



## **HIGH STREET UPGRADE**

Road Safety Assessment

- Comparison of Options 4 and 4A

**Department of Transport**

*August 2011*

LMA Job Ref J1123RP1

## CONTENTS

---

<b>1.</b>	<b>INTRODUCTION</b>	<b>1</b>
1.1	Scope of Report	1
1.2	Background information	1
1.3	Risk Assessment	1
<b>2.</b>	<b>SAFETY ISSUES</b>	<b>2</b>
2.1	Issues Common to Options 4 and 4A	2
2.2	Option 4	2
2.3	Option 4A	2
<b>3.</b>	<b>CONCLUSIONS</b>	<b>4</b>

### APPENDIX

Concept Drawings

## 1.1 Scope of Report

This report describes a road safety assessment of two concept design options prepared for the intersection of High Street and Stirling Highway as part of the High Street Upgrading Study.

The safety assessment was commissioned by Worley Parsons on behalf of the Department of Transport to identify any features of the two designs where potential safety issues need to be addressed.

## 1.2 Background Information

The two options for the intersection of High Street and Stirling Highway are referred to as Options 4 and 4A. Concept designs of the two options are shown in the Appendix.

The following design criteria apply:

- Design Vehicle - 27m B-double
- Curve radius - 270m for Option 4 and 150m for Option 4A
- Curve superelevation - 3%
- Curve operating speed - 70 km/h for Option 4 and 55 km/h for Option 4A (Ref: Austroads Part 3: Geometric Design. Figure 7.7)
- Posted speed limits - High Street (east) - 70 km/h  
Curve Option 4 - 60 km/h  
Curve Option 4A - 50 km/h  
Stirling Highway - 60 km/h

## 1.3 Risk Assessment

The audit recommendations have been rated subjectively according to their level of risk. The suggested treatment approach required to address the recommendations according to their assigned level of risk is given in the following table.

<b>Risk</b>	<b>Suggested Treatment Approach</b>
High	Should be corrected or the risk significantly reduced even if the treatment cost is high.
Medium	Should be corrected or the risk significantly reduced if the treatment cost is moderate but not high.
Low	Should be corrected or the risk significantly reduced if the treatment cost is low.

### **2.1 Issues Common to Options 4 and 4A**

#### **2.1.1 Intersection Approach Sight Distance from High Street (West)**

It is highly desirable for a driver to see and react to the intersection layout well before reaching the intersection. However, due to the superelevation of the curve on the main road, a driver on High Street (west) approaching the intersection will not be able to see the pavement markings and channelisation until just before entering the intersection. Unless High Street (west) can be elevated on the approach to the intersection, it will be necessary for drivers to rely on good signage to indicate the presence and layout of the intersection. The safety implications of the restricted sight distance on High Street will be reduced by the low approach speed after passing through the roundabout at the intersection with Amhurst Street.

*Level of risk – Low to Medium*

### **2.2 Option 4**

#### **2.2.1 Curved Approach to Traffic Signals**

The curved approach to the traffic signals is less desirable than a straight approach because of the need to concentrate more on the alignment and because the signals are off the line of sight.

*Level of risk – Low*

#### **2.2.2 Left Turn Definition**

The left turn lane from High Street (east) to High Street (west) is on the outside of a curve. Since the through alignment alongside the left turn lane is only delineated by pavement markings, some motorists may unintentionally drive off the main alignment into the left turn lane.

*Level of risk – Low*

### **2.3 Option 4A**

#### **2.3.1 Curve Speed**

The safe operating speed on the curve is approximately 55 km/h which is significantly less than the westbound approach speed on High Street (east) of 70 km/h. Although the change in speed limit from 70 km/h to 50 km/h will occur before the intersection and a curve warning sign will be installed, some drivers may not observe the signs and could lose control through the curve. This curve occurs on a regional traffic route and major freight route where substandard geometry would not be expected.

*Level of risk – Medium to High*

**2.3.2 Curved Approach to Traffic Signals**

The curved approach to the traffic signals is less desirable than a straight approach because of the need to concentrate more on the alignment and because the signals are off the line of sight. This issue is more significant for Option 4A than for Option 4 due to the smaller radius curve.

