

# A720 Sheriffhall Roundabout

DMRB Stage 2 Scheme Assessment Report

Part 1 – Engineering, Traffic and Economic Assessment  
Volume 3 – Appendices

Transport Scotland

Project Number: 60470009

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Appendix 1

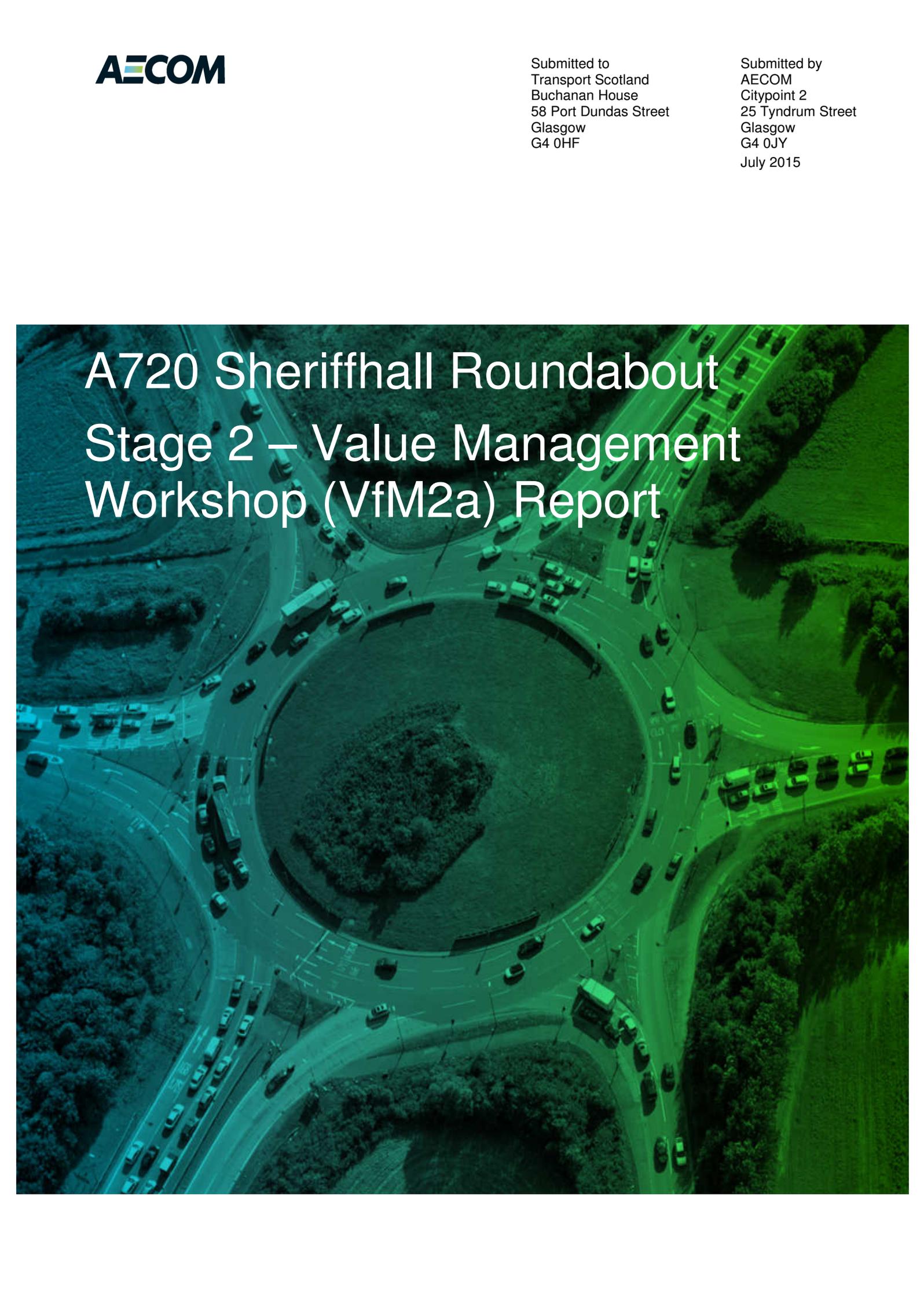
Stage 2 Value Management Workshop (VfM2a) Report

Appendix 2

Stage 2 Value Management Workshop (VfM2b) Report

# Appendix A

## Stage 2 Value Management Workshop (VfM2a) Report



# A720 Sheriffhall Roundabout Stage 2 – Value Management Workshop (VfM2a) Report

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**A720 Sheriffhall Roundabout – Stage 2 Value Management Workshop (VfM2a) Report**  
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## Executive Summary

Sheriffhall Roundabout is the only at-grade junction on the A720 Edinburgh City Bypass. It is a six-arm roundabout located at the junction of the A720, A7 and A6106 south of Edinburgh. Sheriffhall is underlain by a geological fault and this coupled with the presence of historical mine workings initially led to the provision of a roundabout at Sheriffhall in preference to grade separation. Mining activity in the area has since stopped.

Sheriffhall has undergone various improvements including localised widening, signalisation and the provision of additional lanes to try and alleviate the delays which occur at the junction. Despite the improvements, a congestion problem persists, particularly during peak hours.

Junction improvements at Sheriffhall were identified as part of the Strategic Transport Projects Review (STPR), published in December 2008. Intervention 22 recommends targeted road congestion / environmental relief schemes, including junction improvements at the Sheriffhall roundabout.

AECOM (then URS) were appointed in June 2013 to undertake DMRB Stage 1 Scheme Assessment. Stage 1 looked at eight junction options, and in September 2014 recommended that four options go forward to Stage 2 Assessment. Stage 2 Scheme Assessment is ongoing.

The Stage 2 Value Management Workshop (VfM2a) was held on Thursday 26<sup>th</sup> March 2015, attended by the project team at AECOM, and also attendees from Transport Scotland. The VfM2a Workshop provided an update on the scheme development and junction options. The workshop developed evaluation criteria which were based on the Scheme Objectives agreed at the Stage 1 Value Management Workshop. The workshop agreed that each topic should receive an equal weighting of 20%. The scoring methodology was also agreed, options were scored 0 to 10, with 10 awarded to the option(s) which best met the evaluation criteria, and 0 awarded if an option(s) was unacceptable. The evaluation criteria are summarised below, agreed by the workshop as being a robust and transparent method for this stage in the scheme assessment process.

Topic	Evaluation Sub-Criteria	Weighting
Environment (20%)	Minimise intrusion of works on natural environment	5%
	Minimise intrusion of works on cultural heritage	5%
	Minimise intrusion of works on people	5%
	Enhance local environment where opportunities arise	5%
Safety (20%)	Improve road safety for all users	20%
Economy (20%)	Improve movement of traffic on A720	3.3%
	Improve traffic access to / from local road network	3.3%
	Minimise delays during construction	3.3%
	Minimise impact of local proposed development traffic on A720 and approach roads	3.3%
	Improve traffic movement along A7 / A6016	3.3%
	Improve traffic movement along A772	3.3%
Accessibility (20%)	Improve accessibility across the A720 – NMUs	10%
	Improve accessibility across the A720 – public transport	10%
Integration (20%)	Facilitate integration with public transport along A720 – NMUs	6.7%
	Facilitate integration with Shawfair park and ride	6.7%
	Reduce conflict between strategic and local traffic	6.7%

The AECOM design team gave a preliminary assessment of the junction options, including commentary on the Engineering, Geotechnical, Environmental and Traffic aspects of the junction options.

Option 1A is a dumbbell grade separated junction at Sheriffhall, with the A720 on a raised embankment. The preliminary cost estimate for Option 1A was found to be approximately £65.49M. Option 2A is a dumbbell grade separated junction at Gilmerton, with the A720 remaining at grade. Option 2A has the largest footprint area. The preliminary cost estimate for Option 2A was found to be approximately £56.26M. Option 6A is a grade separated roundabout at Sheriffhall, with the

A720 raised up on embankment. Option 6A has the smallest footprint area. The preliminary cost estimate for Option 6A was found to be approximately £75.44M. Option 8A is a dumbbell grade separated junction west of Sheriffhall, with the A720 remaining at grade. The preliminary cost estimate for Option 8A was found to be approximately £53.35M.

The geotechnical constraints in the study area were summarised, which include fault lines and a shatter rock zone of poor quality, and also numerous mine workings, coal seams and mine shafts. Historic mine workings are considered to be the main geotechnical risk, especially given the uncertain position of the coal seam outcrops, but there are no significant 'show-stoppers' present unless economics make the scheme unviable.

The traffic assessment carried out to date was summarised, which included describing the existing traffic conditions, based on surveys carried out in October 2013, and also a base model for 2014 which models AM peak, PM peak and inter peak models. It was noted that all options exhibit benefits over the existing Sheriffhall Roundabout when considered against the base traffic (2014 AM peak). When considering this initial analysis, Option 2A is felt to be the worst performing option. This is because only one junction is provided at Gilmerton (compared to the other options which provide connection at both Gilmerton and Sheriffhall) resulting in redistribution of traffic to the Gilmerton junction. 2014 AM peak traffic would result in some queuing for Option 2A, whereas all other options would have no queuing. 2014 AM peak traffic plus 20% would result in longest queues for Option 2A, including queuing on the A720 approach to the eastbound verge, the A772 and A7 South.

A number of key environmental issues were discussed, which include several scheduled monuments, a high potential for undiscovered archeology, the Dean Burn which runs through the study area, and the preference for segregated Non Motorised User (NMUs) routes. The main developments in the area include The South East Edinburgh Strategic Development Area at Shawfair, Gilmerton, Drum and Newton Farm. It was noted that although there are several environmental issues, none are considered to prevent the scheme from progressing as it is considered that all environmental impacts can be mitigated against.

The agreed weighted evaluation criteria were used to assess the junction options against the government appraisal criteria. A summary of the weighted scores is shown in the table below.

Topic	Option 1A	Option 2A	Option 6A	Option 8A
<b>Environment</b>	17.5	12.0	19.5	13.5
<b>Safety</b>	20.0	12.0	8.0	18.0
<b>Economy</b>	18.3	14.0	17.0	19.0
<b>Accessibility</b>	20.0	18.0	18.0	20.0
<b>Integration</b>	20.0	15.3	20.0	20.0
<b>Function Score</b>	<b>95.8</b>	<b>71.3</b>	<b>82.5</b>	<b>90.5</b>
<i>Cost</i>	<i>£65.5M</i>	<i>£56.3M</i>	<i>£75.4M</i>	<i>£53.4M</i>

The workshop agreed that based on the output from the evaluation exercise, Option 2A should be sifted out and not taken forward for further Stage 2 Assessment. Option 2A had a low function score as it did not meet the evaluation criteria sub-objectives sufficiently. The Workshop felt that the issues associated with Option 2A cannot be mitigated as the main issues are a result of merging two junctions into one at Gilmerton.

It was agreed that the second Stage 2 Value Management Workshop (VfM2b) would include a full risk identification and assessment session, and that Value Management would be fully discussed.

# 1 Introduction

The Stage 2 Value Management Workshop VfM2a was held on Thursday 26<sup>th</sup> March 2015 in the AECOM offices at Citypoint 2. This followed on from the Value Management Workshop which was held during the Stage 1 in January 2014. A copy of the presentation slides is contained in Appendix A.

## 1.1 Workshop Agenda

The agenda for the Value for Money (VfM2a) Workshop was as follows:

9.15am	Tea / Coffee
9.30am	Introduction <ul style="list-style-type: none"> <li>• Safety Moment</li> <li>• Purpose of Workshop</li> </ul>
9.45am	Scheme Development
10.00am	Develop Evaluation Criteria for Selection of Preferred Option
10.45am	Initial Option Assessment & Sifting <ul style="list-style-type: none"> <li>• Engineering, Geotechnical, Traffic, Environment</li> </ul>
12.30pm	lunch
1.00pm	Risk Identification and Assessment
1.30pm	Value Management
2.00pm	Stage 3 Key Issues
2.15pm	Close

## 1.2 Workshop Attendees

The attendees at the Workshop were from the project team at AECOM, and also attendees from Transport Scotland:

<u>Transport Scotland</u>		<u>AECOM</u>	
Duncan McCallum	(Project Director)	Ryan Hutchison	(Project Director)
Andy Anderson	(Project Manager)	Jill Irving	(Project Manager)
Marco Bardelli	(Area Manager)	Russell Bissland	(Traffic & Economics)
John McDonald	(Transport Planning)	Andrew Simpson	(Traffic & Economics)
Stuart Wilson	(Development Management)	Stewart Proud	(Geotechnical)
Adam Priestley	(Technical Analysis)	Catriona Fisher	(Geotechnical)
David Anderson	(Acting Director MTRIPS)	Zoe McClelland	(Environmental)
Sinead Thom	(Environmental)	Nigel Hackett	(Environment)
John Flynn	(Standards Branch)	Steven Smith	(Roads)
Patrick Brassil	(Standards Branch)		
Peter Ritchie	(Construction Branch)		
Paul Mellon	(Geotechnical)	Alan Frew – Workshop Facilitator	

## 1.3 Purpose of Workshop

A two stage approach to Value Management (VM) has been adopted for the A720 Sheriffhall Roundabout Stage 2 Assessment due to the ongoing development of future traffic data. VfM2a Workshop, held on 26<sup>th</sup> March 2015, provided an update on the scheme development and junction options. The workshop also worked to develop and agree evaluation criteria and then used them to carry out an initial option assessment and sifting exercise.

A second VM Workshop will be held later in Stage 2 to complete the Value Management process including a discussion of risk and value management and outlining the key issues for Stage 3.

## 2 Scheme Development

### 2.1 Project Background

The A720 Sheriffhall Roundabout is a six arm roundabout at the junction of the A720 Edinburgh City Bypass, the A7 and the A6106. Sheriffhall roundabout is the only at-grade junction on the A720. Various improvements have been implemented including signalization, localised widening and the provision of additional lanes. The road network surrounding Sheriffhall Roundabout is operating close to capacity and is severely congested at peak times. There are extensive plans for future residential and business development, therefore the junction has been identified for improvements.

### 2.2 The Scheme

AECOM (then URS) was appointed in June 2013 to undertake DMRB Stage 1 Scheme Assessment. Stage 1 looked at eight junction options, including six options which were considered in the 2007 study, and a further two options identified at the Inception Workshop in September 2013.

Stage 1 concluded in September 2014 recommending that four options go forward to Stage 2 Assessment. At the time of the Workshop the delivery of the Stage 2 Report was programmed for October 2015. It is envisaged that Stage 3 will then commence on the successful progression through IDM presentation, and subject to funding.

AECOM is required to undertake the DMRB Stage 2 Assessment to identify the optimum grade separated junction improvement at Sheriffhall Roundabout. The Stage 2 Assessment is ongoing having started in Summer 2014.

## 3 Develop Evaluation Criteria

### 3.1 Develop Evaluation Criteria

The Scheme Objectives as developed during Stage 1 were considered in developing the Evaluation Criteria:

- A. Improve the movement of traffic on the A720 between Gilmerton and Old Craighall by providing grade-separation of the A720 at the existing Sheriffhall Roundabout;
- B. Reduce the conflict between strategic and local traffic;
- C. Minimise traffic impact of local proposed developments in Midlothian, East Lothian and City of Edinburgh on the A720 between Gilmerton Junction and Old Craighall Junction and approach roads;
- D. Improve road safety for all users on the A720 and approach roads between Gilmerton Junction and Dalkeith Northern Bypass;
- E. Minimise intrusion of the new works on the natural environment, cultural heritage and people whilst enhancing the local environment where opportunities arise;
- F. Facilitate integration for different modes of transport along and across the A720 corridor between Gilmerton Junction and the Dalkeith Northern Bypass; and
- G. Reduce severance by improving accessibility across the A720 for all users.

The scheme objectives were considered alongside the Government's main appraisal criteria when developing the evaluation criteria:

- Environment;
- Safety;
- Economy;
- Accessibility; and
- Integration.

The workshop agreed that each criteria topic should receive an equal weighting of 20%.

The scheme objectives were then assigned to the criteria topics. The scheme objectives were then broken down into sub-objectives. AECOM presented their suggested sub-objectives for discussion which were included in the information pack issued to attendees prior to the workshop. A workshop discussion followed, and the final agreed evaluation criteria were as listed in the table below.

The workshop agreed the scoring methodology. Scores ranged from 0 to 10 with 10 awarded to the option (or options) which best meets the objective. A score of 0 is allocated if an option is unacceptable. The scoring is a comparable exercise. It was also noted that more than one option might score 10 for an evaluation sub-objective. It was also noted that options may score the same for a sub-objective, therefore that sub-objective would become 'neutral'.

This approach was agreed as being a robust and transparent method for this stage in the scheme assessment process.

TOPIC	OBJECTIVE	EVALUATION SUB-CRITERIA	Weighting
Environment (20%)	E. Minimise intrusion of the new works on the natural environment, cultural heritage and people whilst enhancing the local environment where opportunities arise	minimise intrusion of works on natural environment	5%
		minimise intrusion of works on cultural heritage	5%
		minimise intrusion of works on people	5%
		enhance local environment where opportunities arise	5%
Safety (20%)	D. Improve road safety for all users on the A720 and approach roads between Gilmerton Junction and Dalkeith Northern Bypass.	Improve road safety for all users	20%
Economy (20%)	A. Improve the movement of traffic on the A720 between Gilmerton and Old Craighall by providing grade-separation of the A720 at the existing Sheriffhall Roundabout.	Improve movement of traffic on A720	3.3%
		Improve traffic access to / from local road network	3.3%
		Minimise delays during construction	3.3%
	C. Minimise traffic impact of local proposed developments in Midlothian, East Lothian and City of Edinburgh on the A720 between Gilmerton Junction and Old Craighall Junction and approach roads.	Minimise impact of local proposed development traffic on A720 and approach roads	3.3%
		Improve traffic movement along A7 / A6106	3.3%
		Improve traffic movement along A772	3.3%
Accessibility (20%)	G. Reduce severance by improving accessibility across the A720 for all users	Improve accessibility across the A720 – NMUs	10%
		Improve accessibility across the A720 – public transport	10%
Integration (20%)	F. Facilitate integration for different modes of transport along and across the A720 corridor between Gilmerton Junction and the Dalkeith Northern Bypass	Facilitate integration with public transport along A720 - NMUs	6.7%
		Facilitate integration with Shawfair park and ride	6.7%
	B. Reduce the conflict between strategic and local traffic	Reduce conflict between strategic and local traffic	6.7%

## 4 Initial Option Assessment and Sifting

The AECOM design team then presented their preliminary assessment of the junction options.

### 4.1 Engineering

Option 1A is a dumbbell grade separated junction at Sheriffhall. The A720 is carried over the A7 on a raised embankment. The dumbbell junction has roundabout of Inscribed Circular Diameter (ICD) of 80metres. The total footprint area of Option 1A is approximately 19Ha. The cost of Option 1A is estimated to be £65.49M (including optimism bias). An initial geometry review which considered the standard of horizontal and vertical geometry found that only Option 1A had 1 departure. It was noted that a further more detailed geometry review will be undertaken during the DMRB Stage 2 Assessment including consideration of the stopping sight distance.

Option 2A is a dumbbell grade separated junction at Gilmerton. The A720 remains at grade through Gilmerton and Sheriffhall. The A7 is carried over the A720 at Sheriffhall. Option 2A has developed from its Stage 1 layout in that the A772 is now dualled to accommodate the anticipated increase in traffic. The dumbbell roundabouts have ICDs of 80 metres. Option 2A has a footprint area of approximately 27Ha which is the largest of all options. The cost of Option 2A is estimated to be £56.26M (including optimism bias). An initial geometry review found that Option 2A had two departures and one relaxation.

Option 6A is a grade separated roundabout at Sheriffhall. The A720 is carried over the A7 on a raised embankment. The new eight arm roundabout would have an ICD of 150metres. The footprint area is approximately 17Ha which is smallest of all options. The cost of Option 6A is estimated to be £75.44Ha (including optimism bias) which makes Option 6A the most expensive option. An initial geometry review found that Option 6A had one departure and two relaxations.

Option 8A is a dumbbell grade separated junction located west of Sheriffhall. The A7 is realigned westwards and carried over the A720, therefore the A720 remains at grade. The cost of Option 8A is estimated to be £53.35M (including optimism bias) making Option 8A the cheapest option. An initial geometry review found that Option 8A has one departure and three relaxations.

The workshop noted that raising the A720 up on embankments (as in options 1A and 6A) is felt to be the best layout given the prevailing topography, and allows the sideroads to tie into the existing road network more quickly with less disruption to adjacent land and property.

It was also noted that the cost estimates include for the draft designs as they stand at this stage. As an outline drainage design has yet to be done, the costs as presented do not include for SUDS ponds.

### 4.2 Geotechnical

The Geotechnical constraints within the study area were summarised. These features include fault lines, and a shatter rock zone of poor quality material, the shatter zone as indicated is likely to be the true position of the fault. There have been no seismic events at the Sheriffhall fault since deep mining working ceased.

There are also numerous mine workings in the study area, coal seams mine shafts. It was noted that there are more coal seams at shallow depths to the west of the Sheriffhall roundabout but there is an inconsistency between sources of information for coal seam outcrop data. As-built information for the Edinburgh City Bypass suggest treatment of some mine shafts positioned directly beneath the alignment. No information was available on treatment of shallow mine workings. AECOM continue to search for information which could verify the position of the coal seams and potential mine workings.

There is also a disused sewage works, and made ground for Edinburgh City Bypass could be colliery spoil which could be hazardous or contaminated. To the east of Sheriffhall, loose sands, soft clays and silts are recorded, unlike the glacial till which occurs predominantly across the site. These poor soils led to issues with the Borders Rail cuttings.

Historic mine workings are considered to be the main geotechnical risk, especially given the uncertain position of the coal seam outcrops, but there are no significant 'show-stoppers' present unless economics make the scheme unviable. The risk of mine workings can be accounted for in the costs. It was noted that the M9 Spur mine workings treatment by consolidation cost approximately £9.0M.

The initial geotechnical assessment concluded that Option 2A and 6A are the preferred options, and Option 8A as being the least preferred option as it involves potentially most mine workings treatment, and is affected by uncertain coal seam positions, and subsequently uncertainty of potential shallow mine workings.

## 4.3 Traffic

### 4.3.1 Existing Traffic Conditions and Base Model

The existing traffic conditions were described based on analysis of traffic surveys carried out in October 2013.

A base model is in development for the scheme which models the AM peak, PM peak and inter-peak models for 2014 base year. Future year traffic growth will be taken from the SEStran regional model SRM12 to growth traffic to 2024.

### 4.3.2 Design Models – Preliminary Traffic Assessment

When considering the base traffic (2014 AM peak), the preliminary traffic assessment found that Option 1A would provide free-flowing traffic. Option 2A would result in queues on the A772 approach to the south dumbbell roundabout. Option 6A and Option 8A would be the same as Option 1A as they would provide free flowing traffic with no queuing. It was noted that all options exhibit benefits over the existing Sheriffhall roundabout when considered against base traffic (2014 AM peak).

