

A720 Sheriffhall Roundabout

DMRB Stage 2 Scheme Assessment Report

Part 3 – Assessment Summary and Recommendations
Volume 1 – Main Report

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Prepared by

Jill Irving,
Principal Engineer

Steven Smith,
Senior Assistant Engineer

Russell Bissland,
Technical Director

Zoe McClelland,
Associate Director


Reviewed by

Ryan Hutchison,
Technical Director

Approved by

Ryan Hutchison,
Technical Director

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Prepared for:

Transport Scotland

Prepared by:

Jill Irving
Principal Engineer
T: 0141 354 5600
E: jill.irving@aecom.com

AECOM Infrastructure & Environment UK Limited
Citypoint 2
25 Tyndrum Street
Glasgow
G4 0JY
UK

T: +44 (141) 354 5600
aecom.com

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1. Assessment Summary

1.1 Introduction

This volume summarises the assessment of the scheme options against the scheme objectives, presents the conclusions of the assessment and recommends the preferred option to be taken forward for DMRB Stage 3 assessment.

1.2 Scheme Objectives

The Scheme Objectives are set out in Part 1, Volume 1, Chapter 1 of this report but are repeated here for clarity.

The development and design of the Scheme has been in accordance with the main government appraisal criteria for the assessment of trunk road schemes: Environment, Safety, Economy, Accessibility and Integration. Preliminary scheme objectives were set based on those in the STAG Part 1 report. These have been further reviewed as part of the Scheme development and the following Scheme Objectives have been agreed.

- 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.

These objectives have been used throughout the scheme development and at the Stage 2 Value for Money workshops evaluation sub-objectives were agreed for each to assist in the comparative assessment of scheme options. In addition, the objectives were assigned to the five appraisal criteria as set out in Table 1.1 below.

Table 1.1 - Scheme Objectives and Evaluation Sub-criteria

Topic	Objective	Evaluation Sub-objective
Environment	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	D. Improve road safety for all users on the A720 and approach roads between Gilmerton Junction and Dalkeith Northern Bypass	Improve safety for non-motorised users (NMUs)
		Improve safety for motorised users (MUs)
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
		Minimise delays during construction
	C. Minimise traffic impact of local proposed developments in Midlothian, East Lothian and City	Minimise impact of local proposed development traffic on A720 and approach roads

Topic	Objective	Evaluation Sub-objective
	of Edinburgh on the A720 between Gilmerton Junction and Old Craighall Junction and approach roads	Improve traffic movement along A7 / A6106
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	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

These objectives were used to undertake a comparative options assessment at the Stage 2 Value for Money Workshop held on 9 February 2017. An option assessment matrix was used which enabled the scheme options to be comparatively scored. For further details on this process refer to the Workshop Report in Part 1, Volume 3, Appendix 1 of this report.

1.3 Assessment Summary Tables

Table 1.2 summarises the assessment of each scheme option against each of the scheme objectives. It also gives the overall scheme cost, the Net Present Value and the Benefit to Cost Ratio for each scheme option.

Table 1.2 - Option Assessment Summary Table

Topic	Objective	Evaluation Sub-objective	Option A	Option B	Option C
Environment	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. <i>In terms of DMRB topics this sub-objective has been considered to include the topics of landscape (character), nature conservation, materials, geology and soils and road drainage and the water environment.</i>	<i>Intrusion on natural environment greater than Option B but less than Option C, principally due to extent of scheme footprint and impact on Dean Burn.</i>	<i>Least intrusion on natural environment, principally due to having smallest scheme footprint and least impact on Dean Burn.</i>	<i>Greatest intrusion on natural environment, principally due to having largest scheme footprint and greatest impact on Dean Burn.</i>
		Minimise intrusion of works on cultural heritage	<i>Intrusion on cultural heritage greater than Option B but less than Option C, principally due to extent of scheme footprint.</i>	<i>Least intrusion on cultural heritage, principally due to having smallest scheme footprint.</i>	<i>Greatest intrusion on natural environment, principally due to having largest scheme footprint with potential for more effects on undiscovered archaeology.</i>
		Minimise intrusion of works on people <i>In terms of DMRB topics this sub-objective has been considered to include the topics of noise and vibration, air quality, community and private assets, landscape (visual) and all travellers.</i>	<i>Greater intrusion on people compared to Option B with road encroaching closer to properties and requiring largest amount of designated economic land allocation. Air and noise impact broadly similar for all options.</i>	<i>Least intrusion on people, principally due to having smallest scheme footprint. Air and noise impact broadly similar for all options.</i>	<i>Greater intrusion on people compared to Option B with realignment having large impact on adjacent properties and requiring largest amount of agricultural land. Air and noise impact broadly similar for all options.</i>
		Enhance local environment where opportunities arise <i>In terms of DMRB topics this sub-objective has been considered to include the topics of landscape and visual, nature conservation, community and private assets and all travellers.</i>	<i>It is considered that all options offer the potential to include mitigation measures to off-set any identified effects which would be detailed further at Stage 3. For landscape and visual is it suggested that Option C could provide more opportunities for landscape mitigation planting but all options would include landscape planting. Mitigation for nature conservation, community and private asset and all travellers will be developed in detail at Stage 3.</i>		

