

**The Moray Council**

Elgin STAG Study

Interim Review

April 2007

**Halcrow Group Limited**

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## Elgin STAG Study

### Interim Review

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# Contents

<b>1</b>	<b>Introduction</b>	<b>1</b>
	1.1 <i>Introduction</i>	1
<b>2</b>	<b>Background</b>	<b>2</b>
	2.1 <i>Introduction</i>	2
	2.2 <i>Pre-Appraisal</i>	2
	2.3 <i>STAG Part 1</i>	2
<b>3</b>	<b>STAG Part 1 Outcomes</b>	<b>4</b>
	3.1 <i>Option Sifting</i>	4
<b>4</b>	<b>VISSIM Microsimulation Model Testing</b>	<b>6</b>
	4.1 <i>Introduction</i>	6
	4.2 <i>Reference/Do Minimum Case</i>	6
<b>5</b>	<b>VISSIM Microsimulation Option Testing</b>	<b>9</b>
	5.1 <i>Option Testing</i>	9
<b>6</b>	<b>Low Impact Options – Traffic Management</b>	<b>11</b>
	6.1 <i>Introduction</i>	11
	6.2 <i>Option 1 – Gyratory System</i>	11
	6.3 <i>Option 2 – HGV Routing Model</i>	11
	6.4 <i>Option 3 – Signals at A96/Haugh Road/Superstore Junction</i>	13
<b>7</b>	<b>Low Impact Options – Link and Junction Improvements</b>	<b>15</b>
	7.1 <i>Introduction</i>	15
	7.2 <i>Option 5 – The Wards Link</i>	15
	7.3 <i>Option 7 – Pansport Road Junction Upgrade</i>	16
	7.4 <i>Option 8 – Pansport Road and Cumming Street Roundabouts</i>	16
	7.5 <i>Option 9 – Partial Dualling of Alexandra Road</i>	17
	7.6 <i>Option 10 – Morriston Road Junction Upgrade</i>	18
	7.7 <i>Option 11 – Boroughbriggs Road Junction Upgrade</i>	19
	7.8 <i>Option 12 – Edgar Road Junction Upgrade</i>	19
	7.9 <i>Option 20 – A941 Railway Bridge Closure</i>	20
<b>8</b>	<b>High Impact Options – Link and Junction Improvements</b>	<b>21</b>

8.1	<i>Introduction</i>	21
8.2	<i>Option 4 – Witter Drive Link (TSP 10-12)</i>	21
8.3	<i>Option 6 – Morriston Road Link (Part TSP 2)</i>	21
8.4	<i>Option 13 – Bypass North Alignment (TSP 1)</i>	22
8.5	<i>Option 14 – Bypass South (Short) Alignment (TSP 2)</i>	23
8.6	<i>Option 15 – Bypass South (Long) Alignment (TSP 2)</i>	24
<b>9</b>	<b>Intermediate/Combination Options</b>	<b>25</b>
9.1	<i>Introduction</i>	25
9.2	<i>Option 16 – Southern Distributor + Option 4 Witter Drive</i>	25
9.3	<i>Option 17 – Southern Distributor + Option 6 Morriston Road Link</i>	26
9.4	<i>Option 18 – Combination of Option 8 + Option 9</i>	26
9.5	<i>Option 19 – Combination of Option 12 and Option 4</i>	27
<b>10</b>	<b>Conclusions and Recommendations</b>	<b>29</b>
10.1	<i>Summary</i>	29
10.2	<i>Recommendations</i>	29

# 1 Introduction

## 1.1

### *Introduction*

The purpose of this paper is to report on the results of an Interim Review carried out to determine the options to be carried forward and appraised during the next stage (STAG Part 2) of the Elgin STAG study. The report is consistent with the objective-led appraisal process and carries on from the pre-appraisal and STAG Part 1 outlined in earlier documents. The review considers the relative impact of a range of Traffic Management and Junction/Link improvements that have the potential to meet the planning objective of providing a quicker, safer and more reliable transport system in and around Elgin while accommodating future development.

Central to any sifting process in STAG is the need for transparency and to outline clearly why any options are being discounted or recommended for further analysis. This interim review charts movement from the initial list of twenty options to a final list of seven options that are recommended for STAG Part 2 appraisal. It provides an audit trail for the options tested and recommends to Moray Council options that should be taken forward for STAG Part 2 appraisal. The recommendations are based on an appraisal of the quantitative impacts from the *Elgin VISSIM Microsimulation Model STAG Option Testing Report* (which sets out details of each of the options) and are linked to the key planning objectives set by the stakeholders at the pre-appraisal workshop and subsequently approved by The Moray Council.

## 2 Background

### 2.1 *Introduction*

In February 2006, Moray Council appointed Halcrow Group to provide Professional and Technical Transportation advice in response to a number of concerns about traffic movement and the general accessibility of Elgin and its surrounding communities.

### 2.2 *Pre-Appraisal*

The starting point for analysis was a pre-appraisal exercise that involved a number of elected members from Moray Council and local stakeholders. The aim was to identify the current transport problems in Elgin and set out a number of planning objectives that reflected these problems. The key transport planning objective was to:

*Provide a quicker, safer and more reliable transport system in and around Elgin while accommodating future development.*

### 2.3 *STAG Part 1*

The pre-appraisal exercise was followed by a STAG Part 1 appraisal. A series of consultations were used to highlight potential solutions to the wide range of transport problems, issues and constraints identified by local stakeholders. Following this an extensive list of possible solutions was presented. STAG advocates that options be narrowed for ease of measurement and appraisal. It was therefore agreed, with Moray Council and local stakeholders, to group options under the following themes:

- 1) **Public transport:** Integrated ticketing for public transport; integrated public transport timetable; free bus travel (within and to Elgin); Improved bus services to Dr Grays hospital; and bus priority measures.
- 2) **Traffic Management:** Traffic management options for Elgin; Improved signage and warnings; loading restrictions; one way system/loop around Elgin; Divert traffic from West of Elgin around North Elgin – e.g. use of Morriston Road; Opportunities to identify HGV specific routes; and, cycle network improvements.