The results from the 2007 SEStrans Regional model (SRM) indicated that significant growth up to 40% could occur on parts of the network between 2007 and 2024. The future traffic due to new development will not be confirmed until the new SRM12 model work is complete, expected late summer 2015.

The Sheriffhall study area does not include Straiton or Old Craighall junctions, but the SEStrans SRM model would pick up these junctions and any interactions due to increased throughput at Sheriffhall, as it covers a much wider study area.

In the absence of SRM12 future traffic data, a preliminary traffic assessment was carried out against the base traffic (2014 AM peak) increased by 20% on all movements. This was not intended to indicate growth to a specific year but was intended to test the options against a reasonable level of traffic increase. Details of the model output are as follows. Applying 2014 AM peak traffic plus 20% resulted in gridlock throughout the modelled road network, on the A720 and the local road network. Option 1 would experience congestion on the A7 south approach to Gilmerton Road roundabout but the A720 would operate well. Option 2A showed substantial queuing on the A772 north, A720 eastbound off-slip which extends back onto the A720 mainline, the A772 and the A7. Option 6A would result in queuing on the A720 eastbound off-slip extending back on to the A720 mainline. Option 8A would result in some queuing on the A7 south approach to Gilmerton Road roundabout, with more queuing than Option 1A. It was stressed that future traffic growth from the SRM 2012 future model may have a differential growth pattern.

### 4.3.3 Summary of Key Issues

When considering this initial analysis, Option 2A is felt to be the worst performing option. This is because only one junction is provided at Gilmerton (compared to the other options which provide connection at both Gilmerton and Sheriffhall) resulting in redistribution of traffic due closure of the Sheriffhall Roundabout and redistribution of traffic to the Gilmerton junction. 2014 AM peak traffic would result in some queuing for Option 2A, whereas all other options would have no queuing. 2014 AM peak traffic plus 20% would result in the longest queues for Option 2A, including queuing on the A720 approach to the eastbound diverge, the A772 and A7 South. 2014 AM peak traffic plus 20% would result in less queuing for the other options, with no queuing on the A720 mainline for Options 1A and 8A.

## 4.4 Environmental

The main proposed developments in the area include the South East Edinburgh Strategic Development Area, where a total of 7,800 new homes are committed at Shawfair, Gilmerton, Drum and Newton Farm. Other developments include the Bioquarter, which is an extension to the Edinburgh Royal Infirmary, the Sheriffhall Park and Ride extension, Sheriffhall South and Shawfair Park. There is also greenbelt designation in the study area to consider.

A number of key environmental issues were discussed including several scheduled monuments close to the junction options, a high potential for undiscovered archeology to be present, the Dean Burn which runs through the study area, and a preference for segregated routes for NMUs.

It was noted that although there are several environmental issues, none are considered to prevent the scheme from progressing as it is considered that all environmental impacts can be mitigated against.

It was also noted that although Option 1A and 6A have the smallest requirement for land, with both options indicating the A720 on a raised embankment. The initial assessment has therefore concluded that Options 1A and 6A perform the best in terms of environmental impact, and Option 8A performs less well.

## 4.5 Initial Option Assessment

A discussion followed on some issues raised in the design team's presentation of initial assessment of options. Option 1A was identified as the most preferred option in terms of buildability based on the information currently available.

Concern was voiced about Option 2A and accessibility to the junction for traffic travelling to / from the Edinburgh Royal Infirmary should access be removed at Sheriffhall. The Workshop also noted that the row of houses adjacent to the Gilmerton Junction north roundabout would be bounded by the A720, the A772 Gilmerton Road and the eastbound merge.

TS Standards Branch commented on the large roundabout proposed for Option 6A. The DMRB states that roundabouts should ideally not exceed 100m diameter, and Option 6A had a roundabout of diameter 150m, required to accommodate all the arms on the roundabout. Although the roundabout size was not ruled out, it was considered less preferable in terms of safety compared to the other options due to the high number of conflict points and the potential for high circulatory speeds on the roundabout. It is likely that signalisation of the roundabout would be required, which would be a potential benefit in that this would offer greater control as traffic flows increased. It was noted that Option 6A had the smallest land take footprint but is the most expensive.

Option 8A is the most constrained in terms of tying into the existing road network therefore it has more departures in horizontal geometry. Option 8A has the highest risk associated with ground conditions due to its location and uncertainty about the position of disused mineshafts.

## 4.6 Initial Option Assessment – Environment

The agreed weighted evaluation criteria were used to assess the junction options against the main government appraisal criteria.

### 4.6.1 Minimise Intrusion of Works on Natural Environment

Schemes with larger footprints were considered to be more intrusive. Option 6A has a greater visual impact than Option 1A and Option 2A was considered to have a more significant impact on the Special Landscape area. Options 1A and 6A have less impact on the Dean Burn and all options are likely to have impact on protected species with Option 8A considered to have the greatest impact on ecological receptors. The Workshop therefore considered Option 1A to be the best option and allocated a score of ten. Option 6A was allocated a score of nine, a score of eight was allocated to Option 8A and seven to Option 2A.

### 4.6.2 Minimise Intrusion of Works on Cultural Heritage

Option 6A has the smallest footprint and therefore is considered to be the best option so was allocated a score of ten. Option 2A is close to a scheduled monument at Gilmerton which could result in a major impact on setting. Option 2A also has the largest footprint and therefore greater risk of exposing undiscovered archaeology. Therefore Option 2A was allocated a score of four. Option 1A and 8A were felt to be similar, though as Option 8A is offline was considered to be second worst due to the close proximity (and potential direct impact on) the Category A listed Kings Gate and Walls of Dalkeith Country Park. Therefore, Option 1A was allocated a score of eight, and Option 8A was allocated a score of six.

### 4.6.3 Minimise Intrusion of Works on People

Option 6A has the smallest footprint therefore is considered the best option although it does impact on the allocated Shawfair Park extension but to a lesser extent than Option 1A. Therefore Option 6A was allocated a score of ten, and Option 1A was allocated a score of eight. Option 2A significantly impacts on four properties at Gilmerton which could potentially affect the deliverability of the scheme. Option 8A causes severance to Summerside property due to the realignment of the A7 north and A6106 Millerhill Road. Therefore Option 2A and 8A were both allocated a score of four.

#### **4.6.4 Enhance Local Environment where Opportunities Arise**

Option 6A is the most compact so has fewest environmental issues to deal with so was considered the best option and allocated a score of ten. All other options were considered to be equal and were each allocated a score of nine.

### **4.7 Initial Option Assessment – Safety**

#### **4.7.1 Improve Safety for All Users**

Option 6A was considered to be the worst option as the roundabout diameter proposed is larger than that recommended in DMRB, there were safety concerns associated with roundabout conflict points and the potential for high circulatory speeds. Therefore Option 6A was allocated a score of four. The preliminary traffic assessment of the 2014 AM peak traffic plus 20% indicated that Option 2A and 6A would result in queuing on the slip roads back on to the A720. Option 1A was considered to be the best option, followed by Option 8A as both provided free flowing traffic on the A720 with no queues. Therefore, Option 1A was allocated a score of ten, Option 8A was allocated a score of nine, and Option 2A was allocated a score of six.

### **4.8 Initial Option Assessment – Economy**

#### **4.8.1 Improve Movement of Traffic on A720**

It was agreed that all options would improve A720 mainline traffic flow, however Option 2A and to a lesser extent Option 6A show queues from the slip roads backing on to the A720 when considering the 2014 AM peak traffic plus 20%. Option 2A is felt to be the worst option and was therefore allocated a score of eight, Option 6A was considered to be the second worst option and allocated a score of nine. Options 1A and 8A were considered to be better and equal and therefore each allocated scores of ten.

#### **4.8.2 Improve Traffic Access to/from Local Road Network**

With the exception of Option 2A, all options provide grade separation at Sheriffhall and retain the existing Gilmerton junction. Option 1A and 8A were considered to be equal and best options as no queuing is expected when considering 2014 AM peak traffic plus 20%. Option 2A is considered to be the worst option as 2014 AM peak traffic plus 20% results in queues on the A772, A720 and A7 south. Therefore, Option 1A and 8A were each allocated scores ten. Option 6A was allocated a score of nine, and Option 2A was allocated a score of six.

#### **4.8.3 Minimise Delays during Construction**

Option 2A was considered to be the easiest option to phase and construct and therefore was allocated a score of ten. Option 1A and 6A would be more difficult to construct as they both have the A720 on embankment. Option 6A involves more work online within the existing highway boundary and was therefore considered the worst option and allocated a score of five. Option 8A provides a junction west of the existing junction and therefore was allocated a score of nine. Option 1A was allocated a score of six.

#### **4.8.4 Minimise Impact of Local Proposed Development Traffic on A720 and Approach Roads**

Options 1A and 8A were considered to be the best options as both provide high capacity dumbbell grade separation at Sheriffhall. Options 1A and 8A were both allocated a score of ten. Option 6A was considered to be less efficient than options 1A and 8A as queues are expected on approach to the eastbound diverge when considering 2014 AM peak traffic plus 20%. Therefore Option 6A was allocated a score of nine. Option 2A was considered to be the worst option as it has less direct access to A720 due to the Sheriffhall effectively being relocated to Gilmerton, which is a greater distance from the large scale development proposed at Shawfair. When considering 2014 AM peak traffic plus 20%, queues were expected on the A772, A720 approach to the eastbound diverge, and the A7 South. Therefore, Option 2A was allocated a score of five.

#### **4.8.5 Improve Traffic Movement along A7 / A6106**

Option 2A offers the best provision for the A7 and A6106, although the realigned A7 would have have two roundabouts it would carry less traffic, therefore Option 2A was allocated a score of ten. Option 8A would provide three roundabouts on the realigned A7 and was considered to be the worst option and was therefore allocated a score of eight. Option 1A and option 6A were considered to be equal and were therefore both allocated a score of nine.

#### **4.8.6 Improve Traffic Movement along A772**

When considering 2014 AM peak traffic, Option 2A would result in queuing on the A772, with more severe delays when considering 2014 AM peak traffic plus 20%. Therefore Option 2A was considered to be the worst option and allocated a

score of two. There were no changes to the A772 traffic movement for Options 1A, 6A and 8A, therefore they were considered to be the best and equal and each allocated a score of ten.

## **4.9 Initial Option Assessment – Accessibility**

### **4.9.1 Improve Accessibility across the A720 – NMUs**

Option 6A was considered to be the worst option as the large roundabout makes dedicated NMU crossings more difficult to implement. Therefore, Option 6A was allocated a score of eight. All other options were considered better than Option 6A and equal, and therefore were each allocated a score of ten.

### **4.9.2 Improve Accessibility across the A720 – Public Transport**

Option 2A was considered to be the worst option due to less direct access to Shawfair from the A720, therefore Option 2A was allocated a score of eight. All other options were considered to be better than Option 2A and equal, and therefore were each allocated a score of ten.

## **4.10 Initial Option Assessment – Integration**

### **4.10.1 Facilitate Integration with Public Transport along A720**

All options were considered to be equal as all have been designed with additional width/span to accommodate the orbital bus. As all options were felt to perform equally against this evaluation sub-criteria, all options were allocated a score of ten.

### **4.10.2 Facilitate Integration with Shawfair Park and Ride**

Option 2A is considered to be the worst option as it removes access to/from the A720 at Sheriffhall which results in a less direct access to Shawfair park and ride facility from the new junction at Gilmerton. All other options were considered to be equal and best. Therefore, Option 2A was allocated a score of five, and all other options were allocated a score of ten.

### **4.10.3 Reduce Conflict between Strategic and Local Traffic**

Option 2A was considered to be the worst option as it would increase the interaction between strategic and local traffic. All other options were considered to be equal. Therefore, Option 2A was allocated a score of eight, and all other options were allocated score of ten.

## 4.11 Initial Option Assessment – Summary of Scores

A summary of the scores allocated to the junction options for each sub-criteria is summarised in the table below.

Topic	Sub-Objective	Option 1A	Option 2A	Option 6A	Option 8A
Environment	minimise intrusion of works on natural environment	10	7	9	8
	minimise intrusion of works on cultural heritage	8	4	10	6
	minimise intrusion of works on people	8	4	10	4
	enhance local environment where opportunities arise	9	9	10	9
Safety	Improve road safety for all users	10	6	4	9
Economy	Improve movement of traffic on A720	10	8	9	10
	Improve traffic access to / from local road network	10	6	9	10
	Minimise delays during construction	6	10	5	9
	Minimise impact of local proposed development traffic on A720 and approach roads	10	5	9	10
	Improve traffic movement along A7 / A6106	9	10	9	8
	Improve traffic movement along A772	10	3	10	10
Accessibility	Improve accessibility across the A720 – NMUs	10	10	8	10
	Improve accessibility across the A720 – public transport	10	8	10	10
Integration	Facilitate integration with public transport along A720 - NMUs	10	10	10	10
	Facilitate integration with Shawfair park and ride	10	5	10	10
	Reduce conflict between strategic and local traffic	10	8	10	10

The function score is a total of all the weighted scores, given as a total score out of a possible maximum of 100.

The final weighted scores are detailed in full in Appendix A. A summary of the weighted scores are shown in the table below.

Topic	Option 1A	Option 2A	Option 6A	Option 8A
Environment	17.5	12.0	19.5	13.5
Safety	20.0	12.0	8.0	18.0
Economy	18.3	14.0	17.0	19.0
Accessibility	20.0	18.0	18.0	20.0
Integration	20.0	15.3	20.0	20.0
Function Score	95.8	71.3	82.5	90.5
Cost	£65.5M	£56.3M	£75.4M	£53.4M

## 4.12 Initial Option Assessment – Conclusion

The Workshop agreed that based on the output from the evaluation exercise, Option 2A should be sifted out and not taken forward for further Stage 2 Assessment. Option 2A had a low function score as it did not meet the evaluation criteria sub-objectives sufficiently. The Workshop felt that the issues associated with Option 2A cannot be mitigated as the main issues are a result of merging two junctions into one at Gilmerton. It was also noted that the option did not perform well when the existing 2014 traffic was applied.

## 5 Risk and Value Management

It was agreed that the next VM Workshop (VfM2b) would include a full risk identification and assessment session.

Similarly, it was agreed that a Value Management review would be fully discussed at the next VM Workshop (VfM2b).

## 6 Stage 3 Issues

At the time of the workshop, the DMRB Stage 2 Scheme Assessment Report delivery was programmed for October 2015, with a TS IDM presentation thereafter. Stage 3 would then commence subject to agreement.

It was noted that the Stage 3 key issues will include:

- GI to be undertaken
- Public Exhibition on announcement of Preferred Option
- More detailed design of the Preferred Option, including more detailed environmental assessment, preparation of draft Roads Orders and Environmental Statement.
- These will be discussed in more detail at the next VM Workshop (VfM2b).

## 7 Conclusions and Further Work

The Workshop agreed that Option 2A is to be sifted out, and therefore will not progress through the remainder of the Stage 2 Scheme Assessment.

Traffic and SRM12 future traffic forecasts is a programming issue, delays in receiving the future traffic from SRM12 will impact on the Stage 2 Scheme Assessment delivery date. The workshop agreed that existing traffic data should be used whilst awaiting SRM12 data. AECOM to work with the SRM team to agree the best way forward on traffic assessment.

AECOM are to develop construction phasing proposals to inform the buildability assessment.

AECOM to consider proposals for NMU / pedestrian provisions in more detail at Stage 2.

A Stage 2 Workshop is to be held with the third party Stakeholders.

The second Stage 2 Value Management Workshop (VfM2b) must ensure adequate time is allowed for risk and value management review.

# **Appendix A. Value Management Workshop (VfM2a)**

*Value Management Workshop (VfM2a)*

- *Workshop Presentation Slides*

# A720 Sheriffhall Roundabout Stage 2 Value Management Workshop

VFM2 facilitator – Alan Frew

26<sup>th</sup> March 2015



## Agenda

- 9.15am *Tea / Coffee*
- 9.30am Introduction
  - Safety Moment
  - Purpose of Workshop
- 9.45am Scheme Development
- 10.00am Develop Evaluation Criteria for selection of Preferred Option
- 10.45am Initial Option Assessment & Sifting
  - Engineering, Geotechnical, Traffic, Environmental
- 12.30pm *Lunch - short break*
- 1.00pm Risk Identification and Assessment
- 1.30pm Value Management
- 2.00pm Stage 3 Key Issues
- 2.15pm *Close*

A720 Sheriffhall Roundabout - VFM2 Workshop Page 2



## Workshop Rules

- Everybody contributes fully
- Political and seniority barriers are ignored
- Everyone tables all their ideas or reservations on every issue
- The focus of the discussions is maintained without diversions
- The correct level of detail is maintained without dropping into too much detail or glossing over important items
- It is a 'No Blame' culture. We are looking for participants, not victims.

A720 Sheriffhall Roundabout - VFM2 Workshop Page 3



# Introduction

## Introductions

<p><u>Transport Scotland</u></p> <ul style="list-style-type: none"> <li>• Duncan McCallum (Project Director)</li> <li>• Andy Anderson (Project Manager)</li> <li>• Marco Bardelli (Area Manager)</li> <li>• John MacDonald (Transport Planning)</li> <li>• Stuart Wilson (Development Management)</li> <li>• Adam Priestly (Technical Analysis)</li> <li>• David Anderson (Acting Director MTRIPS)</li> <li>• Sinead Thom (Environment)</li> <li>• John Flynn (Standards Branch)</li> <li>• Patrick Brassil (Standards Branch)</li> <li>• Peter Ritchie (Construction Branch)</li> <li>• Paul Mellon (Geotechnical)</li> </ul>	<p><u>AECOM</u></p> <ul style="list-style-type: none"> <li>• Ryan Hutchison (Project Director)</li> <li>• Jill Irving (Project Manager)</li> <li>• Russell Bissland (Traffic &amp; Economics)</li> <li>• Andrew Simpson (Traffic &amp; Economics)</li> <li>• Stewart Proud (Geotechnical)</li> <li>• Catriona Fisher (Geotechnical)</li> <li>• Zoe McClelland (Environmental)</li> <li>• Nigel Hackett (Landscape)</li> <li>• Steven Smith (Roads)</li> </ul> <p style="text-align: center;">• Alan Frew – Workshop Facilitator</p>
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## Safety Moment



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### Purpose of VFM2 Workshop

VM Manual, VFM2 Workshop Objectives

- Structured discussion and brainstorming to assess the progress of the study against Objectives set at VFM1 Workshop
- Identification of options worthy of further consideration
- Discard unsuitable Options and agree which set of options require development during Stage 3
- Identify key risks to the Scheme and assess if possible
- Outline scope of Stage 3 Assessment

Scheme Stage	Studies / Reviews	Duration	Workshop Objectives
<b>Stage 1 - Preliminary Assessment</b>			
Inception Workshop	Value Management	1/2 day Workshop	Comments on the need for scheme and scheme objectives
Feasibility: After initial investigation of route corridors.	Value Management (VFM1)	1 day Workshop	Confirm options for development strategy Identify Risks
<b>Stage 2 - Route Option Assessment</b>			
Before identification of Preferred Route	Value Management (VFM2)	1 - 2 days Workshop	Confirm objectives and reach agreement on preferred option. Assess Risks.
<b>Stage 3 - Preferred Route</b>			
Before Publication of Draft Orders and Engineering commencement of full detailed design.	Value Management (VFM3)	1 - 2 days Workshop	Review scheme objectives and reach agreement on preferred route design. Analyse Risks and develop Risk Plan.

Table 1: Outline Procedures, The Value for Money Manual



## Scheme Development

### Project Background

- Six-arm roundabout at the junction of A720 and A7
- Sheriffhall Roundabout is the only at grade junction on the A720
- Various improvements have been implemented including signalisation, localised widening and additional lanes
- Road network at junction operating close to capacity and is severely congested at peak times
- Extensive plans for future residential and business development



### The Scheme

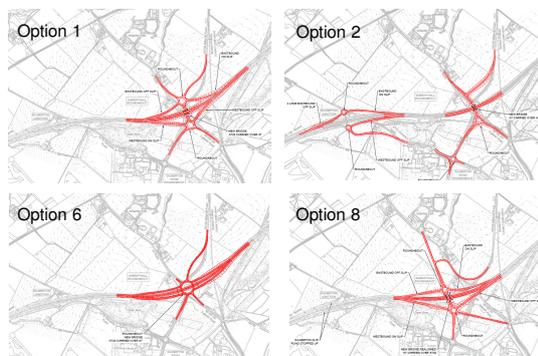
- AECOM (then URS) appointed in June 2013 to undertake DMRB Stage 1 Scheme Assessment.
- Stage 1 looked at 8 junction options
  - 6 Options considered in the 2007 study
  - 2 Options as agreed at Inception Workshop in September 2013
- Stage 1 concluded September 2014 recommending that 4 options go forward to Stage 2 Scheme Assessment
- Stage 2 Scheme Assessment ongoing, delivery of Stage 2 Report programmed for October 2015
- Stage 3 programmed to commence in October 2015 on progression through IDM presentation and subject to funding



### Study Area



### Scheme Options - Stage 1



### Scheme Development – Stage 2 Assessment

- AECOM is required to undertake the DMRB Stage 2 assessment to identify the optimum grade separated junction improvement at Sheriffhall Roundabout
- Stage 2 Scheme Assessment ongoing
- Delivery of Stage 2 Report programmed for October 2015

## Develop Evaluation Criteria

### Objectives

- Improve the movement of traffic on the A720 between Gilmerton and Old Craighall by providing grade-separation of the A720 at the existing Sheriffhall Roundabout
- Reduce the conflict between strategic and local traffic
- Minimise traffic impact of local proposed developments in Midlothian, East Lothian and City of Edinburgh on the A720 between Gilmerton Junction and Old Craighall Junction and approach roads
- Improve road safety for all users on the A720 and approach roads between Gilmerton Junction and Dalkeith Northern Bypass
- Minimise intrusion of the new works on the natural environment, cultural heritage and people whilst enhancing the local environment where opportunities arise
- Facilitate integration for different modes of transport along and across the A720 corridor between Gilmerton Junction and the Dalkeith Northern Bypass
- Reduce severance by improving accessibility across the A720 for all users

### Objectives – Stage 1 Assessment

OBJECTIVE	Option 1	Option 2	Option 6	Option 8
Improve the movement of traffic on the A720 between Gilmerton and Old Craighall by providing grade-separation of the A720 at the existing Sheriffhall Roundabout	✓	✓	✓	✓
Reduce the conflict between strategic and local traffic	✓	✓	✓	✓
Minimise traffic impact of local proposed developments in Midlothian, East Lothian and City of Edinburgh on the A720 between Gilmerton Junction and Old Craighall Junction and approach roads	✓	✗	✓	✓
Improve road safety for all users on the A720 and approach roads between Gilmerton Junction and Dalkeith Northern Bypass	✓	✓	✓	✓
Minimise intrusion of the new works on the natural environment, cultural heritage and people whilst enhancing the local environment where opportunities arise	✓	✓	✓	✗
Facilitate integration for different modes of transport along and across the A720 corridor between Gilmerton Junction and the Dalkeith Northern Bypass	✓	✗	✓	✓
Reduce severance by improving accessibility across the A720 for all users	✓	✓	✓	✓

### Develop Evaluation Criteria

#### Discussion

- Main Government Appraisal Criteria

*Environment – Safety – Economy – Accessibility – Integration*

- Base the evaluation criteria on the Scheme Objectives, which are split down into sub-objectives

### Develop Evaluation Criteria

TOPIC	OBJECTIVE	EVALUATION SUB-OBJECTIVE	WEIGHTING
ENVIRONMENT	E. Minimise intrusion of the new works on the natural environment, cultural heritage and people whilst enhancing the local environment where opportunities arise	minimise intrusion of works on natural environment	
		minimise intrusion of works on cultural heritage minimise intrusion of works on people enhance local environment where opportunities arise	
SAFETY	D. Improve road safety for all users on the A720 and approach roads between Gilmerton Junction and Dalkeith Northern Bypass	improve safety for all users	
ECONOMY	A. Improve the movement of traffic on the A720 between Gilmerton and Old Craighall by providing grade-separation of the A720 at the existing Sheriffhall Roundabout	improve movement of traffic on A720	
		improve traffic access to / from local road network minimise delays during construction	
		C. Minimise traffic impact of local proposed developments in Midlothian, East Lothian and City of Edinburgh on the A720 between Gilmerton Junction and Old Craighall Junction and approach roads	minimise impact of local proposed development traffic on A720 and approach roads improve traffic movement along A7 / A6106 improve traffic movement along A720
ACCESSIBILITY	G. Reduce severance by improving accessibility across the A720 for all users	improve accessibility across the A720 - NMUs improve accessibility across the A720 - public transport	
INTEGRATION	F. Facilitate integration for different modes of transport along and across the A720 corridor between Gilmerton Junction and the Dalkeith Northern Bypass B. Reduce the conflict between strategic and local traffic	Facilitate integration for different modes of transport along and across A720	
		reduce conflict between strategic and local traffic	

# Initial Option Assessment & Sifting

## Initial Option Assessment

Aim

- Review options against evaluation criteria
- Can any options be sifted?

