



STEWART PATON ASSOCIATES
Consulting Engineers and Forensic Investigation Specialists

**AWPR
A944
SOUTH KINGSWELL ROUNDABOUT
AND ASSOCIATED ROADS
ABERDEEN**

STAGE 3 ROAD SAFETY AUDIT
(SPA Ref No: 4021)

Roads Authority: TRANSPORT SCOTLAND

Client: AWPR



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DOCUMENT CONTROL

General

Project	AWPR – A944 South Kingswell Roundabout
Client	AWPR
Document Type	Stage 3 Road Safety Audit
SPA Ref No	4021

Report Revisions

	Originator	Date	Reviewer	Date	Status
Draft – Rev 0		12/06/18	N/A	N/A	For Review
Draft – Rev 1	N/A	N/A		20/06/18	Review/ Convert to Final
Final – Rev 0		22/06/18	N/A	N/A	Issue to Client
Final – Rev 1		24/07/18	Responses Added		Issue to Client
Final – Rev 2		13/08/18	Minor Amendments		Issue to Client

1.0 INTRODUCTION

- 1.1 The report has been prepared for Transport Scotland, Aberdeen City Council and Aberdeenshire Council as a Stage 3 Road Safety Audit of the design and improvements for the A944 South Kingswell Roundabout Junction including the C93C Clintery to Kingsford Road and other associated access roads.
- 1.2 The audit was on behalf of the AWPR Construction Joint Venture (CJV) / Aberdeen Roads Limited and requested by [REDACTED] of the AWPR Construction Joint Venture (CJV). The Project Sponsor is Aberdeen Roads Limited.
- 1.3 The Road Safety Audit Team membership was as follows:

[REDACTED]

(Certificate of Competency in Road Safety Audit gained in August 2017)

[REDACTED]

(Certificate of Competency in Road Safety Audit gained in February 2013)

- 1.4 The audit was instructed and planned as Stage 3 Road safety Audit with day and night sight visits.
- 1.5 The daytime inspection took place on 7 June 2018 between the hours of 2000 and 2130. The weather was dry as was the road surface. The night visit took place the same day commencing at 2230 hours.
- 1.6 A list of those attending the day and night site inspection is as follows: -

[REDACTED]

Auditor	Stewart Paton Associates Ltd
Auditor	Stewart Paton Associates Ltd
TM Project Manager	AWPR CJV
Design Co-ordinator	CJV
AWPR	DSR
CA Roads	Jacobs
Police Liaison	Police Scotland
CA	Jacobs
Section Engineer	
Aberdeen City Council	

- 1.7 The Road Safety Audit desk top exercise took place at the New Stevenston office of Stewart Paton Associates Ltd on 12 - 22 June 2018.

- 1.8 The Road Safety Audit comprised an examination of the on-site conditions with reference made where necessary to design drawings as listed in Annex 1. The documents consisted of various site-specific drawings.
- 1.9. The terms of reference of the Road Safety Audit are as described in HD 19/15. The Road Safety Audit Team has examined and reported only on the road safety implications of the scheme as presented and has not examined or verified the compliance of the designs to any other criteria.
- 1.10 Where necessary comments and recommendations are referenced to the detailed design drawings and the locations indicated on plan included in the Annex 2. Where available, photographs have been included within the body of the report to illustrate issues identified.
- 1.11 To allow the construction to progress and to maintain network traffic flows, separate sections of the new road layout need to be progressed and opened separately. These future openings are part of subsequent Phases of the Project and will be detailed further in future Audit reports.
- 1.12 This report is focused on the layout of the A944 South Kingswell roundabout junction.
- 1.13 The following issues, which are classed as work in progress or snagging, were noted as requiring attention:
 - A944 East Bound Redundant 40 MPH and national speed limit sign to be removed from north verge.