- 3) **Link and Junction Improvements:** Junction improvements for A96 and A941 routes through Elgin; Extension to Edgar Road to Morriston Road Junction; New railway line crossings – “New Elgin – Elgin Link”; Improvements for Wards Road; Options to improve North College Street – College Street; and Elgin bypass.
- 4) **Travel Planning and Information:** Improved information flow for travellers including PR and marketing of travel options; Car share schemes; and, encourage the adoption of flexible working hours.
- 5) **Parking: Park and Ride:** Parking Strategy; Pay and display parking controls; and increase provision of car parking – West/South/Central Elgin.

A qualitative appraisal of the above five themes was used to assess their potential to impact positively on the key planning objectives established by the council. The themes were also considered against the government’s five objectives for transport – Economy, Environment, Safety, Integration and Social Inclusion/Accessibility.

## 3

# STAG Part 1 Outcomes

### 3.1

#### *Option Sifting*

The STAG Part 1 concluded that three of the five themes would not be taken forward for further analysis.

Although public transport was considered to have an important role to play in managing the future traffic problems in Elgin it was concluded that, in isolation, this option would not provide the most effective solution to the planning objectives set. Similarly, it was concluded that travel planning and information would not, in itself, provide the most effective solution in pursuit of the planning objectives set. It was therefore recommended that Moray Council continue to pursue positive travel planning but that this option not be taken forward to the STAG Part 2 analysis. Parking policy was viewed as an attractive traffic demand tool that could contribute to the alleviation of traffic problems in Elgin. Although recommended not to be taken forward to the STAG Part 2 appraisal it was advised that Moray Council consider establishing a 'Parking Strategy' for Elgin. The STAG Part 1 also recommended that bus services to Dr Gray's hospital are analysed and opportunities to improve them be examined but not taken forward for more detailed analysis within STAG.

The STAG Part 1 appraisal also concluded that options contained within the traffic management theme were closely aligned to the planning objectives, and were therefore recommended for further analysis. The Link and Junction improvements theme also highlighted a consistency with the planning objectives. It was recommended that options under this theme be analysed further to determine which options would be subjected to STAG Part 2 analysis.

Two themed outcomes therefore emerged from the STAG Part 1 appraisal; Traffic Management and Link/Junction improvement. These contained a number of specific options that could be taken forward to a detailed STAG Part 2 appraisal, as shown in Table 3-1.

**Table 3-1: Emerging Themes from STAG Part 1 Appraisal**

<b>Traffic Management Options</b>	<b>Link/Junction Improvements</b>
A one way system/loop around Elgin	Junction improvements on the A96
Measures to divert traffic from the west around north Elgin – e.g.: Morrison Road	Junction improvements on the A941
Opportunities to identify HGV specific routes	A96 to Edgar Road options
	Elgin Bypass

The traffic management and link/junction improvement options outlined above was not exhaustive and the elements under each were considered to represent groupings of options. It was clear however that a number of the options would have greater impacts than others in alleviating Elgin’s transport problems. It was also agreed that, given the available time and resources for the study and the level of analysis required in the next stage of the appraisal, it would be preferable to narrow down the options to be taken forward to the STAG Part 2 to a manageable number. It was therefore agreed that a range of specific measures under each category would be tested using the VISSIM microsimulation model, the development of which was running in parallel to the STAG Part 1. It was envisaged that the outputs from the testing would be used to assess which options are likely to have the greatest impact in meeting the planning objectives and solving the traffic problems facing Elgin.

The aim of the option sifting process was twofold:

- Eliminate options that perform poorly against the objectives, using more detailed quantitative information from the model testing
- Identify options that should be taken forward for more detailed analysis in the STAG Part 2 appraisal – on the basis of quantitative information from the modelling tests.

## 4 VISSIM Microsimulation Model Testing

### 4.1 *Introduction*

VISSIM modelling was undertaken to provide more detailed information to support the STAG Part 1 analysis, and to inform the STAG Part 2 appraisal. The VISSIM Model produced quantitative outputs to show which of the options would have a greater impact on the planning objectives when compared to the reference/do minimum case. A detailed report setting out the options tested and the results was prepared by Halcrow – Elgin Vissim Microsimulation Model STAG Option Testing Report. The outputs from this review are summarised below and explain why, on the basis of further analysis, some options have been rejected and others are being taken forward to the STAG Part 2 appraisal.

### 4.2 *Reference/Do Minimum Case*

The VISSIM Model includes a Reference case against which all options are compared. The Reference case sets out what would happen to traffic in Elgin, taking into account network infrastructure improvements that are already committed by the Council. This includes trunk roads, non-trunk roads and infrastructure committed through the planning process. Information about committed schemes was provided by The Moray Council.

