

# **Inverurie Traffic Capacity Study**

**Aberdeenshire Council**

**S-Paramics Testing Results**

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## INVERURIE TRAFFIC CAPACITY STUDY

Description: **Inverurie Traffic Capacity Study**

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## 1 INTRODUCTION

### 1.1 Background

- 1.1.1 Aberdeenshire towns have sustained significant growth over recent years. In particular, the town of Inverurie is earmarked in planning terms as having potential for further growth.
- 1.1.2 Aberdeenshire Council (AC) requested that SIAS Limited (SIAS) undertake an assessment of the traffic impact of proposed development sites in Inverurie, using the Inverurie S-Paramics traffic model originally developed in 2004.
- 1.1.3 On the advice of AC, the model considers Local Plan content to 2010 then considers, in isolation, each of the potential development areas outlined by AC to assess the impact on the road network of various 2016 forecast scenarios.
- 1.1.4 The overall aim of the study was to assess the traffic impact of each of the proposed development sites on the road network and, also under advice from AC, identify conceptual designs for network improvements which may aid performance of the road network.

### 1.2 Objectives

- 1.2.1 The primary purpose of this assessment is to aid and inform AC on the potential impact on the road network of various development scenarios, however, traffic modelling can never be precise and it is not presented as such, because it involves assumptions about the future and about the behavior of people.
- 1.2.2 The principal objectives of this study were to:
- Evaluate the road network impact of the potential development areas
  - Evaluate the conceptual supporting infrastructure options proposed by AC

### 1.3 Inverurie Model Background

- 1.3.1 The Base Inverurie S-Paramics model was recently upgraded using observed data from 2007 and is representative of 2007 conditions.
- 1.3.2 The Inverurie models represent the following AM and PM peak periods:
- AM Peak Period      07:00 – 10:00
  - PM Peak Period      16:00 – 19:00
- 1.3.3 Figure 1.1 shows the Inverurie study area.



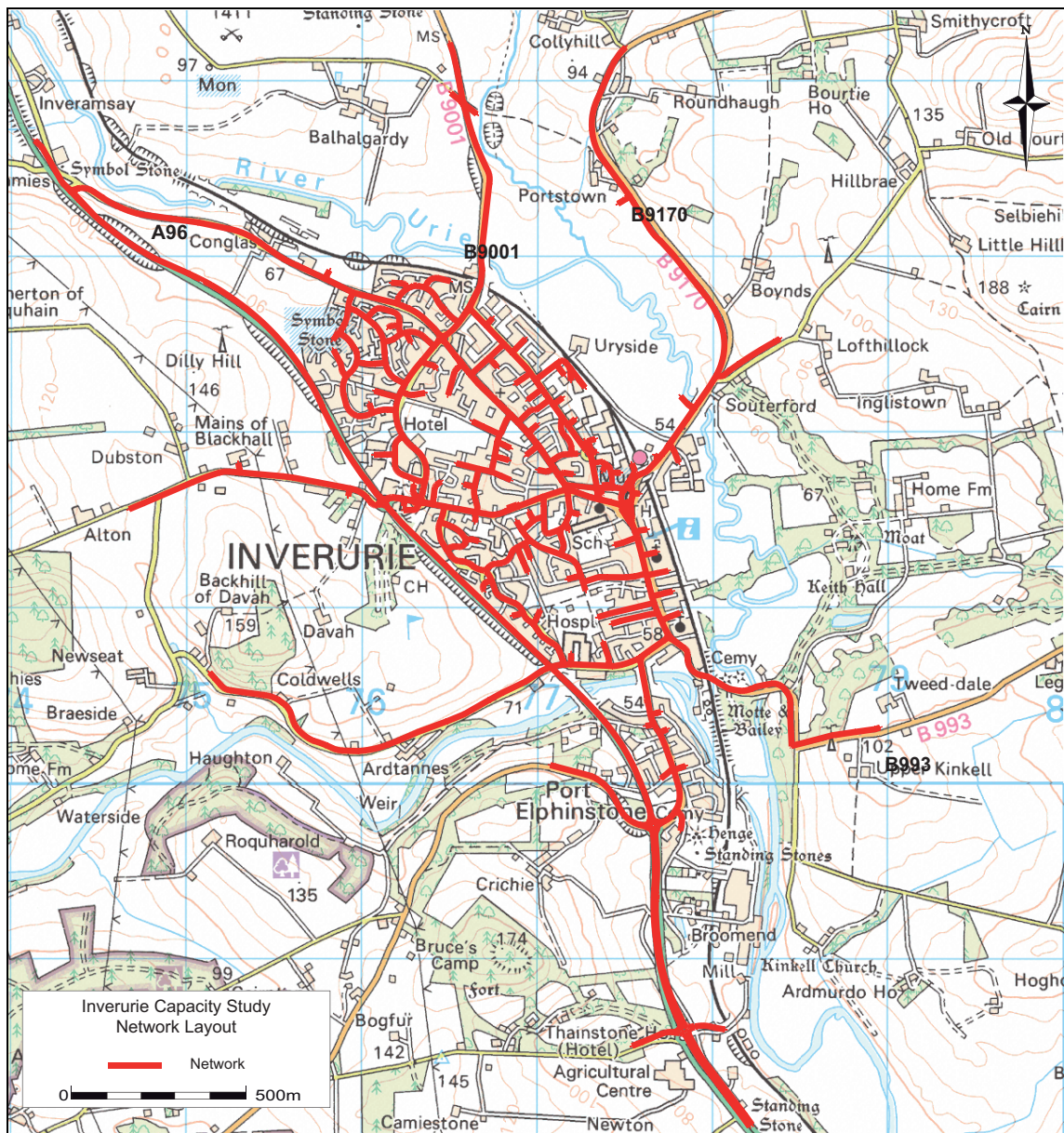


Figure 1.1 : Study Area

**1.4 Model Scenarios**

1.4.1 The following Scenarios were tested in this study

- 2012 Reference Case Year
- 2016 Scenario 1 Crichtie Farm plus dualling of the A96 and Northern link road extension from B9001 to A96
- 2016 Scenario 2 Keithhall Link Road and developments to the north-east of Inverurie



## **2 REFERENCE CASE DEVELOPMENT 2012**

### **2.1 Network Infrastructure**

2.1.1 Following advice from AC it was agreed that the road infrastructure for the Reference Case should include the following

- Two-way traffic over Souterford Bridge and removal of traffic signals
- Signalised access to Souterford retail park
- New signalised junction of Keithhall Street/St James Place
- Five arm roundabout at Blackhall Road junction
- Access roads to Blackhall Road development
- Port Elphinstone Roundabout improvement (section of two lanes on the A96 northbound exit to allow northbound A96 traffic to exit in two lanes).
- Northern Link Road

### **2.2 Developments Content**

2.2.1 The 2012 Reference Case development should include the following developments agreed with AC:

- Uryside housing development (500 units)
- Remaining Mains of Blackhall housing (28 units)
- Blackhall Road mixed use development
- Souterford retail park
- Harlaw Road development
- Thainstone business park

2.2.2 The locations of the above developments are illustrated in Figure 2.1.



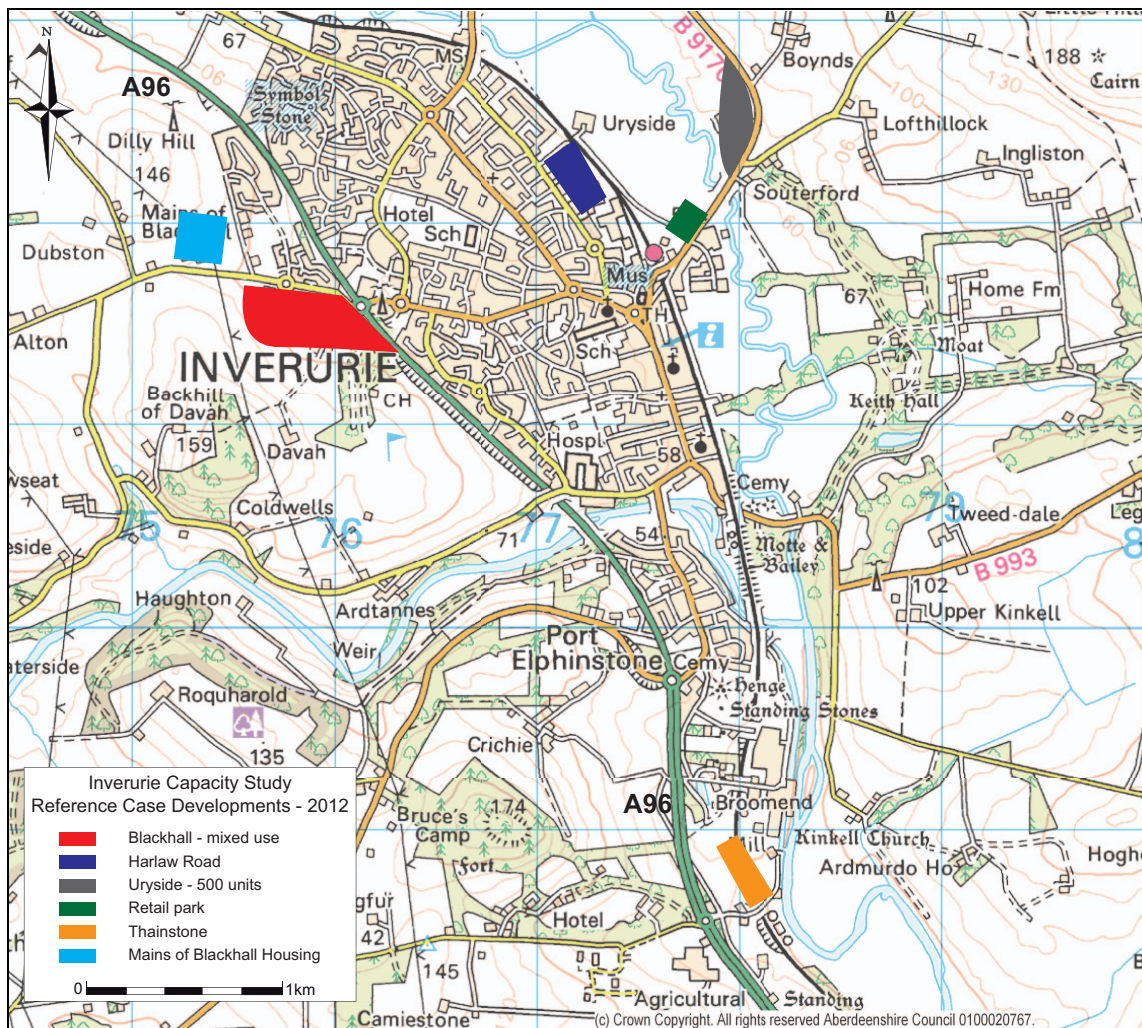


Figure 2.1 : Reference Case Developments Year 2012

### 2.3 Matrix Development

2.3.1 The trip rates and distribution for these developments was taken from the traffic assessment report extracts for each development provided by AC. SIAS has in the past been appointed by various traffic consultants to produce an S-Paramics traffic assessment of each development.

2.3.2 The trips to/from each development can be seen in Table 2.1.

Table 2.1 : Development Trips 2012

Development	AM period		PM period	
	Arrivals	Departures	Arrivals	Departures
Uryside housing	239	602	797	433
Mains of Blackhall housing	33	84	112	61
Blackhall Road mixed use	423	522	541	552
Southerford Road retail park	158	107	307	364
Harlaw Road mixed use	159	112	301	363

2.3.3 The background growth used for the matrix development is detailed in Table 2.2.



Table 2.2 : Background Growth

	Lights		Heavies	
	Internal	External	Internal	External
Internal	No growth	Half Low	No growth	Low
External	Half Low	Low	Low	Central

2.3.4 In Table 2.2 Internal trips are trips from/to the Inverurie town, whereas External trips are trips from/to outwith the study area.

2.3.5 The national traffic growth rates from year 2007 to 2012 are detailed in Table 2.3.

Table 2.3 : NRTF Traffic Growth 2007 to 2012

Year	Growth rate	Lights	Heavies
2012	Half Low	2.9%	3.5%
	Low	5.9%	7.0%
	Central	8.0%	8.8%
	High	10.1%	10.7%

2.3.6 The matrix totals for the Year 2012 Reference Case are illustrated in Table 2.4.

Table 2.4 : Matrix Summary Totals

Year	Scenario	Matrix	AM period		PM period	
2007	Base	Lights	16,710	—	20,000	—
		Heavies	1,743	—	890	—
		Total	18,453	—	20,890	—
2012	Reference Case	Lights	19,288	15.4 %	23,512	17.6 %
		Heavies	1,841	5.6 %	969	8.9 %
		Total	21,129	14.5 %	24,481	17.2 %

2.3.7 The traffic demand matrices were adjusted to minimise double counting and allow internal trips to occur between the new housing and existing employment and vice versa. This reduced the number of new trips which were added to the network.

