00
To Summary					\$743,476.95
<b>SERIES 900 - MISCELLANEOUS</b>					
<u>908 - ANTI-GRAFFITI</u>					
<u>ABUTMENTS AND APPROACH SLABS</u>					
908.01	Anti-graffiti coating to exposed surfaces of base, wall, wingwalls slab and plinths	m <sup>2</sup>	288	\$36.32	\$10,460.16
908.01.1	Anti-graffiti coating to exposed surfaces of the abutment footing	m <sup>2</sup>	24	\$36.32	\$871.68
<u>Retaining Wall</u>					
908.03	Anti-graffiti coating to exposed surfaces of retaining wall	m <sup>2</sup>	432	\$36.32	\$15,690.24
To Summary					\$27,022.08



<b>Schedule No. 2A - BRIDGE WORKS</b>					
Item	Description	Unit	Qty	Rate	Amount
<b>SERIES 600 - TRAFFIC FACILITIES</b>					
<b>603 - ROAD SAFETY BARRIER SYSTEMS</b>					
<u>BARRIER</u>					
603.01	Galvanised W-Beam/ Modified Thriebeam transition beam	m	16	\$570.91	\$9,134.48
603.01.2	Galvanised Thriebeam Nested barrier	m	16	\$502.81	\$8,044.88
603.03	Galvanised Regular Performance Level 4 Rail RHS traffic barrier system for structure	m	48	\$890.98	\$42,766.80
603.03.1	Galvanised 4 Rail RHS traffic barrier system/ Thriebeam Nested transition	m	16	\$890.98	\$14,255.60
603.03.2	Expansion joint in guardrail	No.	8	\$964.75	\$7,718.00
	To Summary				\$81,919.76
<u>STRUCTURAL EXCAVATION</u>					
<u>Abutment footing excavation:</u>					
801.01	Abutment footing excavation not exceeding 2.0m deep commencing at finished ground level	m <sup>3</sup>	720	\$34.10	\$24,553.13
<u>Retaining Walls</u>					
801.05	Retaining wall footing excavation not exceeding 2m deep commencing at existing ground level	m <sup>3</sup>	86	\$30.31	\$2,618.75
<b>820 - CONCRETE FOR STRUCTURES</b>					
<u>ABUTMENTS AND APPROACH SLABS</u>					
<u>Plain Insitu Concrete Class 20 MPa (N)</u>					
820.01	Allow for all charges relating to the supply and installation of cast insitu plain concrete Class N20 as a 50mm blinding layer under abutment footings.	m <sup>3</sup>	24	\$363.67	\$8,728.00
<u>Reinforced Insitu Concrete Class 40MPa (S)</u>					
820.06	Allow for all charges relating to cast reinforced concrete class S40 for abutment footing.	m <sup>3</sup>	480	\$921.22	\$442,184.20
<u>RETAINING WALLS</u>					
<u>Plain Insitu Concrete Class 20 MPa (N)</u>					
820.13	50mm Blinding layer under retaining wall footing	m <sup>3</sup>	14	\$363.67	\$5,236.80
<u>Reinforced Insitu Concrete Class 40MPa (S)</u>					
820.19	Retaining wall footing	m <sup>3</sup>	58	\$921.22	\$53,062.10
<u>DECK</u>					
<u>Reinforced Insitu Concrete Class 40MPa (S)</u>					
820.21	Allow for all charges relating to cast reinforced concrete for the deck of class S40.	m <sup>3</sup>	58	\$921.22	\$53,062.10

Item	Description	Unit	Qty	Rate	Amount
<b>821 - FORMWORK</b>					
821.02	<u>Formwork Class 2</u> Allow for all charges relating to the supply and installation of formwork at the base, wall, wingwalls slab and plinths as per the drawings and the technical specification.	m <sup>2</sup>	0	\$0.00	Incl
821.01	<u>Formwork Class 4</u> Allow for all charges relating to the supply and installation of formwork at the sides of the abutment footing as per the drawings and the technical specification.	m <sup>2</sup>	0	\$0.00	Incl
821.02	Allow for all charges relating to the supply and installation of formwork at the base, wall, wingwalls slab and plinths as per the drawings and the technical specification.	m <sup>2</sup>	0	\$0.00	Incl
821.08	Allow for all charges relating to the supply and installation of formwork at the sides of the approach slab as per the drawings and the technical specification.	m <sup>2</sup>	0	\$0.00	Incl
<u>RETAINING WALLS</u>					
821.15	<u>Formwork Class 4</u> Sides of retaining wall footing	m <sup>2</sup>	0	\$0.00	Incl
<u>DECK</u>					
821.20	<u>Formwork Class 3</u> Allow for all charges relating to the supply and installation of formwork at the sides of the sides of deck and upstand as per the drawings and the technical specification.	m <sup>2</sup>	0	\$0.00	Incl
<b>822 - STEEL REINFORCEMENT</b>					
<u>ABUTMENTS AND APPROACH SLABS</u>					
822.01	<u>Reinforcing Bars</u> Allow for all charges relating to the supply and fabrication of rebar up to 36mm in diameter for the abutment footing as per the drawings and the technical specification.	t	0	\$0.00	Incl
822.02	Allow for all charges relating to the supply and fabrication of rebar up to 36mm in diameter for base, wall, wingwalls slab and plinths as per the drawings and the technical specification.	t	0	\$0.00	Incl
822.06	Allow for all charges relating to the supply and fabrication of rebar up to 36mm in diameter for the approach slab as per the drawings and the technical specification.	t	0	\$0.00	Incl
<u>RETAINING WALLS</u>					
<u>Reinforcing Bars</u>					