The comparisons between the do-something options and the reference case focus on 3 key impacts, depending on the nature of the option, using different indicators. The first looks at the level of service, particularly for changes to junctions. The level of service measurement considers the change in average vehicle delay in seconds at a junction. The different categories of delay are:

- A – Less than 10 seconds
- B – 10 to 20 seconds
- C – 20 to 35 seconds
- D – 35 to 55 seconds
- E – 55 to 80 seconds
- F – More than 80 seconds

The second indicator is the total travel hours on the network. The indicator is the summation of the individual travel times for every vehicle that has undertaken a

journey within the Elgin road network. For example the total travel hours for the morning peak hour are 1,385 hours. Given there is 14,000 journeys undertaken in this two hour period then this figure equates to an average journey length of six minutes for each vehicle within the Elgin model area.

Given the number of trips between the reference case and do-something options is fixed, then if the number of hours taken to make these trips rises this is a good indicator of a more congested network. Conversely, if the number of travel hours falls then this is likely to reflect a less congested network.

The third indicator looks at the average vehicle speed (mph). The higher the vehicle speed the more free-flowing the traffic is likely to be and therefore the less congested the network.

The Reference Case model reveals a significant increase in traffic and reductions in average speed over the period 2006-2012. It also identified particular streets and junctions where traffic conditions would deteriorate as congestion levels rise and waiting times increase. Comparisons with the 2006 base model are used to demonstrate the impact of the reference case. Table 4-1 shows traffic growth in the AM and PM peak periods and during the Saturday Peak Period.

**Table 4-1: Reference Case Traffic Growth**

<b>Time Period</b>	<b>2006 Base</b>	<b>2012 Ref Case</b>	<b>% Change</b>
AM Peak	1,076	1,385	28.7%
PM Peak	1,354	1,782	31.6%
Sat Peak	1,477	2,240	51.7%

These increases are particularly significant when compared with the growth in trips which were 10.8%, 11.5% and 14.0% respectively. This suggests that the extra trips in the reference case model are causing significant congestion beyond the levels experienced in the base model. The knock-on effect is to slow down the average speed of vehicles moving through and in and around Elgin, shown in Table 4-2

**Table 4-2: Reference Case Vehicle Speeds (mph)**

<b>Time Period</b>	<b>2006 Base</b>	<b>2012 Ref Case</b>	<b>% Change</b>
AM Peak	24.0	23.1	-3.7
PM Peak	22.6	21.1	-6.5
Sat Peak	21.1	17.0	-19.4

The statistics produced by the model highlight that the Elgin reference do/minimum case is likely to produce higher levels of congestion in 2012 when compared to 2006 data.

# 5 VISSIM Microsimulation Option Testing

## 5.1

### *Option Testing*

The VISSIM microsimulation model was used to test twenty options drawn from the priority themes identified within the STAG Part 1 analysis. The outputs from the model were measured against the key planning objective and sub-objectives. The options were measured against their ability to:

*Provide a quicker, safer and more reliable transport system in and around Elgin while accommodating future development*

The twenty options are listed below in Table 5-1. Two of the options (0 and 20, shaded) are not included under the two themes of Traffic Management and Link & Junction Improvements. This is because Option 0 is the reference case and is there as standard practice in transport appraisal so that all options can be measured against a consistent base – in this case what would happen to traffic in Elgin if the network was only improved to include investments that are already committed, including that to trunk roads, non-trunk roads and infrastructure committed through the planning process. Option 20 was included to analyse the traffic impact of closing the A941 Railway Bridge Crossing as the key bridge crossing over the railway.

Table 5-1: Options Tested

Group		Ref	Modelling Options
Appraisal Benchmark	Reference Case	0	Committed Development and Forecast Development
Traffic Management		1	Gyratory System
		2	HGV Routing Model
		3	A96/Haugh Road/Superstore
Link & Junction Improvements	Edgar Road to A96	4	Wittet Drive Link (TSP10-12)
		5	The Wards Link
		6	Morrison Road Link (Part TSP2)
	A96 Improvements	7	Pansport Road Junction Upgrade
		8	Pansport Road Junction & A941 Cumming Street – Bishopmill Brae Junction
		9	Partial dualling of Alexandra Road
	A941 Improvements	10	Morrison Road Junction Upgrade
		11	Boroughbriggs Road Junction Upgrade
		12	Edgar Road Junction Upgrade
	Bypass	13	Bypass North Alignment (TSP1)
		14	Bypass South (Short) Alignment (TSP2)
		15	Bypass South (Long) Alignment (TSP2)
	Combination Options	16	Southern Distributor + 4
		17	Southern Distributor + 6
		18	Combination 8 + 9
19		Combination 12 + 4	
	Possible Bridge Closure	20	A941 Railway Bridge Closure



# 6 Low Impact Options – Traffic Management

## 6.1 Introduction

This Chapter examines the effect of Low Impact Traffic Management Options on network performance

## 6.2 Option 1 – Gyratory System

The first option tested was the creation of a Gyratory system around the centre of Elgin. The STAG Part 1 acknowledged the difficulty of this task, with a one way system denying some road users easy access to locations that they could previously reach with little problem. The results from the testing, shown in Table 6-1 showed that, during the AM peak simulation, total distance travelled increased by 3% and the total time of travel increased by approximately 5%. Travel time through Elgin showed little change Eastbound but decreased by approximately 10% Westbound. The PM peak simulation showed that the total travel time increased by 7% over the two hour period. This option therefore conflicts with the key planning objective and it is therefore recommended that it is discounted from a full STAG 2 appraisal.