2.3.8 It can be seen that the total increase in trips between 2007 and 2012 is between 14 – 17 %, which in excess of NRTF high growth.



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**3 2016 SCENARIO 1**

**3.1 Network Infrastructure**

3.1.1 The 2016 Scenario 1 has been developed from the 2012 Reference Case, but following advice from AC it was agreed that the road infrastructure for this scenario should also include the following:

- A96 dualling from Port Elphinstone to northern access
- Northern link road extension from B9001 to A96

3.1.2 The new road infrastructure in the Reference Case is also included in this scenario

3.1.3 The proposed layouts of the above schemes can be seen in Figure 3.1 – 3.2

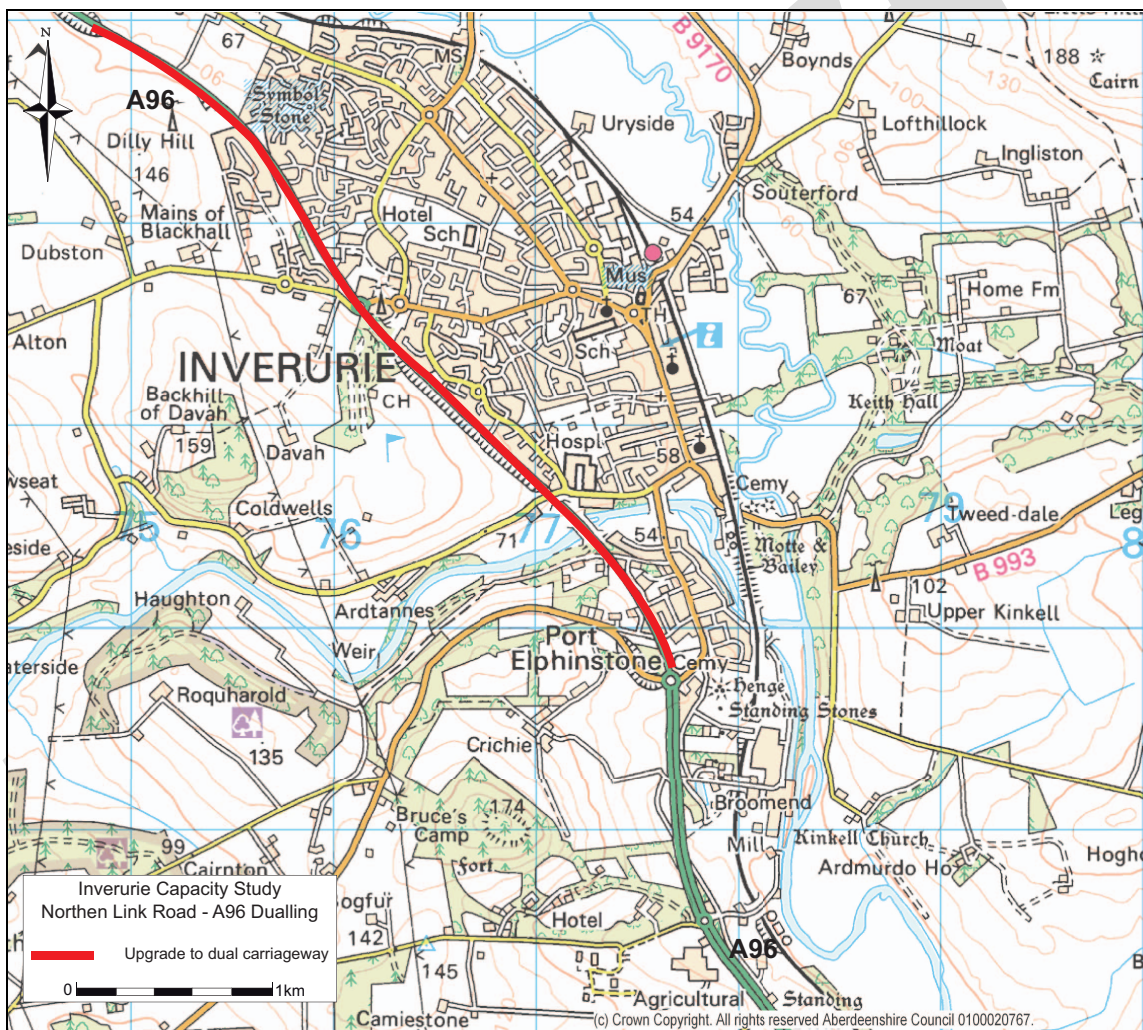


Figure 3.1 : A96 Dualling





Figure 3.2 : Northern Link Road from A96 to B9001

**3.2 Developments to be included**

3.2.1 The developments in this scenario include all the developments in the 2012 Reference Case model with the addition of:

- Crichie Farm Development (800 housing units and 15 Ha employment)

3.2.2 The location of the Crichie Farm Development can be seen in Figure 3.3.





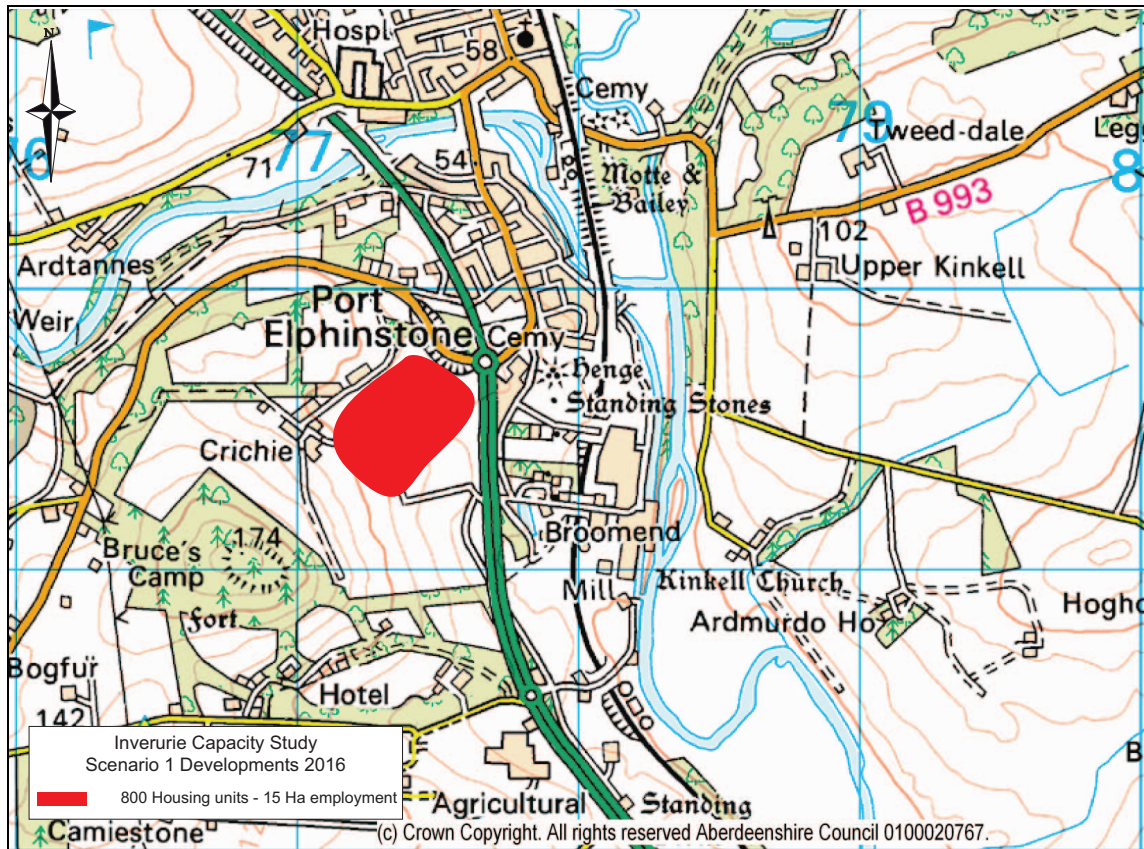


Figure 3.3 : Crichton Farm Development

### 3.3 Matrix Development

- 3.3.1 A Crichton Farm Development (employment only) traffic assessment was carried out by Colin Buchanan and Partners (CBP) on behalf of the developer.
- 3.3.2 The trip rates used for the housing element of this study was derived from TRICS and was previously agreed by SIAS and AC.
- 3.3.3 The trips to/from the Crichton Farm mixed used development are detailed in Table 3.1.

Table 3.1 : Scenario 1 Development Trip Totals

	AM (07:00-10:00)			PM (16:00-19:00)		
	arrivals	departures	Total	arrivals	departures	Total
Employment 15ha	328	148	476	138	307	445
Housing 800 units	370	1,072	1,442	1,102	774	1,875

CBP agreed with AC and Transport Scotland the levels of trip distribution for the employment element of the development to be modelled. These were:

- 22% A96 north of Inverurie
- 33% Inverurie
- 13% A96 south of Thainstone



- 20% east beyond Inverurie
- 12% west via B993

3.3.4 Where necessary, trips in the model were distributed to zones on a proportional basis. This was based on the zone totals currently present in the model.

3.3.5 The background growth to take the matrices forward to year 2016 is detailed in Table 3.2.

*Table 3.2 : NRTF Traffic Growth 2007 to 2016*

Year	Growth rate	Lights	Heavies
2016	Half Low	5.3%	6.7%
	Low	10.6%	13.3%
	Central	14.3%	16.8%
	High	18.0%	20.3%

3.3.6 The growth pattern shown in Table 3.2 was used for these future year matrices in the same manner as Table 2.2.

3.3.7 The matrix totals for the 2016 Development Scenario 1 are illustrated in Table 3.3.

*Table 3.3 : Scenario 1 2016 Matrix Summary Totals*

Year	Scenario	Matrix	AM period		PM period	
2016	Test 1	Lights	21,504	28.7 %	26,198	31.0 %
		Heavies	1,955	12.2 %	1,057	18.8 %
		Total	23,459	27.1 %	27,255	30.5 %

3.3.8 The increase in traffic for this scheme is between 27-31% and is substantially higher than NRTF high growth.



**4 2016 SCENARIO 2**

**4.1 Network Infrastructure**

4.1.1 The 2016 Scenario 2 has been developed from the 2012 Reference Case, but following advice from AC it was agreed that the road infrastructure for this scenario should also include the following