Item	Description	Unit	Qty	Rate	Amount
822.29	Bars 16 - 36 diameter in retaining wall footing	t	0	\$0.00	Incl
	<u>DECK</u>				
	<u>Reinforcing Bars</u>				
822.32	Allow for all charges relating to the supply and fabrication of rebar up to 36mm in diameter for the deck and upstand as per the drawings and the technical specification.	t	0	\$0.00	Incl
	<b>828 - PRECAST CONCRETE MEMBERS</b>				
	<b>828 - PRECAST CONCRETE MEMBERS</b>				
	<u>Precast Prestressed Concrete "I" Beams</u>				
828.01	12m Long "I" beam	No.	4	\$81,371.74	\$325,486.95
	<u>Precast Concrete Retaining Wall Panels</u>				
828.02.4	Supply and Installation of Precast concrete retaining wall panels at Approach slab to Bridge. Rate to included costs associated with any joints between panels	No	72	\$3,361.31	\$242,014.26
829.01	Supply and Installation of Parapet panels	No.	48	\$1,472.10	\$70,660.67
	<b>860 - BRIDGE BEARINGS</b>				
	<u>BRIDGE BEARINGS</u>				
860.01	? Diameter x ? elastomeric laminated rubber bearing including galvanised ? O.D. x ? CHS socket cast into concrete, ? diameter galvanised dowel ? long, dry pack mortars, forming horizontal recess, etc.	No.	8	\$1,702.50	\$13,620.00
	<u>APPROACH SLAB BEARINGS</u>				
860.03	Approach slab bearing comprising ? x ? x ? polyethylene sheet (HDPE), ? x ? x ? rubber bearing pad, galvanised dowel cap cast into approach slab and ? diameter galvanised dowel ? long cast into deck slab all as Drawing ?	No.	8	\$1,418.75	\$11,350.00
	To Summary				\$1,252,576.96
	<b>SERIES 900 - MISCELLANEOUS</b>				
	<u>RAIL WORKS</u>				
M.01	Cutting, removal and disposal of existing rail	m	2,059	\$15.32	\$31,549.03
M.02	Removal and disposal of existing sleeper	No	515	\$32.69	\$16,826.15
M.03	Crushed rock ballast - rail formation	m3	1,853	\$234.26	\$434,114.62
M.04	Place ballast on rail formation and tamp rails	m	2,059	\$108.96	\$224,348.64
M.05	Concrete sleeper, narrow gauge	No	154	\$160.04	\$24,713.40
M.06	Timber/steel sleeper, narrow gauge	No	360	\$117.81	\$42,450.97
M.07	Pandrol concrete sleeper elastic fastening, pair	No	77	\$27.24	\$2,103.27
M.08	Pandrol timber/steel sleeper elastic fastening, pair	No	180	\$27.24	\$4,907.63

Item	Description	Unit	Qty	Rate	Amount
M.09	50kg/m Rail section, standard carbon	m	2,059	\$224.73	\$462,719.07
M.10	Junction rail 50/41, pair	No	77	\$3,405.00	\$262,908.56
M.11	Junction rail 41/31, pair	No	180	\$2,792.10	\$503,031.72
M.12	Place, profile, broom, line, regulate, weld and de- stress rail track	m	2,059	\$333.69	\$687,067.71
<u>908 - ANTI-GRAFFITI</u>					
<u>ABUTMENTS AND APPROACH SLABS</u>					
908.01	Anti-graffiti coating to exposed surfaces of base, wall, wingwalls slab and plinths	m <sup>2</sup>	576	\$36.32	\$20,920.32
908.01.1	Anti-graffiti coating to exposed surfaces of the abutment footing	m <sup>2</sup>	48	\$36.32	\$1,743.36
<u>Retaining Wall</u>					
908.03	Anti-graffiti coating to exposed surfaces of retaining wall	m <sup>2</sup>	864	\$36.32	\$31,380.48
To Summary					<u>\$2,750,784.92</u>