### Project Development – Options

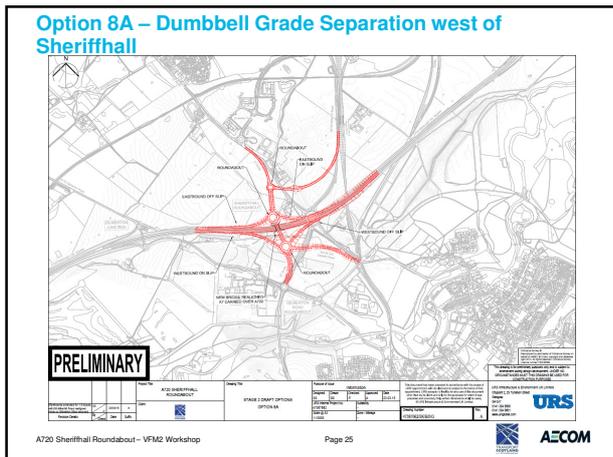
Engineering:

- MX modelling of 4 junction layouts complete
  - Option 1 developed into Option 1A
  - Option 2 developed into Option 2A
  - Option 6 developed into Option 6A
  - Option 8 developed into Option 8A
- Preliminary review of Geometry Standards
- Preliminary Cost Estimates prepared
- Stakeholder Consultation

### Option 1A – Dumbbell Grade Separation at Sheriffhall

### Option 2A – all slips provided at Gilmerton, no connection at Sheriffhall

### Option 6A – Grade Separation at Sheriffhall



### Option Assessment - Preliminary Cost Estimate

Option	Option 1A	Option 2A	Option 6A	Option 8A
Prelims (30%)	£9.18M	£7.68M	£11.11M	£7.77M
Pavement & Ancillaries	£6.76M	£8.57M	£6.37M	£6.22M
Earthworks & Landscaping	£12.92M	£9.77M	£10.81M	£9.65M
Mine Workings Treatment	£5.45M	£3.34M	£3.56M	£7.53M
Structures	£4.58M	£3.18M	£15.25M	£1.77M
Accommodation Works	£0.88M	£0.73M	£1.06M	£0.74M
<b>Roadworks Sub-total</b>	<b>£30.59M</b>	<b>£25.59M</b>	<b>£37.05M</b>	<b>£25.90M</b>
Statutory Undertakers	£3.06M	£2.56M	£3.70M	£2.59M
Contingencies (10%)	£4.28M	£3.58M	£5.19M	£3.63M
<b>Civils Total</b>	<b>£47.11M</b>	<b>£39.41M</b>	<b>£57.05M</b>	<b>£39.88M</b>
Optimism Bias (15% Roads, 23% Bridges)	£4.95M	£4.09M	£6.78M	£4.02M
<b>Construction Total</b>	<b>£52.06M</b>	<b>£43.50M</b>	<b>£63.83M</b>	<b>£43.90M</b>
Land (Including OB at 15%)	£5.38M	£5.85M	£2.35M	£2.89M
<b>Construction &amp; Land Total</b>	<b>£57.45M</b>	<b>£49.35M</b>	<b>£66.17M</b>	<b>£46.80M</b>
Preparation (9%)	£5.17M	£4.44M	£5.96M	£4.21M
Supervision (5%)	£2.87M	£2.47M	£3.31M	£2.34M
<b>Total Scheme Cost</b>	<b>£65.49M</b>	<b>£56.26M</b>	<b>£75.44M</b>	<b>£53.35M</b>

Costs Q4 2 / 2013

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AECOM

### Option Assessment - Engineering

- Preliminary review of standard of geometry
- Footprint area
- Buildability
- Cost

Engineering	Option 1A	Option 2A	Option 6A	Option 8A
Geometry	1 departure 0 relaxations (wb diverge)	2 departures 1 relaxation (A7 bridge, Millerhill Rd)	1 departure 2 relaxations (Millerhill Rd)	1 departure 3 relaxations (A7 North, A7 South, Millerhill Rd)
Footprint Area	19.16Ha	27.42Ha	17.55Ha	18.98Ha
Buildability	A720 • Online • Embankment	A720 • Online • At-grade	A720 • Online • Embankment	A720 • Online • At-grade
Cost	£65.49M	£56.26M	£75.44M	£53.35M

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### Option Assessment – Stakeholder Consultation

#### Stage 2 Stakeholder Consultation

Over 60 Environmental and Engineering stakeholders contacted

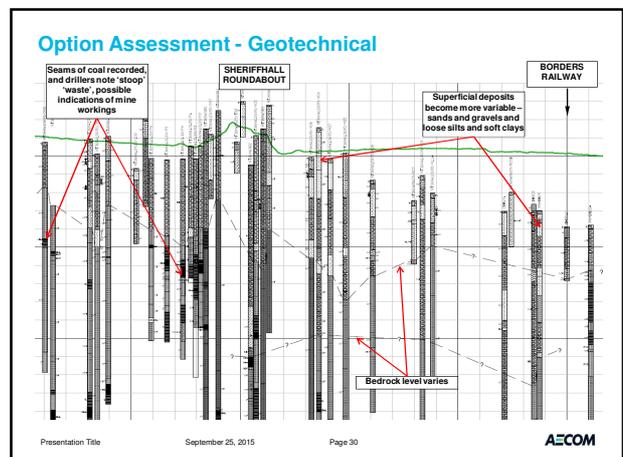
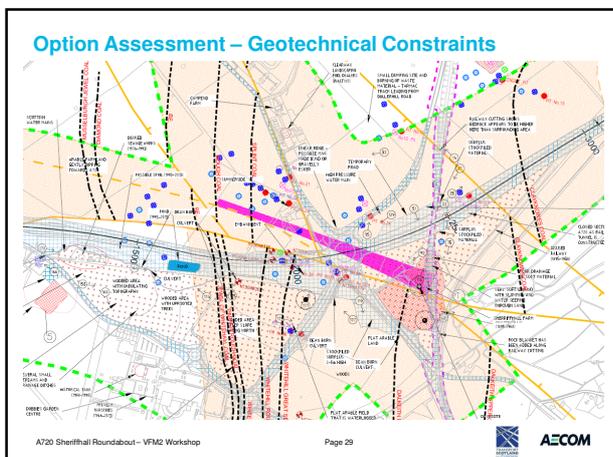
10 responses to date:

- Buccleuch Estates
- City of Edinburgh Council
- East Lothian Council, Environment
- East Lothian Council, Transport
- Historic Scotland
- Road Haulage Association
- Scottish Natural Heritage
- SEPA
- Sustrans
- Transport Scotland
- Visit Scotland

Correspondence also received from local landowners.

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### Option Assessment - Geotechnical

- Coal seam outcrops (old County Series map or new BGS Geology sheet) could affect mine workings treatment cost.
- Option 8A is most at risk – see comparison below.



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### Option Assessment - Geotechnical

Geotechnical	Option 1A	Option 2A	Option 6A	Option 8A
Cuttings	4	2	1	3
Embankments	=2	1	=2	=2
Mine Workings	£2.8m to £4.08m	£1.84m	£1.26m - £2.35m	£4.17m to £8.12m
Mine Entries	16	12	14	11
	3	=1	=1	4

KEY TO SCORING: 1 = Good Score 4 = Poor Score

- Cuttings: Option 1A and Option 8A are less preferable due to deeper cuttings, possibly more loose/soft soils and possible high groundwater.
- Embankments: All options are similar.
- Mine Workings: Option 8A is least preferred as it involves potentially most mine workings treatment, and is more affected by uncertain geology.
- Mine Entries: All options are similar.

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### Option Assessment - Traffic

- Existing Traffic Conditions
- Base Model
- Design Models - Preliminary Traffic Assessment
- Summary of Key Issues

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### Option Assessment - Traffic

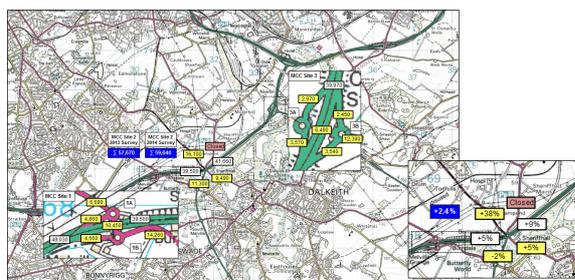
- Existing Traffic Conditions
- Manual and Automatic Traffic Count Surveys (October 2014)



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### Option Assessment - Traffic

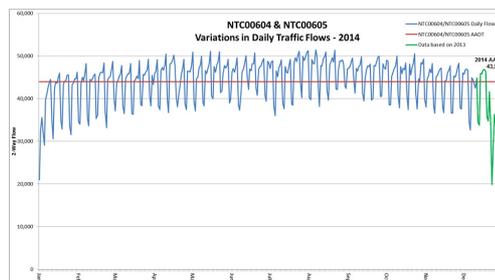
- Existing Traffic Conditions
- Observed 12-Hour Traffic Flows and Effects of A6106 Closure



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### Option Assessment - Traffic

- Existing Traffic Conditions
- A720 Long-term 24-Hour Traffic Flows, west of Sheriffhall R/b

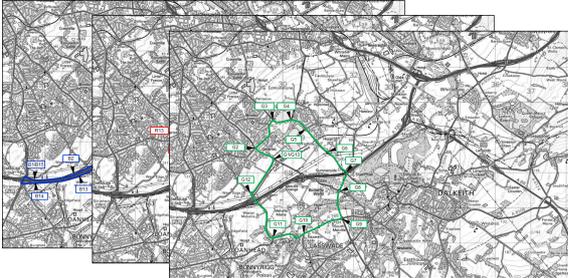


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### Option Assessment - Traffic

Existing Traffic Conditions

- Journey Time Surveys (October 2014)



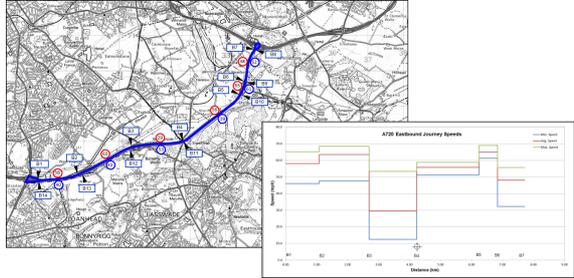
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### Option Assessment - Traffic

Existing Traffic Conditions

- 12-Hour Average Vehicle Speeds Profiles (mph) and Variations



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### Option Assessment - Traffic

- Existing Traffic Conditions
- Base Model
- Design Models - Preliminary Traffic Assessment
- Summary of Key Issues

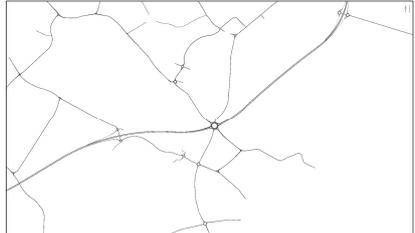
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### Option Assessment - Traffic

Base Model – Paramics Micro Simulation Model

- Developing AM peak, Inter-peak and PM peak models for 2014 Base Year
- Matrix Estimation Techniques to Derive Local Trip Patterns in 2014
- Future Year Traffic Growth from SEStran Regional Model (SRM12) to 2024



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### Option Assessment - Traffic

Base Model – Paramics Micro Simulation Model

- 2014 Modelled AM Peak Hour (07:30 to 08:30) Traffic Flow Bandwidths
- 5,500 strategic and local traffic movements converge at Sheriffhall R/b in AM Peak Hour.



Traffic Distribution

- 2670 A720 through movements (49%)
- 1730 A720 on/off movements (31%)
- 1090 local movements (20%)

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### Option Assessment - Traffic

Base Model – Paramics Micro Simulation Model

- 2014 Modelled PM Peak Hour (16:30 to 17:30) Traffic Flow Bandwidths
- 5,600 strategic and local traffic movements converge at Sheriffhall R/b in PM Peak Hour.

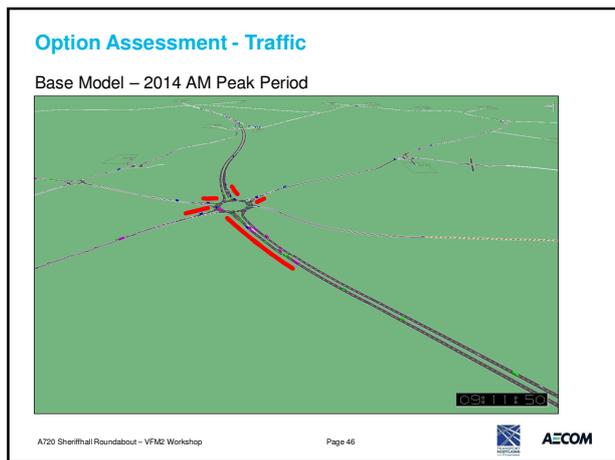
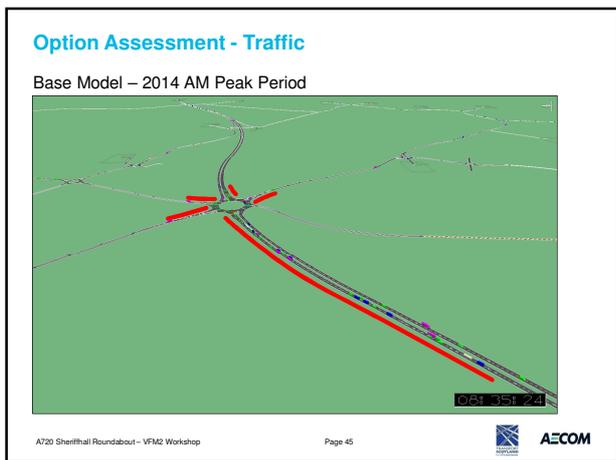
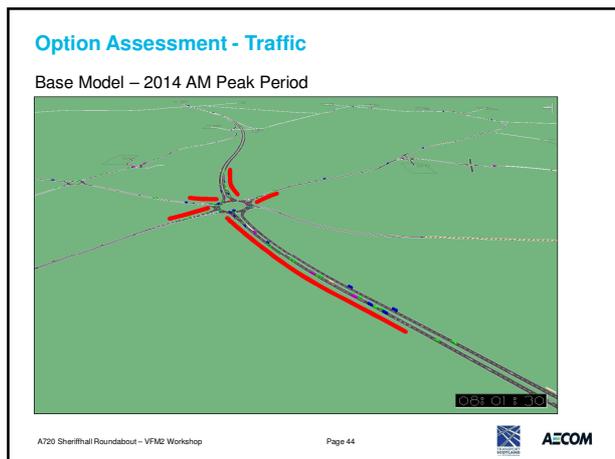
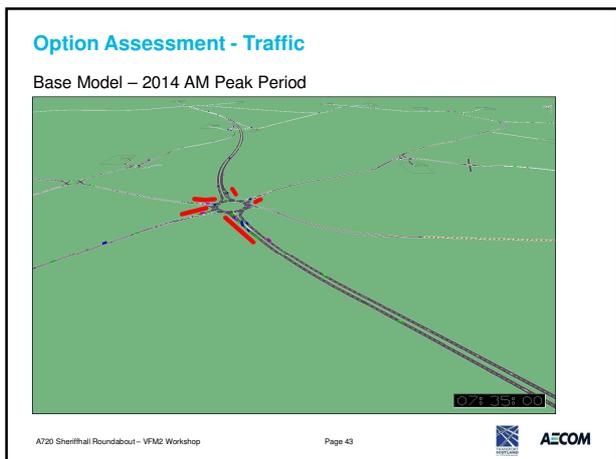


Traffic Distribution

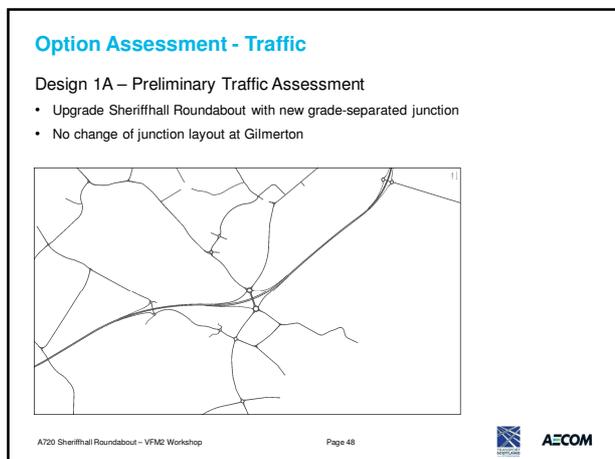
- 2980 A720 through movements (54%)
- 1730 A720 on/off movements (31%)
- 850 local movements (15%)

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- Option Assessment - Traffic**
- Existing Traffic Conditions
  - Base Model
  - Design Models - Preliminary Traffic Assessment
  - Summary of Key Issues
- A720 Sheriffhall Roundabout – VF22 Workshop Page 47
- 



**Option Assessment - Traffic**

Design 1A – Preliminary Assessment, 2014 AM Peak Period



Aerial map showing traffic flow for Design 1A. The map features a central roundabout and several roads extending from it. Green shaded areas are overlaid on the map, representing different assessment zones or traffic flow paths. The map is oriented with North roughly at the top.

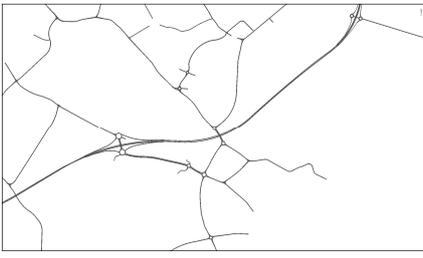
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**Option Assessment - Traffic**

Design 2A – Preliminary Traffic Assessment

- Removal of Sheriffhall Roundabout
- Provision of full grade-separated junction at Gilmerton



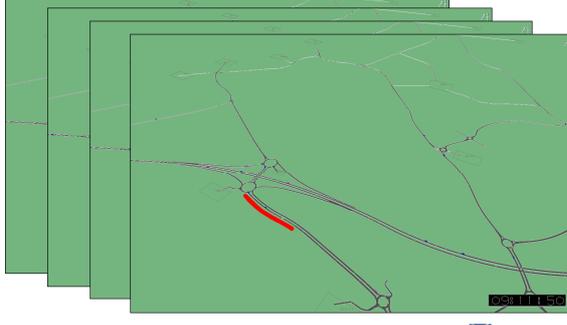
Schematic diagram of a road network. It shows a central junction where multiple roads meet. The roads are represented by simple black lines on a white background. The layout is similar to the aerial map in Design 1A but without the green overlays.

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**Option Assessment - Traffic**

Design 2A – Preliminary Assessment, 2014 AM Peak Period



Aerial map showing traffic flow for Design 2A. Similar to Design 1A, it features a central roundabout and roads. Green shaded areas are present, and a specific section of a road is highlighted in red, likely indicating a key feature or change in the design.

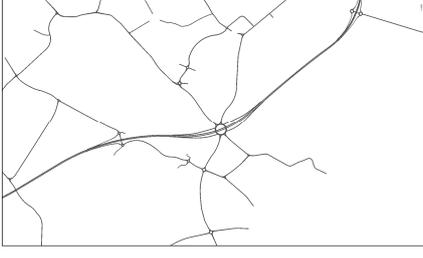
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**Option Assessment - Traffic**

Design 6A – Preliminary Traffic Assessment

- Upgrade Sheriffhall Roundabout with new grade-separated junction
- No change of junction layout at Gilmerton



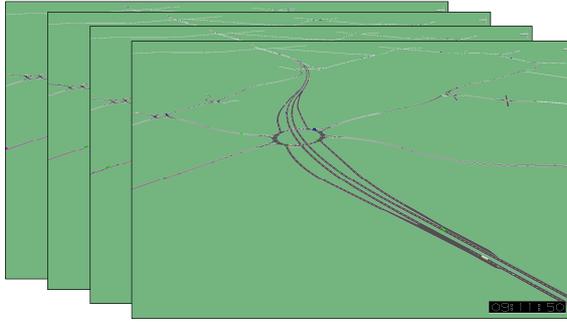
Schematic diagram of a road network, similar to Design 2A. It shows a central junction with multiple roads. The layout is consistent with the other designs, showing the relative positions of the roads.

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**Option Assessment - Traffic**

Design 6A – Preliminary Assessment, 2014 AM Peak Period



Aerial map showing traffic flow for Design 6A. It features a central roundabout and roads with green shaded assessment areas overlaid. The map is similar to Design 1A and 2A.