*Level of risk – Medium*

**2.3.3 Left Turn Definition**

The left turn lane from High Street (east) to High Street (west) is on the outside of a curve. Since the through alignment alongside the left turn lane is only delineated by pavement markings, some motorists may unintentionally drive off the main alignment into the left turn lane. The curve for Option 4A has a smaller radius curve than for Option 4 and the left turn lane is poorly defined at the start of the curve which will both tend to draw more motorists into the turn lane.

*Level of risk – Medium*

## CONCLUSIONS 3

---

A road safety assessment has been undertaken of two intersection design options for High Street and Stirling Highway as part of the High Street Upgrading Study.

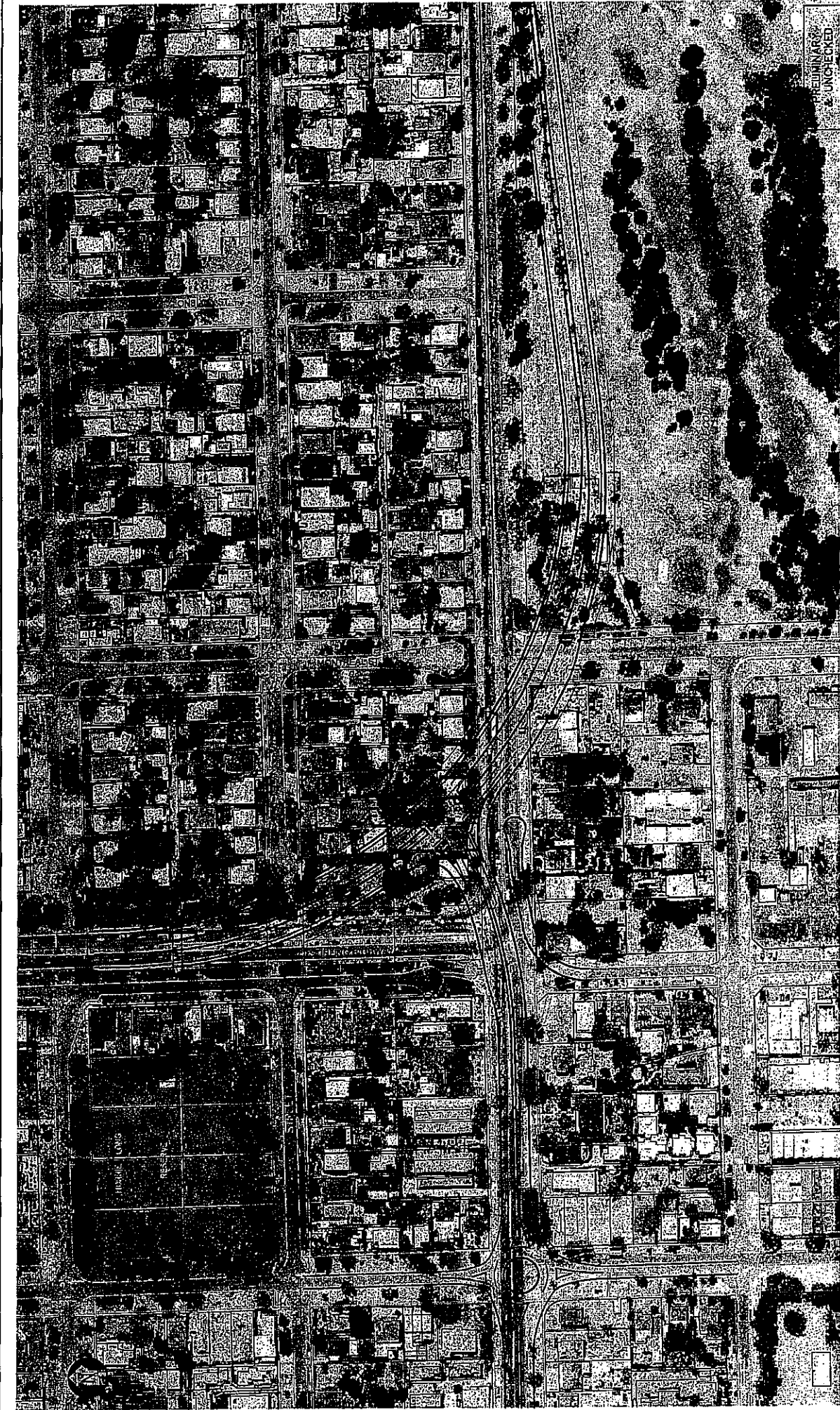
The curved alignment is undesirable for a signalised intersection for reasons of visibility and delineation. These issues are more evident in Option 4A than Option 4 due to the smaller radius curve. The main concern with Option 4A is that the safe speed around the curve is lower than expected for this type of road, particularly on the westbound approach, which could result in vehicles losing control despite the presence of speed limit and warning and signs.