- A90 Northbound diverge to South Kingswell Roundabout. – Give Way Lines to be provided.
- A90 northbound diverge slip road – Pedestrian crossing markings to be completed.
- A90 Southbound Diverge – Pedestrian guardrail and lining to be completed.
- A944 South Kingswell Roundabout. During the dark site visit it was initially observed that a number of lighting units were dark at various locations throughout the roundabout. It was noticed that as time progressed some of the dark lamps became lit. Between 2230 hours and 2300 hours the lights started to come at various stages. The lights should be adjusted so that they all luminate at the same time. Any dark lamps should be repaired. In addition to this the lighting for the roundabout appeared to come on much later than the approaches from the A944.



The consistency of the illumination time for the A944 and the junction should be reviewed being the illumination of the roundabout is arguably, given the potential for more conflict points, more important than the approaches.

Note 1:

The Audit Team notes the following in relation to the DMRB standard HD19/15: Road Safety Audits:-

HD 19 /15. Clause 2.97 – 1 (Black Box - i) (Stage 1, 2 and 3 Road Safety Audit Reports shall include:). A statement, signed by both the Road Safety Audit Team Leader and the Road Safety Audit Team Member(s) in the format given in Annex D.

That being: -

We certify that this Road Safety Audit has been carried out in accordance with HD 19/15.

It is this practice's interpretation that once an Audit Team has been approved this statement within a report is solely related to the processes as detailed in HD19/15 associated with reviewing the scheme in terms of the documentation provided in the Audit Brief, undertaking site inspections and producing draft and final Road Safety Audit Reports.

The Audit Team is not responsible for the actions of other stakeholders in relation to other management and approval processes contained within the overall audit process. The Audit Team does however reserve the right, within the introduction of its reports, to highlight and/or explain any areas where the overall audit process has not followed that laid down in the standard.

Note 2:

Any reference to a Chapter is a reference to a Chapter of the Traffic Signs Manual, reference to the Regulations is a reference to the Traffic Signs Regulations and General Directions 2016 and any reference to a Diagram (Diag) is a reference to a sign Diagram number in those Regulations. References to standards are those found in the Design Manual for Roads and Bridges.

2.0 OUTSTANDING MATTERS FROM STAGE 1 & 2 ROAD SAFETY AUDIT

2.1 The following comment was made in the Stage 1 RSA and again mentioned in the Stage 2 RSA. The topic was also the subject of an E mail discussion in February 2017: -

Extract from Stage 1 RSA

A3.1.6 Comment

Location South Kingswell Junction- A944

Summary Single lane exit from roundabouts to north and southbound merges with A90
From the plans provided it would appear that the exits from the roundabout to the north and southbound merges with A90 are only of single lane width. It is appreciated that a single lane diverge is desired, however entries and exits from roundabouts can be locations where breakdowns occur and with a reduced carriageway width a broken-down vehicle could block the diverge and then lead to congestion on the roundabout. This in turn leads to driver frustration and potential unexpected driving behaviour and manoeuvres elsewhere of the surrounding road network.

Recommendation: It is recommended that the width of the exit from the roundabout (to the start of the hard shoulder on the diverge) can accommodate two vehicles, however ghost hatch markings should be provided on the offside to show that the exit is intended to operate as a single lane.

Designer's Response: The exit widths from the roundabout to the start of the hard shoulder are approximately:

NB merge 3.700-4.205m.

SB merge 3.800-4.374m.

Therefore, currently there is not enough space to accommodate two vehicles. Carriageway widening at the roundabout exits would have to be included at detailed design stage

Audit Review: Designer's Response noted and accepted.

Extract from Stage 2 RSA

As the stage 1 audit was limited to drawings showing the basic plan and profile of the road proposals, many of the comments raised at that time were generic in nature.