Topic	Objective	Evaluation Sub-objective	Option A	Option B	Option C
Safety	D. Improve road safety for all users on the A720 and approach roads between Gilmerton Junction and Dalkeith Northern Bypass	Improve safety for non-motorised users (NMUs)	<i>Grade separation improves NMU safety; may require signalisation to maximise benefits</i>	<i>Grade separation improves NMU safety; may require signalisation to maximise benefits</i>	<i>Provision of separate dedicated route provides advantages over Options A and B.</i>
		Improve safety for motorised users (MUs)	<i>Grade separation improves overall MU safety. One 1-step departure.</i>	<i>Grade separation improves overall MU safety. Two 1-step departures.</i>	<i>Grade separation improves overall MU safety. Five 1-step departures. Earlier congestion than other options with consequent queueing reduces safety</i>
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	<i>Significant improvement in journey times with Options A and B offering similar benefits.</i>	<i>Significant improvement in journey times with Options A and B offering similar benefits.</i>	<i>Significant improvement in journey times but with benefits reducing over time compared to Options A and B. It is therefore likely that under the predicted growth, significant congestion would occur at the off-slips which would queue back on to the A720 and adversely impact on traffic conditions on the trunk road.</i>
		Minimise delays during construction	<i>All options require temporary signalisation and extensive traffic management</i>	<i>All options require temporary signalisation and extensive traffic management</i>	<i>All options require temporary signalisation and extensive traffic management. Off-line nature of Option C will reduce impact compared to Options A and B</i>
	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	<i>Proposed grade-separated junction would allow further growth in traffic levels from local proposed developments compared to existing at-grade roundabout.</i>	<i>Proposed grade-separated junction would allow further growth in traffic levels from local proposed developments compared to existing at-grade roundabout.</i>	<i>Proposed grade-separated junction would allow further growth in traffic levels from local proposed developments compared to existing at-grade roundabout. For Option C, the interaction between the multiple roundabouts leads to significant congestion on the local road network and results in queues extending along the A720 off-slips.</i>
		Improve traffic movement along A7 / A6106	<i>Significant improvement in traffic movement along A7 / A6106 with Options A and B offering similar benefits.</i>	<i>Significant improvement in traffic movement along A7 / A6106 with Options A and B offering similar benefits.</i>	<i>Significant improvement in traffic movement along A7 / A6106 but with benefits reducing over time compared to</i>

Topic	Objective	Evaluation Sub-objective	Option A	Option B	Option C
					Options A and B For Option C, the interaction between the multiple roundabouts leads to significant congestion and queuing on the local road network.
Accessibility	G. Reduce severance by improving accessibility across the A720 for all users	Improve accessibility across the A720 – NMUs	<i>Grade separation improves NMU accessibility; may require signalisation to maximise benefits</i>	<i>Grade separation improves NMU accessibility; may require signalisation to maximise benefits</i>	<i>Provision of separate dedicated route provides advantages over Options A and B</i>
		Improve accessibility across the A720 – public transport	<i>Grade separation reduces severance caused by current junction</i>	<i>Grade separation reduces severance caused by current junction</i>	<i>Grade separation reduces severance caused by current junction; additional junction with A6106 reduces benefit compared to Options A and B</i>
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	<i>Grade separation assists integration with public transport</i>	<i>Grade separation assists integration with public transport</i>	<i>Grade separation assists integration with public transport</i>
		Facilitate integration with Shawfair park and ride	<i>Grade separation assists integration with Shawfair park and ride</i>	<i>Grade separation assists integration with Shawfair park and ride</i>	<i>Grade separation assists integration with Shawfair park and ride; additional junction with A6106 reduces benefit compared to Options A and B</i>
	B. Reduce the conflict between strategic and local traffic	Reduce conflict between strategic and local traffic	<i>Grade separation reduces conflict between strategic and local traffic</i>	<i>Grade separation reduces conflict between strategic and local traffic</i>	<i>Grade separation reduces conflict between strategic and local traffic; additional junction with A6106 reduces benefit compared to Options A and B</i>

Based on the above appraisal, each option was scored against each sub-objective, as detailed in the Workshop Report, providing a Function Score reflecting how well each Option achieves the Scheme Objectives; with the best performing score the highest.

This in turn provided a Value Index for each Option by dividing the Function Score by the estimated cost in £Ms, with the highest Value Index providing the best ratio of function to cost.

Lastly, each Option was assessed against cost and time risks with each option being assigned risk ratings.

The results of the above assessment are summarised in Table 1.3 followed by a ranking of the Options against each in Table 1.4.

Table 1.3 - Option Assessment - Scoring

Metric	Summary Output		
	Option A	Option B	Option C
Function	87.3	91.0	83.0
Cost	94.1	87.3	90.3
Value	0.927	1.042	0.919
BCR	9.14	9.49	4.62
Risk - Cost	279	282	304
Risk - Time	369	371	394

Table 1.4 - Option Assessment - Ranking

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

2. Conclusions

All options achieve the main scheme objective of improving the movement of traffic on the A720 between Gilmerton and Old Craighall by providing grade-separation of the A720 at the existing Sheriffhall Roundabout.