**SCHEDULE No. 2 - ROADWORKS**

Item	Description	Unit	Qty	Rate	Amount
<b>SERIES 300 - EARTHWORKS</b>					
<b>301 - CLEARING</b>					
301.01	Site clearing	ha	1	\$7,924.95	\$5,959.56
<b>302 - EARTHWORKS</b>					
<u>TOPSOILING</u>					
<u>Topsoil Removal</u>					
302.01	Topsoil removal, 100mm deep	ha	1	\$8,874.37	\$6,673.53
<u>Topsoil Spreading</u>					
302.03	Respread topsoil, 100mm thick	ha	1	\$4,400.52	\$3,309.19
<u>REMOVAL OF REDUNDANT PAVEMENTS</u>					
302.05	Removal of redundant pavement including seal	m <sup>2</sup>	800	\$2.26	\$1,811.54
302.10	Marking out and cutting edge along junction between new	m	80	\$2.32	\$185.22
<u>EMBANKMENT CONSTRUCTION</u>					
302.14	Embankment foundation compaction	m <sup>2</sup>	9,024	\$3.32	\$29,964.92
302.16	Embankment construction using site excavated material (Cut to Fill)	m <sup>3</sup>	39	\$15.78	\$614.33
302.16.1	Embankment construction using imported material	m <sup>3</sup>	102,570	\$17.62	\$1,806,855.83
<u>SUBGRADE</u>					
302.20	Subgrade	m <sup>2</sup>	8,648	\$3.71	\$32,067.66
To Summary					<b>\$1,881,482.22</b>

Item	Description	Unit	Qty	Rate	Amount
<b>SERIES 400 - DRAINAGE</b>					
<b>404 - CULVERTS</b>					
<u>CULVERTS</u>					
<u>Reinforced Concrete Pipes Class 2</u>					
404.01	600 Diameter pipe culvert (1 Barrel) extend Culvert LHS	m	29	\$583.19	\$17,075.71
<u>All Culverts</u>					
404.04	Selected bedding material	m <sup>3</sup>	9	\$35.49	\$311.74
404.05	Extra over culverts for cement stabilised backfill	m <sup>3</sup>	18	\$268.60	\$4,718.80
404.07	Reinforced concrete insitu end treatment including base slab	m <sup>3</sup>	25	\$2,947.86	\$73,696.50
<u>STORMWATER DRAINS</u>					
<u>Reinforced Concrete Pipes Class 2</u>					
404.17	375mm Diameter drain in trench, depth exceeding 1.5m but not exceeding 2.5m	m	80	\$323.23	\$25,858.54
<u>All Stormwater Drains</u>					
404.20	Extra over stormwater drains for cement stabilised backfill	m <sup>3</sup>	21	\$268.60	\$5,640.65
<b>405 - DRAINAGE STRUCTURES</b>					
<u>GULLIES</u>					
405.02	Gully Type - TGT	No.	8	\$3,820.98	\$30,567.82
<b>406 - ROCK PROTECTION</b>					
406.01	Full Depth Rock protection to embankments	m <sup>2</sup>	1,504	\$88.00	\$132,355.35
<b>407 - KERBING</b>					
407.01	SM-2 (40) Kerbing	m	560	\$33.63	\$18,833.68
407.03	Kerb openings	No.	2	\$1,927.24	\$3,854.49
To Summary					\$312,913.27

Item	Description	Unit	Qty	Rate	Amount
<b>SERIES 500 - PAVEMENT &amp; SURFACING</b>					
<b>501 - PAVEMENTS</b>					
<u>SUBBASE</u>					
501.03	150mm Thick gravel subbase.	m <sup>2</sup>	8,460	\$16.08	\$136,067.43
<u>BASECOURSE</u>					
501.12	150mm Thick gravel basecourse.	m <sup>2</sup>	8,347	\$15.33	\$127,999.84
<b>503 - BITUMINOUS SURFACING</b>					
<u>ROADWORKS</u>					
<u>Primerseal</u>					
503.02	First coat primerseal with BAR of ? litres/m <sup>2</sup> and ?mm	m <sup>2</sup>	8,347	\$0.85	\$7,105.55
503.03	Second coat primerseal with BAR of ? litres/m <sup>2</sup> and ?mm aggregate	m <sup>2</sup>	8,347	\$29.51	\$246,325.87
To Summary					\$517,498.70
<b>SERIES 600 - TRAFFIC FACILITIES</b>					
<b>601 - SIGNS</b>					
<u>SINGLE POST SIGNS</u>					
601.01	Supply and Install New signs on single post	No.	10	\$375.49	\$3,754.95
<u>DOUBLE POST SIGNS</u>					
601.03	Supply and Install New signs on double post	No.	5	\$604.10	\$3,020.48
<u>REMOVAL OF EXISTING SIGNS</u>					
601.05	Removal and disposal of Single post sign	No.	5	\$88.14	\$440.68
601.06	Removal and disposal of Double post sign	No.	2	\$117.52	\$235.03
<u>RELOCATION OF EXISTING SIGNS</u>					
601.08	Relocation of Single post sign	No.	10	\$175.27	\$1,752.70
601.09	Relocation of Double post sign	No.	10	\$203.64	\$2,036.45
<b>602 - GUIDE POSTS</b>					
602.01	Guide post	No.	50	\$50.31	\$2,515.36
<b>603 - ROAD SAFETY BARRIER SYSTEMS</b>					
<u>BARRIER</u>					
603.01	Galvanised W-Beam barrier	m	200	\$119.18	\$23,835.00
603.04	Galvanised eccentric terminal	No.	8	\$3,036.13	\$24,289.00