- Keithhall Link Road

4.1.2 The new road infrastructure in the Reference Case is also included in this scenario

4.1.3 The proposed layout of the above scheme can be seen in Figure 4.1.

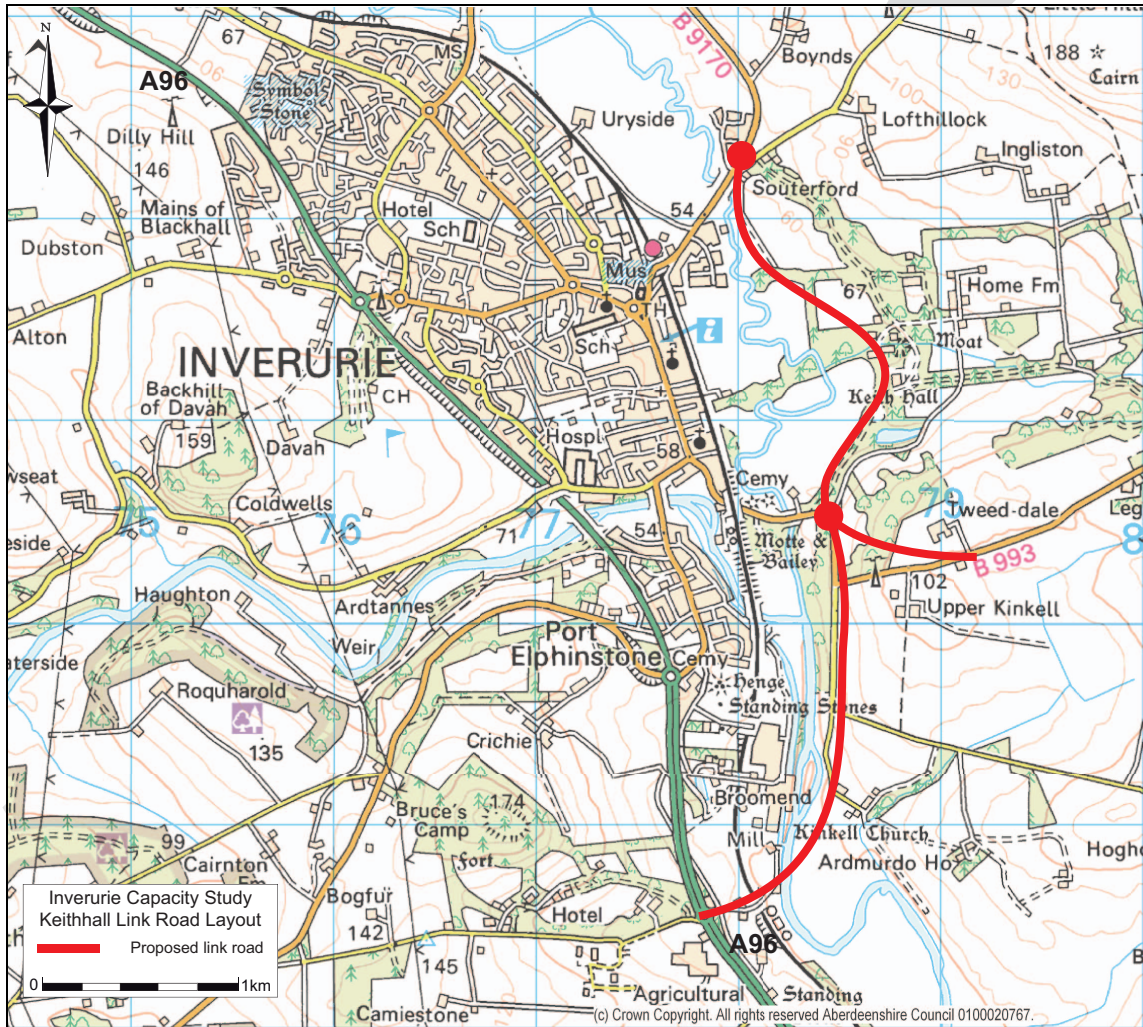


Figure 4.1 : Keithhall Link Road Layout

**4.2 2016 Scenario 2 Development Content**

4.2.1 The developments in this scenario include all the developments in the 2012 Reference Case model and the following

- Souterford Housing (300 units)
- Boynds housing (500 units)



- Portstown housing (400 units)
- Employment 5Ha south of NLR
- Employment 10Ha north of NLR
- New Primary School

4.2.2 The location of these developments can be seen in Figure 4.2.

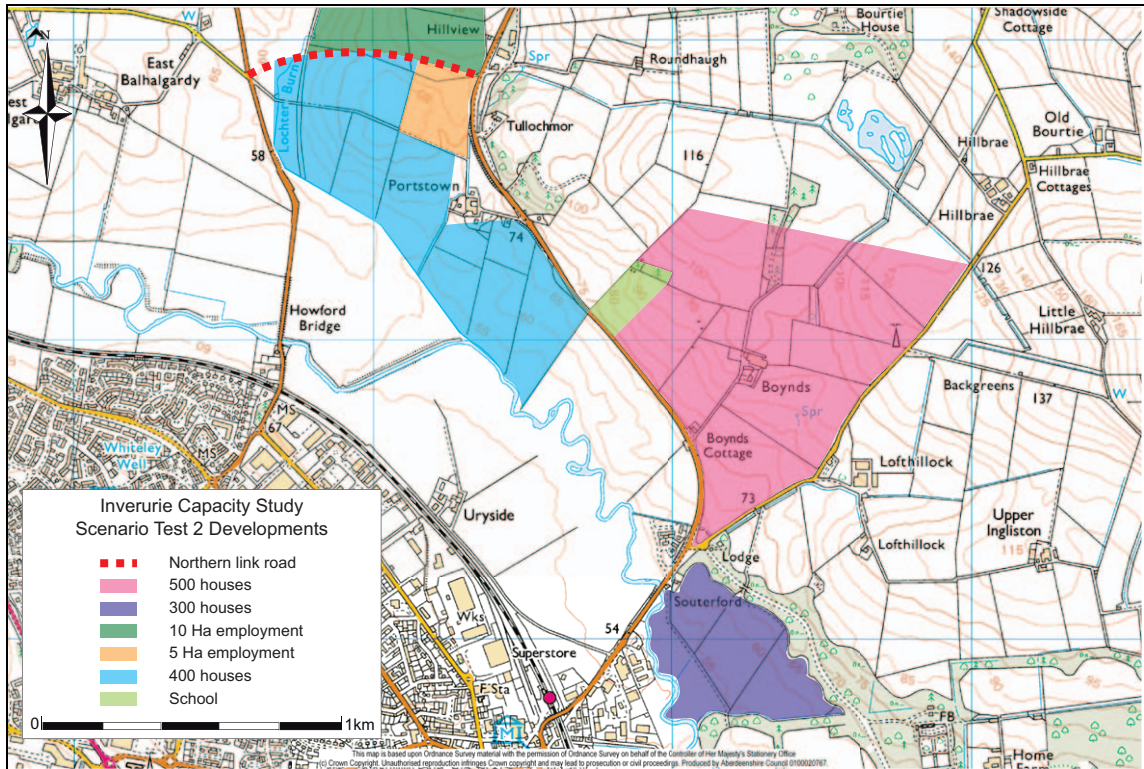


Figure 4.2 : Scenario 2 Developments

### 4.3 Matrix Development

4.3.1 The trips to/from the Scenario 2 developments are detailed in Table 4.1.

Table 4.1 : Scenario 2 Development Trip Totals

	AM (07:00-10:00)			PM (16:00-19:00)		
	arrivals	departures	Total	arrivals	departures	Total
Employment 15ha	1,260	455	1,715	353	1,062	1,415
Housing 1200 units	555	1,608	2,163	1,651	1,161	2,812

4.3.2 The new primary school was assumed to have 200 pupils and would only be relevant in the AM period. This resulted in 65 vehicles entering the school and 50 leaving. The new housing developments were assumed to be the catchment area for the school.



4.3.3 It was agreed with AC that the levels of trip distribution to be modeled were as follows:

- 10% A96 north of Inverurie
- 35% Inverurie
- 35% A96 south of Thainstone
- 10% east beyond Inverurie
- 10% west via B993

4.3.4 Where necessary, trips in the model were distributed to zones on a proportional basis. This was based on the zone totals currently present in the model.

4.3.5 The matrix totals for the 2016 Development Scenario 2 are illustrated in Table 4.2.

*Table 4.2 : Scenario 1 2016 Matrix Summary Totals*

Year	Scenario	Matrix	AM period		PM period	
	Test 2	Lights	23,173	38.7 %	27,659	38.3 %
		Heavies	1,908	9.5 %	1,011	13.6 %
		Total	25,081	35.9 %	28,670	37.2 %

4.3.6 The increase in traffic for this scheme is between 36 – 37% and is substantially higher than NRTF high growth and is also a significant increase compared to Scenario 1.



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**5 MODELLING RESULTS**

**5.1 Introduction**

5.1.1 The object of this study was to evaluate the impact of potential development areas and to look at conceptual supporting infrastructure options. The results from the S-Paramics modelling are presented in this chapter.

5.1.2 A Local Accessibility Appraisal was also carried out to identify opportunities for public transport, pedestrians and cyclists. The results of this appraisal are detailed in Appendix B.

**5.2 Evaluation of S-Paramics Modelling Results**

5.2.1 To remain consistent with previous evaluations it was agreed that queue graphs for the relevant junctions, modelled flows and journey time comparisons be used in this study.

5.2.2 The journey times were collected from the following routes :

- A96 South of Thainstone to North of Inverurie
- A96 North of Inverurie to South of Thainstone
- Uryside to A96 North
- A96 North to Uryside
- Uryside to A96 South
- A96 South to Uryside

5.2.3 Table 5.1 shows the modeled flows for the reference case and each scenario for the following locations in the AM (08:00 – 09:00) and PM (17:00 – 18:00) peak hours

- A96 South of Port Elphinstone
- New Northern Link Road Extension(Scenario 1 only)
- New Keithhall Link Road (Scenario 2 only)

*Table 5.1 : Modelled Flows*

<b>2012 Reference Case</b>	A96 South of Port Elphinstone	AM	North 987	South 1,960
		PM	North 1,128	South 2,411
<b>2016 Scenario 1</b>	A96 South of Port Elphinstone	AM	North 1,128	South 2,411
		PM	East 2,204	West 1,430
	New Northern Link Road Extension	AM	East 20	West 50
		PM	East 18	West 12
<b>2016 Scenario 2</b>	A96 South of Port Elphinstone	AM	North 869	South 1,719
		PM	North 1,628	South 1,102
	New Keithhall Link Road	AM	North 473	South 673
		PM	North 751	South 416



### 5.3 2012 Reference Case Observations

- 5.3.1 In the AM period there is substantial queueing on Elphinstone Road heading out of Inverurie and queueing on the A96 southbound at Port Elphinstone Roundabout.
- 5.3.2 In the PM period there is substantial queueing on the A96 northbound at Port Elphinstone and some queueing at the Keithhall signals.
- 5.3.3 In the town centre there is intermittent queueing at some locations, such as Market Place and West High Street, but there are no significant permanent queues.

### 5.4 2016 Scenario 1 Observations

- 5.4.1 The northern link from A96 to Portstown does not attract much traffic and the new road infrastructure does nothing to reduce traffic on the A96 at Port Elphinstone.
- 5.4.2 Table 5.1 demonstrates that there is little traffic using the New Northern link Road, with only 10 – 50 vehicles per hour using the new road.
- 5.4.3 With the addition of the full Crichton development there is additional queueing on Elphinstone Road of up to 100m and substantial queues on the A96 southbound in the AM period (up to 500m additional queueing).
- 5.4.4 In the PM period there is substantial additional queueing of up to 200m on the A96 northbound at Port Elphinstone.
- 5.4.5 To attempt to alleviate the queueing on Port Elphinstone, various arrangements were tested and a solution was identified.
- 5.4.6 It was agreed with AC that Port Elphinstone Roundabout should be tested with a three lane circulating carriageway, three lane entries on A96, and a segregated left turn lane from Elphinstone Road, as illustrated in Figure 5.1.
- 5.4.7 It should be noted that this is a conceptual option and will require a more detailed design and evaluation to identify an optimum arrangement at this location.





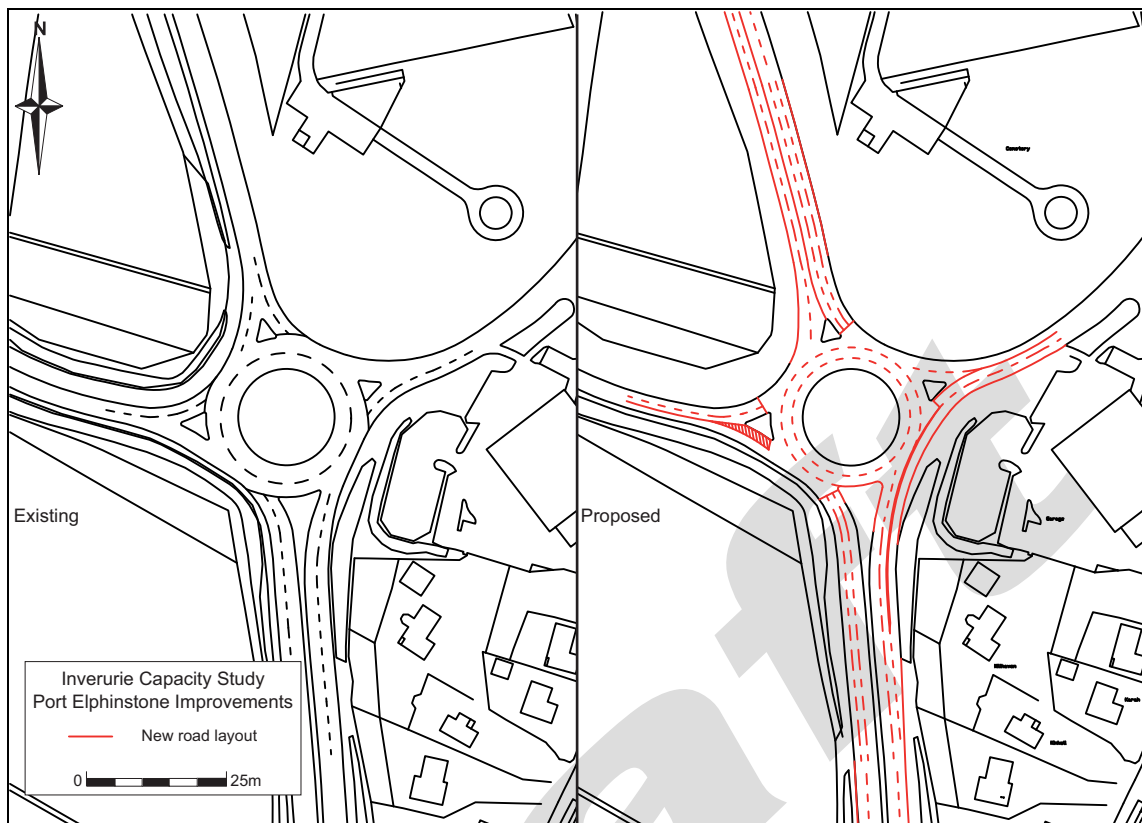


Figure 5.1 : Proposed Port Elphinstone Upgrade compared to existing layout

## 5.5 Proposed 2016 Scenario 1 with Port Elphinstone Roundabout Upgrade

- 5.5.1 The upgraded Port Elphinstone roundabout significantly improved the congestion in both periods with the maximum queues reduced significantly, as demonstrated in Figures 5.2-5.4.
- 5.5.2 It should be noted that the queueing graphs show the maximum queue in each 10min interval.