In order to determine the preferred option, the three options have been assessed against the scheme objectives, as summarised in Table 1.2. The assessment has also considered other factors including value for money, NPV, BCR and risk. This has demonstrated that no one option emerges as being preferred across all objectives.

One of the scheme objectives is to “minimise intrusion of works on natural environment, cultural heritage and people whilst enhancing the local environment where opportunities arise”. The assessment of the objective to minimise intrusion showed Option B as the preferred option, primarily due to its reduced footprint in comparison to Options A and C. Option C fares relatively poorly due to the large land take resulting from the “off-line” nature of this option.

Safety has been assessed separately for motorised and non-motorised users. For motorised users, reservations have been expressed about the potential for high circulatory speeds for the large roundabout on Option B and hence it has been marked down slightly in comparison to Option A. Option C has been further marked down due to increased junction movements and operational assessment showing early congestion compared to Options A and B. In contrast, Option C performs well for safety for non-motorised users due to the opportunities it provides for a segregated non-motorised user route on the line of the existing A7.

Modelling of the traffic operation of the three options has shown that Options A and B perform significantly better than Option C. Whilst Options A and B perform relatively similar, Option C shows traffic congestion on the A720, with queues on slip roads impacting on the A720 from 2030 onwards. Similarly, as a result of its off-line location and the inclusion of an additional roundabout junction to accommodate the A6106 north of the Sheriffhall roundabout, Option C shows much heavier congestion on the adjacent local road network with greater delays along the A7 / A6106 compared to Options A and B.

Cost estimates range from £87.3M to £94.2M, with Option B having the lowest overall cost and Option A the highest. Options A and B demonstrate similar NPV benefits of £527.4M and £508.3M, however relative to the estimated cost, Option B returns a stronger BCR of 9.49 compared to 9.14 for Option A. In contrast, Option C returns much lower NPV of £224.1M, resulting in a significantly lower BCR of 4.62.

Given the location of the scheme and the need to keep the A720 operational throughout construction, an objective was set on minimising delays during construction. A buildability review concluded that all options can be constructed whilst maintaining traffic flows albeit all would require temporary traffic signalisation and extensive traffic management. Due to its off-line location, Option C offers buildability advantages compared to the other two options and this was reflected in scoring on this objective. The review also concluded that the construction methodology for Options A and B would be similar.

All options offer benefits through the reduction in severance provided by the grade separation of the A720. The segregated NMU route within Option C offers advantage over Options A and B however all offer safer and improved facilities for NMUs. All Options would also provide improved accessibility across the A720 for public transport although it is considered Option C is slightly less advantageous due to the presence of the additional roundabout at the A6106.

In relation to integration objectives, there is little difference between options with all offering benefits in comparison to the existing situation. Similarly to severance, Option C is considered to be slightly less advantageous due to the presence of the additional roundabout at the A6106.

Consultation feedback was predominantly positive with all consultees recognising the need for improvements at Sheriffhall. Whilst a common theme was a desire to take opportunities to improve NMU provision, most consultees acknowledged that all options offered substantial improvements on current arrangements.

Risk analysis has been undertaken against cost and time and whilst scores were broadly similar for all options, Option C was assessed as presenting more risk than Options A and B which scored very similarly.

Taking into account all the above factors, an overall assessment concluded that Option B provided the best balance of benefits across the full range of environment, safety, economy, accessibility and integration objectives.

Whilst Option C offers benefits, particularly with respect to buildability and NMU provision, traffic assessment has identified significant operational issues compared to Options A and B, as reflected in the NPV and BCR results. It is also the least favourable option from an environmental viewpoint and overall had the lowest function score of all options. For these reasons it is concluded that Option C is less preferable than the other options.

Whilst Options A and B offer similar benefits, the lower capital cost of Option B represents better value for money than Option A.

In relation to Options A and B, the operation of the junctions will require more detailed consideration at the next stage, particularly with respect to NMU routes.

It has however been noted that whilst Options A and B perform much more strongly than Option C in relation to future traffic provision, it is clear that with the high levels of traffic growth predicted for the area, all options will face capacity challenges in future years. From this perspective, further operational enhancements may be required to maintain capacity and minimise congestion and it would be sensible to take this scope for enhancement into account in scheme development and assessment. The obvious measure to improve capacity would be to signalise the junction and the need and timing for potential signalisation will require detailed consideration at Stage 3, both from an operational perspective and with respect to NMU provision. Whilst Options A and B could both be developed to allow future signalisation, Option B has a more propitious layout, offering better opportunities for future capacity enhancement.

Therefore, taking into account overall benefits, value for money and the future scope for enhancement, it is considered that Option B should be taken forward as the preferred option.

3. Recommendations

It is recommended that Option B be adopted as the preferred option and should be taken forward for further development to DMRB Stage 3 assessment and then publication of draft Orders.

In developing Option B further, the following engineering and operational issues should be given further consideration:

- NMU provision
- Roundabout ICD and safety/operational implications
- Need for traffic signalisation