In relation to the area being opened under Phase 3, outwith the generic issues, the main road safety issue raised by the Audit Team were as follows: -

- Speed limits at the Stonehaven Roundabout
- Long downhill southbound approach to the Stonehaven Roundabout
- Fast approach speeds on diverge to half Cloverleaf junction at Milltimber
- Long straight on gyratory leading to tight horizontal bend at South Kingswells Roundabout
- Single lane width exits from roundabouts to north and southbound merges with A90 at South Kingswells
- Existing Cycle facilities and proposed signalised junction A93/B979 junction

- Location of crossing points at roundabout entries and exits South Kingswells Roundabout.

The majority of these issues appears to have been considered as part of the design process. It is however the case that the single lane width exits at South Kingswells have been questioned by the local authority. The Audit Team are of the view that the probability of a vehicle breaking down at these points is limited. It is also recognised that if the concern relates to vehicles stopping at the exit then this will be a frequent occurrence on the north side, not due to breakdowns but by the operation of the signalised crossing on this arm. Similarly, at the north side of the roundabout there is land constraints given the proximity of the adjacent arm to the west.

- 2.2 As such the Audit Team have raised the concern as part of the earlier Audit process, but the matter appears to have been agreed through the design and consultation process.
- 2.3 The issue is raised again in item 3.3.1 of this report.

3.0 ITEMS ARISING FROM THIS STAGE 3 AUDIT

3.1 GENERAL

The Audit Team have not identified any problems relative to this section at this time.

3.2 LOCAL ALIGNMENT

3.2.1 Problem

Location: A90 Northbound merge to South Kingswell Roundabout

Drawing(s): Various

Summary: Incorrect Roundabout geometry can result in an increase in accidents with vehicles leaving the carriageway onto the central hub.

It was noted on site that the centre line carriageway markings on the A90 northbound diverge appeared to have been laid non – tangential to the central hub.

The alignment of the entry lanes could cause driver to misjudge their entry and cause collisions with the central hub



RECOMMENDATION

It recommended that the designer reviews the layout of the centre lining on the A90 northbound diverge.

If necessary, the lining should be adjusted to ensure that they are tangential to the hub.

DESIGNERS RESPONSE

Recommendation accepted. The road centreline will be reviewed on site and adjusted if necessary.

AUDIT TEAM RESPONSE

Noted and Accepted.

3.3 JUNCTIONS

3.3.1 Problem

Location: AWPR Merge slip roads

Drawing(s): Various

Summary: Narrow width roads can be hazardous in several situations. Large goods vehicles, especially abnormal loads, can have difficulty negotiating a way through narrow width carriageways especially if street furniture is also present. Vehicle breakdowns can effectively close the slip road resulting in frustration.

It was observed that the merge slip roads to the AWPR appeared narrow and in the region of 4.5m wide. The northbound merge is also bounded by pedestrian crossing guardrail and street furniture thus giving a further impression of a narrow exit.

This issue was raised in the stage 1 and 2 RSA and further addressed by Email in 2017.

It is assumed a narrow exit width is being dictated by the Land Made Available and preference to help eliminate the potential for constant two vehicle exits from the circulatory carriageway (which in itself could result in road safety problems) and to encourage appropriate lane discipline on the roundabout.

The Audit Team were led to believe the designers were to examine this issue as part of the detailed design process and presumably reach agreement with the relevant stakeholders.

On site at the Stage 3 inspection the Aberdeen City Council representative produced a document stating that the merge slip road should be a minimum width of 7.7m. (Source of document unknown).

The Audit Team acknowledges that in the unlikely event of a vehicle breakdown that the slip road will effectively be closed for a period of time till the breakdown is cleared. They also acknowledge that such an occurrence will lead to congestion and driver frustration which in turn can result in an increase in a variety of accidents. However as discussed, a similar situation will potentially arise, albeit for a shorter period of time, at times when the pedestrian crossing is called on the north side.

The issue therefore revolves around the risk posed by a breakdown event over a short length of carriageway, which may be a rare occurrence.