**LACHLAN MILLAR** BE MSc CPEng MIEAust  
Principal

# **APPENDIX**

## Concept Drawings



UNCONTROLLED COPY

INFORMATION ONLY  
NOT TO BE USED  
FOR CONSTRUCTION

SCALE OF METRES 1:1000

20 0 20 40 60 80 100

THIS DRAWING WAS PRODUCED BY KBR pty ltd  
AND PROVIDED BY DEPT. OF TRANSPORT

RESIDUALS  
&  
UNCHECKED

REV	DATE	ISSUED FOR	INTERNAL	COUNT	BY	CHK	BY	DATE	DESCRIPTION
1		AS PER							
2		AS PER							
3		AS PER							
4		AS PER							
5		AS PER							
6		AS PER							
7		AS PER							
8		AS PER							
9		AS PER							
10		AS PER							
11		AS PER							
12		AS PER							
13		AS PER							
14		AS PER							
15		AS PER							
16		AS PER							
17		AS PER							
18		AS PER							
19		AS PER							
20		AS PER							
21		AS PER							
22		AS PER							
23		AS PER							
24		AS PER							
25		AS PER							
26		AS PER							
27		AS PER							
28		AS PER							
29		AS PER							
30		AS PER							
31		AS PER							
32		AS PER							
33		AS PER							
34		AS PER							
35		AS PER							
36		AS PER							
37		AS PER							
38		AS PER							
39		AS PER							
40		AS PER							
41		AS PER							
42		AS PER							
43		AS PER							
44		AS PER							
45		AS PER							
46		AS PER							
47		AS PER							
48		AS PER							
49		AS PER							
50		AS PER							
51		AS PER							
52		AS PER							
53		AS PER							
54		AS PER							
55		AS PER							
56		AS PER							
57		AS PER							
58		AS PER							
59		AS PER							
60		AS PER							
61		AS PER							
62		AS PER							
63		AS PER							
64		AS PER							
65		AS PER							
66		AS PER							
67		AS PER							
68		AS PER							
69		AS PER							
70		AS PER							
71		AS PER							
72		AS PER							
73		AS PER							
74		AS PER							
75		AS PER							
76		AS PER							
77		AS PER							
78		AS PER							
79		AS PER							
80		AS PER							
81		AS PER							
82		AS PER							
83		AS PER							
84		AS PER							
85		AS PER							
86		AS PER							
87		AS PER							
88		AS PER							
89		AS PER							
90		AS PER							
91		AS PER							
92		AS PER							
93		AS PER							
94		AS PER							
95		AS PER							
96		AS PER							
97		AS PER							
98		AS PER							
99		AS PER							
100		AS PER							

WorleyParsons  
resources & energy  
CORPORATE  
WorleyParsons Services Pty Ltd  
ASX:WPS