Item	Description	Unit	Qty	Rate	Amount
<b>604 - PAVEMENT MARKING</b>					
<u>ROAD PAVEMENT MARKINGS</u>					
604.01	Line type - Broken Lane Line	m	752	\$1.35	\$1,015.69
604.01.1	Line type - Double Two-Way Barrier Line	m	150	\$2.04	\$307.27
604.01.2	Line type - Double One-Way Barrier Line	m	150	\$1.65	\$247.52
604.01.3	Line type - Edge	m	1,504	\$1.42	\$2,133.80
604.03	Turn arrow (Right, Left and Change Lanes)	No.	5	\$139.04	\$695.19
<u>RAISED PAVEMENT MARKERS</u>					
604.05	Raised pavement marker type Bi-directional	No.	100	\$11.35	\$1,135.00
604.05.1	Raised pavement marker type Uni-directional	No.	100	\$11.35	\$1,135.00
To Summary					<b>\$68,549.10</b>



**SCHEDULE No. 2 - ROADWORKS**

Item	Description	Unit	Qty	Rate	Amount
<b>SERIES 300 - EARTHWORKS</b>					
<b>301 - CLEARING</b>					
301.01	Site clearing	ha	2	\$7,924.95	\$13,939.98
<b>302 - EARTHWORKS</b>					
<u>TOPSOILING</u>					
<u>Topsoil Removal</u>					
302.01	Topsoil removal, 100mm deep	ha	2	\$8,874.37	\$15,610.02
<u>Topsoil Spreading</u>					
302.03	Respread topsoil, 100mm thick	ha	2	\$4,400.52	\$7,740.52
<u>EMBANKMENT CONSTRUCTION</u>					
302.14	Embankment foundation compaction	m <sup>2</sup>	14,072	\$3.32	\$46,727.20
302.16	Embankment construction using site excavated material (Cut to Fill)	m <sup>3</sup>	53	\$15.78	\$834.28
302.16.1	Embankment construction using imported material	m <sup>3</sup>	292,286	\$17.62	\$5,148,847.42
<u>SUBGRADE</u>					
302.20	Subgrade	m <sup>2</sup>	13,193	\$3.71	\$48,919.13
To Summary					<b>\$5,268,678.58</b>

Item	Description	Unit	Qty	Rate	Amount
<b>SERIES 500 - PAVEMENT &amp; SURFACING</b>					
<b>501 - PAVEMENTS</b>					
<u>SUBBASE</u>					
501.03	150mm Thick gravel subbase.	m <sup>2</sup>	12,753	\$16.08	\$205,110.39
	To Summary				<u>\$205,110.39</u>

**SCHEDULE No. 3 - PROVISIONAL SUMS**

Item	Description	Unit	Qty	Rate	Amount
<b><u>PROVISIONAL SUMS</u></b>					
<b>SUPERINTENDENT'S TELEPHONE AND FACSIMILE CALLS</b>					
PS.01	Allow the Provisional Sum of \$? (? Thousand Dollars) for the cost of metered telephone and facsimile calls of the Superintendent	P.S.			
<b>EARTHWORKS</b>					
PS.02	<i>Allow the Provisional Sum of \$150,000 (One Hundred &amp; Fifty Thousand Dollars) for the removal and replacement of rock</i>	P.S.	<b>1</b>	<b>\$150,000.00</b>	\$150,000.00
PS.03	<i>Allow the Provisional Sum of \$250,000 (Two Hundred &amp; Fifty Thousand Dollars) for Additional Works as directed by the Superintendent</i>	P.S.	<b>1</b>	<b>\$250,000.00</b>	\$250,000.00
<b>SERVICE RELOCATIONS</b>					
PS.04	Allow the Provisional Sum of \$310,607 (? Thousand Dollars) for the relocation of Existing Western Power Services affected by the proposed Realignments	P.S.	<b>1</b>	<b>\$310,607.00</b>	\$310,607.00
PS.05	Allow the Provisional Sum of \$334,064.50 (? Thousand Dollars) for the relocation of Existing Water Corporation Services affected by the proposed Realignments	P.S.	<b>1</b>	<b>\$334,064.50</b>	\$334,064.50
	To Summary				<u>\$1,044,671.50</u>