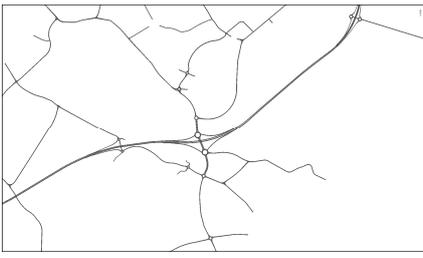
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**Option Assessment - Traffic**

Design 8A – Preliminary Traffic Assessment

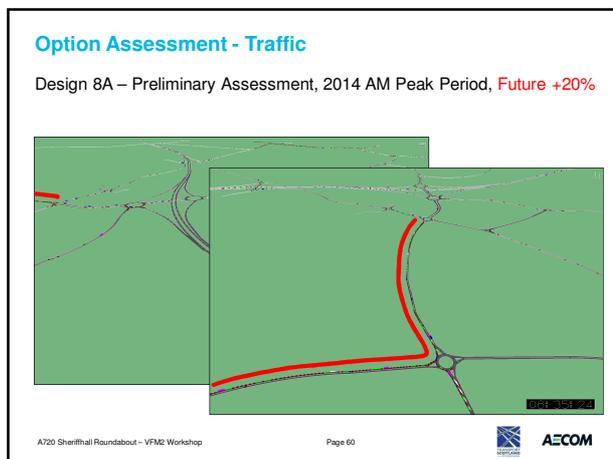
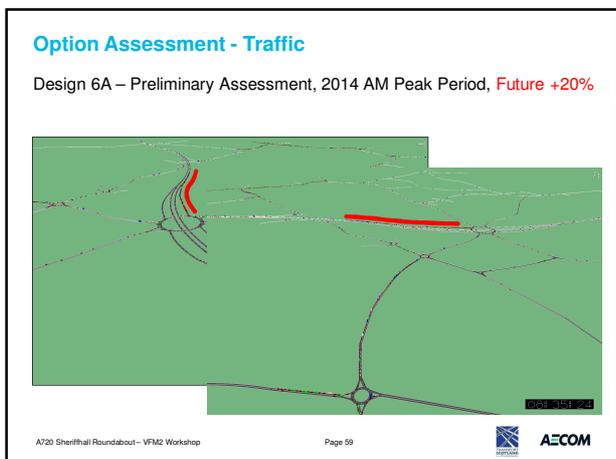
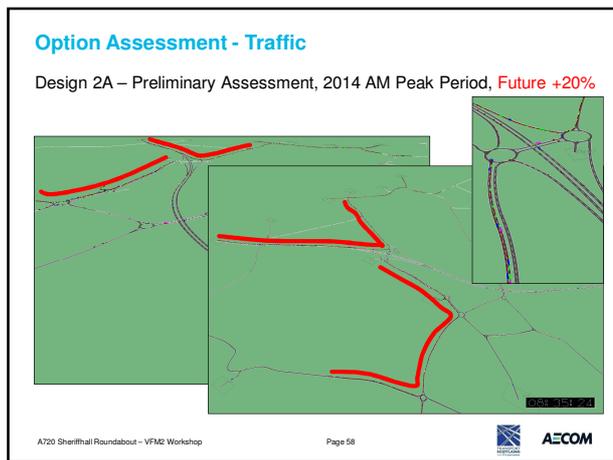
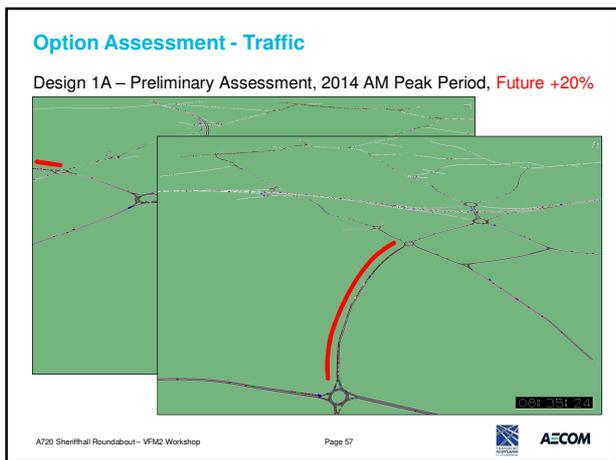
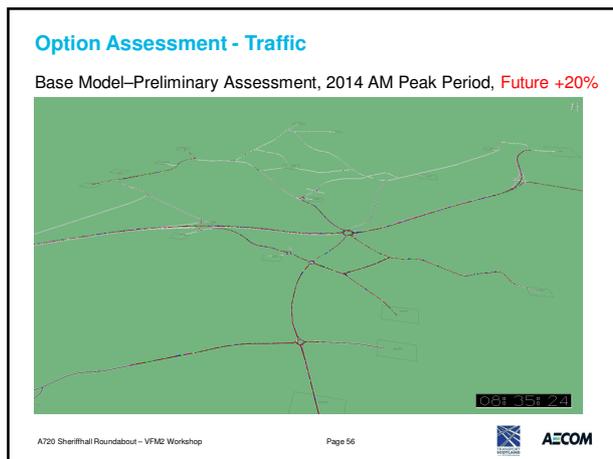
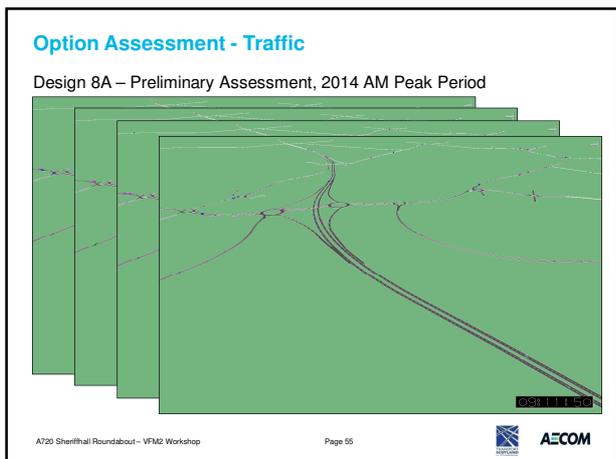
- Upgrade Sheriffhall Roundabout with new grade-separated junction (west)
- No change of junction layout at Gilmerton



Schematic diagram of a road network, similar to Design 6A. It shows a central junction with multiple roads. The layout is consistent with the other designs.

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### Option Assessment - Traffic

- Existing Traffic Conditions
- Base Model
- Design Models - Preliminary Traffic Assessment
- Summary of Key Issues

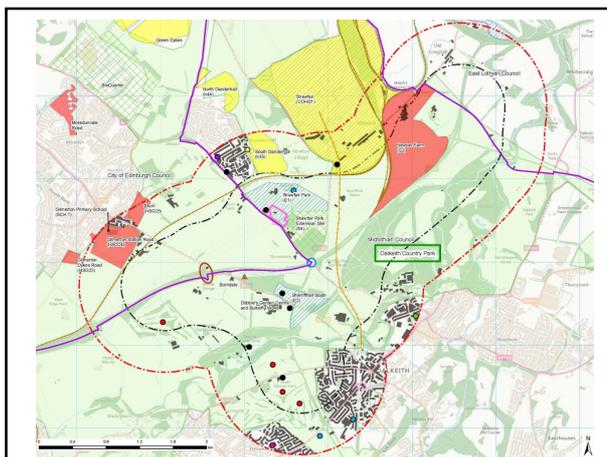
### Option Assessment - Traffic

#### Summary of Key Issues

Traffic	Option 1A	Option 2A	Option 6A	Option 8A
A720 mainline traffic flow.	Improved by removal of at-grade jcn. ✓	Improved by removal of at-grade jcn. ✓	Improved by removal of at-grade jcn. ✓	Improved by removal of at-grade jcn. ✓
A720 access arrangements	Improved at Sheriffhall + retain Gilmerton. Two junctions. ✓	No access at Sheriffhall. Gilmerton access only – heavily trafficked. X	Improved at Sheriffhall + retain Gilmerton. Two junctions. ✓	Improved at Sheriffhall + retain Gilmerton. Two junctions. ✓
Minimise impact of proposed developments.	Replace congested at-grade r/b with higher capacity GS jcn. ✓	Remove congested at-grade r/b. Dev traffic need to travel greater distance to improved GS jcn at Gilmerton – X	Replace congested at-grade r/b with higher capacity GS jcn. ✓	Replace congested at-grade r/b with higher capacity GS jcn. ✓
Local Roads - A7/A6106 Sheriffhall	Replace existing r/b, 2 r/b's on A7/A6106 ✓	Replace existing r/b, 2 r/b's on A7/A6106, but less traffic. A772 heavily trafficked X	Replace existing r/b, 1 r/b on A7/A6106 ✓	Replace existing r/b, 3 r/b's on A7/A6106 ✓
- A772 Gilmerton	A772 no change ✓	A772 heavily trafficked X	A772 no change ✓	A772 no change ✓

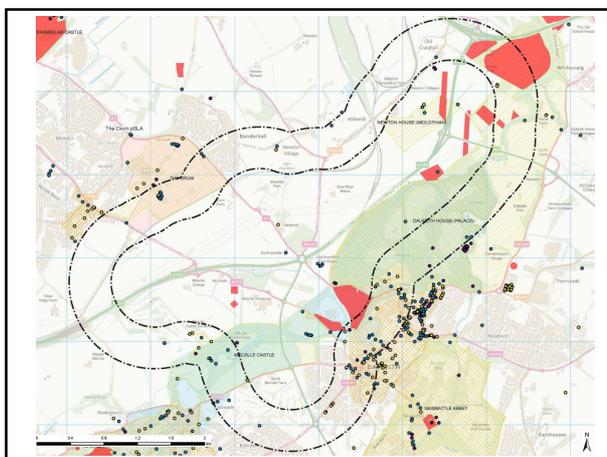
### Policy context

- South East Edinburgh Strategic Development Area** – 7,800 new homes committed – Shawfair new settlement, Danderhall, Gilmerton, Drum and Newton Farm
- Bioquarter** – extension to Edinburgh Royal Infirmary
- Sheriffhall Park n Ride Extension**
- Sheriffhall South & Shawfair Park** (+ potential extension) – Business and Industry
- Greenbelt designation**



### Key Constraints – Cultural Heritage and Landscape

- Scheduled Monuments** – Elginhaugh Roman Camp & Fort, Melville Grange and Newton Church.
- Listed Buildings** – Summerside (Cat B), 4. no at Old Sheriffhall Farm House (Cat B), Campend (Cat c), Dalkeith Park – Kings Gate, Walls and Lodge (Cat A) (and 408 others within 2km search area)
- Conservation Areas** – Dalkeith House & Park, Eskbank & Ironmills
- Garden and Designed Landscapes** – Dalkeith House (Palace), Melville Castle and The Drum.
- Large number of **non-designated assets** (44 within 500m)
- North Esk Valley **Special Landscape Area (SLA)**
- Large number of **visual receptors** – most sensitive of which are as above and residential properties and recreational locations.



### Key Constraints – Ecology and Hydrology

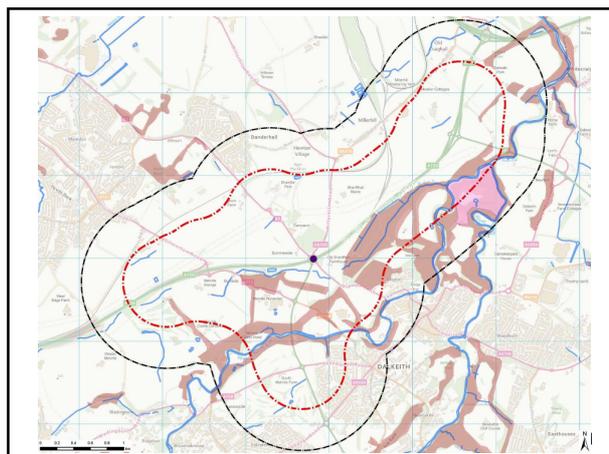
- **SSSI** – Dalkeith Oakwood (woodland, lichen, invertebrates)
- Large areas of **Ancient Woodland**
- **Badger Setts** (Option 1 and 8 direct impact ) and **Otter lie up** (Option 8 direct impact, all others within 30m)
- **Giant Hogweed** ( 6 stands)
- Breeding Birds, bats and potentially badger
- River North, Esk, Dean Burn and Aquifers
- Potential Flooding - 0.5% or greater annual exceedance probability



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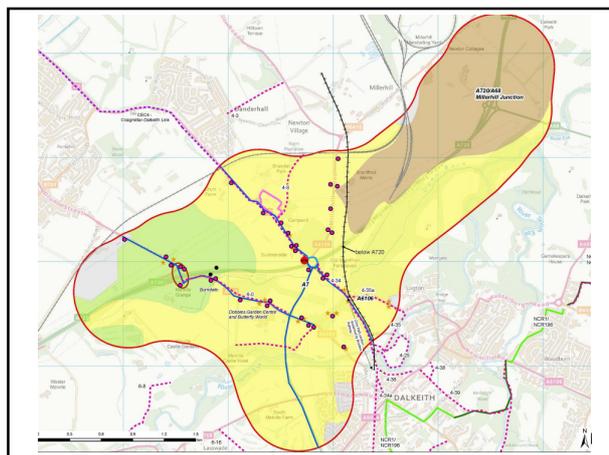
### Key Constraints – All Travellers/ Community & Private Assets

- Large number of **field accesses**
- **Access to residential properties and businesses** – Dobbies Garden Centre, Restaurant , Laser Combat Challenge, Nursery etc.
- **Core Paths** – Old Dalkeith Road & A7
- **Local cycle routes**
- **Allotments** south of A720 at Burndale
- **Agricultural land** – suitable for a wide range of crops (high quality)
- **New Borders Rail**
- **Dalkeith Country Park**

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### Key Constraints – Geology/ Noise/ Air Quality

- **Agricultural land** – pesticides, insecticides and fertilisers
- **Historical mining activity** – former pits, abandoned mines, shafts, slag heaps
- **Disused sewage works** south of Dean Burn

#### Noise/ Air

- **Construction impacts** limited to small number of residential properties in close proximity - potential vibration impacts from piling for bridge structures
- Increase in operational **traffic noise** (raising A720 will propagate further) & potential **benefit on air quality** from reduced congestion.
- Air Quality for area is good and below objectives.

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### Summary of preferred options by topic

	Option 1A	Option 2A	Option 6A	Option 8A
<b>Cultural heritage</b>	Potential Significant Negative Impacts	Potential Significant Negative Impacts	✓	Potential Significant Negative Impacts
<b>Landscape</b>	✓	Potential Significant Negative Impacts	2 <sup>nd</sup> Preference	Potential Significant Negative Impacts
<b>Nature Conservation</b>	Potential Significant Negative Impacts	2 <sup>nd</sup> Preference	✓	Potential Significant Negative Impacts
<b>Effects on all Travellers</b>	✓	Potential Significant Negative Impacts	2 <sup>nd</sup> Preference	Potential Significant Negative Impacts
<b>Community &amp; Private Assets</b>	2 <sup>nd</sup> Preference	Potential Significant Negative Impacts	✓	Potential Significant Negative Impacts
<b>Road Drainage &amp; the Water Environment</b>	✓	Potential Significant Negative Impacts	2 <sup>nd</sup> Preference	Potential Significant Negative Impacts

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### Objectives – Stage 2 Assessment

Discussion

- *Live xls document*

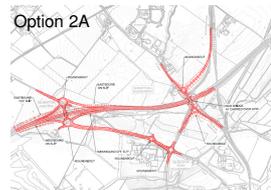
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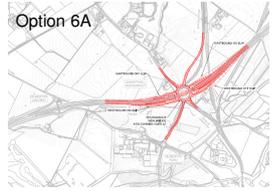
### Stage 2 Options



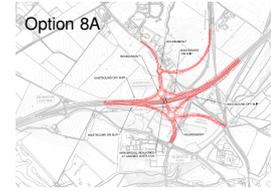
Option 1A



Option 2A



Option 6A



Option 8A

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# Risk

### Risk Register

Discussion

- Review of draft Risk Register
- Any other issues?

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### Risk Register – 3rd Parties / Approvals

Risk No.	Risk	Risk Description	Mitigating Controls	Residual Risk
11	20	Potential issues with Network Rail consultation/ obtaining technical approvals	1. Ensure consultation with Network Rail during design stage	10
10	15	Potential objection from cycling groups to proposed routing arrangements	1. Ensure consultation is carried out at an early stage and then continued as necessary with stakeholders.	3
9	15	Key Stakeholders unhappy with aspects and may require changes.	1. Ensure consultation is carried out at an early stage and then continued as necessary with stakeholders.	4
8	12	Status of A6106 Millerhill Road, study assumes A6106 remains open, subsequent closure of A6106 (as part of another scheme) affects viability of junction options	1. ongoing consultation with TS / CEC / MLC re status of A6106	6
7	8	Objections to the scheme from the public/non statutory consultees	1. Ensure consultation is carried out at an early stage and then continued as necessary with consultees including land owners.	4
6	8	Potential objections from Statutory Consultees	1. Ensure consultation is carried out at an early stage and then continued as necessary with statutory consultees.	4
5	6	IDMs not content with scheme options	1. Use rigorous assessment of Options at Stage 1 and 2.	3
4	4	Potential objection from bus operators to proposed routing arrangements	1. Ensure consultation is carried out at an early stage and then continued as necessary with stakeholders. 2. Ensure where realistic consultees concerns have been taken into account or concerns allayed.	3
3	4	Additional drainage measures required by SEPA	1. Ensure consultation with SEPA during the design and procurement phases for project. 2. Ensure written agreement received from SEPA.	2
2	4	Delays in obtaining CAR licences	Early liaison with SEPA	2
1	4	Delays in responses from statutory bodies (SEPA, etc) may affect the design and construction programmes.	1. Maintain a register of requests for information / comments / etc.	2

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### Risk Register – Statutory Undertakers / Environmental

Risk No.	Risk	Risk Description	Mitigating Controls	Residual Risk
<b>Statutory Undertakers</b>				
12	20	Dealing with Statutory Undertakers will be problematic and time consuming	1. Ensure that early consultation is held with utility organization. 2. Check that there is no delays in receiving information as the result of utility costs for design not being paid at all or timeously. 3. If failure to agree on costs then arrange for an independent estimate of costs to be asked for.	12
13	6	Scope of SU works is greater than expected	1. Ensure consultation is carried out at an early stage and then continued as necessary with stakeholders.	2
<b>Environmental Issues</b>				
17	4	Environmental considerations may affect the design and construction programmes and may require redesign with increased quantities.	Mitigation measures to be included in the Environmental Statement.	2
16	4	Flooding during construction		4
14	2	Presence of protected species requires changes to scheme more onerous than expected	1. Carry out timeous survey. 2. Ecological Clerk of Works to be appointed if protected species are found. 3. Early agreement of mitigation with SNH.	2
15	2	Uncharted archaeology found	Mitigation measures to be included in the Environmental Statement.	2

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### Risk Register – Traffic Issues / Traffic Management during Construction

Risk No.	Risk	Risk Description	Mitigating Controls	Residual Risk
<b>Traffic Issues</b>				
51	20	Conflicting traffic analysis results between SRM07/10 and SRM12 data	Use most up to date SRM data where programme allows, review as new data becomes available.	15
18	16	Uncertainty over future local developments / associated traffic growth may affect viability of junction options	Ensure traffic / development info kept up to date.	12
47	6	Slip in year of opening renders preferred option less successful operationally		6
<b>Traffic Management during construction</b>				
33	6	Additional costs/delays associated with temporary diversion routes & haul routes		6
32	4	Traffic management issues and problems with construction sequencing (compared to current base estimate allowance)	TM requirements are included within the scheme preliminaries	2
34	4	Incidents or accidents during construction of the works particularly on-site working e.g. to operatives or road users	Ensure traffic management is carried out in accordance with Chapter 9 of the TSM. Works to be carried out in a safe manner following risk assessments and method statements.	2

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### Risk Register – Ground Conditions / Earthworks

Risk No.	Risk	Risk Description	Mitigating Controls	Residual Risk
<b>Ground Conditions / Earthworks</b>				
20	15	Unexpected mining works found	ensure that adequate ground investigation is carried out throughout study	10
21	12	Ground conditions differ from those assumed in earthworks design	1. Ensure that an adequate ground investigation has been carried out. 2. Ensure that all geotechnical certification has been signed off. Monitor programme	9
19	6	Delays to award of GI contract		4
24	6	Aggressive ground conditions that might effect structure foundations	1. Ensure that an adequate ground investigation has been carried out. 2. Ensure that all geotechnical certification has been signed off.	4
22	4	Contaminated land may be present	2. Ensure that an adequate ground investigation has been carried out. 3. Ensure that all geotechnical certification has been signed off.	2
23	4	Hydrogeological impacts change scheme permanent design or delay scheme	1. Agree mitigation with SEPA. 2. Cover in ES.	2
48	4	Future tracking in the area, design issue for structures		4
25	4	Lack of availability of suitable fill material and more expensive than anticipated	Pass risk to contractor at contract stage	2

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### Risk Register – Highways

Risk No.	Risk	Risk Description	Mitigating Controls	Residual Risk
<b>Highways</b>				
28	15	Transport Scotland Standards Branch will not accept Departures from Standard	1. Organize a consultation meeting with TS Standards Branch at an early stage in the design process in order to establish possible departures and either eliminate them or set them up for a submission which would be acceptable to Standards Branch. 2. Ensure that Departures to Standards are submitted timely. 3. Advise Standards Branch of the submissions and when they will be received.	10
29	10	RSA may require additional design aspects.	1. Ensure that the Road Safety Audit Stage 1 is carried out at an early stage in the design to eliminate abortive work. 2. Ensure that scheme is developed with awareness of road safety matters and designers carry out an internal review by road safety engineers if necessary.	6
30	6	Existing outfalls/drainage system cant cope with increased runoff.	Obtain drainage design approval from SEPA.	4
26	4	Insufficient survey work to assess condition of existing structures (Glimerton) - leading to requirement for additional work	Liaise with operating company to obtain most recent Principal Inspection Report and As-built drawings.	2
27	2	Condition of existing pavement	Monitor condition as project progresses	2
31	2	Additional SUDS requirements	1. Ensure consultation with SEPA during the design and procurement phases for project.	1

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### Risk Register – Site

Risk No.	Risk	Risk Description	Mitigating Controls	Residual Risk
<b>Site</b>				
39	6	Onerous restrictions on traffic management	1. early involvement of TS/BEAR	6
38	5	Failure of specialist construction equipment	Ensure equipment is properly maintained, is within testing and checked regularly.	5
37	4	Insufficient land allocated for construction activities/access	1. Arrange for a constructability audit. 2. Ensure that the design is developed as comprehensively as possible in advance of Draft Orders. 3. Check that some latitude is taken in the plot sizes to permit minor adjustments to the design at a late stage (if required).	2
35	4	Objections to nighttime working	1. Ensure consultation is carried out at an early stage and then continued as necessary with consultees including land owners.	2
36	4	Environmental incident e.g. noise, water pollution during works	1. Agree mitigation with SEPA and Local Authority.	2

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### Risk Register – Site / Accommodation Works / Land

Risk No.	Risk	Risk Description	Mitigating Controls	Residual Risk
<b>Site</b>				
39	6	Onerous restrictions on traffic management	1. early involvement of TS/BEAR	6
38	5	Failure of specialist construction equipment	Ensure equipment is properly maintained, is within testing and checked regularly.	5
37	4	Insufficient land allocated for construction activities/access	1. Arrange for a constructability audit. 2. Ensure that the design is developed as comprehensively as possible in advance of Draft Orders. 3. Check that some latitude is taken in the plot sizes to permit minor adjustments to the design at a late stage (if required).	2
35	4	Objections to nighttime working	1. Ensure consultation is carried out at an early stage and then continued as necessary with consultees including land owners.	2
36	4	Environmental incident e.g. noise, water pollution during works	1. Agree mitigation with SEPA and Local Authority.	2
<b>Accommodation Works</b>				
40	6	Additional accommodation works required	Consultation and negotiation	4
<b>Land</b>				
41	10	Potential additional costs for land purchase - review estimate	Early involvement of District Valuer.	6

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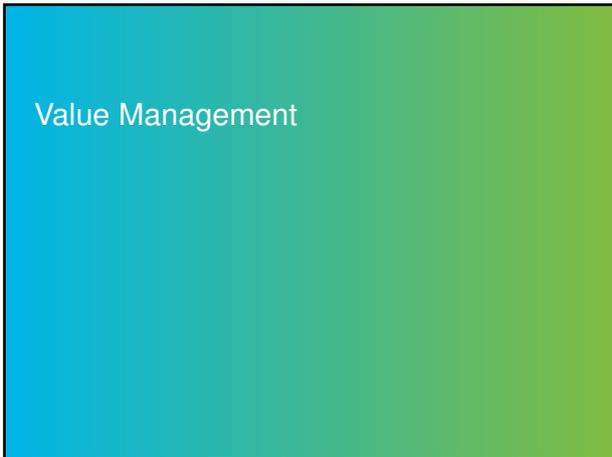
### Risk Register – Programme / Other Risks

Risk No.	Risk	Risk Description	Mitigating Controls	Residual Risk
<b>Programme</b>				
49	16	Delay in receiving SRM data, delaying stage 2 operational assessment of junction options	Continue dialogue with consultants to try obtain data timely	12
44	8	Costs associated with potential Pre-contract delay	Monitor programme on a regular basis.	4
45	8	Costs associated with potential construction contract delay	Monitor programme on a regular basis.	4
43	6	Securing funding for Stage 3 Feasibility and onwards	Ensure Stage 2 deadline is met	6
42	4	Increase in price of commodities over and above inflation	Obtain most up to date price base when preparing cost and compare with similar schemes	4
<b>Other</b>				
50	10	Overlap of brief of Sheriffhall & A720 Corridor Study could potentially delay implementation of improvements at Sheriffhall	Close liaison with TS/Wider Study team to ensure studies complementary, share info/common strategy	5
46	6	Junction improvements at Sheriffhall have adverse effect on operation of adjacent junctions	consider wider study area including adjacent junctions in assessment of junction options	4

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**Value Management**

Any value opportunities?