The Audit Team are unable to offer a viable solution to this problem other than to increase the width of the merge slip roads which they expect may not be practical or possible.

RECOMMENDATION

It is recommended that the designer reviews the layout of the merge slip roads and if possible reach an agreement with the roads authority on how best to address this issue.

DESIGNERS RESPONSE

Recommendation of a review of the design is accepted. It should be noted the proposals are for a single exit lane only and that only a small section (approx. 40m) of the slip road doesn't include the nearside hardstrip provision. As outlined by the Road Safety Auditors, this arrangement is to help eliminate the potential for two vehicles exiting the circulatory carriageway simultaneously, which in itself presents safety issues, while encouraging appropriate lane discipline on the roundabout. The design has adopted the method for terminating hardstrips for single lane slip roads as shown in Figure 8/10 of TD16/07 on approach to and exit from the roundabout, resulting in the hard strip starting on the straights beyond the exit from the circulatory carriageway. This is an arrangement used across the network for single lane slip roads. It should also be noted that there would still be a risk of a broken-down vehicle blocking the circulatory carriageway with an increased carriageway width therefore widening the start of the on-slips will not remove this risk. We therefore concur with the Road Safety Auditors comments that the risk of vehicle breaking down within this small section resulting in a road safety risk is low.

We can confirm that there has been on-going dialogue with Aberdeen City Council (ACC) over their concerns regarding the width of the slip road. However, as Designer, we are satisfied with the design and that operational perceptions of potential blockages are unlikely to occur.

AUDIT TEAM RESPONSE

Noted and Accepted at this stage. The Audit Team will again examine this area during any subsequent stage 4 RSA.

3.4 NON-MOTORISED USERS (NMU)

3.4.1 Problem

Location: Splitter Island A944 South Kingswell Roundabout / A944 Kingsford Industrial Units
Drawing(s): N/A
Summary: Dropped kerb crossing layouts which do not provide sufficient continuity can result in indiscriminate crossings and an increase in pedestrians being involved in accidents.

Pedestrian dropped kerb crossing points, complete with tactile paving, are to be provided on the triangular Splitter Island A944 South Kingswell Roundabout / A944 Kingsford Industrial Units.

In order for the dropped kerb crossings to be an effective aide for the partially sighted the tactile paving on the splitter island needs to direct users to the adjacent dropped kerb tactile area. It is often seen by the Audit Team that the orientation of tactile paving on splitter islands, especially that at the outer edges, often directs users out onto the carriageway and not the adjacent tactile area. The publication guidance on the use of tactile paving suggest that either pedestrian guardrail or heel kerbs be provided, these features can then be used by the partially sighted to locate the adjacent tactile area. On small islands this is not usually practical and in instances where the tactile does not provide the desired guidance between the tactile areas some form of guide paving is required.



It was observed that on the island in question the tactile was positioned such that should a partially sighted person walk on the edge nearer the circulatory carriageway they could be directed out onto the carriageway

RECOMMENDATION

It is recommended that the designer reviews the dropped kerb pedestrian crossing provision and in particular the location and distances between the tactile paving area on the splitter island to ensure that the partially sighted will not find themselves stranded on the splitter island and unable to locate the tactile paving needed to complete the crossing. It may be the case that guide paving is required.

DESIGNERS RESPONSE

Recommendation not accepted. It is proposed to provide pedestrian guardrail on the pedestrian island to ensure partially sighted people are directed through the crossing.

AUDIT TEAM RESPONSE

Noted and Accepted. Care should be taken to ensure that the guardrail does not obstruct visibility splays.

3.5 ROAD SIGNS, CARRIAGEWAY MARKINGS AND LIGHTING

3.5.1 Problem

Location: A944 Westbound

Drawing(s): N/A

Summary: Inconsistent road markings can result in an increase in a variety of accidents.

It was noted that the old section of the A944 had been provided with edge of carriageway markings, road studs, and a footway boundary edge marking. The new section, forming the exit / entry arm for the South Kingswell Roundabout had not been provided with similar markings nor does the design provide for these features.