Table 6-1: Option 1 Test Results

Scenario	Period	Total Travel Hours	Average Vehicle Speed (mph)
Reference Case	AM	1,385	23.1
Option 1	AM	1,449	22.7
Reference Case	PM	1,782	21.1
Option 1	PM	1,918	20.2
Reference Case	Sat	2,240	17.0
Option 1	Sat	n/a	n/a

## 6.3 Option 2 – HGV Routing Model

This option assessed the impact of creating an alternative route for HGV's to the A96 trunk road avoiding the town centre of Elgin. The option would see HGV vehicles travelling through Elgin from routed via Morrision Road, and

Lossiemouth Road to the Cumming Street/A96 roundabout, or Lossiemouth Road then Lesmurdie Road to reach the A96 at Pansport Road.

This option was considered inappropriate for traffic modelling due to the relatively low traffic flow data and HGV flow data extracted from the 2012 Reference Case model. As an example, flows extracted for the modelled link adjacent to the bus station are shown in Table 6-2 below.

**Table 6-2: HGVs as a Percentage of Through Traffic on A96 at Bus Station**

Peak / Flow	Through Traffic - All Vehicles on A96	Through HGVs on A96	Through HGVs as % of Through Traffic
AM – west to east	1,234	23	2%
PM – west to east	1,669	32	2%
Sat – west to east	1,515	12	1%
AM – east to west	1,577	40	3%
PM – east to west	1,996	44	2%
Sat – east to west	2,007	5	0%

The table shows that on a typical A96 link, through HGV represents a small percentage of the total volume of traffic using this route. Testing this option with the traffic model is likely to show very little overall difference in traffic impact and thus the results would be only marginally different. Hence it would be difficult to quantify any discernible impact of this option.

Besides the quantification of traffic impacts, it may also be considered inappropriate to route HGV vehicles along this route on road safety grounds. This route features a mix of residential frontage with on street parking, mixed business use and two schools (Elgin Academy and Bishopmill Primary) front onto one section of the route on Morrision Road. There is also a part-time 20mph zone in operation along this particular section of the route.

Additionally, it is generally considered that vehicles, particularly HGVs should use the most appropriate (i.e.: highest) level of road available in any local hierarchy, and by proposing this alternative route, HGV vehicles would be removed from the Trunk Road network and placed onto less suitable local distributor roads. It is

likely that if the HGV component of vehicles on this alternative route were increased, there could be a requirement for increased maintenance costs, due to the higher number of heavy vehicles using it.

Another factor considered in the appraisal is that the several of the route's junctions may be unsuitable for the movement of HGV vehicles. At some junction locations there may be few suitable gaps in traffic flows to allow a safe right turn by HGV vehicles. The likely delay caused by such hindrance to movement would also impact on general traffic.

It is apparent that this Option does not address in any respect the key transport planning objective to *Provide a quicker, safer and more reliable transport system in and around Elgin while accommodating future development.*

In summary, this option is not suited to modelling, and other impacts (safety, junction performance and enforcement/compliance) of this option do not justify taking the HGV routing forward.

#### **6.4**

##### ***Option 3 – Signals at A96/Haugh Road/Superstore Junction***

This option assesses the impact of positioning signals at the A96/Haugh Road/Superstore to regulate and ease traffic flow. The model results in Table 6-3 show that during the AM peak the level of service is significantly lower than the reference case scenario. Introducing traffic signals increases average wait time for drivers and results in the junction operating under capacity during the AM peak period. The PM peak results are mixed with a slight improvement for users accessing Tesco creating queues along the A96 (South) onto High St. The Saturday peak produces similar results with traffic blocking back to the Cumming St roundabout and occasional problems on the High St junction. This option therefore falls short of the key planning objective. It is therefore recommended that this option be discounted from a full STAG Part 2 appraisal.

**Table 6-3: Option 3 Test Results**

	<b>Period</b>	<b>Total Travel Hours</b>	<b>Average Vehicle Speed (mph)</b>
Reference Case	AM	1,385	23.1
Option 3	AM	1,424	22.5
Reference Case	PM	1,782	21.1
Option 3	PM	1,799	20.9
Reference Case	Sat	2,240	17.0
Option 3	Sat	2,324	16.4

# 7 Low Impact Options – Link and Junction Improvements

## 7.1 Introduction

This Chapter examines the effect of Low Impact Junction and Link Improvement Options on network performance.

## 7.2 Option 5 – The Wards Link

This option upgrades the existing layout associated with Wards Rd, taking account of junction improvements to The Wards and Edgar Rd within the reference case. This option shows a clear correlation between traffic reductions on the A941 Railway Bridge and an increase in traffic on The Wards, with the exception of the Saturday peak. During the Saturday peak although there is an increase of around 100 vehicles on The Wards there is no significant change on the railway bridge. Travel times for Option 5 show little variance from the reference case, with the exception of Northbound routes on the A941. The levels of service at junctions for Option 5 remain generally unchanged and it is therefore recommended that this option be discounted from a full STAG Part 2 appraisal. Details are found in Table 7-1.

Table 7-1: Option 5 Test Results

	Period	Total Travel Hours	Average Vehicle Speed (mph)
Reference Case	AM	1,385	23.1
Option 5	AM	1,377	23.3
Reference Case	PM	1,782	21.1
Option 5	PM	1,773	21.2
Reference Case	Sat	2,240	17.0
Option 5	Sat	2,135	17.9

### 7.3

#### ***Option 7 – Pansport Road Junction Upgrade***

This option tests the impact of increasing the capacity of the roundabout at the Pansport Road Junction. This produces positive localised impacts with the level of service at the interchange increasing from level B to A<sup>1</sup>. Western and Eastern approaches also improve to level A. Improvements are also evident along Maisondieu Rd which improves from a level of service B to A. In contrast the level of service at Pansport Road reduces from B to C. Similar patterns emerge across the PM peak with traffic improvements counterbalanced by negative impacts at Pansport Road, which shows a reduction in the level of service from C to D. Mixed results are also evident during the Saturday peak with significant improvements along the Eastern and Western approaches but little or no improvements at Maisondieu Rd and Pansport Rd. In general although journey times along the A96 from the Eight Acres Hotel to Moycroft improve slightly (5%) it is unlikely that this would have any noticeable improvement for traffic moving along the A96 through the centre of Elgin. Journey time data in Table 7-2 highlights that the overall impact on the Elgin traffic network is not significant. It is therefore recommended that this option be discounted from a full STAG Part 2 appraisal.