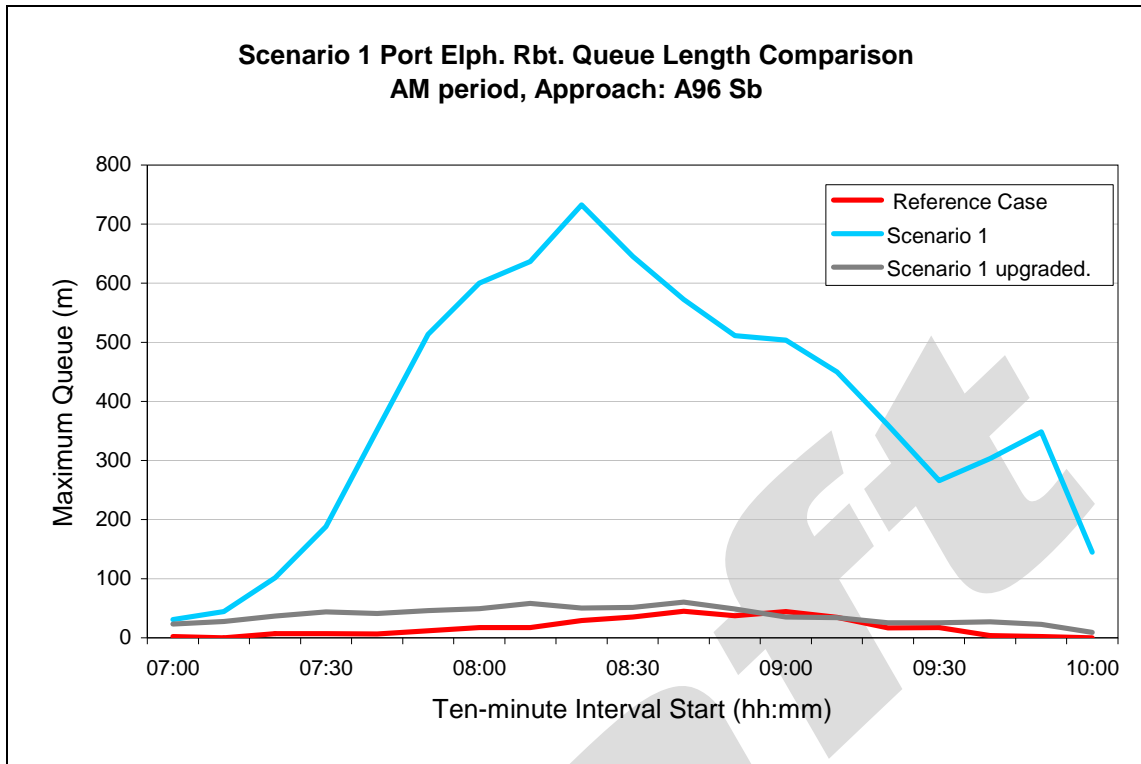


Figure 5.2 : Port Elphinstone A96 Southbound AM

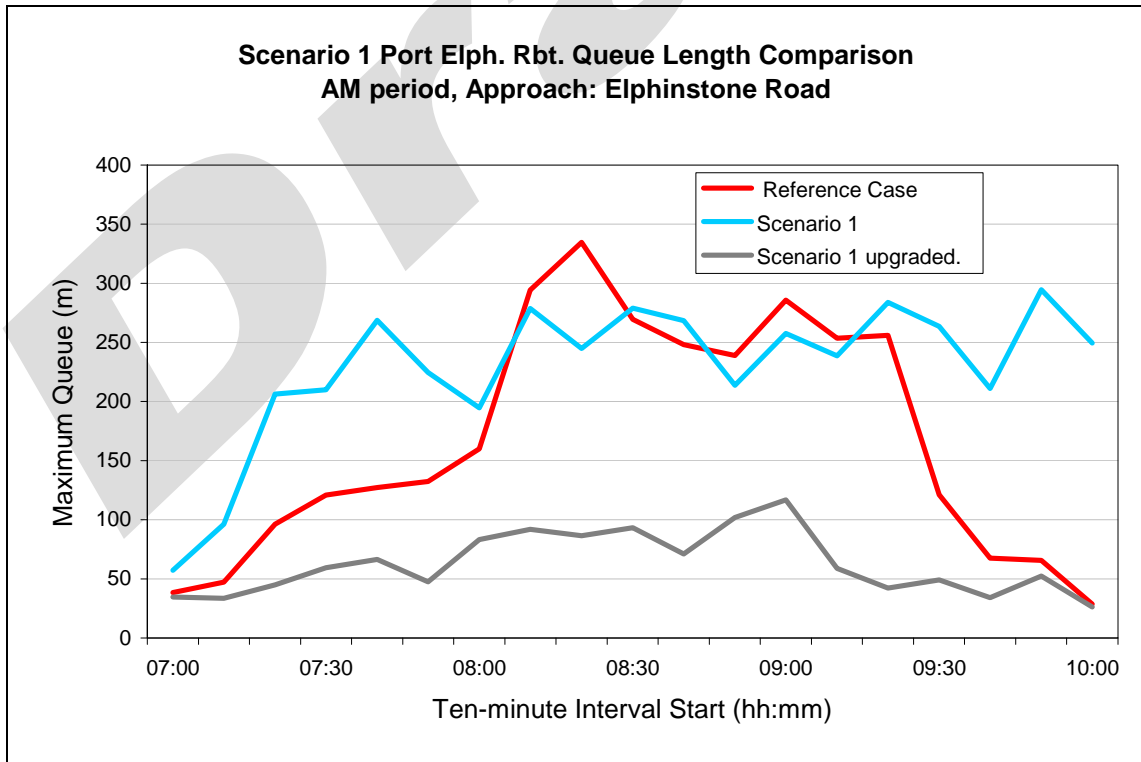


Figure 5.3 : B993 Elphinstone Road Eastbound AM



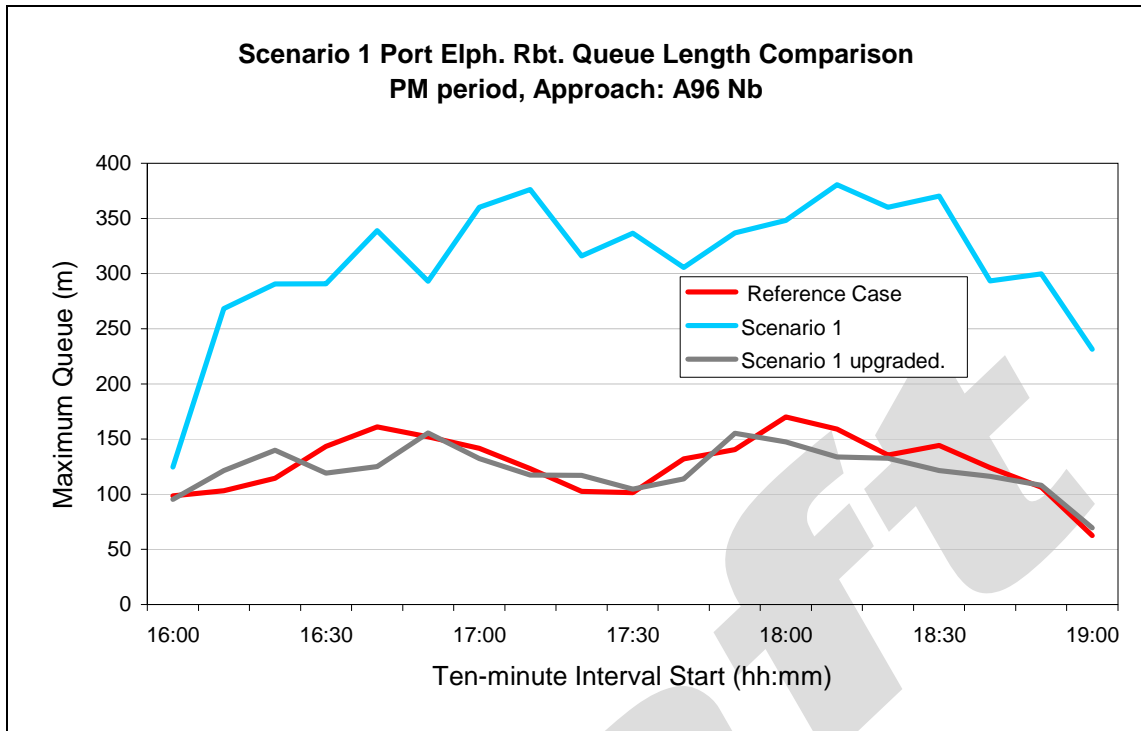


Figure 5.4 : Port Elphinstone A96 Northbound PM

- 5.5.3 In the AM period the upgraded Scenario 1 reduces the maximum queueing on the A96 southbound from a maximum of 700m to approximately 50m.
- 5.5.4 Elphinstone Road queues are reduced from a maximum of 300m in the Reference Case and the original Scenario 1 to consistently less than 100m in the upgraded scheme.
- 5.5.5 The northbound queueing on the A96 in the PM period is reduced over 300m down to less than 150m.
- 5.5.6 The journey times are detailed in Figure 5.5 – 5.6 for AM and PM periods.