In relation to the footway boundary edge marking, it was noted that on the new section an area of block paving was provided around the exit curves from the roundabout to identify the available pedestrian area, the block paving stopped a short distance from the exit curves with nothing provided to link up with the existing boundary marking.

The Audit Team acknowledges the lack of edge of carriageway markings and studs and the difference in standards between the old and new section of the A944. They are of the opinion that, given the change in nature of the carriageway and the provision of street lighting, road safety will not be compromised.

This opinion was reinforced by observations made during the night visit. It was also observed during the night audit that the relatively poor standard of road studs and edge of carriageway markings on the old section of the A944 did not flag up any noticeable difference between the old and new carriageways.



In relation to the lack of footway separate edge marking it is the opinion of the Audit Team that an additional marking should be provided between the block paving and the existing marking.



RECOMMENDATION

It is recommended that an additional footway boundary edge marking be provided.

DESIGNERS RESPONSE

Recommendation accepted. The existing footway boundary edge marking will be extended to tie into the block paving on the radli of the roundabout entry.

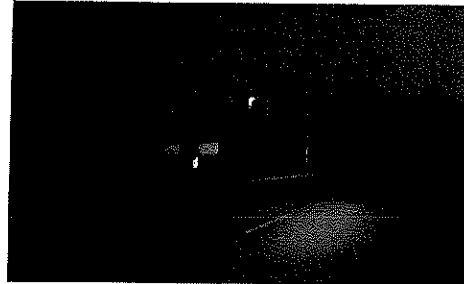
AUDIT TEAM RESPONSE

Noted and Accepted.

3.5.2 Problem

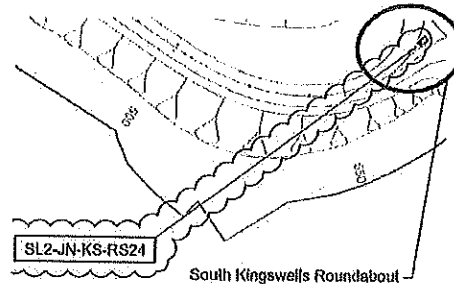
Location: A944 South Kingswell Roundabout / Kingsford Gairnlea Road
Drawing(s): N/A
Summary: Lack of definition of roadside features can result in an increase in late braking and sudden manoeuvre type accidents.

It was noted that on the splitter island on A944 South Kingswell Roundabout / Kingsford Gairnlea Road no bollard had been provided at the interface of the circulatory carriageway and the exit arm



There was no permanent signing provided on the splitter island although the design provides for a bollard with left aspect for northbound traffic approaching the roundabout on the Kingsford Gairnlea Road. Temporary direction signs are currently provided on the splitter island.

It is normally the case that where an illuminated fingerpost sign is provided that there is no requirement for a bollard.



RECOMMENDATION

It is recommended that a bollard with blank face be provided between the circulatory carriageway and the Kingsford Gairnlea Road. It is further recommended that the as designed bollard be provided on the splitter island for northbound traffic.

In addition, it is recommended that the designer reviews to need to provide a fingerpost direction sign on the splitter island.

DESIGNERS RESPONSE

Recommendation accepted. A bollard with a blank face will be provided between the circulatory carriageway and the Kingsford Gairnlea Road. We can also confirm that the bollard on the splitter island for northbound traffic will also be provided as per the design.

A signage strategy was developed with Transport Scotland, Aberdeenshire Council and Aberdeen City Council. This included all advanced directional signage including fingerpost directional signs. As part of this strategy, it was considered that finger post directional signs were not required for the splitter island on the A944 South Kingswell Roundabout / A944 Westbound exit arm

AUDIT TEAM RESPONSE

Noted and Accepted.