**Table 7-2: Option 7 Test Results**

	<b>Period</b>	<b>Total Travel Hours</b>	<b>Average Vehicle Speed (mph)</b>
Reference Case	AM	1,385	23.1
Option 7	AM	1,380	23.2
Reference Case	PM	1,782	21.1
Option 7	PM	1,781	21.1
Reference Case	Sat	2,240	17.0
Option 7	Sat	2,289	16.6

### 7.4

#### ***Option 8 – Pansport Road and Cumming Street Roundabouts***

This option explores upgrading roundabouts at Pansport Place and (A941) Cumming Street – Bishopmill Brae. The upgrades would include Pansport

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<sup>1</sup> The Option Testing Report sets out in detail the various levels. A – less than 10 seconds, B – 10 to 20 seconds, C – 20 to 35 seconds, D – 35 to 55 seconds, E – 55 to 80 seconds, F – More than 80 seconds

roundabout layout as set out for Option 7 and Cumming Street roundabout upgraded to the three lane approaches on all arms. This would allow greater capacity. Mixed results are produced during the AM peak with significant improvements at the Pansport roundabout but little improvement at Cumming St. Similar results are produced during the PM peak with the level of service at the Pansport roundabout increasing from C to A. Marginal improvements are produced at the Cumming St roundabout with the level of service moving from E to D, although it is noticeable that significant queues remain on the A96 approach. This option produces benefits and dis-benefits during the Saturday peak. The Western approach to the Cumming St roundabout shows significant improvements. Marginal improvements are produced at the Pansport roundabout while a reduction in traffic flow is evident at Greyfriars roundabout. Although this option produces a number of benefits as shown in Table 7-3, the magnitude of the benefits is marginal and it is unlikely that in isolation that the overall impact on the Elgin traffic network would be significant. It is therefore recommended that this option is not taken forward to a full STAG Part 2 appraisal

**Table 7-3: Option 8 Test Results**

	<b>Period</b>	<b>Total Travel Hours</b>	<b>Average Vehicle Speed (mph)</b>
Reference Case	AM	1,385	23.1
Option 8	AM		23.3
Reference Case	PM	1,782	21.1
Option 8	PM		21.2
Reference Case	Sat	2,240	17.0
Option 8	Sat		17.0

## 7.5

### ***Option 9 – Partial Dualling of Alexandra Road***

This option considers the partial dualling of Alexandra Rd between the Greyfriars Roundabout and the Tesco roundabout. The model results show that sections of the A96 between Greyfriars roundabout and Tesco roundabout are heavily congested during the PM and Saturday peaks. The results from this option in Table 7-4 show no significant change at any of the intersections when the scheme is implemented. It is therefore recommended that this option be discounted from a full STAG Part 2 appraisal.

**Table 7-4: Option 9 Test Results**

	<b>Period</b>	<b>Total Travel Hours</b>	<b>Average Vehicle Speed (mph)</b>
Reference Case	AM	1,385	23.1
Option 9	AM	1,374	23.3
Reference Case	PM	1,782	21.1
Option 9	PM	1,775	21.2
Reference Case	Sat	2,240	17.0
Option 9	Sat	2,248	17.0

**7.6**

***Option 10 – Morriston Road Junction Upgrade***

This option tests improvements to intersections along the A941 (Morriston Rd, North St, Lossiemouth Rd) to the North of the town centre. The model testing has shown that this option generates localised positive impacts at the Morriston Junction. However, little net positive impact is produced at the network level as any improvements at Morriston Junction are neutralised by worsening conditions elsewhere in Elgin. In comparison to the reference case traffic volumes across the network decrease marginally in the AM and Saturday peak periods with a slight increase in traffic volume in the PM peak. Vehicle speed remains static across the network across all peak period simulations, as shown in Table 7-5 . It is therefore recommended that this option be rejected at this stage of the appraisal. However, while it is recommended that this option not be considered further as part of this study, because the option does not generate benefits at the network level, the Council may wish to revisit this option as it does generate localised benefits at Morriston Junction.

**Table 7-5: Option 10 Test Results**

	<b>Period</b>	<b>Total Travel Hours</b>	<b>Average Vehicle Speed (mph)</b>
Reference Case	AM	1,385	23.1
Option 10	AM	1,381	23.2
Reference Case	PM	1,782	21.1
Option 10	PM	1,807	20.9
Reference Case	Sat	2,240	17.0
Option 10	Sat	2,193	17.4



7.7

***Option 11 – Boroughbriggs Road Junction Upgrade***

This option assesses improvements at the Borough Briggs Road junction. The aim of this scheme is to ease traffic from Borough Briggs Rd to the A941. Table 7-6 shows travel times are not significantly improved through this option. Journey time increases for Southbound trips due to the impact of the roundabout on this approach. It is therefore recommended that this option be discounted from a full STAG Part 2 appraisal.