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**Stage 3 Scope**

Stage 2 DMRB Report programmed for October 2015

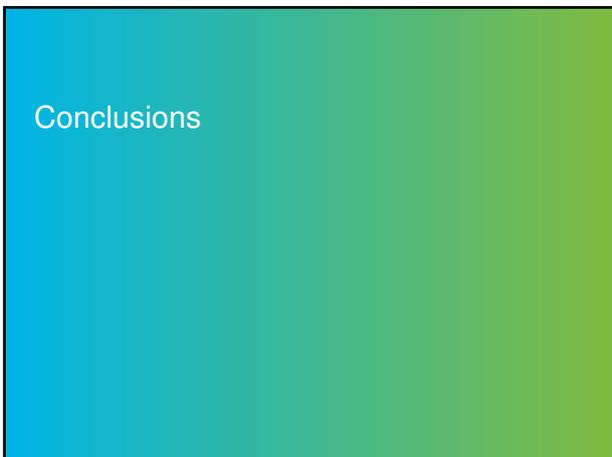
TS IDM presentation October 2015

Stage 3 commences October 2015, subject to agreement

Stage 3 Scope

- GI to be undertaken
- Public Exhibition on announcement of Preferred Option
- More detailed design of Preferred Option
- More detailed environmental assessment of Preferred Option
- Preparation of draft Road Orders and Environmental Statement

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**Thank You**

26<sup>th</sup> March 2015



*Value Management Workshop (VfM2a)*

- *Final Workshop Option Evaluation Scorings*

## Final Workshop Option Evaluation Scorings

TOPIC	OBJECTIVE	EVALUATION SUB-CRITERIA	Weight	Scoring							
				Option 1A		Option 2A		Option 6A		Option 8A	
				raw	weighted	raw	weighted	raw	weighted	raw	weighted
Environment	E. Minimise intrusion of the new works on the natural environment, cultural heritage and people whilst enhancing the local environment where opportunities arise	minimise intrusion of works on natural environment	5%	10	5.0	7	3.5	9	4.5	8	4.0
		minimise intrusion of works on cultural heritage	5%	8	4.0	4	2.0	10	5.0	6	3.0
		minimise intrusion of works on people	5%	8	4.0	4	2.0	10	5.0	4	2.0
		enhance local environment where opportunities arise	5%	9	4.5	9	4.5	10	5.0	9	4.5
Safety	D. Improve road safety for all users on the A720 and approach roads between Gilmerton Junction and Dalkeith Northern Bypass.	Improve road safety for all users	20%	10	20.0	6	12.0	4	8.0	9	18.0
Economy	A. Improve the movement of traffic on the A720 between Gilmerton and Old Craighall by providing grade-separation of the A720 at the existing Sheriffhall Roundabout.	Improve movement of traffic on A720	3.3%	10	3.3	8	2.7	9	3.0	10	3.3
		Improve traffic access to / from local road network	3.3%	10	3.3	6	2.0	9	3.0	10	3.3
		Minimise delays during construction	3.3%	6	2.0	10	3.3	5	1.7	9	3.0
	C. Minimise traffic impact of local proposed developments in Midlothian, East Lothian and City of Edinburgh on the A720 between Gilmerton Junction and Old Craighall Junction and approach roads.	Minimise impact of local proposed development traffic on A720 and approach roads	3.3%	10	3.3	5	1.7	9	3.0	10	3.3
		Improve traffic movement along A7 / A6106	3.3%	9	3.0	10	3.3	9	3.0	8	2.7
		Improve traffic movement along A772	3.3%	10	3.3	3	1.0	10	3.3	10	3.3
Accessibility	G. Reduce severance by improving accessibility across the A720 for all users	Improve accessibility across the A720 – NMUs	10%	10	10.0	10	10.0	8	8.0	10	10.0
		Improve accessibility across the A720 – public transport	10%	10	10.0	8	8.0	10	10.0	10	10.0
Integration	F. Facilitate integration for different modes of transport along and across the A720 corridor between Gilmerton Junction and the Dalkeith Northern Bypass	Facilitate integration with public transport along A720 - NMUs	6.7%	10	6.7	10	6.7	10	6.7	10	6.7
		Facilitate integration with Shawfair park and ride	6.7%	10	6.7	5	3.3	10	6.7	10	6.7
	B. Reduce the conflict between strategic and local traffic	Reduce conflict between strategic and local traffic	6.7%	10	6.7	8	5.3	10	6.7	10	6.7
<b>FUNCTION SCORE:</b> The product of weightings and individual scores gives the function score (highest = better)			100%	<b>95.8</b>		<b>71.3</b>		<b>82.5</b>		<b>90.5</b>	
<b>COST IN £Ms</b> (incl. Optimism Bias) Capital costs for each option are include in the matrix (lower = better)				<b>65.5</b>		<b>56.3</b>		<b>75.4</b>		<b>53.4</b>	

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# Appendix B

## Stage 2 Value Management Workshop (VfM2b) Report



An agency of  The Scottish Government

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# A720 SHERRIFFHALL JUNCTION

STAGE 2 SCHEME OPTIONS ASSESSMENT  
VALUE FOR MONEY WORKSHOP  
(CVRL Ref: 6131)

## REPORT

Version: 14 March 2017



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# 1 INTRODUCTION

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## 1 INTRODUCTION

A one day Stage 2 Value for Money Workshop for the A720 Sherriffhall junction improvement options, was held on 9 February 2017 with representatives of Transport Scotland (TS) and their consultants, AECOM.

Transport Scotland required an independent facilitator to manage the VfM study. Capital Value & Risk Limited (CVRL) was commissioned to undertake the study which incorporated the workshop.

The workshop was preceded by a briefing meeting on 19<sup>th</sup> January 2017 with TS, AECOM and CVRL. Glyn Harrison facilitated the workshop with support from Amanda Harrison. The workshop was held at The Doubletree, Cambridge Street Glasgow.

### 1.1 WORKSHOP OBJECTIVES

As part of developing the scheme and in accordance with TS VfM procedures, the workshop was convened to undertake a value for money review of the proposed scheme options.

The purpose of the workshop was to reach consensus on the emerging preferred route for the scheme.

The results of the discussions are recoded in this the Workshop Report which comprises background information about the scheme, the workshop findings, agenda and attendees along with relevant supporting information given on the day.

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## 2 SCHEME INFORMATION

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### 2 SCHEME INFORMATION

#### 2.1 BACKGROUND

Sheriffhall is a six arm roundabout located at the junction of the A720 Edinburgh City Bypass, the A7 and the A6106 south-east of Edinburgh. Sheriffhall is underlain by a geological fault and this coupled with the presence of historical mine workings initially led to the provision of a roundabout at Sheriffhall in preference to grade separation.

Sheriffhall has undergone various improvements including localised widening, signalisation and provision of additional lanes to try and alleviate the delays which occur at the junction. Despite the improvements, a congestion problem persists, particularly during peak hours.

There are extensive plans for future residential and business development within the vicinity of Sheriffhall, including the South East Wedge (Shawfair) development. Sheriffhall also provides access to a number of growth areas, including South East of Edinburgh, where an enterprise area has recently been established, and large developments along the A7 Corridor. Sheriffhall also provides access from the east of Edinburgh City to the growth areas around the West of Edinburgh and the M8 Corridor.

Junction improvements at Sheriffhall were identified as part of the Strategic Transport Projects Review (STPR), published in December 2008. Intervention 22 recommends targeted road congestion / environmental relief schemes, including junction improvements at Sheriffhall roundabout.

AECOM were appointed by Transport Scotland in July 2013 to provide clarity on the most appropriate form of junction and to update previous STAG studies published in 2008, carried out prior to the opening of Dalkeith Bypass.

An Inception Workshop was held which identified the scheme objectives and tabled some outline junction options. This initiated the option development process.

## 2 SCHEME INFORMATION

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### 2.2 SCHEME OBJECTIVES

The following Scheme Objectives have been set to address the main issues encountered at Sheriffhall roundabout and will be used in the assessment to help determine the performance of the options. The objectives

- A. Improve the movement of traffic on the A720 between Gilmerton and Old Craighall by providing grade-separation of the A720 at the existing Sheriffhall Roundabout
- B. Reduce the conflict between strategic and local traffic
- C. Minimise traffic impact of local proposed developments in Midlothian, East Lothian and City of Edinburgh on the A720 between Gilmerton Junction and Old Craighall Junction and approach roads
- D. Improve road safety for all users on the A720 and approach roads between Gilmerton Junction and Dalkeith Northern Bypass
- E. Minimise intrusion of the new works on the natural environment, cultural heritage and people whilst enhancing the local environment where opportunities arise
- F. Facilitate integration for different modes of transport along and across the A720 corridor between Gilmerton Junction and the Dalkeith Northern Bypass
- G. Reduce severance by improving accessibility across the A720 for all users.

### 2.3 SCHEME CONSTRAINTS

Other than the existing road network, which includes the A720, A7, A6106 and A772, further constraints within the immediate study area include:

- Δ The Borders Railway.
- Δ Ground conditions, historical mine workings and geological fault.
- Δ Residential buildings, listed buildings including Summerside Farmhouse, Old Sheriffhall Farmhouse, and scheduled monuments including Melville Grange.
- Δ And the Dean Burn.

## 2 SCHEME INFORMATION

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### 2.4 JUNCTION OPTIONS

#### 2.4.1 Option Development

A total of eight junction options underwent DMRB Stage 1 Scheme Assessment, six options were based on those considered during an earlier study, and two options were developed at the Inception Workshop.

The Stage 1 Scheme Assessment recommended that four options go forward to Stage 2:

- Δ Option 1 – Dumbbell grade separation at Sheriffhall
- Δ Option 2 – all slip roads provided at Gilmerton, no connection at Sheriffhall
- Δ Option 6 – Grade separation at Sheriffhall
- Δ Option 8 – dumbbell grade separation west of Sheriffhall

A further sifting exercise was carried out early in Stage 2 (see 2.6 below). Option 2 did not perform well when considered against the scheme objectives, therefore the Stage 2 options were narrowed down to the three emerging options listed below:

- Δ Option A – dumbbell grade separation at Sheriffhall (previously Option 1)
- Δ Option B – grade separation at Sheriffhall (previously Option 6)
- Δ Option C – dumbbell grade separation west of Sheriffhall (previously Option 8).

Appendix A contains plans of the junction Options.

#### 2.4.2 Option A

Option A is a grade separated dumbbell arrangement with the A720 elevated and passing over the A7 carried by a new overbridge with a span of approximately 35m. The dumbbell roundabouts and local roads would remain approximately at grade. The north roundabout is a 5-arm 3 lane roundabout which connects the A720 eastbound off slip, the A7 north, the A6106 Millerhill Road, the A720 eastbound on slip and the A7 South. The south roundabout is a 5-arm 3-lane roundabout which connects the A720 westbound on slip, the A7 North, the A720 westbound off slip, the A6106 Old Dalkeith Road, and the A7 South.

The A720 mainline would be raised up on embankments up to 9.5m high on approach to the A7 crossing. Vertical and horizontal

## 2 SCHEME INFORMATION

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realignment of the A720 would be required over an approximate length of 1600m.

The A720 eastbound on-slip and A720 westbound off-slip cross the Borders Railway and would therefore require the existing railway underbridge structure to be extended by approximately 20m. The railway underbridge has been designed such that it can accommodate an additional 5m depth of fill material. Therefore the A720 mainline level increase at this location is understood to be achievable without further structural work.

### 2.4.3 Option B

Option B provides a grade separated roundabout at Sheriffhall, and has the least land-take of all emerging options. Vertical and horizontal realignment of the A720 would be required over an approximate length of 1600m and the A720 would be carried across the Sheriffhall Roundabout by two new bridges each with a span of approximately 40m. The A720 mainline would be raised up on embankments up to 9.9m high on approach to the Sheriffhall Roundabout crossings. The Sheriffhall Roundabout layout would be retained, but would become an 8-arm roundabout, connecting the A7 North, the A6106 Millerhill Road, the A6106 Old Dalkeith Road, A7 South and all A720 east and west facing slips.

The A720 eastbound on-slip and A720 westbound off-slip cross the Borders Railway and would therefore require the existing railway underbridge structure to be extended by approximately 50m. The roundabout at Sheriffhall would be enlarged but is retained at its existing location, and would be reduced to three lanes. Minimal regrading of the roundabout arms would be required, with the exception of the A6106 Millerhill Road to the north which would be realigned over an approximate length of 550m.

### 2.4.4 Option C

Option C provides a dumbbell grade separated junction west of Sheriffhall, with the A7 carried over the A720. Option C has the largest landtake of all the emerging options. The A7 would be realigned and carried over the A720 by a new overbridge located approximately 250m west of Sheriffhall Roundabout and with an approximate span of 40m. The dumbbell roundabouts, located north and south of the A720, would be raised on embankments up to 9.8m in height.

The 3 lane dumbbell roundabout to the north of the A720 would be a 4-arm roundabout, connecting the A720 eastbound off-slip, the A7 North,

## 2 SCHEME INFORMATION

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the A720 eastbound on-slip and the A7 South. The A7 North would be realigned for an approximate length of 585m tying in to the existing Shawfair Park roundabout. The A7 North would have embankments up to 5m in height on its approach to the north dumbbell roundabout.

The 3 lane roundabout to the south of the A720 would be a 5-arm roundabout, connecting the A720 westbound on-slip, the A7 North, the A720 westbound off-slip, the realigned A6106 Old Dalkeith Road, and the realigned A7 South. The A7 South would be realigned over an approximate length of 250m tying into the existing Gilmerton Road roundabout. The realigned A6106 Old Dalkeith Road would be realigned for approximately 530m, and would have embankments up to 9.7m in height.

The A6106 Millerhill Road would be realigned for a length of approximately 760m. A 2-lane 3-arm roundabout would be provided at the junction of the A6106 Millerhill Road and the realigned A7 North. The A6106 Millerhill Road would be largely at-grade with minimal embankments.

The A720 would be at-grade through Sheriffhall. The east facing slips would tie into the existing A720 mainline to the west of Borders Railway therefore no works would be required at the Borders Railway underbridge.

### 2.5 COST ESTIMATES

Cost Estimates for the options have been prepared using Spon's 2017 Civil Engineering and Highway Works Price Book where possible. They are based on the material quantities calculated for each option and include preliminaries, roadworks, earthworks, environment and landscaping, land, utilities diversion costs and structures. Where costs were required for specific items not included in the Spon's manual, these costs were taken from comparable project data.

In preparing cost estimates certain assumptions have been made using data from previous comparable projects and based on information that is available at this stage:

- Δ Preparation at 9% of construction and land costs (inc preliminaries, risk and optimism bias);
- Δ Supervision at 5% of construction and land costs (inc preliminaries, risk and optimism bias);
- Δ Preliminaries at 30% of construction costs;

## 2 SCHEME INFORMATION

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- Δ Areas of potentially reusable material identified, 70% of cut in these areas assumed reusable as fill;
- Δ Land costs are based on advice provided by Valuation Agency Office.

Roadworks ancillaries includes for works such as drainage, roads signs and markings, safety barrier, fencing and soiling and seeding. Rates per linear meter for the proposed mainline and sideroads were calculated using information from SPON's Book and other comparable projects.

Earthworks volumes were calculated using standard slopes of 1:2, although further steepening is require in some places, for which retaining walls have been assumed.

Environment and landscaping costs include for planting and environmental mitigation.

A cost estimate summary for the options is given in the table below.

Option	Option A	Option B	Option C
Cost (Q4/2016)	£89.9M	£84.9M	£85.9M

Note: Costs given above are total construction and land costs including Optimism Bias (@ 25% and 44% for structures), and preparation and supervision. These costs are preliminary estimates and are subject to change.

### 2.6 EARLIER VFM WORKSHOP

A Value Workshop was held earlier during the Stage 2 Assessment in March 2015. The workshop provided an update on the scheme development and junction options.

The workshop also developed and agreed the evaluation sub-criteria. These were based on the scheme objectives agreed at the Inception workshop. The objectives were assigned to the five main government appraisal criteria, Environment, Safety, Economy, Accessibility and Integration. It was agreed that the five topics should be given equal overall weighting of 20% each.

Scheme Objectives were then broken down in to sub-objectives, which were used to carry out assessment of the options. It was agreed that equal weighting should be applied to each sub-objective within each topic.

## 2 SCHEME INFORMATION

The Evaluation sub-criteria which were agreed are detailed below:

Topic	Objective	Evaluation Sub-objective
Environment (20%)	E. Minimise intrusion of works on natural environment, cultural heritage and people whilst enhancing the local environment where opportunities arise	minimise intrusion of works on natural environment.
		minimise intrusion of works on cultural heritage
		minimise intrusion of works on people
		enhance local environment where opportunities arise
Safety (20%)	D. Improve road safety for all users on the A720 and approach roads between Gilmerton Junction and Dalkeith Northern Bypass	Improve safety for all users
Economy (20%)	A. Improve the movement of traffic on the A720 between Gilmerton and Old Craighall by providing grade-separation of the A720 at the existing Sheriffhall Roundabout	Improve movement of traffic on A720
		Improve traffic access to / from local road network
		Minimise delays during construction
	C. Minimise traffic impact of local proposed developments in Midlothian, East Lothian and City of Edinburgh on the A720 between Gilmerton Junction and Old Craighall Junction and approach roads	Minimise impact of local proposed development traffic on A720 and approach roads
		Improve traffic movement along A7 / A6106
		Improve traffic movement along A772
Accessibility (20%)	G. Reduce severance by improving accessibility across the A720 for all users	improve accessibility across the A720 – NMUs
		improve accessibility across the A720 – public transport
Integration (20%)	F. Facilitate integration for different modes of transport along and across the A720 corridor between Gilmerton Junction and the Dalkeith Northern Bypass	Facilitate integration with public transport along A720 – NMUs
		Facilitate integration with Shawfair park and ride
	B. Reduce the conflict between strategic and local traffic	Reduce conflict between strategic and local traffic

The Workshop then carried out an assessment of the options against the evaluation sub-criteria scoring each option in turn.

The Workshop found one of the options, Option 2, did not meet the evaluation sub-objectives sufficiently. The Workshop queried whether issues associated with Option 2 could be adequately mitigated. It was agreed this was not possible and therefore it was concluded that that based on the output from the evaluation exercise, Option 2 should be sifted out and not taken forward for further Stage 2 Assessment.

## 2 SCHEME INFORMATION

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### 2.7 PUBLIC EXHIBITION

A Public Exhibition on the Emerging Options was held on the 5<sup>th</sup> & 6<sup>th</sup> December 2016 at the Sheriffhall Park and Ride Terminal Building. The exhibition gave a background to the scheme, including study area constraints, summarised progress to date, and also detailed the three emerging options.

The Public Exhibition was attended by 167 people over the two days, with formal feedback comments received from 33 people.

In the main, the feedback was that there was a need for junction improvements due to the existing congestion experienced at Sheriffhall roundabout. Some feedback responses stated a preference, with Option C coming out as the most popular option, mainly due to the perceived Non-Motorised User (NMU) advantages. A common theme in the feedback was ensuring adequate provision for NMUs within the emerging option.

## 3 WORKSHOP OUTPUTS

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### 3 WORKSHOP OUTPUTS

#### 3.1 INTRODUCTION

The workshop comprised several sessions:

1. Information stage
2. Options Matrix Assessment
3. Risk Assessment of Options
4. Workshop summary and conclusions

The following sub-sections detail the outputs from each of the above.

#### 3.2 INFORMATION

All presentation information can be found in Appendix A.

The following issues were highlighted during the presentations:

1. Following completion of the scheme would there be implications regarding traffic volume/congestion at other junctions along the A720? It was noted that the A720 Corridor study would address this with the scheme itself focussed on addressing the congestion problem at Sherrifhall.
2. The options are not signalised. It was thought by some that signalisation of Option B could be required.
3. For economic/traffic purposes a date of 2030 has been used to compare the performance of the three options.
4. Only committed development has been included in the traffic modelling.