3.5.3 Problem

Location: A944 South Kingswell Roundabout / A944 Westbound exit arm
Drawing(s): N/A
Summary: Lack of definition of roadside features can result in an increase in late braking and sudden manoeuvre type accidents.

It was noted that on the splitter island on A944 South Kingswell Roundabout / A944 westbound exit arm no bollard had been provided at the interface of the circulatory carriageway and the exit arm

A permanent non – illuminated fingerpost sign had been provided on the splitter island.

It is normally the case that where an illuminated fingerpost sign is provided that there is no requirement for a bollard.

It was mentioned on site that the sign seen in the picture opposite had already been struck by a vehicle.



RECOMMENDATION

It is recommended that a bollard with blank face be provided between the circulatory carriageway and the A944 westbound exit arm.

DESIGNERS RESPONSE

Recommendation accepted. A bollard with a blank face will be provided between the circulatory carriageway and the A944 Westbound exit arm.

AUDIT TEAM RESPONSE

Noted and Accepted,

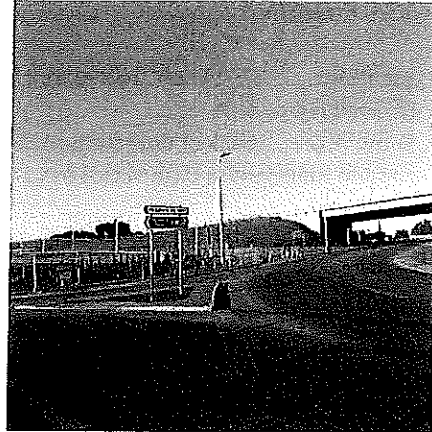
3.5.4 Problem

Location: A944 South Kingswell Roundabout / C93C Clintery to Kingsford Road.
Drawings: N/A
Summary: Lack of definition of roadside features can result in an increase in late braking and sudden manoeuvre type accidents.

It was noted that, on the splitter island on A944 South Kingswell Roundabout / C93C Clintery to Kingsford Road exit arm, no bollard had been provided at the interface of the circulatory carriageway and the exit arm

A permanent non – illuminated fingerpost sign had been provided on the splitter island.

It is normally the case that where an illuminated fingerpost sign is provided that there is no requirement for a bollard.



RECOMMENDATION

It is recommended that a bollard with blank face be provided between the circulatory carriageway and the C93C Clintery to Kingsford Road exit arm. A second bollard should also be provided on the southbound approach to the circulatory carriageway.

DESIGNERS RESPONSE

Recommendation accepted. A bollard with a blank face will be provided between the circulatory carriageway and the C93C Clintery to Kingsford Road exit arm. A second bollard will also be provided on the southbound approach to the circulatory carriageway.

AUDIT TEAM RESPONSE

Noted and Accepted.

3.5.5 Problem

Location: A944

Drawing(s): N/A

Summary: Incorrectly signed speed limits can result in inappropriate speeds and an increase in speed related accidents. It can also result in the Police being unable to enforce the speed limit.

It was observed that along the length of the new A944 there was a lack of signs to Diag 670, '40 MPH Repeater'. It may be the case that the previous signs and interval spacing has been disturbed by the creating of the new junction.

RECOMMENDATION

It is recommended that additional signs to Diag 670, '40 MPH Repeater', be provided on the A944.

DESIGNERS RESPONSE

Recommendation accepted. We can confirm that any existing regulation signage such as 40mph repeater signs removed as part of the works will be reinstalled and that new 40mph repeater signs will be provided as required on the A944.

AUDIT TEAM RESPONSE

Noted and Accepted.

3.5.6 Problem

Location: A944

Drawing(s): N/A

Summary: Poorly signed cycle facilities can result in an increase in cyclists / pedestrians being involved in accidents.

The north footway of the A944 is designated as a shared use cycle / pedestrian facility. The AWPR works and the creation of the new A944 has resulted in some of the signs to Diag 956 being removed. It may be the case that the previous signs and interval spacing has been disturbed by the creating of the new junction.