**Table 7-6: Option 11 Test Results**

	<b>Period</b>	<b>Total Travel Hours</b>	<b>Average Vehicle Speed (mph)</b>
Reference Case	AM	1,385	23.1
Option 11	AM	1,408	22.8
Reference Case	PM	1,782	21.1
Option 11	PM	1,803	20.7
Reference Case	Sat	2,240	17.0
Option 11	Sat	2,141	17.9

7.8

***Option 12 – Edgar Road Junction Upgrade***

This option explores the option of upgrading the roundabout at the junction of Edgar Rd and New Elgin Road. A number of positive impacts are produced during the AM and PM peak periods, although impacts are largely local. The consultants understand however that there is an outstanding planning condition for a developer to improve the junction. There are few impacts during the Saturday peak with the Main St approach continuing to operate at a level of service F. In general this option produces a small positive impact on the overall network although the total travel hours actually increase slightly during the Saturday peak. The benefits from this option are marginal and it is therefore recommended that this option be discounted from a full STAG Part 2 appraisal. Similar to Option 10 however, the Council may wish to revisit this option as it does generate local benefits

**Table 7-7: Option 12 Test Results**

	<b>Period</b>	<b>Total Travel Hours</b>	<b>Average Vehicle Speed (mph)</b>
Reference Case	AM	1,385	23.1
Option 12	AM	1,406	22.8
Reference Case	PM	1,782	21.1
Option 12	PM	1,831	20.6
Reference Case	Sat	2,240	17.0
Option 12	Sat	2,165	17.5

**7.9**

***Option 20 – A941 Railway Bridge Closure***

Option 20 was not originally considered under the themes of Traffic Management or Link & Junction Improvements. It was added to the options to be tested in the model to quantify the impact of closure of the A941 Railway Bridge Crossing as the key crossing over the railway. It is clear from the model that closure of the bridge would have catastrophic impacts on the road network in Elgin. Removing the critical link would place extreme pressure on other parts of the network. Indeed, in the model testing the impacts were so severe it was not possible to complete all iterations of the model assignment. No summary table of information is presented for this option. It is therefore recommended that this option be discounted from a full STAG part appraisal due to the severe adverse impact it would have on the remainder of the network

# 8 High Impact Options – Link and Junction Improvements

## 8.1 Introduction

This chapter examines the effect of High Impact Junction and Link Improvement Options on network performance.

## 8.2 Option 4 – Witter Drive Link (TSP 10-12)

This option assesses the impact of linking Edgar Road to the A96 adjacent to Witter Drive. This option draws traffic from competing routes to the new link road, and the results are shown in Table 8-1. The Wards shows a significant reduction across all three peak periods with falls of 20% (AM), 19% (PM) and 23% (Saturday peak). Time savings are produced during peak periods, particularly Westbound along the A96 and A941 Northbound. Levels of service at the newly established roundabouts on the A96 and Edgar Road are excellent. It is therefore recommended that this option be taken forward for a full STAG Part 2 appraisal.

Table 8-1: Option 4 Test Results

	Period	Total Travel Hours	Average Vehicle Speed (mph)
Reference Case	AM	1,385	23.1
Option 4	AM	1,312	24.4
Reference Case	PM	1,782	21.1
Option 4	PM	1,669	22.5
Reference Case	Sat	2,240	17.0
Option 4	Sat	1,987	19.3

## 8.3 Option 6 – Morriston Road Link (Part TSP 2)

This option considers the impact of linking Edgar Road with the A96 at Morriston Road through a new link road. In this scenario traffic switches from Witter Drive and The Wards during peak periods. Travel times improve marginally across all time periods. Average speed increases by 4% during the AM peak, decreasing travel time by approximately 3.5%. Similar impacts are produced during the PM peak. Significant improvements are provided during the Saturday peak with travel

time reduced by 6.8% and the journey speed on average increasing by 8.1%, as shown in TAB. It is therefore recommended that this option be taken forward for a full STAG Part 2 appraisal.

**Table 8-2: Option 6 Test Results**

	Period	Total Travel Hours	Average Vehicle Speed (mph)
Reference Case	AM	1,385	23.1
Option 6	AM	1,338	24.0
Reference Case	PM	1,782	21.1
Option 6	PM	1,732	21.8
Reference Case	Sat	2,240	17.0
Option 6	Sat	2,089	18.4

**8.4**

***Option 13 – Bypass North Alignment (TSP 1)***

This option tests the impact of providing a bypass around Elgin’s northern periphery. This produces reductions in traffic volume along the A96 and through Elgin town centre during the AM (between 15% and 25%) and PM peak (between 10% to 20%), as shown in Table 8-3. Even more significant reductions are produced during the Saturday peak, with reductions of 10% to 30% on certain approaches. Travel times eastbound and westbound through Elgin improve by similar magnitudes with journey times decreasing by approximately 10% to 20% on most routes. Northbound reductions are also evident with journey time reductions between 7% and 23% produced during peak periods. More modest journey time savings are delivered Southbound with reductions falling between 3% and 10%. It is therefore recommended that this option be taken forward for a full STAG Part 2 appraisal.