DEPARTMENT OF TRANSPORT  
HIGH STREET UPGRADING STUDY  
OPTION 4 (ARBB/KBR 2007 STUDY)  
INTERSECTION PLAN

UNCONTROLLED COPY

INFORMATION ONLY  
NOT TO BE USED  
FOR CONSTRUCTION

SCALE OF METRES 1:1000

20 0 20 40 60 80 100


THIS DRAWING WAS PRODUCED BY KBR pty ltd  
AND PROVIDED BY DEPT. OF TRANSPORT

RESIDUALS  
&  
UNCHECKED



INFORMATION ONLY  
NOT TO BE USED  
FOR CONSTRUCTION



 <b>WorleyParsons</b> RESOURCES & ENERGY 10000 170th Street, Surrey, BC V3V 7K9 TEL: 604.273.4400 FAX: 604.273.4401 WWW.WORLEYPARSONS.COM		CLIENTS DEPARTMENT OF TRANSPORT HIGH STREET UPGRADING STUDY OPTION 4a INTERSECTION PLAN		DRAWN DATE		PROJECT NO. 301012-01A.30		SHEET NO. 1/1		DRAWING TITLE INTERSECTION PLAN	
PROJECT NO. 301012-01A.30		SHEET NO. 1/1		DRAWN DATE		CHECKED DATE		APPROVED DATE		REVISIONS NO. DESCRIPTION DATE	
PROJECT NO. 301012-01A.30		SHEET NO. 1/1		DRAWN DATE		CHECKED DATE		APPROVED DATE		REVISIONS NO. DESCRIPTION DATE	

ISSUED FOR INTERNAL / CLIENT REVIEW  
REVISIONS

REV DATE

TC UP

DRAWN DRAFT OPI

DESIGNED

ENG DRG

APPROVED

CHECKED

REF DRAWING NO.

REFERENCE DRAWING TITLE

301012-01A.30

WORLEYPARSONS PROJECT NO.

10000 170th Street, Surrey, BC V3V 7K9

RESOURCES & ENERGY

WorleyParsons logo

CLIENTS

DEPARTMENT OF TRANSPORT

HIGH STREET UPGRADING STUDY

OPTION 4a

INTERSECTION PLAN

DRAWN

DATE

PROJECT NO.

301012-01A.30

SHEET NO.

1/1

DRAWING TITLE

INTERSECTION PLAN

CLIENTS

DEPARTMENT OF TRANSPORT

HIGH STREET UPGRADING STUDY

OPTION 4a

INTERSECTION PLAN

DRAWN

DATE

PROJECT NO.

301012-01A.30

SHEET NO.

1/1

DRAWING TITLE

INTERSECTION PLAN

CLIENTS

DEPARTMENT OF TRANSPORT

HIGH STREET UPGRADING STUDY

OPTION 4a

INTERSECTION PLAN

DRAWN

DATE

PROJECT NO.

301012-01A.30

SHEET NO.

1/1

DRAWING TITLE

INTERSECTION PLAN

CLIENTS

DEPARTMENT OF TRANSPORT

HIGH STREET UPGRADING STUDY

OPTION 4a

INTERSECTION PLAN

DRAWN

DATE

PROJECT NO.

301012-01A.30

SHEET NO.

1/1

DRAWING TITLE

INTERSECTION PLAN

CLIENTS

DEPARTMENT OF TRANSPORT

HIGH STREET UPGRADING STUDY

OPTION 4a

INTERSECTION PLAN

DRAWN

DATE

PROJECT NO.

301012-01A.30

SHEET NO.

1/1

DRAWING TITLE

INTERSECTION PLAN

CLIENTS

DEPARTMENT OF TRANSPORT

HIGH STREET UPGRADING STUDY

OPTION 4a

INTERSECTION PLAN

DRAWN

DATE

PROJECT NO.

301012-01A.30

SHEET NO.

1/1

DRAWING TITLE

INTERSECTION PLAN

CLIENTS

DEPARTMENT OF TRANSPORT

HIGH STREET UPGRADING STUDY

OPTION 4a

INTERSECTION PLAN

DRAWN

DATE

PROJECT NO.

301012-01A.30

SHEET NO.

1/1

DRAWING TITLE

INTERSECTION PLAN

CLIENTS

DEPARTMENT OF TRANSPORT

HIGH STREET UPGRADING STUDY

OPTION 4a

INTERSECTION PLAN

DRAWN

DATE

PROJECT NO.

301012-01A.30

SHEET NO.

1/1

DRAWING TITLE

INTERSECTION PLAN

CLIENTS

DEPARTMENT OF TRANSPORT

HIGH STREET UPGRADING STUDY

OPTION 4a

INTERSECTION PLAN

DRAWN

DATE

PROJECT NO.