RECOMMENDATION

It is recommended that the designer reviews the provision of signs to Diag 956 on the north side of the AWPR. Additional signs should be provided.

DESIGNERS RESPONSE

Recommendation accepted. It is proposed to re-erect any existing signs (to Diag 956) that were removed along the shared use cycle /pedestrian facility on the A944.

AUDIT TEAM RESPONSE

Noted and Accepted.

3.5.7 Problem

Location: A944, westbound approach to roundabout

Drawing(s): N/A

Summary: The obscuring of sign legends can lead to drivers having difficulty interpreting the road layout ahead.

It was noted that the ADS on the westbound A944 on the approach to the roundabout was slightly obscured by the boundary wall of the private house on the southside of the A944.



RECOMMENDATION

It is recommended that if practical and possible that the height of the sign be adjusted to improve visibility to the lower legends.

DESIGNERS RESPONSE

Recommendation not accepted. We have undertaken a review of the sign, post and foundation design and it is not possible to increase the mounting height of the sign face. As the sign face is slightly obscured by the boundary wall but still becomes clearly visible, it is proposed to retain the sign in its current position.

AUDIT TEAM RESPONSE

Noted and Accepted at this stage.

4.0 AUDIT TEAM STATEMENT

We certify that this audit has been carried out in accordance with HD 19/15

AUDIT TEAM LEADER

Name:

[REDACTED]

Signed:

[REDACTED]

Position:

Dated: 13 August 2018

Organisation: Stewart Paton Associates Ltd
Consulting Civil Engineers

Address: 69 Barnton Park Avenue
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EH4 6HD

AUDIT TEAM MEMBER

Name:

[REDACTED]

Signed:

[REDACTED]

Position:

Dated: 13 August 2018

Organisation: Stewart Paton Associates Ltd
Consulting Civil Engineers

Address: 69 Barnton Park Avenue
Edinburgh
EH4 6HD

Annex 1 LIST OF PLANS AND DOCUMENTS

AWPR - Stage 3 RSA Report – A944 South Kingswell Junction

Drawing No.	Revision No.	Title / Description
Road Markings		
AWPR-DJV-HW1200-ZZ00-DR-C-0026	C06	Road Markings, Sheet 26 of 90
AWPR-DJV-HW1200-ZZ00-DR-C-0027	C07.2	Road Markings, Sheet 27 of 90
Road Restraint Systems		
AWPR-DJV-HW0400-ZZ00-DR-C-0026	C03	Road Restrain Systems Layout Sheet 26 of 90
Drawing No.		
Revision No.		
Title / Description		
Sign Face Details		
AWPR-DJV-HW1200-DE03-DR-C-0004	C03	South Kingswell Junction Sign Face Details Sheet 01 of 02
AWPR-DJV-HW1200-DE03-DR-C-0005	C02	South Kingswell Junction Sign Face Details Sheet 02 of 02
Traffic Sign Locations		
AWPR-DJV-HW1200-ZZ00-DR-C-0126	C03	Traffic Sign Locations Sheet 26 of 90
Pavement Layout		
AWPR-DJV-HW0700-ZZ00-DR-C-0026	C05	Pavement Layout Sheet 26 of 90
Lighting Layout		
AWPR-DJV-HW1300-JU05-DR-C-0001	C03	Lighting Layout South Kingswell Junction Sheet 1 of 1
AWPR-DJV-HW1400-JU05-DR-C-0001	C02	Lighting Schematic South Kingswell Junction Sheet 1 of 2
AWPR-DJV-HW1400-JU05-DR-C-0002	C02	Lighting Schematic Layout South Kingswell Junction Sheet 2 of 2

AWPR – A944 South Kingswell Junction
Stage 3 Road Safety Audit



Annex 2 PROBLEM LOCATION PLAN

Not Required at this Stage