**Table 8-3: Option 13 Test Results**

	<b>Period</b>	<b>Total Travel Hours</b>	<b>Average Vehicle Speed (mph)</b>
Reference Case	AM	1,385	23.1
Option 13	AM	1,306	25.1
Reference Case	PM	1,782	21.1
Option 13	PM	1,609	23.9
Reference Case	Sat	2,240	17.0
Option 13	Sat	1,922	20.4

**8.5**

***Option 14 – Bypass South (Short) Alignment (TSP 2)***

This option tests the impact of providing a bypass around Elgin’s southern periphery. Significant impacts are provided during the AM peak with traffic volumes using the A96 to the East and West of Elgin decreasing by 30% to 40%. In Elgin town centre traffic volume on the A96 is reduced by 15% to 20%. Similar reductions are produced during the PM peak. The Saturday peak period produces greater impacts with peak period traffic reduced by over 30% West of Elgin and by 40% to 45% East of Elgin. Significant travel time reductions are also evident Eastbound during the AM, PM and Saturday peak periods. Travel time reductions for the AM and Saturday peak periods range from 7% (AM peak) to 19% (Saturday peak). The model results for this option show significant improvements from the reference case, as shown in Table 8-4. It is therefore recommended that this option be taken forward for a full STAG Part 2 appraisal.

**Table 8-4: Option 14 Test Results**

	<b>Period</b>	<b>Total Travel Hours</b>	<b>Average Vehicle Speed (mph)</b>
Reference Case	AM	1,385	23.1
Option 14	AM	1,293	25.4
Reference Case	PM	1,782	21.1
Option 14	PM	1,605	24.0
Reference Case	Sat	2,240	17.0
Option 14	Sat	1,908	20.7

8.6

**Option 15 – Bypass South (Long) Alignment (TSP 2)**

This option provides an extended bypass around Elgin’s Southern periphery. Table 8-5 shows that in the AM peak a substantial reduction in traffic volume is produced along the A96 (30% to 45%). During the AM peak traffic volumes in Elgin Town Centre decrease by 15% and 30%. Larger reductions are produced during the PM peak, with traffic volumes East of Elgin reducing by 40% and West of Elgin between 40% and 50%. Town centre volumes decrease during the PM peak by 15% to 30%. Outputs for the Saturday peak are also positive with reductions East and West of the town centre approximately 35%. Town centre traffic falls by between 5% and 15% during the Saturday peak period. Travel time savings ranging from 3% to 4% (Southbound AM peak) to 25% to 30% (Saturday Peak) are forecast for this option. It is therefore recommended that this option be taken forward for a full STAG Part 2 appraisal.

**Table 8-5: Option 15 Test Results**

	<b>Period</b>	<b>Total Travel Hours</b>	<b>Average Vehicle Speed (mph)</b>
Reference Case	AM	1,385	23.1
Option 15	AM	1,283	25.2
Reference Case	PM	1,782	21.1
Option 15	PM	1,596	23.9
Reference Case	Sat	2,240	17.0
Option 15	Sat	1,932	20.1

# 9 Intermediate/Combination Options

## 9.1 Introduction

This chapter considers the impact of a number of intermediate or composite options on the effectiveness of the network.

## 9.2 Option 16 – Southern Distributor + Option 4 Wittet Drive

This option combines Option 4 (Wittet Dr Link) to a Southern Distributor route along Reiket Lane through to Glen Moray Drive. It is important to distinguish between the impacts created by this option compared to Option 4 in isolation. In this scenario little change is evident during the AM peak when compared with Option 4. During the PM peak traffic volume falls marginally by 2.8% compared to Option 4 with average vehicle speed increasing marginally from 22.5mph to 23.2mph. A more significant impact of the combination option is produced during the Saturday peak with traffic volumes falling by 9.1% and average vehicle speed increasing from 19.3mph to 21.3mph (10.3%) when compared to Option 4 in isolation. These results are shown in Table 9-1. Most of the positive impacts produced through this option can be attributed to elements contained in Option 4. Although additional impacts, during the AM and PM peak, are marginal the variation during the Saturday peak is significant. It is therefore recommended that this option be taken forward for a full STAG Part 2 appraisal.

Table 9-1: Option 16 Test Results

	Period	Total Travel Hours	Average Vehicle Speed (mph)
Reference Case	AM	1,385	23.1
Option 4 only	AM	1,312	24.4
Option 16	AM	1,322	24.4
Reference Case	PM	1,782	21.1
Option 4 only	PM	1,669	22.5
Option 16	PM	1,621	23.2
Reference Case	Sat	2,240	17.0
Option 4 only	Sat	1,987	19.3
Option 16	Sat	1,805	21.3

### 9.3

#### ***Option 17 – Southern Distributor + Option 6 Morriston Road Link***

This option combines the Option 6 link road to an upgraded route along Reiket Lane through to Glen Moray Dr to form a Southern distributor route. Again it is important to distinguish between impacts created through this option compared to Option 6 in isolation. The results in Table 9-2 show there is little impact during the AM peak with the volume of traffic and vehicle speed remaining static. Marginally positive impacts are produced during the PM peak, compared to Option 6, with traffic volume decreasing by a further 2.7% and average vehicle speed increasing from 21.8mph to 22.5mph. Similar to Option 16 more significant impacts are produced during the Saturday peak with traffic volume falling by a further 9.9% and average speed increasing from 18.4mph to 20.5mph, compared to Option 6 in isolation. It is therefore recommended that this option be taken forward for a full STAG Part 2 appraisal.