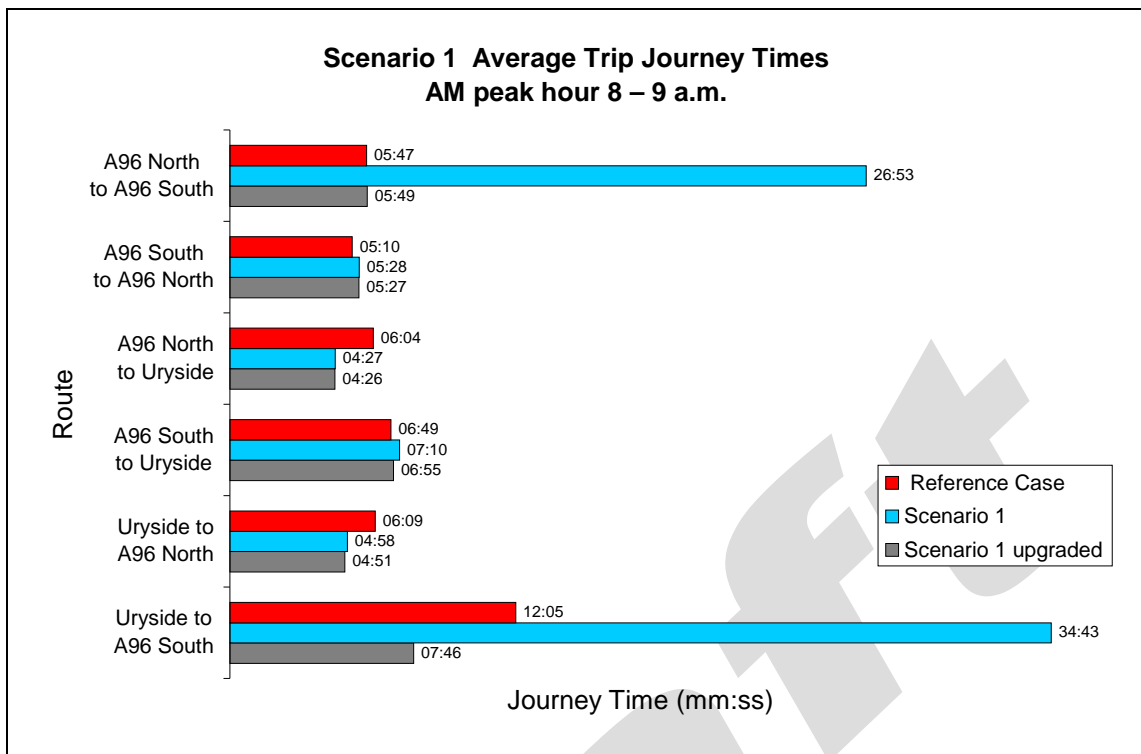


Figure 5.5 : Journey Times Scenario 1 AM

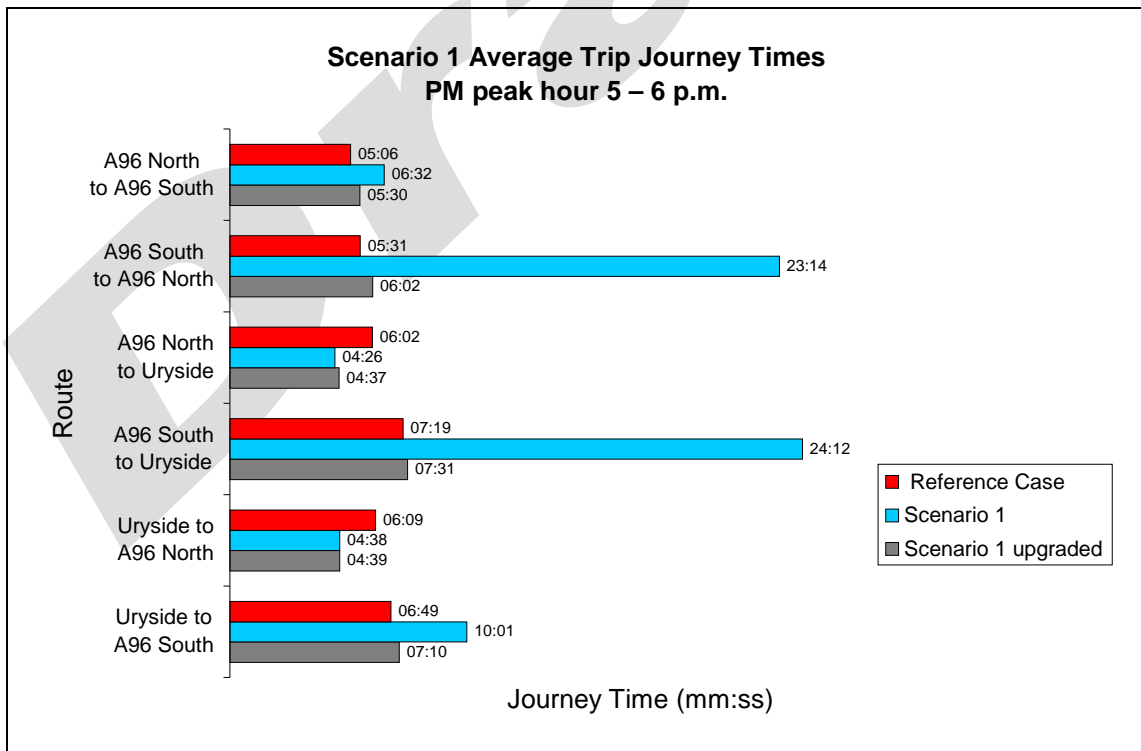


Figure 5.6 : Journey Times Scenario 1 PM



- 5.5.7 It can be seen from Figure 5.5 that the addition of an upgraded junction at Port Elphinstone substantially reduces journey times heading south through Port Elphinstone Roundabout in the AM period.
- 5.5.8 In the PM period the journey times of traffic travelling north is substantially reduced compared to the original Scenario 1.
- 5.5.9 The journey times of the upgraded Scenario 1 are approximately the same or less than the Reference Case 2012.

## **5.6 2016 Scenario 2**

- 5.6.1 The Keithhall Link Road successfully removes some of the traffic from the Port Elphinstone Roundabout; it also accommodates the additional traffic from the new developments on the north-east of Inverurie. There are substantial time savings for vehicles travelling to/from north Inverurie and the A96 towards Aberdeen.
- 5.6.2 There is some queueing in the AM period on the A96 southbound and the new link road at Thainstone, there is also queueing on the Port Elphinstone Roundabout southbound. In the PM period there is queueing from the unclassified road to the west of Thainstone roundabout. This is due to the high levels of traffic travelling north on the A96.
- 5.6.3 To attempt to alleviate the queueing on Thainstone roundabout various arrangements, such as a bypass lane from the new link road, were tested, but still resulted in some queueing on the A96 southbound.
- 5.6.4 It was agreed with AC that Thainstone roundabout should be tested with a three lane circulating and three lane flares on the A96 entering the roundabout. There are also bypass lanes on the unclassified Thainstone road east and west as seen in figure 5.7.
- 5.6.5 It should be noted that this is a conceptual option and will require a more detailed design and evaluation to identify an optimum arrangement at this location.



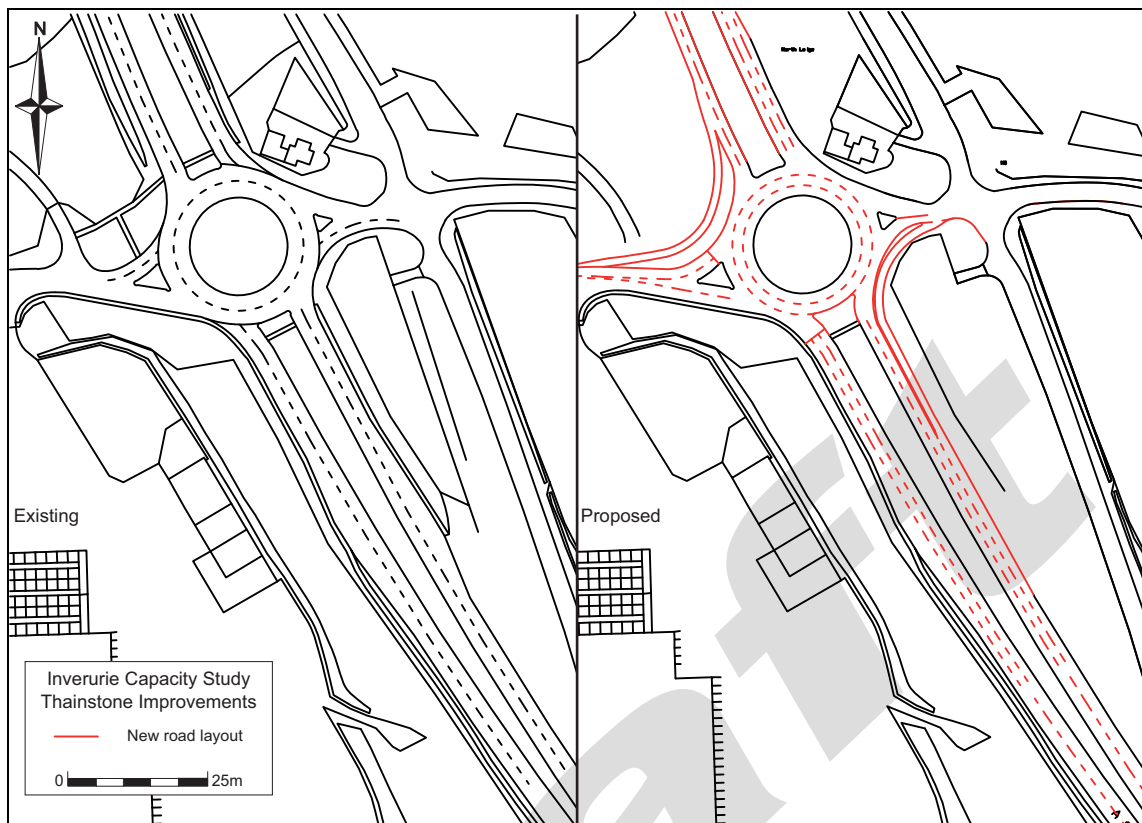


Figure 5.7 : Thainstone Roundabout Upgrade compared to existing layout

## 5.7 2016 Scenario 2 with Thainstone Roundabout Upgrade

- 5.7.1 The upgraded Thainstone Roundabout results in no significant queueing on the new link road or the unclassified road to the west. It also relieves the queueing on the A96 southbound in the AM period. The queueing graphs can be seen in Figures 5.8-5.10.