**Service Relocation Costs**

**Western Power**

Item	Length	Rate	Total Cost	Comments
Excavation & Backfill	1000	\$88.13	\$88,130	Based on Previous Historical projects
Supply and Lay 150mm Conduit	1000	\$37.43	\$37,430	
Supply and Lay Cable	1000	\$21.81	\$21,810	Average of Historical Pricing
New Cable Pits	10	\$3,500.00	\$35,000	Assumed one required every 100m
Reinstatement	1000	\$100.00	\$100,000	Allowance for reinstatement
Allowance for Liasion with Western Power	1	\$28,237.00	\$28,237	20% of Total Cost
<b>Total Cost for Western Power Relocations</b>			<b>\$310,607</b>	

**Western Power**

Item	Length	Rate	Total Cost	Comments
Excavation & Backfill	500	\$88.13	\$44,065	Based on Previous Historical projects
Supply and Lay DN300mm MSCL Pipe	500	\$374.26	\$187,130	
New Air Valve/Scour Valve Pits	4	\$5,000.00	\$20,000	
Fittings and Valves	1	\$25,000.00	\$25,000	
Reinstatement	500	\$55.00	\$27,500	Allowance for reinstatement
Allowance for Liasion with Water Corporation	1	\$30,369.50	\$30,370	10% of Total Cost
<b>Total Cost for Water Corporation Relocations</b>			<b>\$334,065</b>	

**STOCK ROAD & BEELIAR DRIVE**

**MGA Quantities**

**Series 300 - Earthworks**

Item BOQ Ref	Item Description	Uom	Length	Width	Depth	Total	Comments
301.01	Site clearing	ha	0	10		1	Road over Rail
	Site clearing	ha	0	10		2	Rail over Road
302.01	Topsoil removal, 100mm deep	ha	0	10		1	Road over Rail
	Topsoil removal, 100mm deep	ha	0	10		2	Rail over Road
302.03	Respread topsoil, 100mm thick	ha	0	10		1	Road over Rail
	Respread topsoil, 100mm thick	ha	0	10		2	Rail over Road
302.05	Removal of redundant pavement including seal	m2	20	10		800	Assumed 4 tie in locations. North and South of Soldier Road, Keirman Street and Junction with Bishop Road
302.10	Marking out and cutting edge along junction between new pavement and existing pavement including trimming existing pavement layers as required to bond to new pavement	m	10	2		80	
302.14	Embankment foundation compaction	m2	752	12		9024	Road over Rail
	Embankment foundation compaction	m2	1759	8		14072	Rail over Road
302.16	Embankment construction using site excavated material (Cut to Fill)	m3	36	1	1	36	South of Soldiers Road
	Embankment construction using site excavated material (Cut to Fill)	m3	3	1	1	3	North of Soldiers Road
	Embankment construction using site excavated material (Cut to Fill)	m3	53	1	1	53	Rail Crossings
302.16.1	Embankment construction using imported material	m3	86390	1	1	86390	South of Soldiers Road
	Embankment construction using imported material	m3	16180	1	1	16180	North of Soldiers Road
	Embankment construction using imported material	m3	298009	1	1	298009	Rail Crossings
	Embankment construction using imported material	m3	-5723	1	1	-5723	Difference between existing ground levels and underside of road construction
302.20	Subgrade	m2	752	12		8648	
	Subgrade	m2	1759	8		13193	

**Series 400 - Drainage**

Item BOQ Ref	Item Description	Uom	Length	Width	Depth	Total	Comments
404.01	600 Diameter pipe culvert (1 Barrel) extend Culvert LHS	m	29	1		29	Extend existing culvert to LHS - Assumed at 4 locations
404.04	Selected bedding material	m3	8.78	1	1	9	
404.05	Extra over culverts for cement stabilised backfill	m3	17.57	1	1	18	
404.07	Reinforced concrete insitu end treatment including base slab	m3	25.00	1	1	25	
404.17	375mm Diameter drain in trench, depth exceeding 1.5m but not exceeding 2.5m	m	40	2		80	Assumed stormwater drainage required on approach to road bridge only
404.20	Extra over stormwater drains for cement stabilised backfill	m3	21	1	1	21	
405.02	Gully Type - TGT	No	4	2		8	
406.01	Full Depth Rock protection to embankments	m2	1504	1		1504	Assumed average depth of full depth rock protection to be 1m in fill sections
407.01	SM-2 (40) Kerbing	m	20	8		160	Assumed 20m long kerbing on either side of bridge
	SM-2 (40) Kerbing	m	400	1		400	at intersection with Keirman Street and other tie-in
407.03	Kerb openings	No	2	1		2	Assumed 2 kerbing openings at Road bridge only