**Table 9-2: Option 17 Test Results**

	<b>Period</b>	<b>Total Travel Hours</b>	<b>Average Vehicle Speed (mph)</b>
Reference Case	AM	1,385	23.1
Option 6 only	AM	1,338	24.0
Option 17	AM	1,329	24.2
Reference Case	PM	1,782	21.1
Option 6 only	PM	1,732	21.8
Option 17	PM	1,684	22.5
Reference Case	Sat	2,240	17.0
Option 6 only	Sat	2,089	18.4
Option 17	Sat	1,882	20.5

### 9.4

#### ***Option 18 – Combination of Option 8 + Option 9***

This option is a combination of measures to improve traffic flow along the A96 corridor through Elgin town centre. This combines measures contained in Options 7, 8 and 9. None of these options have been recommended, in isolation, for a full STAG Part 2 appraisal. Modelling these options together does not produce significant impacts on the volume of traffic across the network during the AM and PM peak periods. Vehicle speed remains relatively static during AM and PM peak periods with modest impacts produced for slow moving traffic during the Saturday peak. Table 9-3 shows the results for the Reference Case, each individual option and the Combined Option 18A. Across the network travel time reductions are not



significant when compared to the reference case. It is therefore recommended that this option be discounted from a full STAG part appraisal

**Table 9-3: Option 18 Test Results**

	<b>Period</b>	<b>Total Travel Hours</b>	<b>Average Vehicle Speed (mph)</b>
Reference Case	AM	1,385	23.1
Option 7 only	AM	1,380	23.2
Option 8 only	AM	1,374	23.3
Option 9 only	AM	1,396	22.9
Option 18	AM	1,373	23.3
Reference Case	PM	1,782	21.1
Option 7 only	PM	1,781	21.1
Option 8 only	PM	1,775	21.2
Option 9 only	PM	1,756	21.4
Option 18	PM	1,761	21.4
Reference Case	Sat	2,240	17.0
Option 7 only	Sat	2,289	16.6
Option 8 only	Sat	2,248	17.0
Option 9 only	Sat	2,204	17.4
Option 18	Sat	2,145	17.8

**9.5**

***Option 19 – Combination of Option 12 and Option 4***

This option considers the impacts of adding extra lanes to the Edgar Road roundabout and incorporating the Wittet Drive link into the network and is therefore a combination of Option 4 and Option 12. The analysis above recommends that Option 4 be taken forward but that Option 12 is discounted. The positive impacts produced for Option 19 can largely be attributed to improvements contained within Option 4. Although the results show significant impacts during the AM, PM and Saturday peak periods little variation exists between the results for Option 4 and Option 19. Augmenting Option 4 with Option 12 produces little impact, with the traffic volume and vehicle speed remaining relatively static. The summary results are shown in Table 9-4. It is therefore recommended that this option be discounted from a full STAG part appraisal.

**Table 9-4: Option 19 Test Results**

	<b>Period</b>	<b>Total Travel Hours</b>	<b>Average Vehicle Speed (mph)</b>
Reference Case	AM	1,385	23.1
Option 4 only	AM	1,312	24.4
Option 12 only	AM	1,406	22.8
Option 19	AM	1,300	24.6
Reference Case	PM	1,782	21.1
Option 4 only	PM	1,782	21.1
Option 12 only	PM	1,669	22.5
Option 19	PM	1,831	20.6
Reference Case	Sat	2,240	17.0
Option 4 only	Sat	2,240	17.0
Option 12 only	Sat	1,987	19.3
Option 19	Sat	2,165	17.5

# 10 Conclusions and Recommendations

## 10.1

### *Summary*

A consistent approach to the option testing has been used to narrow down the number of options being taken forward for a full STAG Part 2 appraisal. The options have been considered against the positive impact and likelihood of “**providing a quicker, safer and more reliable transport system in and around Elgin while accommodating future development..**”

## 10.2

### *Recommendations*

On the basis of the outputs from the model testing and how the options perform in helping to achieve the objectives/alleviate the problems, **it is recommended that the options contained within the traffic management theme be discounted from STAG Part 2 appraisal.** The options tested under this theme (1, 2 and 3) produce marginal and in some cases negative impacts.

A number of options tested under the Link and Junction Improvements produced positive impacts on a significant scale. **It is recommended that the following five options be taken forward for a full STAG Part 2 appraisal:**

- **Option 4 - Wittet Drive Link (TSP10-12)**
- **Option 6 - Morriston Road Link (Part TSP2)**
- **Option 13 - Bypass North Alignment (TSP1)**
- **Option 14 - Bypass South (Short) Alignment (TSP2)**
- **Option 15 - Bypass South (Long) Alignment (TSP2)**

Four combination options were also tested to determine whether combining elements from various options would produce significant positive impacts. It is important to isolate the impacts from combination options to identify significant improvements from options already tested and conclude whether these are significant enough to merit full STAG Part 2 appraisal. Two of the four combination options showed sufficient improvement, particularly during the Saturday peak period, to merit further analysis. **It is therefore recommended that combination Options 16 and 17 are taken forward for STAG Part 2 appraisal:**

- **Option 16 Southern Distributor route and Wittet Drive Link (TSP10-12)**
- **Option 17 Southern Distributor routes and Morriston Road Link (Part TSP2).**

The model simulations for the remaining options produced little improvements at the network level. It is unlikely that any of the remaining options would meet the key planning objective or sub-objectives. **It is therefore recommended that the following options be discounted from STAG Part 2 Appraisal:**

- **Option 1 - Gyrotory System**
- **Option 2 - HGV Routing Model**
- **Option 3 - Traffic Signals at A96 / Blackfriars Road**
- **Option 5 -The Wards Link**
- **Option 7 - Pansport Road Junction Upgrade**
- **Option 8 - Pansport Road & Cumming Street Junction Upgrades**
- **Option 9 -Partial dualling of Alexandra Road**
- **Option 10 -Morriston Road Junction Upgrade**
- **Option 11 – Borough Briggs Road Junction Upgrade**
- **Option 12 - Edgar Road Junction Upgrade**
- **Option 18 - Combination 8 + 9**
- **Option 19 - Combination 12 + 4**
- **Option 20 - A941 Railway Bridge Closure**