#### 3.3 OPTIONS MATRIX ASSESSMENT

##### 3.3.1 Introduction

The option assessment criteria was developed in line with the government appraisal criteria as follows

- 1 Economy
- 2 Safety
- 3 Environment / Sustainability
- 4 Accessibility
- 5 Integration

## 3 WORKSHOP OUTPUTS

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Sub-objectives, derived from the scheme objectives, were aligned to the main criteria. The main criteria were weighted equally at 20% per topic. The sub-objectives were then weighted equally within each of the five main topics.

The comparative assessment utilised a scoring process where the best option scored 10 points and the other options then compared against the best. The product of the weighting and the individual scores gave a utility score for the objective criteria.

The summation of all utility scores provided a total utility score for each option. The utility score when divided by capital cost provided a Value Index measure.

### 3.3.2 Workshop Output - Options Assessment Table

Since the earlier Value Management workshop the sub-criteria had been reviewed and refined. Refinements were as follows:

- Safety - The single safety sub-objective was divided into two: Non-Motorised Users (NMUs) and Motorised Users (MUs).
- Economy - Improve traffic access to / from local road network: sub-objective deleted as considered to be a repeat of 'minimise impact of local proposed development on A720 & approach road' sub-objective.
- Economy - improve traffic movement along A772: sub-objective deleted - refers to the A772 which is no longer affected by the remaining design options.

The above changes were ratified and agreed with the workshop participants.

Ahead of the workshop the consultants undertook a draft scoring exercise of the options and this was presented at the commencement of each main criteria with participants encouraged to review and challenge the proposed findings as they considered necessary.

The assessment matrix completed and agreed by the workshop is given below.

3 WORKSHOP OUTPUTS

TOPIC	OBJECTIVE	EVALUATION SUB-OBJECTIVE	Weight	SCORING <i>(marks out of 10, 10 = best meets objective, 0 = unacceptable, discounted)</i>						Workshop Notes/Comments
				Option A		Option B		Option C		
				raw	weighted	raw	weighted	raw	weighted	
ENVIRONMENT	E. Minimise intrusion of the new works on the natural environment, cultural heritage and people whilst enhancing the local environment where opportunities arise	minimise intrusion of works on natural environment	5.0%	8	4.0	10	5.0	7	3.5	
		minimise intrusion of works on cultural heritage	5.0%	7	3.5	10	5.0	5	2.5	<i>Reduction in C score associated with risk of archaeological finds</i>
		minimise intrusion of works on people (property?)	5.0%	8	4.0	10	5.0	8	4.0	
		enhance local environment where opportunities arise	5.0%	9	4.5	9	4.5	10	5.0	<i>TS to review word "enhance" although main objectives have been presented to the public.</i>
		<b>Total</b>	<b>20.0%</b>		<b>16.0</b>		<b>19.5</b>		<b>15.0</b>	
SAFETY	D. Improve road safety for all users on the A720 and approach roads between Gilmerton Junction and Dalkeith Northern Bypass	improve safety for NMUs	10.0%	6	6	7	7	10	10	<i>Option B offers opportunity for signalisation to improve NMU safety. Option A dumbbell arrangement would not support signalisation.</i>
		improve safety for MUs	10.0%	10	10	8	8	7	7	<i>Departures: A has one 1-step, B has 2 one step depts. and C has 5 depts. Potential queuing on Option C under future post 2030 traffic flow scenario.</i>
		<b>Total</b>	<b>20.0%</b>		<b>16.0</b>		<b>15.0</b>		<b>17.0</b>	
ECONOMY	A. Improve the movement of traffic on the A720 between Gilmerton and Old Craighall by providing grade-separation of the A720 at the existing Sheriffhall Roundabout	improve movement of traffic on A720	5.0%	10	5.0	10	5.0	6	3.0	<i>Option C causes traffic congestion post-2030 compared to other options.</i>
		improve traffic access to / from local road network		0	0.0	0	0.0	0	0.0	

3 WORKSHOP OUTPUTS

TOPIC	OBJECTIVE	EVALUATION SUB-OBJECTIVE	Weight	SCORING (marks out of 10, 10 = best meets objective, 0 = unacceptable, discounted)						Workshop Notes/Comments	
				Option A		Option B		Option C			
				raw	weighted	raw	weighted	raw	weighted		
	C. Minimise traffic impact of local proposed developments in Midlothian, East Lothian and City of Edinburgh on the A720 between Gilmerton Junction and Old Craighall Junction and approach roads	minimise delays during construction	5.0%	8	4.0	8	4.0	10	5.0	Options would be temporarily signalised during construction. Ground Investigation (GI) access would be more problematic for Options A and B than C which is offline.	
		minimise impact of local proposed development traffic on A720 and approach roads	5.0%	10	5.0	9	4.5	6	3.0	Future signalisation could improve B compared to A.	
		improve traffic movement along A7 / A6106	5.0%	10	5.0	10	5.0	6	3.0		
		improve traffic movement along A772									
		<b>Total</b>	<b>20.0%</b>		<b>19.0</b>		<b>18.5</b>		<b>14.0</b>		
ACCESSIBILITY	G. Reduce severance by improving accessibility across the A720 for all users	improve accessibility across the A720 - NMUs	10.0%	7	7.0	8	8.0	10	10.0	Future signalisation could improve Option B compared to A by providing controlled crossings	
		improve accessibility across the A720 - public transport	10.0%	10	10.0	10	10.0	9	9.0		
		<b>Total</b>	<b>20.0%</b>		<b>17.0</b>		<b>18.0</b>		<b>19.0</b>		
INTEGRATION	F. Facilitate integration for different modes of transport along and across the A720 corridor between Gilmerton Junction and the Dalkeith Northern Bypass	facilitate integration with public transport along A720	6.7%	10	6.7	10	6.7	10	6.7		
		facilitate integration with Shawfair park and ride	6.7%	9	6.0	10	6.7	8	5.3	Distinction is number of junctions to access park & ride could affect usability	
	B. Reduce the conflict between strategic and local traffic	6.7%	10	6.7	10	6.7	9	6.0			
	<b>Total</b>	<b>20.0%</b>		<b>19.4</b>		<b>20.1</b>		<b>18.0</b>			

3 WORKSHOP OUTPUTS

TOPIC	OBJECTIVE	EVALUATION SUB-OBJECTIVE	Weight	SCORING <i>(marks out of 10, 10 = best meets objective, 0 = unacceptable, discounted)</i>						Workshop Notes/Comments
				Option A		Option B		Option C		
				raw	weighted	raw	weighted	raw	weighted	
	<b>FUNCTION SCORE</b>	<i>The product of weightings and individual scores give the function score (highest = better)</i>		<b>87.3</b>		<b>91.0</b>		<b>83.0</b>		
	<b>COST IN £M's</b>	<i>(incl Optimism Bias) Capital costs for each option are included in the matrix (lower = better)</i>		<b>89.9</b>		<b>84.9</b>		<b>85.9</b>		
	<b>VALUE RATIO</b>	<i>The Function Score divided by capital cost provide the Value index (higher = better)</i>		<b>0.971</b>		<b>1.072</b>		<b>0.966</b>		

### 3 WORKSHOP OUTPUTS

#### 3.3.3 Sensitivity Testing

Following the options matrix assessment a sensitivity test was undertaken on the Economy sub-criteria weightings.

As the “construction delay” sub-criteria was considered to apply to a relatively short period, the impact of reducing its weighting and increasing that of “improve traffic on A720” was investigated. The resultant output is shown below:

TOPIC	OBJECTIVE	EVALUATION SUB-OBJECTIVE	Weight	SCORING (marks out of 10, 10 = best meets objective, 0 =					
				Option A		Option B		Option C	
				raw	weighted	raw	weighted	raw	weighted
ECONOMY	A. Improve the movement of traffic on the A720 between Gilmerton and Old Craighall by providing grade-separation of the A720 at the existing Sheriffhall Roundabout	improve movement of traffic on A720	7.5%	10	7.5	10	7.5	6	4.5
		improve traffic access to / from local road network		0	0.0	0	0.0	0	0.0
		minimise delays during construction	2.5%	8	2.0	8	2.0	10	2.5
	C. Minimise traffic impact of local proposed developments in Midlothian, East Lothian and City of Edinburgh on the A720 between Gilmerton Junction and Old Craighall Junction and approach roads	minimise impact of local proposed development traffic on A720 and approach roads	5.0%	10	5.0	9	4.5	6	3.0
		improve traffic movement along A7 / A6106	5.0%	10	5.0	10	5.0	6	3.0
		improve traffic movement along A772							
		<b>Total</b>	<b>20.0%</b>		<b>19.5</b>		<b>19.0</b>		<b>13.0</b>

The above re-assessment did not change the ranking order of Options for the Economy objective. It was agreed that the assessment would proceed as before, with equal weighting across each of the Economy sub-criteria, for consistency in the overall exercise.

### 3 WORKSHOP OUTPUTS

#### 3.4 OPTIONS RISK ASSESSMENT

As part of the assessment process the deliverability risk for design, procurement and construction stages was assessed for each option.

A pre-workshop excel risk register was produced by the consultants for review at the workshop. The risks were categorised and then assessed using a 5X5 Probability/Impact matrix as given below:

Design & Construction - Project Risk Categories		Cat							
3 <sup>rd</sup> Parties/Approvals including Public Inquiry	A		Probability						
Statutory Undertakers	B		Very High	5	10	15	20	25	
Environmental Issues	C		80-100%	5					
Traffic Issues	D		High	4	8	12	16	20	
Ground conditions/Earthworks	E		65-80%	4					
Highway – incl stdds, alignment, junctions, roadwks, drainage	F		Medium	3	6	9	12	15	
Traffic Management during Construction	G		35-65%	3					
Construction Site Control/Access/Logistics/Phasing	H		Low	2	4	6	8	10	
Accommodation Works	I		15/35%	2					
Land / Compensation	J		Very Low	1	2	3	4	5	
Programme Issues	K		0/15%	1					
Other	L		Impact	Low	Low	Medium	High	Very High	
				1	2	3	4	5	
			= HIGH RISK	Cost	<£25k	£25k - £100k	£100k - £250k	£250k - £500k	>£500k
			= MEDIUM RISK	Time	< 2 weeks	2 wks – 1 month	1– 3 months	3 – 6 months	6months+
			= LOW RISK	Publicity	Very Low	Low	Medium	High	Very High

For ease of comparison at the workshop those differences in rating were highlighted with a grey shaded cell.

It was noted that the cost parameters would need review following the workshop in order to better quantify the cost impact for the purposes of a quantified risk assessment (QRA). However, they would suffice for the purposes of a comparative assessment between options.

The risk register workshop output is given below.

### 3 WORKSHOP OUTPUTS

No	RISK IDENTIFICATION Risks	Cat	OPTION A - RISK ASSESSMENT					OPTION B - RISK ASSESSMENT					OPTION C - RISK ASSESSMENT					Workshop Notes Actions
			Prob	Cost	Time	Cost Rank (Pxl)	Time Rank (Pxl)	Prob	Cost	Time	Cost Rank (Pxl)	Time Rank (Pxl)	Prob	Cost	Time	Cost Rank (Pxl)	Time Rank (Pxl)	
1	Potential objections from Statutory Consultees	A	4	2	5	8	20	4	2	5	8	20	5	2	5	10	25	
2	Objections to the scheme from the public/non statutory consultees	A	4	2	5	8	20	4	2	5	8	20	4	2	5	8	20	
3	IDMs not content with recommended preferred option	A	1	0	5	0	5	1	0	5	0	5	1	0	5	0	5	
4	Delays in responses from statutory bodies (SEPA, etc.) may affect the design and construction programmes.	A	1	1	3	1	3	1	1	3	1	3	1	1	3	1	3	
5	Delays in obtaining CAR licences	A	2	1	2	2	4	2	1	2	2	4	2	1	2	2	4	
6	Additional drainage measures required by SEPA	A	2	2	2	4	4	2	2	2	4	4	3	3	2	9	6	
7	Potential issues with Network Rail consultation / obtaining technical approvals	A	5	2	4	10	20	5	2	4	10	20	2	1	4	2	8	
8	Potential objection from bus operators / LAs to proposed PT routeing arrangements	A	1	1	3	1	3	1	1	3	1	3	1	1	3	1	3	
9	Potential objection from NMU groups/LAs to proposed routeing arrangements	A	3	3	4	9	12	3	3	4	9	12	2	3	4	6	8	
10	Delays in obtaining SU approvals	B	3	1	3	3	9	3	1	3	3	9	3	1	3	3	9	
11	Uncharted SU apparatus	B	2	3	3	6	6	2	3	3	6	6	2	3	3	6	6	
12	Construction delays due to SUs	B	3	3	3	9	9	3	3	3	9	9	3	3	3	9	9	
13	Presence of protected species requires changes to scheme/more onerous than expected	C	1	2	3	2	3	1	2	3	2	3	1	2	3	2	3	
14	Environmental considerations may affect the design and construction programmes and may require redesign with increased quantities.	C	2	2	2	4	4	2	2	2	4	4	2	2	2	4	4	
15	Uncharted archaeology found	C	3	2	2	6	6	3	2	2	6	6	4	3	3	12	12	
16	Flooding during construction	C	1	2	2	2	2	1	2	2	2	2	1	2	2	2	2	
17	Additional land required for landscaping mitigation	C	2	3	4	6	8	2	3	4	6	8	3	3	4	9	12	
18	Off-site mitigation measures identified as part of Environmental Impact Assessment (stage 3)	C	1	3	4	3	4	1	3	4	3	4	1	3	4	3	4	
19	Legal reviews do not identify benefited proprietors	C	1	1	3	1	3	1	1	3	1	3	1	1	3	1	3	
20	Adjacent properties meet threshold for noise mitigation measures increasing cost of the scheme	C	1	2	3	2	3	1	2	3	2	3	2	2	3	4	6	
21	Uncertainty over cumulative impacts given significant development proposals on short and long term	C	3	1	2	3	6	3	1	2	3	6	3	1	2	3	6	
22	Uncertainty over future local developments / associated traffic growth may affect viability of junction options	D	1	1	3	1	3	1	1	3	1	3	1	1	3	1	3	
23	Requirement to refine design layouts for operational/traffic reasons	D	1	2	2	2	2	1	2	2	2	2	4	3	2	12	8	Signalisation of Option B addressed as a separate issue
24	Results of Sheriffhall paramics model raises issues	D	2	0	3	0	6	2	0	3	0	6	2	0	3	0	6	
25	Results of Sheriffhall paramics model audit impact economic assessment	D	2	0	2	0	4	2	0	2	0	4	2	0	2	0	4	
26	Delays to award of GI contract	E	2	1	2	2	4	2	1	2	2	4	2	1	2	2	4	
27	Inadequate GI undertaken (due to access issues, not done as instructed)	E	3	3	2	9	6	3	3	2	9	6	3	3	2	9	6	

### 3 WORKSHOP OUTPUTS

No	RISK IDENTIFICATION Risks	Cat	OPTION A - RISK ASSESSMENT					OPTION B - RISK ASSESSMENT					OPTION C - RISK ASSESSMENT					Workshop Notes Actions
			Prob	Cost	Time	Cost Rank (Pxl)	Time Rank (Pxl)	Prob	Cost	Time	Cost Rank (Pxl)	Time Rank (Pxl)	Prob	Cost	Time	Cost Rank (Pxl)	Time Rank (Pxl)	
28	Unexpected mining works and mine entries found	E	3	5	5	15	15	3	5	5	15	15	4	5	5	20	20	
29	Treatment of mine entries not as shown on design drawings	E	3	3	3	9	9	3	3	3	9	9	3	3	3	9	9	
30	Ground conditions differ from those assumed in earthworks design	E	3	4	3	12	9	3	4	3	12	9	3	3	3	9	9	
31	Contaminated land may be present	E	2	2	2	4	4	2	2	2	4	4	2	2	2	4	4	
32	Hydrogeological impacts change scheme permanent design or delay scheme	E	2	2	2	4	4	2	2	2	4	4	2	2	2	4	4	
33	Aggressive ground conditions that might affect structure foundations	E	2	2	2	4	4	2	2	2	4	4	2	2	2	4	4	
34	Cost of imported fill material	E	3	2	1	6	3	3	2	1	6	3	3	2	1	6	3	Earthworks costs to be reviewed
35	Poor ground / rock condition affects extents of piling required for bridge structures	E	3	3	2	9	6	4	3	2	12	8	2	3	2	6	4	
36	Condition of existing pavement	F	1	2	2	2	2	1	2	2	2	2	1	2	2	2	2	
37	Transport Scotland Standards Branch will not accept Departures from Standard	F	1	2	3	2	3	1	2	3	2	3	1	2	3	2	3	
38	RSA may require additional design aspects.	F	5	2	2	10	10	5	2	2	10	10	5	2	2	10	10	
39	Existing outfalls/drainage system can't cope with increased runoff.	F	2	2	2	4	4	2	2	2	4	4	3	2	2	6	6	
40	Additional SUDS requirements	F	2	1	1	2	2	2	1	1	2	2	2	1	1	2	2	
41	Traffic management issues and problems with construction sequencing (compared to current base estimate allowance)	G	3	5	3	15	9	3	5	3	15	9	3	3	2	9	6	
42	Additional costs/delays associated with temporary diversion routes & haul routes	G	3	2	2	6	6	3	2	2	6	6	3	2	2	6	6	
43	Incidents or accidents during construction of the works particularly online working e.g. to operatives or road users	G	3	2	2	6	6	3	2	2	6	6	2	2	2	4	4	
44	Onerous restrictions on traffic management	H	2	3	3	6	6	2	3	3	6	6	2	2	2	4	4	
45	Objections to nighttime working	H	2	2	2	4	4	2	2	2	4	4	2	2	2	4	4	
46	Environmental incident e.g. noise, water pollution during works	H	2	2	2	4	4	2	2	2	4	4	2	2	2	4	4	
47	Additional accommodation works required	I	3	2	2	6	6	3	2	2	6	6	4	2	2	8	8	
48	Potential additional costs for land purchase - land value	J	2	4	2	8	4	2	4	2	8	4	3	5	2	15	6	Action: review land costs
49	Additional land purchase required due to design development	J	4	4	1	16	4	4	4	1	16	4	4	4	1	16	4	
50	Increase in price of commodities over and above inflation	K	2	2	2	4	4	2	2	2	4	4	2	2	2	4	4	
51	Securing funding for Stage 3 Feasibility and onwards	K	2	0	3	0	6	2	0	3	0	6	2	0	3	0	6	
52	Costs associated with potential Pre-contract delay	K	2	4	4	8	8	2	4	4	8	8	2	4	4	8	8	
53	Costs associated with potential construction contract delay	K	2	4	4	8	8	2	4	4	8	8	2	4	4	8	8	
54	Junction improvements at Sheriffhall have adverse effect on operation of adjacent junctions - A720 junctions	L	4	0	2	0	8	4	0	2	0	8	4	0	2	0	8	

### 3 WORKSHOP OUTPUTS

RISK IDENTIFICATION		OPTION A - RISK ASSESSMENT						OPTION B - RISK ASSESSMENT					OPTION C - RISK ASSESSMENT					Workshop Notes Actions
No	Risks	Cat	Prob	Cost	Time	Cost Rank (Pxl)	Time Rank (Pxl)	Prob	Cost	Time	Cost Rank (Pxl)	Time Rank (Pxl)	Prob	Cost	Time	Cost Rank (Pxl)	Time Rank (Pxl)	
55	Overlap of brief of Sheriffhall & A720 Corridor Study could potentially delay implementation of improvements at Sheriffhall	L	3	0	5	0	15	3	0	5	0	15	3	0	5	0	15	
56	Outcome of A720 Corridor Study could conflict with A720 Sheriffhall study objectives	L	3	0	5	0	15	3	0	5	0	15	3	0	5	0	15	
New	Extra costs associated with disposal of excavated material - opportunity					0	0				0	0				0	0	
New	Junction improvements at Sheriffhall have adverse effect on operation of adjacent junctions - local road junctions		1	1	2	1	2	1	1	2	1	2	3	3	5	9	15	
<b>Rating Totals:</b>						<b>279</b>	<b>369</b>				<b>282</b>	<b>371</b>				<b>304</b>	<b>394</b>	

### 3 WORKSHOP OUTPUTS

#### 3.5 WORKSHOP SUMMARY AND CONCLUSIONS

A summary table of the key metrics associated with the assessment process are given below followed by a ranking of the options:

Metric	Summary Output			Workshop Notes/Comments
	Option A	Option B	Option C	
Function	87.3	91.0	83.0	
Cost	89.9	84.9	85.9	Additional cost for signalisation at B at circa £0.5m-£1m.
Value	0.971	1.072	0.966	
BCR	9.90	10.10	5.10	
Risk - Cost	279	282	304	Note the risk scores for A and B are very close
Risk - Time	369	371	394	

RANKING	Option A	Option B	Option C	
Function	2	1	3	
Cost	3	1	2	
Value Ratio	2	1	3	
BCR	2	1	3	
Risk - Cost	1	2	3	
Risk - Time	1	2	3	

Taking account of the above outputs the workshop conclusion was that Option B is preferred, subject to the agreed Stage 2 actions being closed out. Actions were identified as follows:

## 3 WORKSHOP OUTPUTS

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### **Stage 2 Actions**

1. Transport Scotland Standards Branch to confirm if 150m ICD roundabout on Option B would be classified as a departure from standard.
2. Review NMU provision vis a vis signalisation for Options A and B.

### **Stage 3 Actions**

3. Determine any safety issues with Old Craighall roundabout.

## 4 WORKSHOP LOGISTICS

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### 4 WORKSHOP LOGISTICS

#### 4.1 AGENDA

The agenda timings were flexible but all elements were included.

9.45 **Coffee**

10:00 **Introduction**

- Δ Introductions, objectives, process, agenda, rules & roles
- Δ Welcome – Andy Anderson, TS Project Manager

10:10 **Session 1- Information**

- Δ Update on scheme status
  - Δ Scheme objectives, key constraints and junction options
  - Δ Engineering, Environment, Traffic/Economics, capital costs
  - Δ Outputs from previous VFM workshop
- AECOM (20-30mins)

Questions & Answers

10.40 **Session 2 - Option Matrix Assessment**

1. Option assessment evaluation criteria and weighting brought forward from previous VFM workshop explained and reviewed.
2. Each evaluation criteria to be introduced and initial scoring for each to be provided by AECOM.
3. Discussion on the performance of each option against the criteria.
4. Undertake any changes to the draft scoring.