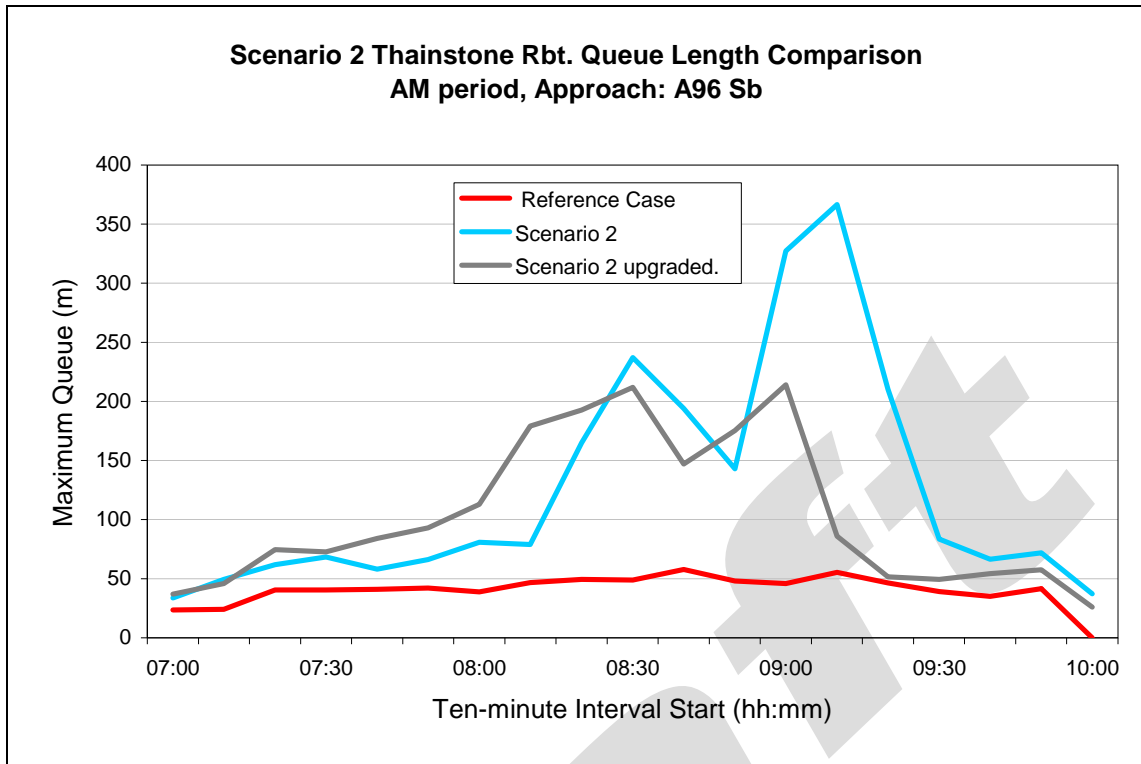


Figure 5.8 : Thainstone A96 Southbound AM

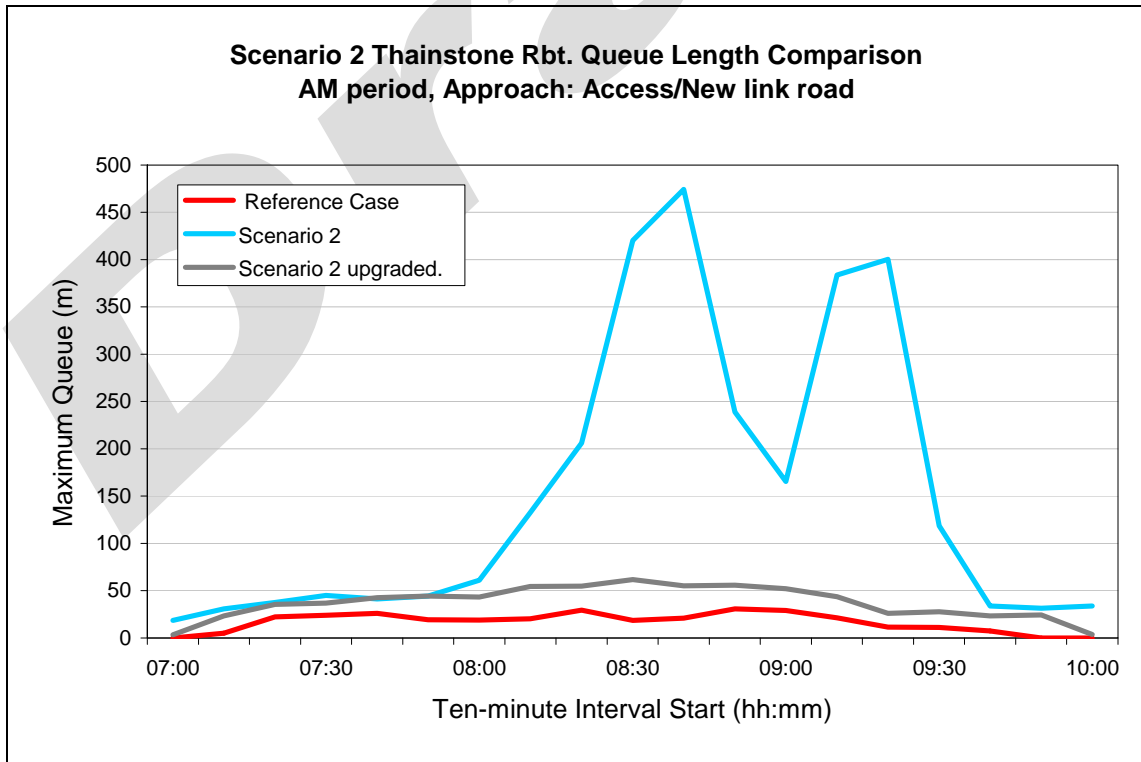


Figure 5.9 : Thainstone New Link Road AM



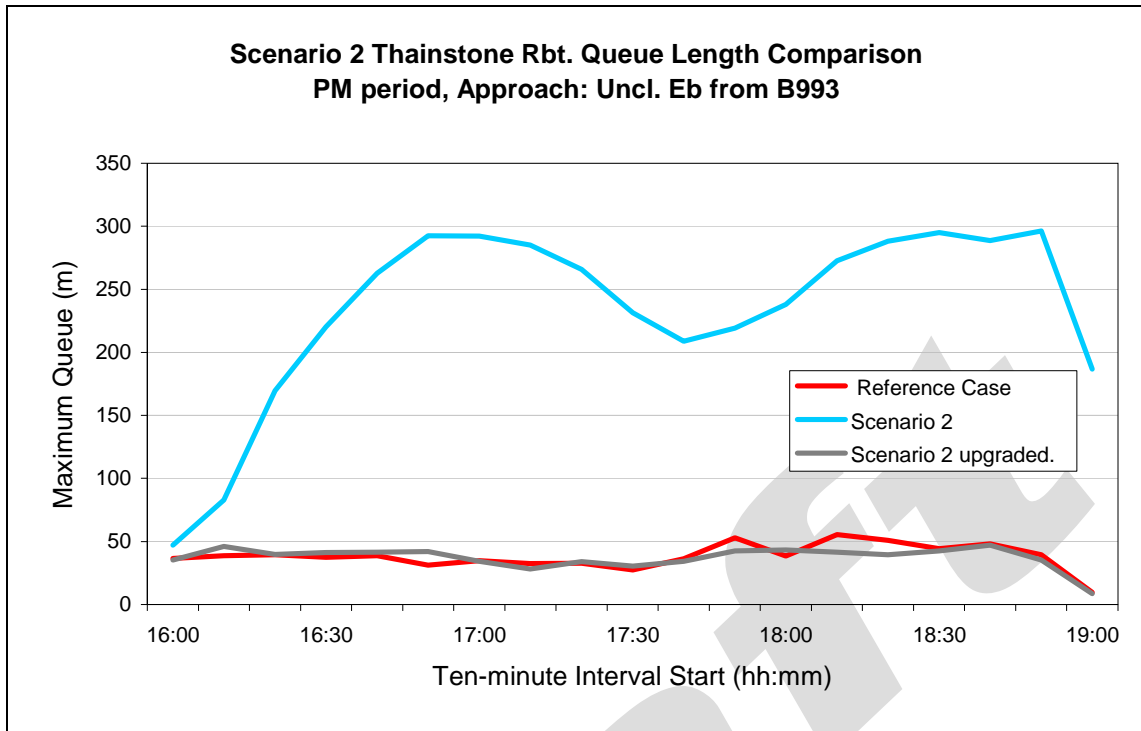


Figure 5.10 : Thainstone Roundabout U/C west of roundabout PM

- 5.7.2 The upgraded Thainstone Roundabout reduces the queueing on the new link road and the A96 southbound in the AM period. The traffic from the unclassified road eastbound can access the roundabout in the PM period without any significant delay.
- 5.7.3 It should be noted that the queueing on the A96 southbound in the original Scenario 2 reaches a maximum of 350m for a 20min period in the AM period.
- 5.7.4 The journey times are detailed in Figure 5.12 – 5.13 for AM and PM periods





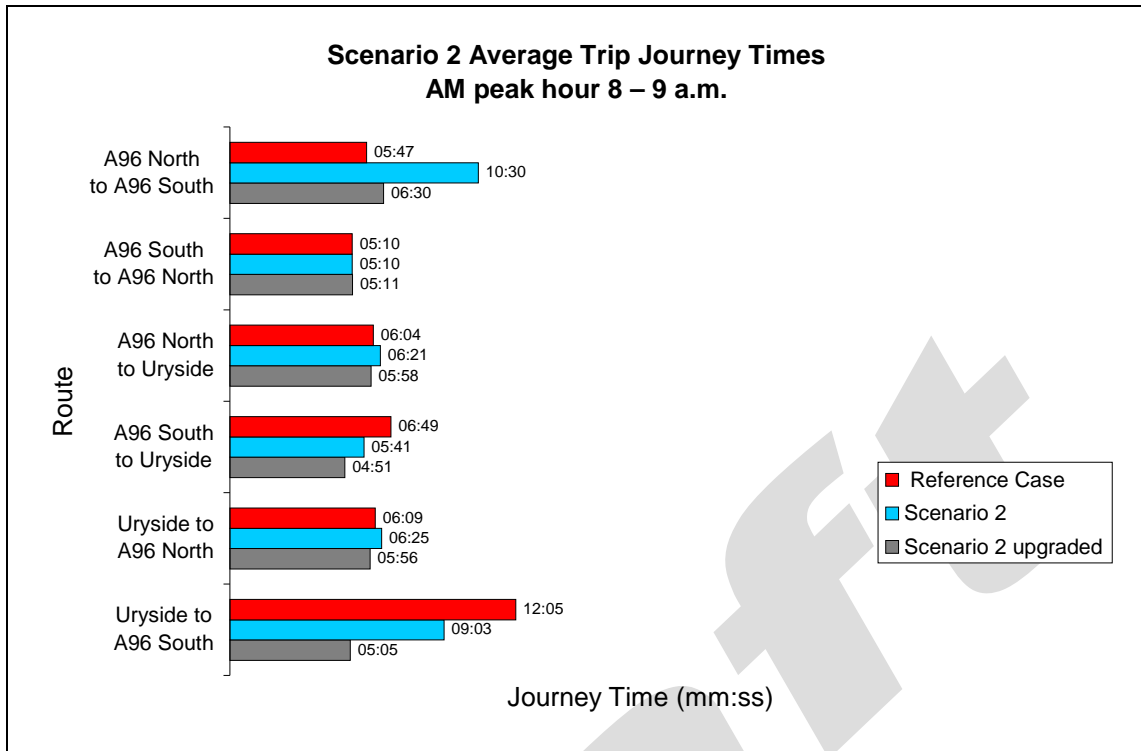


Figure 5.11 : Journey Times Scenario 2 AM

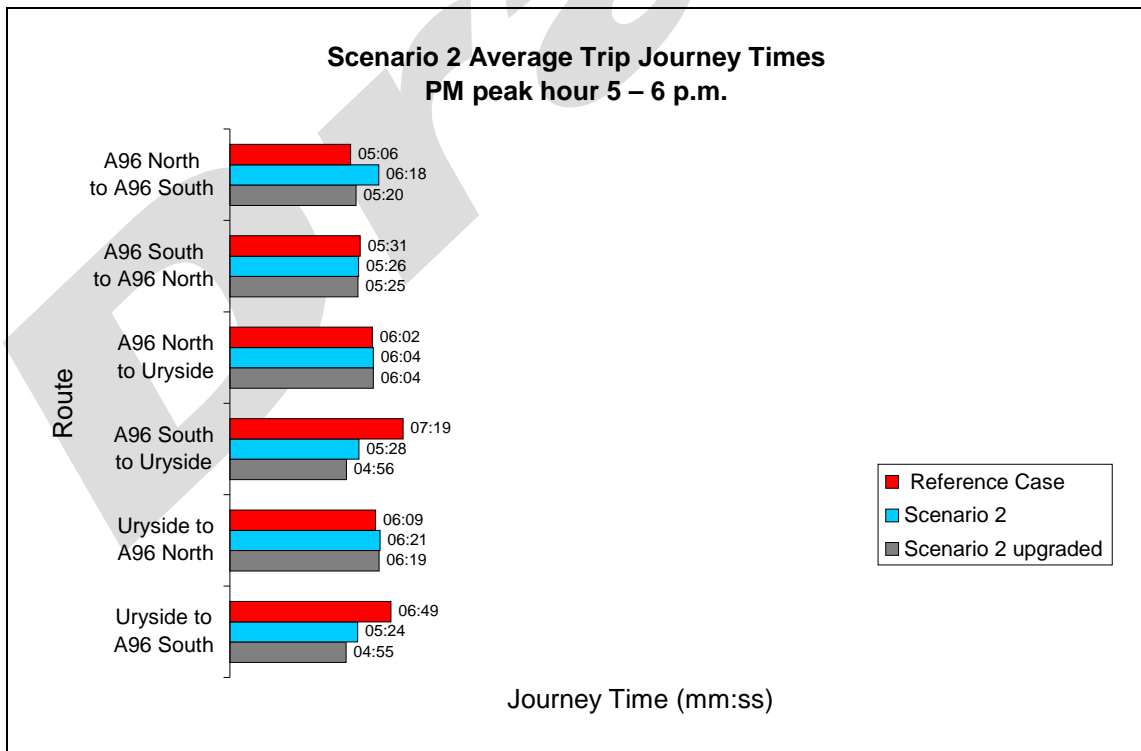


Figure 5.12 : Journey Times Scenario 2 PM



- 5.7.5 By observing the journey times between Uryside and the A96 South, it can be seen that there is a time saving with the new link road in place. There is a saving of 7min in the AM and almost 2min in the PM or 30 – 60% between the upgraded Scenario 2 and the Reference Case.
- 5.7.6 The A96 southbound traffic journey times are reduced in the AM period due to the upgraded Thainstone Roundabout when compared to the original Scenario 2.

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## 6 PROVISIONAL SCHEME COSTS

### 6.1 Introduction

6.1.1 An exercise to derive preliminary infrastructure cost estimates was carried out by Mouchel for the following infrastructure improvements:

- Keithhall Link Road
- Northern Link Road
- Dual A96
- Port Elphinstone Improvements
- Thainstone Improvements

### 6.2 Summary Costs

6.2.1 Mouchel have developed all costings using SPON'S 2009 and considering:

- Optimism Bias 44%  
*Design Manual for Roads and Bridges (DMRB)* (Highways Agency)
- Stage 2)
- Contingencies Allowance 20%
- Utilities Allowance 10%

6.2.2 The summary costs provided in Tables 6.1 – 6.2 are given as indicative general costs to include all aspects of construction.