301012-01A.30

SHEET NO.

1/1

DRAWING TITLE

INTERSECTION PLAN

CLIENTS

DEPARTMENT OF TRANSPORT

HIGH STREET UPGRADING STUDY

OPTION 4a

INTERSECTION PLAN

DRAWN

DATE

PROJECT NO.

301012-01A.30

SHEET NO.

1/1

DRAWING TITLE

INTERSECTION PLAN

CLIENTS

DEPARTMENT OF TRANSPORT

HIGH STREET UPGRADING STUDY

OPTION 4a

INTERSECTION PLAN

DRAWN

DATE

PROJECT NO.

301012-01A.30

SHEET NO.

1/1

DRAWING TITLE

INTERSECTION PLAN

CLIENTS

DEPARTMENT OF TRANSPORT

HIGH STREET UPGRADING STUDY

OPTION 4a

INTERSECTION PLAN

DRAWN

DATE

PROJECT NO.

301012-01A.30

SHEET NO.

1/1

DRAWING TITLE

INTERSECTION PLAN

CLIENTS

DEPARTMENT OF TRANSPORT

HIGH STREET UPGRADING STUDY

OPTION 4a

INTERSECTION PLAN

DRAWN

DATE

PROJECT NO.

301012-01A.30

SHEET NO.

1/1

DRAWING TITLE

INTERSECTION PLAN

CLIENTS

DEPARTMENT OF TRANSPORT

HIGH STREET UPGRADING STUDY

OPTION 4a

INTERSECTION PLAN

DRAWN

DATE

PROJECT NO.

301012-01A.30

SHEET NO.

1/1

DRAWING TITLE

INTERSECTION PLAN

CLIENTS

DEPARTMENT OF TRANSPORT

HIGH STREET UPGRADING STUDY

OPTION 4a

INTERSECTION PLAN

DRAWN

DATE

PROJECT NO.

301012-01A.30

SHEET NO.

1/1

DRAWING TITLE

INTERSECTION PLAN

CLIENTS

DEPARTMENT OF TRANSPORT

HIGH STREET UPGRADING STUDY

OPTION 4a

INTERSECTION PLAN

DRAWN

DATE

PROJECT NO.

301012-01A.30

SHEET NO.

1/1

DRAWING TITLE

INTERSECTION PLAN

CLIENTS

DEPARTMENT OF TRANSPORT

HIGH STREET UPGRADING STUDY

OPTION 4a

INTERSECTION PLAN

DRAWN

DATE

PROJECT NO.

301012-01A.30

SHEET NO.

1/1

DRAWING TITLE

INTERSECTION PLAN

CLIENTS

DEPARTMENT OF TRANSPORT

HIGH STREET UPGRADING STUDY

OPTION 4a

INTERSECTION PLAN

DRAWN

DATE

PROJECT NO.

301012-01A.30

SHEET NO.

1/1

DRAWING TITLE

INTERSECTION PLAN

CLIENTS

DEPARTMENT OF TRANSPORT

HIGH STREET UPGRADING STUDY

OPTION 4a

INTERSECTION PLAN

DRAWN

DATE

PROJECT NO.

301012-01A.30

SHEET NO.

1/1

DRAWING TITLE

INTERSECTION PLAN

CLIENTS

DEPARTMENT OF TRANSPORT

HIGH STREET UPGRADING STUDY

OPTION 4a

INTERSECTION PLAN

DRAWN

DATE

PROJECT NO.

301012-01A.30

SHEET NO.

1/1

DRAWING TITLE

INTERSECTION PLAN

CLIENTS

DEPARTMENT OF TRANSPORT

HIGH STREET UPGRADING STUDY

OPTION 4a

INTERSECTION PLAN

DRAWN

DATE

PROJECT NO.

301012-01A.30

SHEET NO.

1/1

DRAWING TITLE

INTERSECTION PLAN

CLIENTS

DEPARTMENT OF TRANSPORT

HIGH STREET UPGRADING STUDY

OPTION 4a

INTERSECTION PLAN

DRAWN

DATE

PROJECT NO.

301012-01A.30