11.15 **Break**

11.25 **Session 2 -Option Matrix Assessment cont'd**

1. Continue undertaking comparative options scoring assessment for each criteria.

12:30 **Lunch**

13:15 **Session 2 -Option Matrix Assessment cont'd**

1. Incorporation of capital costs.
2. Review of utility score and value index.
3. Review of NPV and BCR values.
4. Discussion on the outputs from the matrix evaluation and rankings of options against key metrics.

## 4 WORKSHOP LOGISTICS

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- 14:00 **Session 3-Options Risk Matrix Review**
1. Review of risk register and assessment outputs.
  2. Identification of any further risks
  3. Review of top risks and refinement of assessments and quantification if required.
  4. Which option has the greater delivery risk?
- 15:00 **Coffee/Tea Break**
- 15:10 **Session 3-Options Risk Matrix Review cont'd**
1. Review of top risks and refinement of assessments and quantification if required.
  2. Which option has the greater delivery risk?
- 15:45 **Workshop Conclusions**
- Taking into account the matrix assessment outputs and risk assessment what is the preferred junction option to take forward?
- Any sensitivity testing of the outputs?
- 16.15 **Workshop Summary and Actions**
- Δ Confirm the preferred option
  - Δ Way Forward for completion of the DMRB Stage 2 assessment
  - Δ Actions Arising from workshop– Who? What? When?
- 16.30 **Workshop Close**

## 4 WORKSHOP LOGISTICS

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### 4.2 PARTICIPANTS

The following participants attended the workshop:

Name	Organisation	Email
1. Sandy Jamieson	Transport Scotland / Project Director	sandy.jamieson@transport.gov.scot
2. Andy Anderson	Transport Scotland / Project Manager	andy.anderson@transport.gov.scot
3. Asif Huq	Transport Scotland	asif.huq@transport.gov.scot
4. Alasdair Graham	Transport Scotland / Head of Design Team 1&3	alasdair.graham@transport.gov.scot
5. Nick Farrell	Transport Scotland / Area Manager, Network Management	nick.farrell@transport.gov.scot
6. Paul Reid	Transport Scotland / Standards Branch	paul.reid@transport.gov.scot
7. Emily Alfred	Transport Scotland / Standards Branch	emilyalfred@transport.gov.scot
8. Stephen Davies	Transport Scotland / Network Manager	stephen.davies@transport.gov.scot
9. Sinead Thom	Transport Scotland / Environment & Sustainability	sinead.thom@transport.gov.scot
10. Paul Mellon	Transport Scotland / Geotechnical	paul.mellon@transport.gov.scot
11. Angus Corby	Transport Scotland / Landscape	angus.corby@transport.gov.scot
12. Adam Priestly	Transport Scotland / Transport Planner	adam.priestly@transport.gov.scot
13. John MacDonald	Transport Scotland / National Operations, Safety & Development	john.macdonald@transport.gov.scot
14. Jason Gillespie	Systra	jgillespie@systra.com
15. Harlene Doohan	Transport Scotland / Construction Branch	harlene.doohan@transport.gov.scot
16. Ryan Hutchison	AECOM / Project Director	ryan.hutchison@aecom.com
17. Jill Irving	AECOM / Project Manager	jill.irving@aecom.com
18. Russell Bissland	AECOM / Traffic & Economics	russellbissland@aecom.com
19. Andrew Simpson	AECOM / Traffic & Economics	andrew.j.simpson@aecom.com

## 4 WORKSHOP LOGISTICS

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Name	Organisation	Email
20. Zoe McClelland	AECOM / Environmental	Zoe.mcclelland@aecom.com
21. Cat Fisher	AECOM / Geotechnical	catriona.fisher@aecom.com
22. Steven Smith	AECOM / Roads	steven.a.smith02@aecom.com

### 4.3 CAPITAL VALUE & RISK TEAM

Facilitator: Glyn Harrison

Assistant: Amanda Harrison

## APPENDIX A – WORKSHOP PRESENTATION INFORMATION

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### APPENDIX A – WORKSHOP PRESENTATION INFORMATION

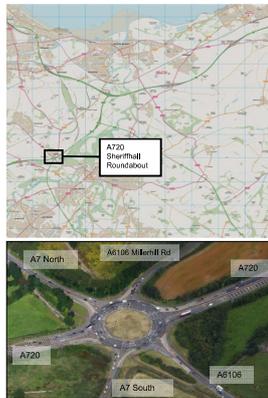
## Session 1 - Information

Thursday 9th February 2017



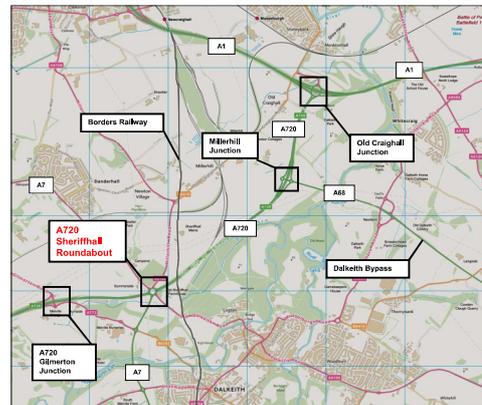
### Project Background

- Six-arm roundabout at the junction of A720, A7 and A6106
- Sheriffhall Roundabout is the only at grade junction on the A720
- Various improvements have been implemented including signalisation, localised widening and additional lanes
- Road network at junction operating close to capacity and is severely congested at peak times
- Extensive plans for future residential and business development



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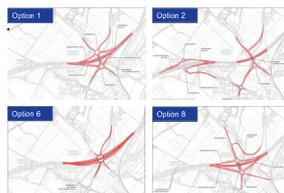
### Scheme Location



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### Summary of DMRB Stage 1 Scheme Assessment

- AECOM (then URS) appointed in June 2013 to undertake DMRB Stage 1 Scheme Assessment.
- Stage 1 assessed a total of eight junction options:
  - 6 options considered in the 2007 STAG study
  - 2 options as agreed at the Inception Workshop.
- DMRB Stage 1 Scheme Assessment concluded September 2014 recommending that four options go forward to Stage 2:
  - Option 1
  - Option 2
  - Option 6
  - Option 8



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### Stage 2 Assessment

- AECOM is required to undertake the DMRB Stage 2 assessment to identify the optimum grade separated junction improvement at Sheriffhall Roundabout
- VfM2(a) Workshop held in March 2015
- Wider Stakeholder Workshop held in October 2016
- Public Exhibition on the three Emerging Options held in December 2016
- Stage 2 Scheme ongoing – due to be complete end of March 2017



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## Scheme Objectives

- A. Improve the movement of traffic on the A720 between Gilmerton and Old Craighall by providing grade-separation of the A720 at the existing Sheriffhall Roundabout
- B. Reduce the conflict between strategic and local traffic
- C. Minimise traffic impact of local proposed developments in Midlothian, East Lothian and City of Edinburgh on the A720 between Gilmerton Junction and Old Craighall Junction and approach roads
- D. Improve road safety for all users on the A720 and approach roads between Gilmerton Junction and Dalkeith Northern Bypass
- E. Minimise intrusion of the new works on the natural environment, cultural heritage and people whilst enhancing the local environment where opportunities arise
- F. Facilitate integration for different modes of transport along and across the A720 corridor between Gilmerton Junction and the Dalkeith Northern Bypass
- G. Reduce severance by improving accessibility across the A720 for all users



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## Evaluation Criteria

TOPIC	OBJECTIVE	EVALUATION SUB-OBJECTIVE
ENVIRONMENT (20%)	E. Minimise intrusion of the new works on the natural environment, cultural heritage and people whilst enhancing the local environment where opportunities arise	minimise intrusion of works on natural environment
		minimise intrusion of works on cultural heritage
		minimise intrusion of works on people enhance local environment where opportunities arise
SAFETY (20%)	D. Improve road safety for all users on the A720 and approach roads between Gilmerton Junction and Dalkeith Northern Bypass	Improve safety for all users
ECONOMY (20%)	A. Improve the movement of traffic on the A720 between Gilmerton and Old Craighall by providing grade separation of the A720 at the existing Sheriffhall Roundabout	Improve movement of traffic on A720
		Improve traffic access to / from local road network minimise delays during construction
	C. Minimise traffic impact of local proposed developments in Midlothian, East Lothian and City of Edinburgh on the A720 between Gilmerton Junction and Old Craighall Junction and approach roads	minimise impact of local proposed development traffic on A720 and approach roads Improve traffic movement along A7 / A6106 Improve traffic movement along A772
ACCESSIBILITY (20%)	G. Reduce severance by improving accessibility across the A720 for all users	Improve accessibility across the A720 - NMUs Improve accessibility across the A720 - public transport
INTEGRATION (20%)	F. Facilitate integration for different modes of transport along and across the A720 corridor between Gilmerton Junction and the Dalkeith Northern Bypass	Facilitate integration with public transport along A720 Facilitate integration with Shawfair Park and Ride
	B. Reduce the conflict between strategic and local traffic	reduce conflict between strategic and local traffic



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## Output from VfM2a Workshop, March 2015

Options assessed against the Scheme Objectives / evaluation sub-criteria

- Option 2A scored low as did not meet the evaluation criteria sub-objectives sufficiently
- Workshop felt the issues associated with Option 2A cannot be mitigated, as main issues result from merging two junctions into one at Gilmerton
- Option 2A did not perform well when existing 2014 traffic was applied

Workshop agreed that based on the outcome of the evaluation process, Option 2A should be sifted out and not taken forward for further Stage 2 Assessment

Therefore three options undergoing Stage 2 Assessment:

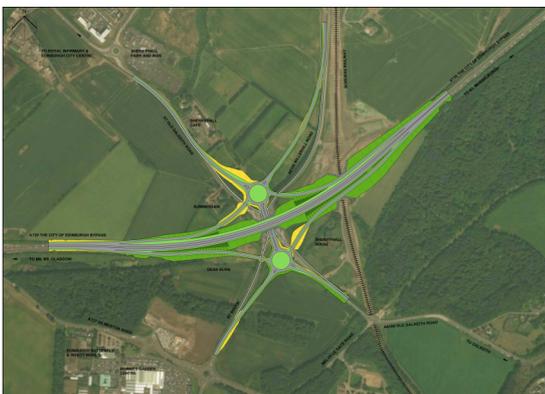
- Option 1A (renamed Option A)
- Option 6A (renamed Option B)
- Option 8A (renamed Option C)



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## Options

### Option A – Dumbbell Grade Separation at Sheriffhall



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### Option B – Grade Separation at Sheriffhall



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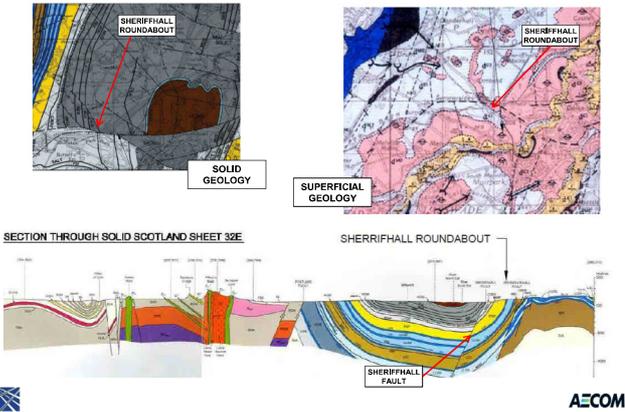
## Option C – Dumbbell Grade Separation west of Sheriffhall



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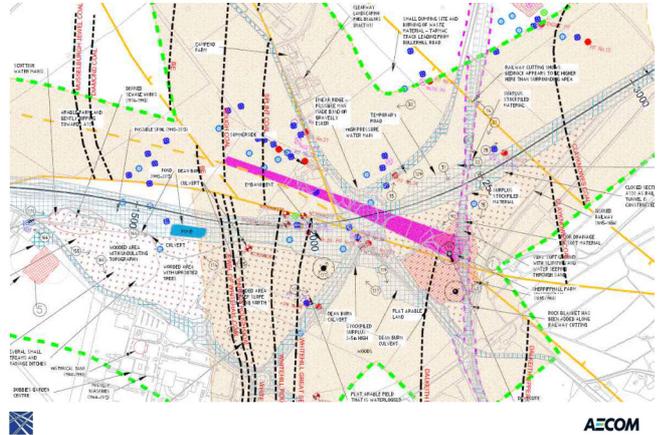
## Engineering / Geotechnical

### Option Assessment – Geotechnical



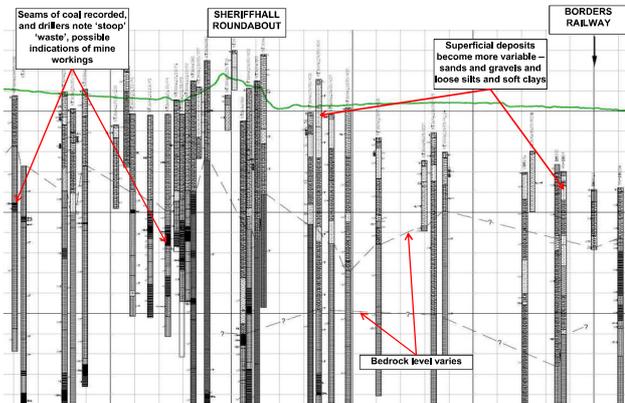
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### Option Assessment – Geotechnical Constraints



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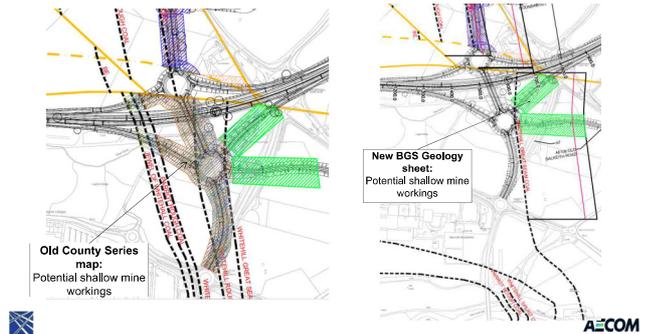
### Option Assessment - Geotechnical



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### Option Assessment - Geotechnical

- Coal seam outcrops (old County Series map or new BGS Geology sheet) could affect mine workings treatment cost.
- Option C is most at risk – see comparison below.



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## Option Assessment - Geotechnical



## Environment

### Policy Context

SESplan – Strategic Development Plan for South East Scotland

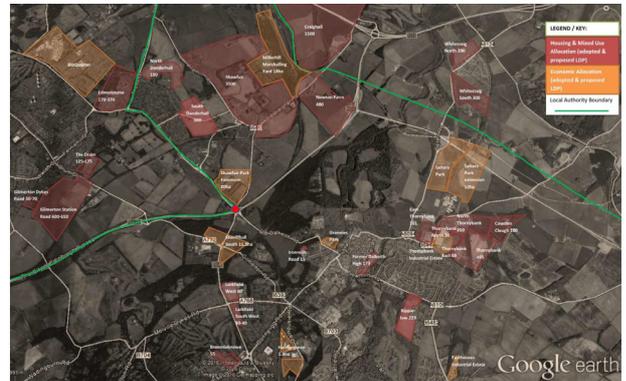
- First SESplan adopted June 2013
- SESplan 2 (approved for publication 20<sup>th</sup> June 2016). Public consultation underway with examination Summer 2017 and approval 2018.



Status	City of Edinburgh Council	Midlothian Council	East Lothian Council
LP Adopted	Nov 2016	2008	2008
LDP expected to be adopted		Spring 2017	End 2017 / early 2018

*Significant development pressures in the south east to deliver approx. 9,000 homes over the next 20 years*

### Development Plan Allocations

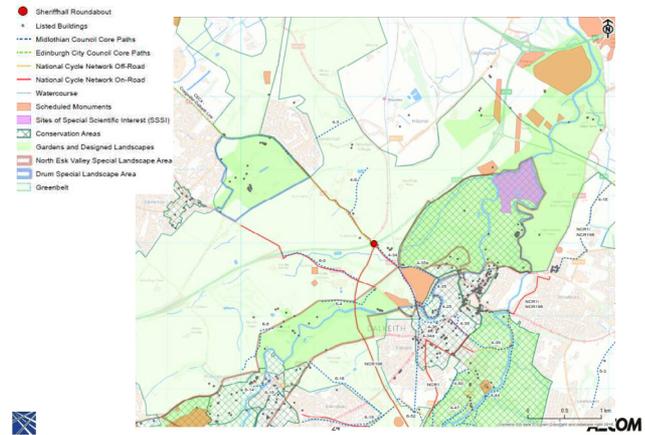


### Environmental Context

Stage 2 DMRB Assessment will cover following Environmental Topics:

- Landscape and Visual Effects
- Cultural Heritage
- Nature Conservation
- Road Drainage and the Water Environment
- Noise and Vibration
- Air Quality
- Effects on All Travellers
- Community and Private Assets
- Geology and Soils
- Materials

### General Environmental Constraints



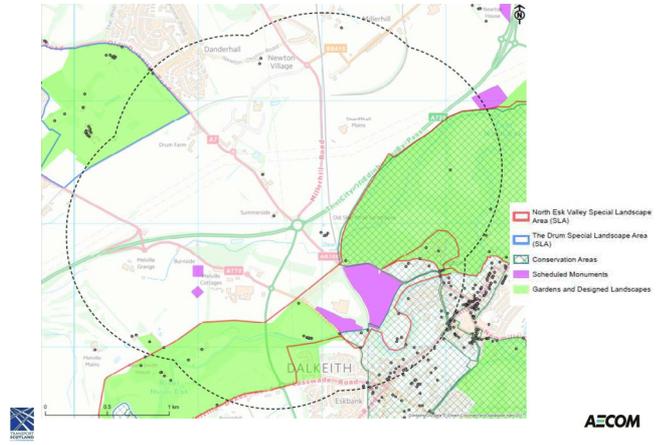
## Key Constraints – Cultural Heritage and Landscape

- Scheduled Monuments – Elginhaugh Roman Camp & Fort, Melville Grange and Newton Church.
- Listed Buildings – Summerside (Cat B), 4. no at Old Sheriffhall Farm House (Cat B), Campend (Cat c), Dalkeith Park – Kings Gate, Walls and Lodge (Cat A) (and 408 others within 2km search area)
- Conservation Areas – Dalkeith House & Park, Eskbank & Ironmills
- Garden and Designed Landscapes – Dalkeith House (Palace), Melville Castle and The Drum.
- Large number of non-designated assets North Esk Valley Special Landscape Area (SLA)
- Large number of visual receptors – most sensitive of which are as above and residential properties and recreational locations.



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## Cultural Heritage and Landscape



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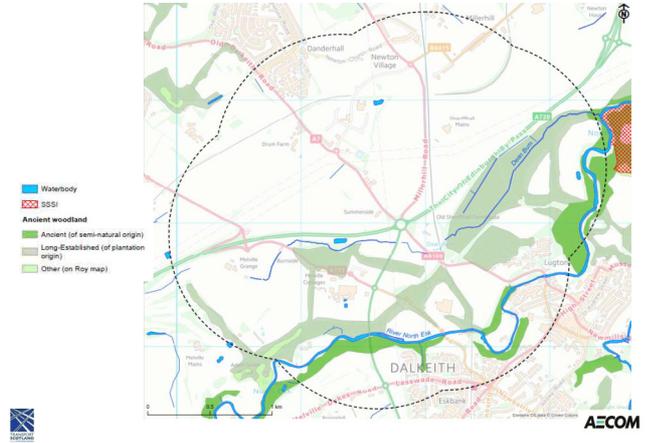
## Key Constraints – Ecology and Hydrology

- SSSI – Dalkeith Oakwood (woodland, lichen, invertebrates)
- Areas of Ancient Woodland (some immature Birch and some mature Beech)
- Badger Setts and Otter lie up
- Giant Hogweed Breeding Birds, bats and potentially badger
- River North, Esk, Dean Burn and Aquifers
- Potential Flooding - 0.5% or greater annual exceedance probability



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## Ecology and Hydrology



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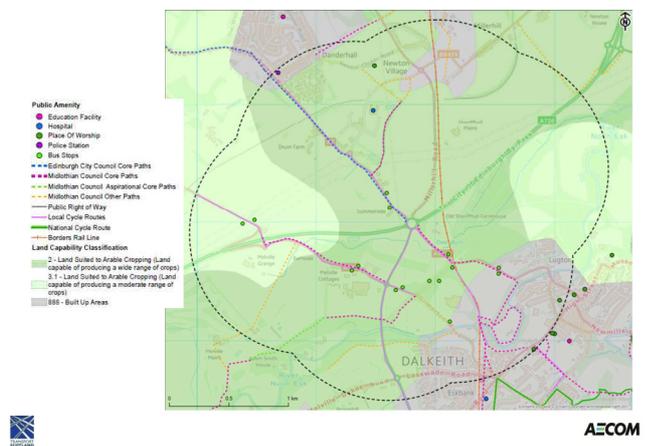
## Key Constraints – All Travellers / Community & Private Assets

- Large number of field accesses
- Access to residential properties and businesses – Dobbies Garden Centre, Restaurant, Laser Combat Challenge, Nursery etc.
- Core Paths – Old Dalkeith Road & A7
- Local cycle routes
- Allotments south of A720 at Burndale
- Agricultural land – suitable for a wide range of crops (high quality)
- Borders Rail
- Dalkeith Country Park



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## All Travellers / Community & Private Assets



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## Key Constraints – Geology, Noise / Air Quality

### Geology & Soils

- Agricultural land – Grade 1 and 2
- Historical mining activity – former pits, abandoned mines, shafts, slag heaps
- Contamination – no significant issues.
- Disused sewage works south of Dean Burn

### Noise / Air Quality

- Number of residential and commercial properties within 200m of the options
- No SACs, SPAs, SSSIs, Ramsar sites within 200m of the options. The nearest designated site is Dalkeith Oakwood SSSI, located at least 250m east of the proposed scheme.