*Table 6.1 : Inverurie Provisional Scheme Costs Scenario 1*

<b>Infrastructure</b>	<b>Indicative Cost Estimate</b>
Northern Link Road Extension	12,490,900
Dual A96	28,877,900
Port Elphinstone Improvements	4,254,600
<b>Total Works</b>	<b>45,623,400</b>

*Table 6.2 : Inverurie Provisional Scheme Costs Scenario 2*

<b>Infrastructure</b>	<b>Indicative Cost Estimate</b>
Keithhall Link Road	24,766,500
Thainstone Improvements	3,064,000
<b>Total Works</b>	<b>27,830,500</b>



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## 7 SUMMARY

- 7.1.1 The traffic forecasts for the Scenarios are substantial and in the case of Scenario 2 almost twice NRTF high growth.
- 7.1.2 The Northern Link Road Extension from the A96 to the B9001 does not attract enough traffic (less than 50 vehicles per hour) to justify being built. It does nothing to relieve the problem junction at Port Elphinstone.
- 7.1.3 Scenario 1 appears to operate satisfactorily with the dualling of the A96 and the upgraded Port Elphinstone Roundabout.
- 7.1.4 Scenario 2 with the Keithhall link in place relieves the Port Elphinstone Roundabout and accommodates the additional development in the north-east of Inverurie.
- 7.1.5 An upgraded junction at Thainstone roundabout will allow the vehicles to progress from the new link and the existing unclassified road without any significant delay.
- 7.1.6 The delay at Thainstone Roundabout on the A96 for Scenario 2 occurs in the AM over a 20min period. It may be possible that bypass lanes on the new link road and the unclassified road from Kemnay would suffice and reduce the cost of the Thainstone upgrade.
- 7.1.7 Scenario 2 allows the network to accommodate more development traffic at less infrastructure cost compared to Scenario 1.
- 7.1.8 The suggested improvements to Port Elphinstone and Thainstone roundabouts are conceptual at this stage and will require engineering design feasibility, detailed design and further modeling to identify an optimum solution to the apparent traffic problems.



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**A PROVISIONAL SCHEME COST DETAILS**

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**Northern link Rd**



**Preliminary Estimate**

<u>Item No.</u>	<u>Description of Work</u>	<u>Quantity</u>	<u>Unit</u>	<u>Rate</u>	<u>Amount</u>	<u>Calculated Total</u>	<u>Rounded</u>
<b>Preliminaries</b>							
	Site Offices	1	item	£450,000.00	£450,000.00		
	Traffic Management	1	item	£150,000.00	£150,000.00	£600,000.00	£600,000.00
<b>Site Clearance (2.4km x 17.3m + slip roads)</b>							
	Site Clearance	4.2	ha	£1,105.00	£4,641.00	£4,641.00	£10,000.00
<b>Roundabout (20m ICD roundabout)</b>							
	roundabout	1300	m2	£60.00	£78,000.00		
	tie in areas	400	m2	£50.00	£20,000.00	£98,000.00	£100,000.00
<b>Section 1 (2.4km length) 7.3m c/way, 2m verge, 3m footway/cycletrack total width 17.3m</b>							
<b>C/way</b>							
	Subbase 210mm thick	3679	m3	£34.00	£125,092.80		
	Basecourse 140mm thick	17520	m2	£18.65	£326,748.00		
	Binder course 55mm thick	17520	m2	£8.50	£148,920.00		
	Tack coat	17520	m2	£0.69	£12,088.80		
	Surface course 45mm thick	17520	m2	£9.50	£166,440.00		
	HB Kerbing	4800	m	£10.00	£48,000.00		
	Heel kerb	9600	m	£6.50	£62,400.00		
<b>Footway/cycletrack</b>							
	Subbase 100mm thick	1440	m3	£2.00	£2,880.00		
	Paving 70mm thick	14400	m2	£18.50	£266,400.00		
	Excavate Topsoil (500mm deep)	20760	m3	£3.00	£62,280.00		
	Excavate Suitable	0	m3	£3.00	£0.00		
	Disposal Topsoil	20760	m3	£10.00	£207,600.00		
	Disposal Suitable	0	m3	£5.00	£0.00		
	Compaction Fill	0	m3	£1.00	£0.00		
	Formation	31920	m2	£0.25	£7,980.00		
	Earthworks Balance (due to lack of knowledge of Topography)		sum		£250,000.00	£1,686,829.60	£1,750,000.00
<b>20m ICD roundabout</b>							
	roundabout	1300	m2	£60.00	£78,000.00		
	tie in areas	400	m2	£50.00	£20,000.00	£98,000.00	£100,000.00
<b>Bridge over Rail and River</b>							
	Bridge		sum		£3,000,000.00	£3,000,000.00	£3,000,000.00
<b>Fencing &amp; Gates</b>							
	P&W Fencing w/netting	4800	No.	£29.00	£139,200.00		
	Gates	10	No.	£175.00	£1,750.00	£140,950.00	£150,000.00
<b>Drainage</b>							
	Gullies	171	No.	£250.00	£42,857.14		
	Manholes	48	No.	£1,200.00	£57,600.00		
	Drainage pipe	4800	m	£55.00	£264,000.00	£364,457.14	£400,000.00
<b>Settlement Ponds</b>							
	Headwalls : In-situ reinforced concrete structure inc. walls & base slab	4	No.	£800.00	£3,200.00		
	Settlement Ponds	800	m3	£3.00	£2,400.00	£5,600.00	£10,000.00
<b>Grassing &amp; Soiling</b>							
	<b>Soiling</b> at less than 10°	14400	m2	£5.20	£74,880.00		
	<b>Grassing</b> at less than 10°	14400	m2	£1.00	£14,400.00	£89,280.00	£100,000.00

**Northern link Rd**



**Preliminary Estimate**

<u>Item No.</u>	<u>Description of Work</u>	<u>Quantity</u>	<u>Unit</u>	<u>Rate</u>	<u>Amount</u>	<u>Calculated Total</u>	<u>Rounded</u>
	Street Lighting				£160,000.00	£160,000.00	£160,000.00
					<b>Sub-total</b>	<b>£6,247,757.74</b>	<b>£6,380,000.00</b>
	Signing & lining (3% of total cost above)		sum	3%		£187,432.73	£191,400.00
					<b>Sub-total</b>	<b>£6,435,190.48</b>	<b>£6,571,400.00</b>
	Public Utilities (10% of total cost)		sum	10%		£643,519.05	£657,140.00
					<b>Sub-total</b>	<b>£7,078,709.52</b>	<b>£7,228,540.00</b>
	Contingencies			20%		£1,415,741.90	£1,445,708.00
					<b>Sub-total</b>	<b>£8,494,451.43</b>	<b>£8,674,248.00</b>
	Optimism Bias			44%		£3,737,558.63	£3,816,669.12
	<b>TOTAL</b>					<b>£12,232,010.06</b>	<b>£12,490,917.12</b>

**Dualing of A96 from Port Elphinstone through Blackhall to where Northern link joins A96**

**Preliminary Estimate**

<u>Item No.</u>	<u>Description of Work</u>	<u>Quantity</u>	<u>Unit</u>	<u>Rate</u>	<u>Amount</u>	<u>Calculated Total</u>	<u>Rounded</u>
	Road construction (including Earthworks) for Dualing of 5km of A96		sum		£9,250,000.00	£9,250,000.00	£9,250,000.00
	Road Drainage		sum		£1,000,000.00	£1,000,000.00	£1,000,000.00
	Bridge over River Bridge		sum		£3,000,000.00	£3,000,000.00	£3,000,000.00
	Widening of Overbridge at St James Place Underpass		sum		£500,000.00	£500,000.00	£500,000.00
	Extension of underpass at Davanagh Wood access road Bridge		sum		£1,000,000.00	£1,000,000.00	£1,000,000.00
					<b>Sub-total</b>	<b>£14,750,000.00</b>	<b>£14,750,000.00</b>
	Signing & lining (3% of total cost above)		sum	3%		£442,500.00	£442,500.00
					<b>Sub-total</b>	<b>£15,192,500.00</b>	<b>£15,192,500.00</b>
	Public Utilities (10% of total cost)		sum	10%		£1,519,250.00	£1,519,250.00
					<b>Sub-total</b>	<b>£16,711,750.00</b>	<b>£16,711,750.00</b>
	Contingencies			20%		£3,342,350.00	£3,342,350.00
					<b>Sub-total</b>	<b>£20,054,100.00</b>	<b>£20,054,100.00</b>
	Optimism Bias			44%		£8,823,804.00	£8,823,804.00
	<b>TOTAL</b>					<b>£28,877,904.00</b>	<b>£28,877,904.00</b>
	<b>COMBINED TOTAL</b>					<b>£41,109,914.06</b>	<b>£41,368,821.12</b>

**Port Elphinstone Roundabout**



**Preliminary Estimate**

Item No.	Description of Work	Quantity	Unit	Rate	Amount	Calculated Total	Rounded (£10,000)
<b>Preliminaries</b>							
	Site Offices	1	item	£200,000.00	£200,000.00		
	Traffic Management	1	item	£100,000.00	£100,000.00	£300,000.00	£300,000.00
<b>Site Clearance (2.4km x 17.3m + slip roads)</b>							
	Site Clearance	2	ha	£1,105.00	£2,210.00	£2,210.00	£10,000.00
<b>Roundabout (70m ICD roundabout)</b>							
	roundabout	4500	m2	£60.00	£270,000.00		
	tie in areas	11600	m2	£50.00	£580,000.00	£850,000.00	£850,000.00
<b>Section 1 B993 Westwards (75m length) 10.95m c/way, 2m verge, 3m footway/cycletrack total width 20.95m</b>							
<b>C/way</b>							
	Subbase 210mm thick	172	m3	£34.00	£5,863.73		
	Basecourse 140mm thick	821	m2	£18.65	£15,316.31		
	Binder course 55mm thick	821	m2	£8.50	£6,980.63		
	Tack coat	821	m2	£0.69	£566.66		
	Surface course 45mm thick	821	m2	£9.50	£7,801.88		
	HB Kerbing	150	m	£10.00	£1,500.00		
	Heel kerb	300	m	£6.50	£1,950.00		
<b>Footway/cycletrack</b>							
	Subbase 100mm thick	45	m3	£2.00	£90.00		
	Paving 70mm thick	450	m2	£18.50	£8,325.00		
	Excavate Topsoil (500mm deep)	786	m3	£3.00	£2,356.88		
	Excavate Suitable	0	m3	£3.00	£0.00		
	Disposal Topsoil	786	m3	£10.00	£7,856.25		
	Disposal Suitable	0	m3	£5.00	£0.00		
	Compaction Fill	0	m3	£1.00	£0.00		
	Formation	1271	m2	£0.25	£317.81		
	Earthworks Balance (due to lack of knowledge of Topography)		sum		£25,000.00	£83,925.14	£83,925.14
<b>Section 2 A96 Northwards (140m length) 18.25m c/way, 2m verge, 3m footway/cycletrack total width 28.25m</b>							
<b>C/way</b>							
	Subbase 210mm thick	537	m3	£34.00	£18,242.70		
	Basecourse 140mm thick	2555	m2	£18.65	£47,650.75		
	Binder course 55mm thick	2555	m2	£8.50	£21,717.50		
	Tack coat	2555	m2	£0.69	£1,762.95		
	Surface course 45mm thick	2555	m2	£9.50	£24,272.50		
	HB Kerbing	280	m	£10.00	£2,800.00		
	Heel kerb	560	m	£6.50	£3,640.00		
<b>Footway/cycletrack</b>							
	Subbase 100mm thick	84	m3	£2.00	£168.00		
	Paving 70mm thick	840	m2	£18.50	£15,540.00		
	Excavate Topsoil (500mm deep)	1978	m3	£3.00	£5,932.50		
	Excavate Suitable	0	m3	£3.00	£0.00		
	Disposal Topsoil	1978	m3	£10.00	£19,775.00		
	Disposal Suitable	0	m3	£5.00	£0.00		
	Compaction Fill	0	m3	£1.00	£0.00		
	Formation	3395	m2	£0.25	£848.75		
	Earthworks Balance (due to lack of knowledge of Topography)		sum		£25,000.00	£187,350.65	£187,350.65
<b>Section 3 B993 Eastwards (140m length) 10.95m c/way, 2m verge, 3m footway/cycletrack total width 20.95m</b>							
<b>C/way</b>							
	Subbase 210mm thick	322	m3	£34.00	£10,945.62		
	Basecourse 140mm thick	1533	m2	£18.65	£28,590.45		
	Binder course 55mm thick	1533	m2	£8.50	£13,030.50		
	Tack coat	1533	m2	£0.69	£1,057.77		
	Surface course 45mm thick	1533	m2	£9.50	£14,563.50		
	HB Kerbing	280	m	£10.00	£2,800.00		
	Heel kerb	560	m	£6.50	£3,640.00		
<b>Footway/cycletrack</b>							
	Subbase 100mm thick	84	m3	£2.00	£168.00		
	Paving 70mm thick	840	m2	£18.50	£15,540.00		
	Excavate Topsoil (500mm deep)	1467	m3	£3.00	£4,399.50		
	Excavate Suitable	0	m3	£3.00	£0.00		
	Disposal Topsoil	1467	m3	£10.00	£14,665.00		
	Disposal Suitable	0	m3	£5.00	£0.00		
	Compaction Fill	0	m3	£1.00	£0.00		
	Formation	2373	m2	£0.25	£593.25		