**Series 500 - Pavement & Surfacing**

Item BOQ Ref	Item Description	Uom	Length	Width	Depth	Total	Comments
501.03	150mm Thick gravel subbase.	m2	752	11		8460	Road over Rail
	150mm Thick gravel subbase.	m2	1759	7		12753	Rail over Road
501.12	150mm Thick gravel basecourse.	m2	752	11		8347	
503.02	First coat primerseal with BAR of ? litres/m <sup>2</sup> and ?mm aggregate	m2	752	11		8347	
503.03	Second coat primerseal with BAR of ? litres/m <sup>2</sup> and ?mm aggregate	m2	752	11		8347	

**Series 600 - Traffic Facilities**

Item BOQ Ref	Item Description	Uom	Length	Width	Depth	Total	Comments
601.01	Supply and Install New signs on single post	No	10	1		10	Allowance for signage
601.03	Supply and Install New signs on double post	No	5	1		5	
601.05	Removal and disposal of Single post sign	No	5	1		5	
601.06	Removal and disposal of Double post sign	No	2	1		2	
601.08	Relocation of Single post sign	No	10	1		10	
601.09	Relocation of Double post sign	No	10	1		10	
602.01	Guide post	No	50	1		50	
603.01	Galvanised W-Beam barrier	m	100	2		200	
603.04	Galvanised eccentric terminal	No	4	2		8	
604.01	Line type - Broken Lane Line	m	752	1		752	
604.01.1	Line type - Double Two-Way Barrier Line	m	150	1		150	
604.01.2	Line type - Double One-Way Barrier Line	m	150	1		150	
604.01.3	Line type - Edge	m	1504	1		1504	
604.03	Turn arrow (Right, Left and Change Lanes)	No	5	1		5	
604.05	Raised pavement marker type Bi-directional	No	100	1		100	
604.05.1	Raised pavement marker type Uni-directional	No	100	1		100	

**Miscellaneous**

Item BOQ Ref	Item Description	Uom	Length	Width	Depth	Total	Comments
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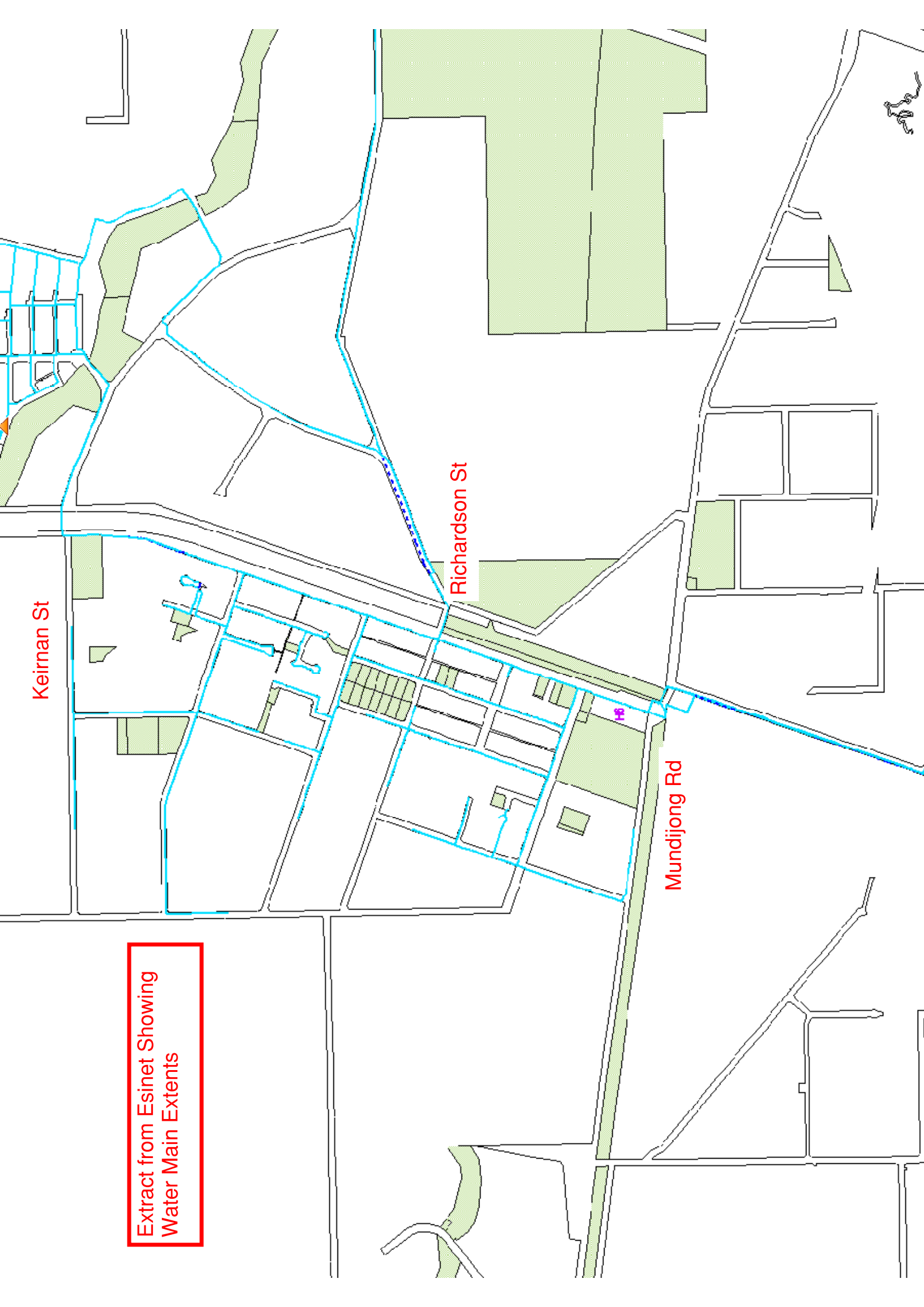
APPENDIX