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## Summary of preferred option by topic

	Option A	Option B	Option C
Landscape and Visual Effects		✓	
Nature Conservation		✓	
Cultural Heritage		✓	
Road Drainage & the Water Environment		✓	
Noise & Vibration			✓
Air Quality			
Effects on All Travellers		✓ - All Travellers	✓ NMUs
		NMUs	
Community & Private Assets		✓	
Geology & Soils		✓	
Materials			✓

## Capital Costs

## Option Assessment - Cost Estimates

Option	Option A	Option B	Option C
Prelims (30%)	£ 11.85M	£ 11.53M	£ 11.69M
Pavement	£ 7.17M	£ 6.51M	£ 6.80M
Ancillaries	£ 4.55M	£ 4.04M	£ 4.38M
Earthworks	£ 16.92M	£ 15.45M	£ 11.76M
Mine Workings Treatment	£ 6.53M	£ 4.41M	£ 10.14M
Structures	£ 2.63M	£ 6.37M	£ 4.22M
Landscaping & Environmental	£ 0.57M	£ 0.55M	£ 0.56M
Accommodation Works	£ 1.13M	£ 1.10M	£ 1.12M
Statutory Undertakers	£ 3.95M	£ 3.84M	£ 3.90M
Contingencies (10%)	£ 5.53M	£ 5.38M	£ 5.46M
<b>Civils Sub-total</b>	<b>£ 60.84M</b>	<b>£ 59.19M</b>	<b>£ 60.02M</b>
Optimism Bias (25% roads, 44% bridges)	£ 10.37M	£ 10.82M	£ 10.54M
<b>Construction Total</b>	<b>£ 71.21M</b>	<b>£ 70.01M</b>	<b>£ 70.56M</b>
Land (including 25% OB)	£ 7.67M	£ 4.43M	£ 4.76M
<b>Construction &amp; Land Total</b>	<b>£ 78.88M</b>	<b>£ 74.44M</b>	<b>£ 75.32M</b>
Preparation (9%)	£ 7.10M	£ 6.70M	£ 6.78M
Supervision (5%)	£ 3.94M	£ 3.72M	£ 3.77M
<b>Total Scheme Cost</b>	<b>£ 89.92M</b>	<b>£ 84.86M</b>	<b>£ 85.86M</b>



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## Buildability

## Buildability – Option A

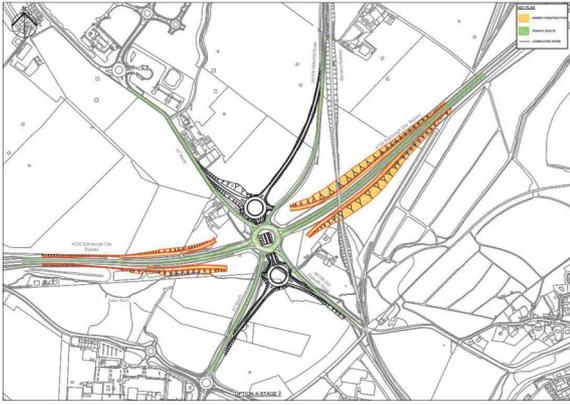
Phase 1



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Buildability – Option A

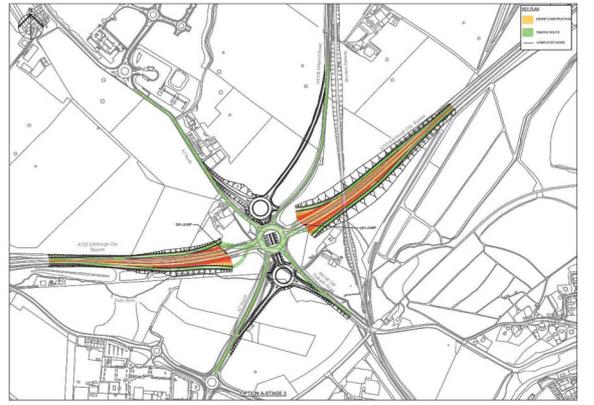
Phase 2



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Buildability – Option A

Phase 3



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Buildability – Option A

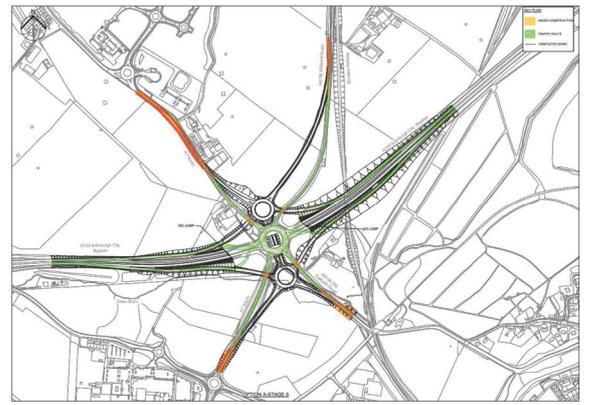
Phase 4



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Buildability – Option A

Phase 5



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Buildability – Option A

Phase 6



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Buildability – Option A

Phase 7



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Buildability – Option A

Phase 8



Buildability – Option B

Phase 1



Buildability – Option B

Phase 2



Buildability – Option B

Phase 3



Buildability – Option B

Phase 4



Buildability – Option B

Phase 5



**Buildability – Option B**

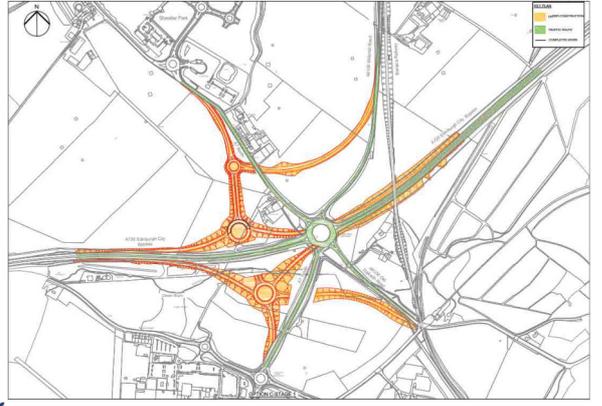
Phase 6



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**Buildability – Option C**

Phase 1



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**Buildability – Option C**

Phase 2



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**Buildability – Option C**

Phase 3



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**Buildability – Option C**

Phase 4



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**Buildability – Option C**

Phase 5



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# A720 Sheriffhall Junction Stage 2 Scheme Options Assessment Value for Money Workshop Traffic & Economics

Russell Bissland  
Technical Director

9th February 2017

## Scheme Options Assessment – Traffic & Economics

1. Existing Traffic Conditions
2. Traffic Forecasts
3. Design Options
4. Preliminary Operational Assessment
5. Preliminary Economic Assessment

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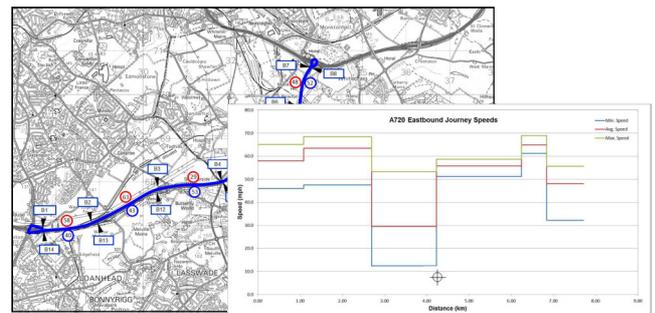
## Existing Traffic Conditions

Manual Classified Traffic Count Survey Programme (October 2014)

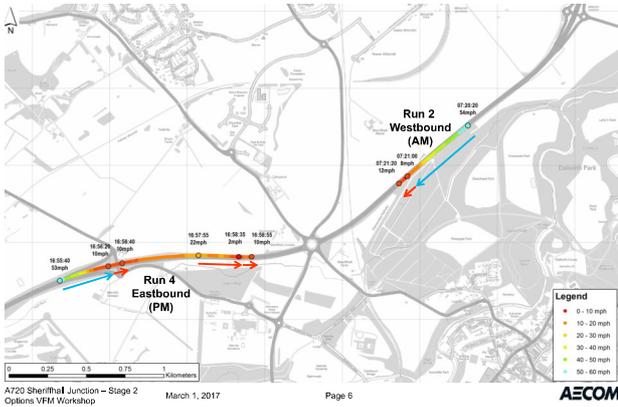


## Existing Traffic Conditions

12-Hour Average Vehicle Speeds Profiles (mph) and Variations (October 2014)



## Existing Traffic Conditions

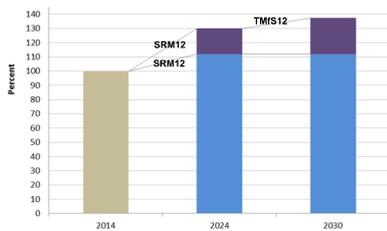


## Option Assessment – Traffic & Economics

1. Existing Traffic Conditions
2. **Traffic Forecasts**
3. Design Options
4. Preliminary Operational Assessment
5. Preliminary Economic Assessment

## Traffic Forecasts

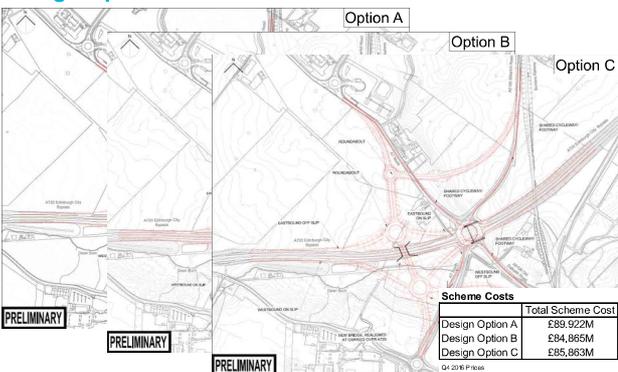
### Traffic Growth Chart



## Option Assessment – Traffic & Economics

1. Existing Traffic Conditions
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## Design Options

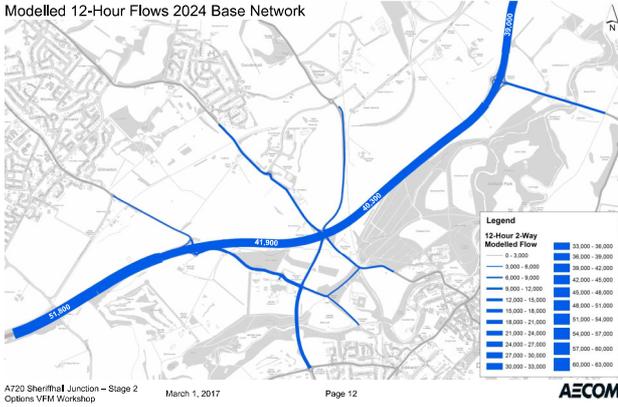


## Option Assessment – Traffic & Economics

1. Existing Traffic Conditions
2. Traffic Forecasts
3. Design Options
4. **Preliminary Operational Assessment**
5. Preliminary Economic Assessment

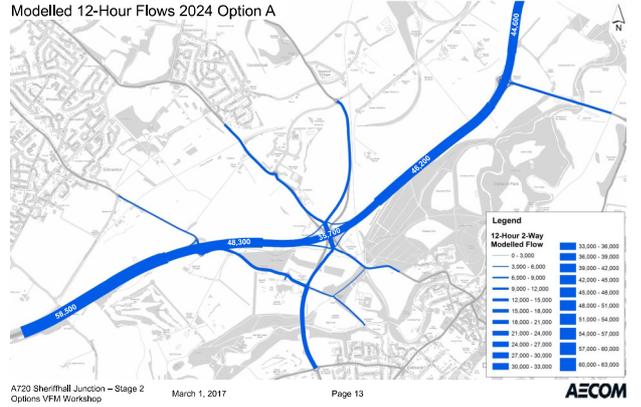
## Preliminary Operational Assessment

Modelled 12-Hour Flows 2024 Base Network



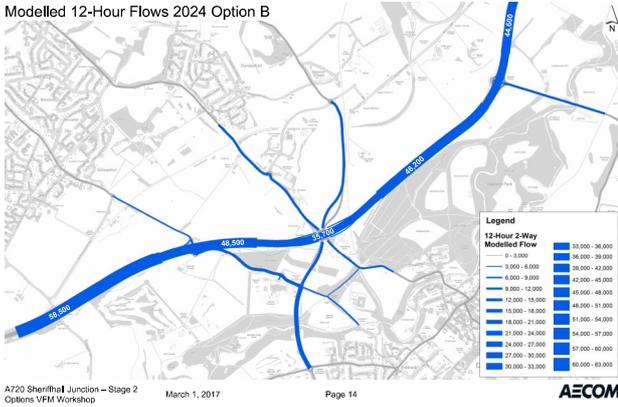
## Preliminary Operational Assessment

Modelled 12-Hour Flows 2024 Option A



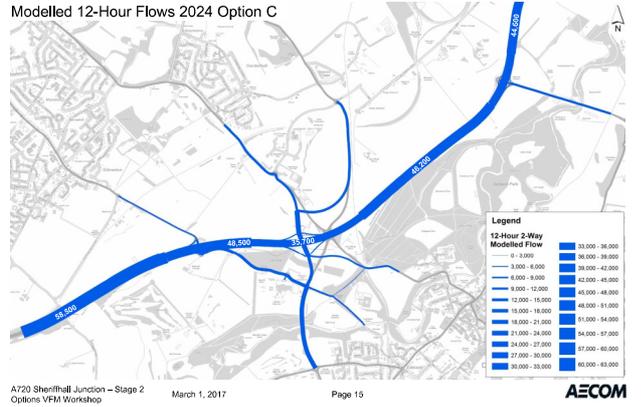
## Preliminary Operational Assessment

Modelled 12-Hour Flows 2024 Option B



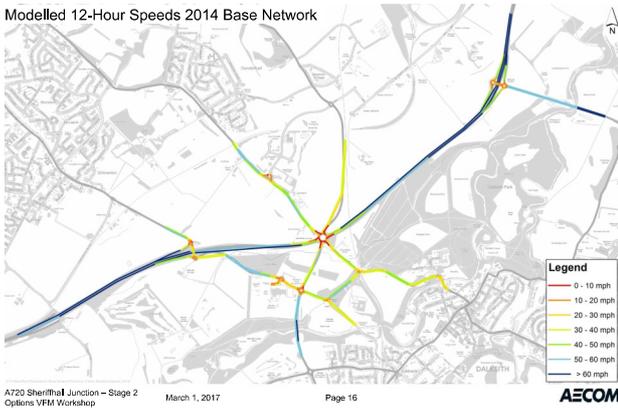
## Preliminary Operational Assessment

Modelled 12-Hour Flows 2024 Option C



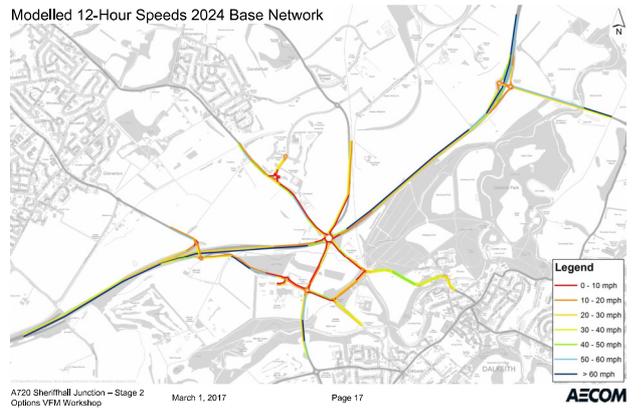
## Preliminary Operational Assessment

Modelled 12-Hour Speeds 2014 Base Network



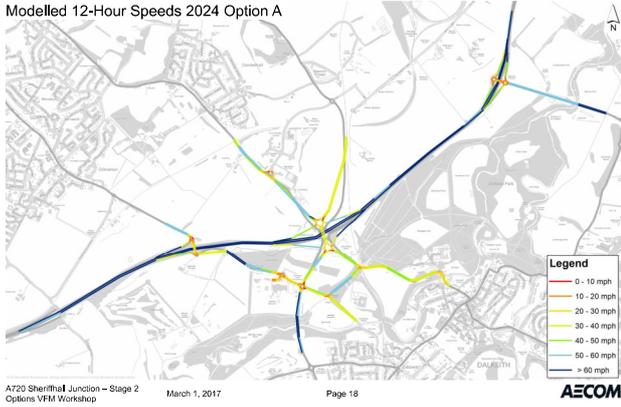
## Preliminary Operational Assessment

Modelled 12-Hour Speeds 2024 Base Network



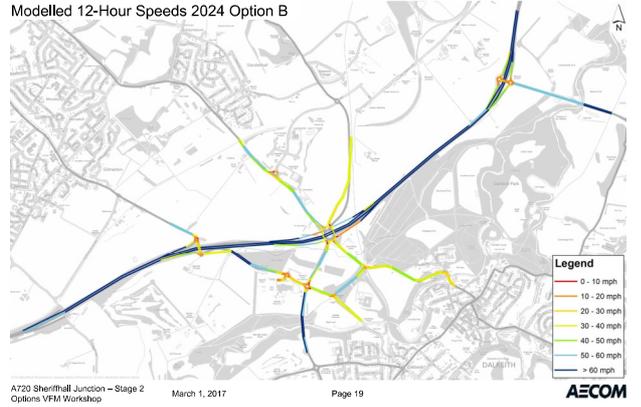
## Preliminary Operational Assessment

Modelled 12-Hour Speeds 2024 Option A



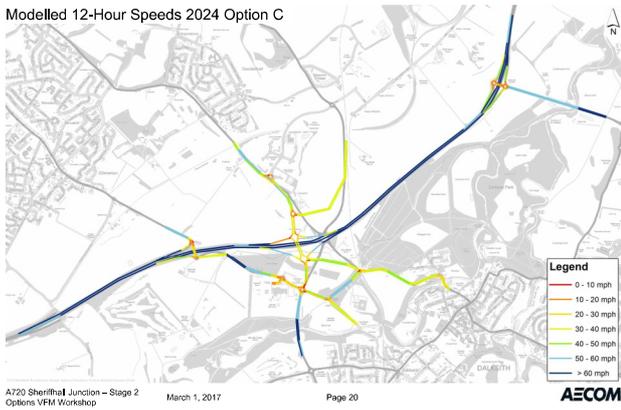
## Preliminary Operational Assessment

Modelled 12-Hour Speeds 2024 Option B



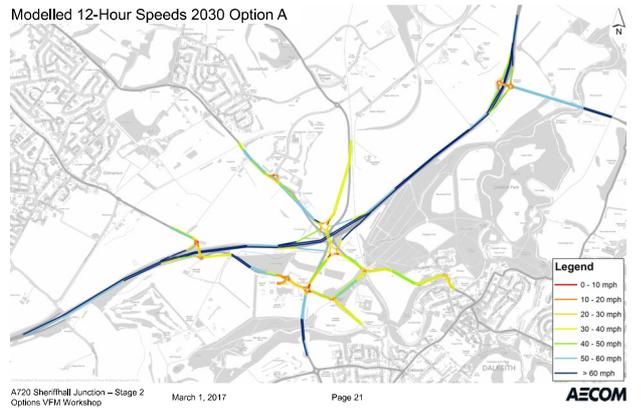
## Preliminary Operational Assessment

Modelled 12-Hour Speeds 2024 Option C



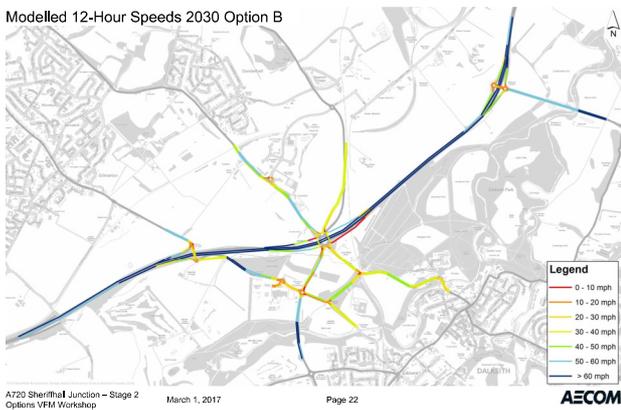
## Preliminary Operational Assessment

Modelled 12-Hour Speeds 2030 Option A



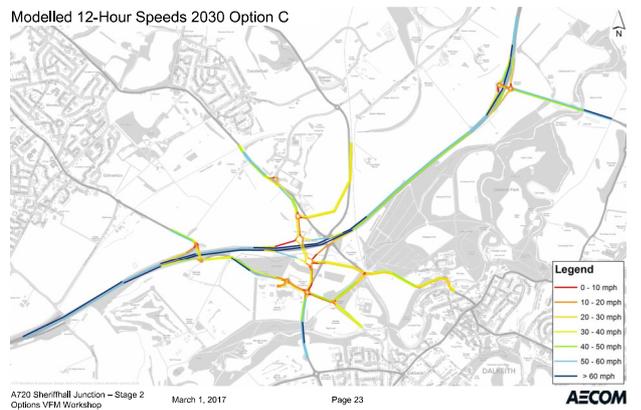
## Preliminary Operational Assessment

Modelled 12-Hour Speeds 2030 Option B



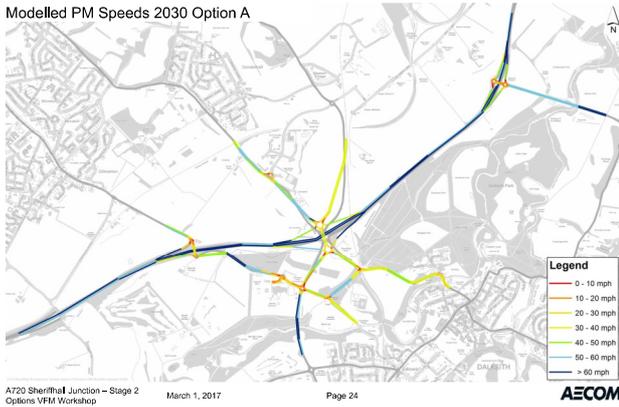
## Preliminary Operational Assessment

Modelled 12-Hour Speeds 2030 Option C



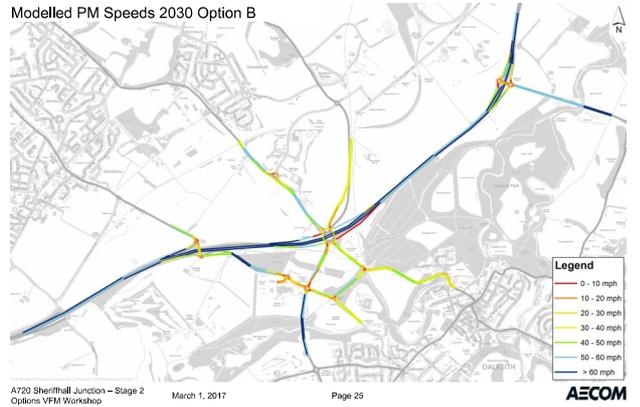
## Preliminary Operational Assessment

Modelled PM Speeds 2030 Option A



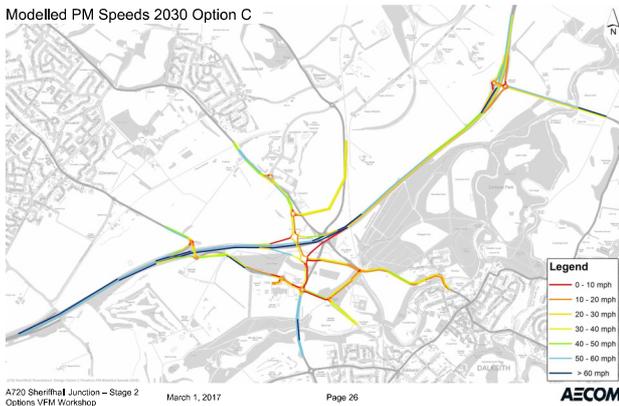
## Preliminary Operational Assessment

Modelled PM Speeds 2030 Option B



## Preliminary Operational Assessment

Modelled PM Speeds 2030 Option C



## Option Assessment – Traffic & Economics

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## Preliminary Economic Assessment

Discounted Network Costs in Market Prices