# D

INDICATION OF EXISTING SERVICE



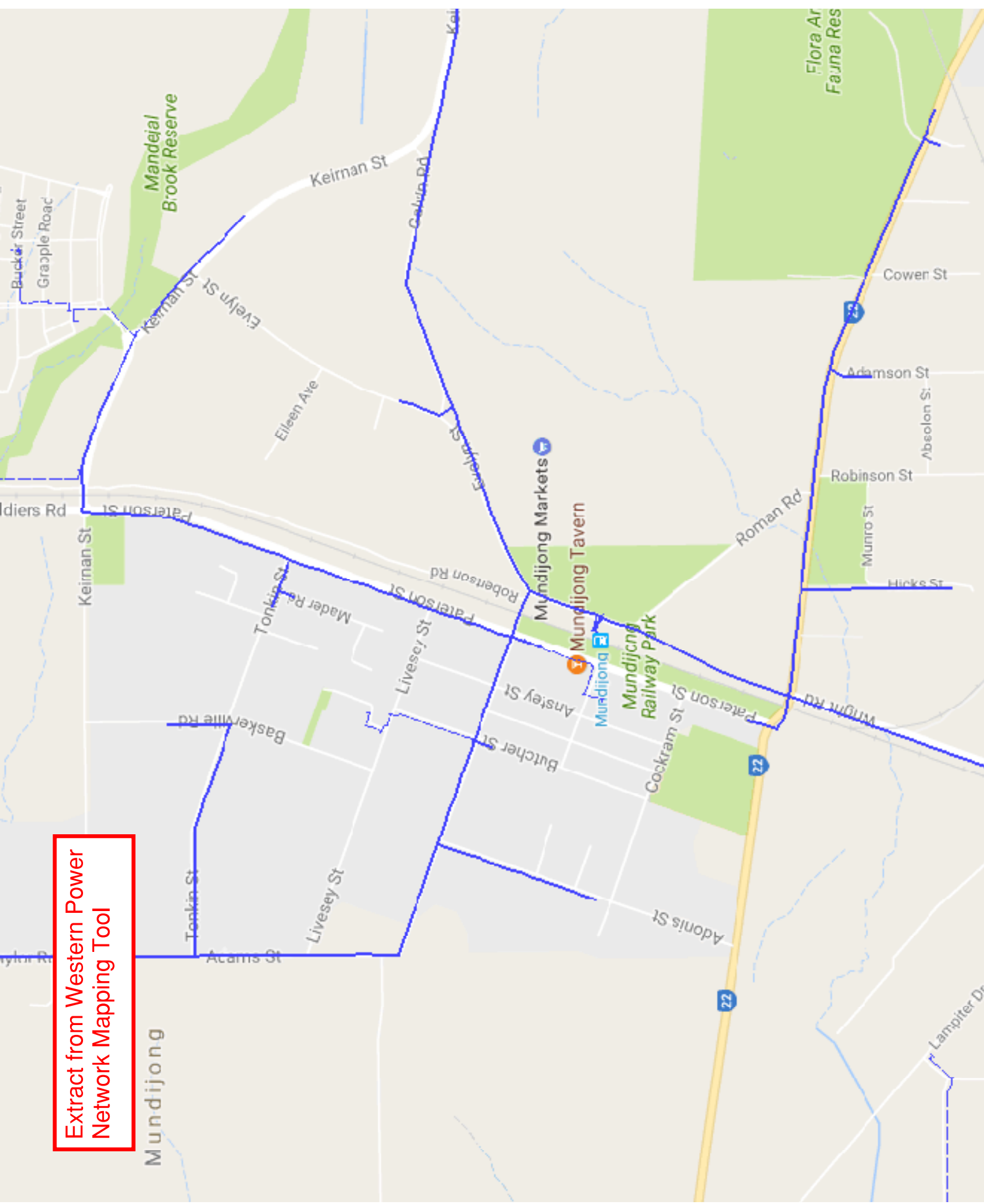




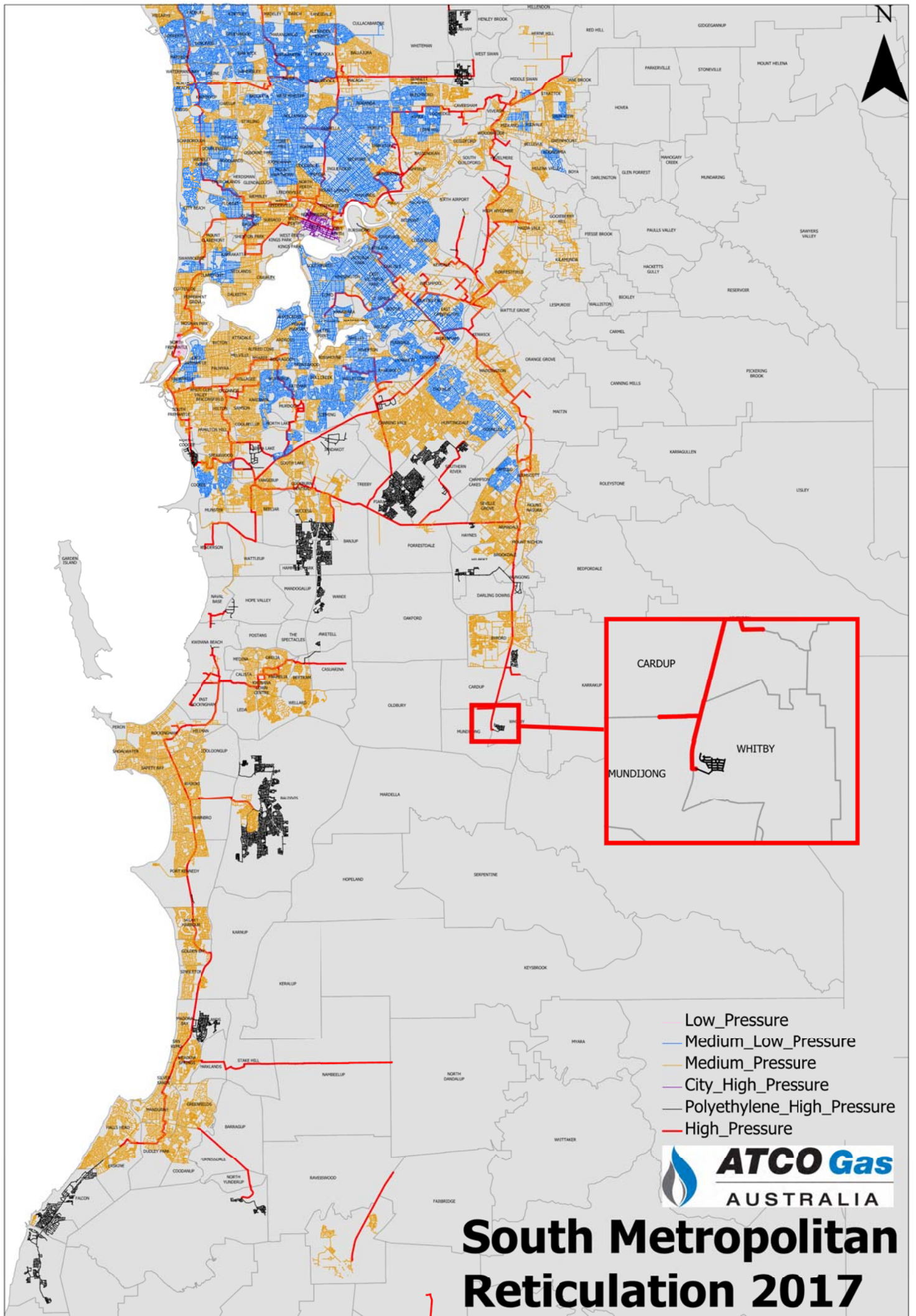
Extract from Esinet Showing  
Water Main Extents



Extract from Western Power  
Network Mapping Tool











## About Cardno

Cardno is a professional infrastructure and environmental services company, with expertise in the development and improvement of physical and social infrastructure for communities around the world. Cardno's team includes leading professionals who plan, design, manage and deliver sustainable projects and community programs. Cardno is an international company listed on the Australian Securities Exchange [ASX:CDD].

## Contact

West Perth

11 Harvest Terrace  
West Perth WA 6005

PO Box 447  
West Perth WA 6872

Phone +61 8 9273 3888  
Fax +61 8 9486 8664

[wa@cardno.com.au](mailto:wa@cardno.com.au)  
[www.cardno.com](http://www.cardno.com)