**Port Elphinstone Roundabout**



**Preliminary Estimate**

<b>Item No.</b>	<b>Description of Work</b>	<b>Quantity</b>	<b>Unit</b>	<b>Rate</b>	<b>Amount</b>	<b>Calculated Total</b>	<b>Rounded (£10,000)</b>
	Earthworks Balance (due to lack of knowledge of Topography)		sum		£25,000.00	<u>£134,993.59</u>	<u>£134,993.59</u>
<b>Section 4 A96 Southwards (140m length) 21.9m c/way, 2m verge, 3.65m central reserve, 3m footway/cycletrack total width 35.55m</b>							
<b>C/way</b>							
	Subbase 210mm thick	644	m3	£34.00	£21,891.24		
	Basecourse 140mm thick	3066	m2	£18.65	£57,180.90		
	Binder course 55mm thick	3066	m2	£8.50	£26,061.00		
	Tack coat	3066	m2	£0.69	£2,115.54		
	Surface course 45mm thick	3066	m2	£9.50	£29,127.00		
	HB Kerbing	280	m	£10.00	£2,800.00		
	Heel kerb	560	m	£6.50	£3,640.00		
<b>Footway/cycletrack</b>							
	Subbase 100mm thick	84	m3	£2.00	£168.00		
	Paving 70mm thick	840	m2	£18.50	£15,540.00		
	Excavate Topsoil (500mm deep)	2489	m3	£3.00	£7,465.50		
	Excavate Suitable	0	m3	£3.00	£0.00		
	Disposal Topsoil	2489	m3	£10.00	£24,885.00		
	Disposal Suitable	0	m3	£5.00	£0.00		
	Compaction Fill	0	m3	£1.00	£0.00		
	Formation	3906	m2	£0.25	£976.50		
	Earthworks Balance (due to lack of knowledge of Topography)		sum		£25,000.00	<u>£216,850.68</u>	<u>£216,850.68</u>
<b>Fencing &amp; Gates</b>							
	P&W Fencing w/netting	1000	No.	£29.00	£29,000.00		
	Gates	4	No.	£175.00	£700.00	<u>£29,700.00</u>	<u>£50,000.00</u>
<b>Drainage</b>							
	Gullies	71	No.	£250.00	£17,857.14		
	Manholes	20	No.	£1,200.00	£24,000.00		
	Drainage pipe	2000	m	£55.00	£110,000.00	<u>£151,857.14</u>	<u>£200,000.00</u>
<b>Settlement Ponds</b>							
	Headwalls : In-situ reinforced concrete structure inc. walls & base slab	4	No.	£800.00	£3,200.00		
	Settlement Ponds	326	m3	£3.00	£978.00	<u>£4,178.00</u>	<u>£10,000.00</u>
<b>Grassing &amp; Soiling</b>							
	<b>Soiling</b> at less than 10°	6000	m2	£5.20	£31,200.00		
	<b>Grassing</b> at less than 10°	6000	m2	£1.00	£6,000.00	<u>£37,200.00</u>	<u>£50,000.00</u>
<b>Street Lighting</b>							
					£80,000.00	<u>£80,000.00</u>	<u>£80,000.00</u>
					<b>Sub-total</b>	<b>£2,078,265.20</b>	<b>£2,173,120.06</b>
<b>Signing &amp; lining (3% of total cost above)</b>							
			sum	3%		<u>£62,347.96</u>	<u>£65,193.60</u>
					<b>Sub-total</b>	<b>£2,140,613.16</b>	<b>£2,238,313.66</b>
<b>Public Utilities (10% of total cost)</b>							
			sum	10%		<u>£214,061.32</u>	<u>£223,831.37</u>
					<b>Sub-total</b>	<b>£2,354,674.47</b>	<b>£2,462,145.03</b>
<b>Contingencies</b>							
				20%		<u>£470,934.89</u>	<u>£492,429.01</u>
					<b>Sub-total</b>	<b>£2,825,609.37</b>	<b>£2,954,574.03</b>
<b>Optimism Bias</b>							
				44%		<u>£1,243,268.12</u>	<u>£1,300,012.57</u>
					<b>TOTAL</b>	<b>£4,068,877.49</b>	<b>£4,254,586.60</b>

**Keithhall new link**



**Preliminary Estimate**

<b>Item No.</b>	<b>Description of Work</b>	<b>Quantity</b>	<b>Unit</b>	<b>Rate</b>	<b>Amount</b>		
<b>Preliminaries</b>							
	Site Offices	1	item	£750,000.00	£750,000.00		
	Traffic Management	1	item	£250,000.00	£250,000.00		
						<u>£1,000,000.00</u>	<u>£1,000,000.00</u>
<b>Site Clearance (5.5km x 17.3m + slip roads)</b>							
	Site Clearance	10	ha	£1,105.00	£11,050.00		
						<u>£11,050.00</u>	<u>£15,000.00</u>
<b>Roundabout (20m ICD roundabout)</b>							
	roundabout	1300	m2	£60.00	£78,000.00		
	tie in areas	400	m2	£50.00	£20,000.00		
						<u>£98,000.00</u>	<u>£100,000.00</u>
<b>Section 1 (2.0km length) 7.3m c/way, 2m verge, 3m footway/cycletrack total width 17.3m</b>							
<b>C/way</b>							
	Subbase 210mm thick	3066	m3	£34.00	£104,244.00		
	Basecourse 140mm thick	14600	m2	£18.65	£272,290.00		
	Binder course 55mm thick	14600	m2	£8.50	£124,100.00		
	Tack coat	14600	m2	£0.69	£10,074.00		
	Surface course 45mm thick	14600	m2	£9.50	£138,700.00		
	HB Kerbing	4000	m	£10.00	£40,000.00		
	Heel kerb	8000	m	£6.50	£52,000.00		
<b>Footway/cycletrack</b>							
	Subbase 100mm thick	1200	m3	£2.00	£2,400.00		
	Paving 70mm thick	12000	m2	£18.50	£222,000.00		
	Excavate Topsoil (500mm deep)	17300	m3	£3.00	£51,900.00		
	Excavate Suitable	0	m3	£3.00	£0.00		
	Disposal Topsoil	17300	m3	£10.00	£173,000.00		
	Disposal Suitable	0	m3	£5.00	£0.00		
	Compaction Fill	0	m3	£1.00	£0.00		
	Formation	26600	m2	£0.25	£6,650.00		
	Earthworks Balance (due to lack of knowledge of Topography)		sum		£500,000.00		
						<u>£1,697,358.00</u>	<u>£1,750,000.00</u>
<b>Roundabout (20m ICD roundabout)</b>							
	roundabout	1300	m2	£60.00	£78,000.00		
	tie in areas	400	m2	£50.00	£20,000.00		
						<u>£98,000.00</u>	<u>£100,000.00</u>
<b>Section 2 (2.5km length) 7.3m c/way, 2m verge, 3m footway/cycletrack total width 17.3m (inc r/b)</b>							
<b>C/way</b>							
	Subbase 210mm thick	3833	m3	£34.00	£130,305.00		
	Basecourse 140mm thick	18250	m2	£18.65	£340,362.50		
	Binder course 55mm thick	18250	m2	£8.50	£155,125.00		
	Tack coat	18250	m2	£0.69	£12,592.50		
	Surface course 45mm thick	18250	m2	£9.50	£173,375.00		
	HB Kerbing	5000	m	£10.00	£50,000.00		
	Heel kerb	10000	m	£6.50	£65,000.00		
<b>Footway/cycletrack</b>							
	Subbase 100mm thick	1500	m3	£2.00	£3,000.00		
	Paving 70mm thick	15000	m2	£18.50	£277,500.00		
	Excavate Topsoil (500mm deep)	21625	m3	£3.00	£64,875.00		
	Excavate Suitable	0	m3	£3.00	£0.00		
	Disposal Topsoil	21625	m3	£10.00	£216,250.00		
	Disposal Suitable	0	m3	£5.00	£0.00		
	Compaction Fill	0	m3	£1.00	£0.00		
	Formation	33250	m2	£0.25	£8,312.50		
	Earthworks Balance (due to lack of knowledge of Topography)		sum		£500,000.00		
						<u>£1,996,697.50</u>	<u>£2,100,000.00</u>
<b>Section 3 (1.0km length) 7.3m c/way, 2m verge, 3m footway/cycletrack total width 17.3m (inc r/b)</b>							
<b>C/way</b>							
	Subbase 210mm thick	1533	m3	£34.00	£52,122.00		
	Basecourse 140mm thick	7300	m2	£18.65	£136,145.00		
	Binder course 55mm thick	7300	m2	£8.50	£62,050.00		
	Tack coat	7300	m2	£0.69	£5,037.00		
	Surface course 45mm thick	7300	m2	£9.50	£69,350.00		
	HB Kerbing	2000	m	£10.00	£20,000.00		
	Heel kerb	4000	m	£6.50	£26,000.00		

**Keithhall new link**



**Preliminary Estimate**

<u>Item No.</u>	<u>Description of Work</u>	<u>Quantity</u>	<u>Unit</u>	<u>Rate</u>	<u>Amount</u>		
<b>Footway/cycletrack</b>							
	Subbase 100mm thick	600	m3	£2.00	£1,200.00		
	Paving 70mm thick	6000	m2	£18.50	£111,000.00		
	Excavate Topsoil (500mm deep)	8650	m3	£3.00	£25,950.00		
	Excavate Suitable	0	m3	£3.00	£0.00		
	Disposal Topsoil	8650	m3	£10.00	£86,500.00		
	Disposal Suitable	0	m3	£5.00	£0.00		
	Compaction Fill	0	m3	£1.00	£0.00		
	Formation	13300	m2	£0.25	£3,325.00		
	Earthworks Balance (due to lack of knowledge of Topography)		sum		£150,000.00	£748,679.00	£850,000.00
<b>Section 4 (0.8km length) (Assume 7.3m c/way)</b>							
	Break up existing section of B993 and remove to tip	1460	m3	£56.00	£81,760.00	£81,760.00	£100,000.00
<b>Bridge over Rail and River</b>							
	Bridge		sum		£3,000,000.00	£5,000,000.00	£5,000,000.00
<b>Fencing &amp; Gates</b>							
	P&W Fencing w/netting	11000	No.	£29.00	£319,000.00		
	Gates	12	No.	£175.00	£2,100.00	£321,100.00	£350,000.00
<b>Drainage</b>							
	Gullies	393	No.	£250.00	£98,214.29		
	Manholes	110	No.	£1,200.00	£132,000.00		
	Drainage pipe	11000	m	£55.00	£605,000.00	£835,214.29	£900,000.00
<b>Settlement Ponds</b>							
	Headwalls : In-situ reinforced concrete structure inc. walls & base slab	8	No	£800.00	£6,400.00		
	Settlement Ponds	1100	m3	£3.00	£3,300.00	£9,700.00	£15,000.00
<b>Grassing &amp; Soiling</b>							
	<b>Soiling</b> at less than 10°	33000	m2	£5.20	£171,600.00		
	<b>Grassing</b> at less than 10°	33000	m2	£1.00	£33,000.00	£204,600.00	£210,000.00
<b>Street Lighting</b>							
					£160,000.00	£160,000.00	£160,000.00
					<b>Sub-total</b>	<b>£12,262,158.79</b>	<b>£12,650,000.00</b>
<b>Signing &amp; lining (3% of total cost above)</b>							
			sum	3%		£367,864.76	£379,500.00
					<b>Sub-total</b>	<b>£12,630,023.55</b>	<b>£13,029,500.00</b>
<b>Public Utilities (10% of total cost)</b>							
			sum	10%		£1,263,002.35	£1,302,950.00
					<b>Sub-total</b>	<b>£13,893,025.90</b>	<b>£14,332,450.00</b>
<b>Contingencies</b>							
				20%		£2,778,605.18	£2,866,490.00
					<b>Sub-total</b>	<b>£16,671,631.09</b>	<b>£17,198,940.00</b>
<b>Optimism Bias</b>							
				44%		£7,335,517.68	£7,567,533.60
					<b>TOTAL</b>	<b>£24,007,148.76</b>	<b>£24,766,473.60</b>

**Thainstone Roundabout**

**Preliminary Estimate**

<u>Item No.</u>	<u>Description of Work</u>	<u>Quantity</u>	<u>Unit</u>	<u>Rate</u>	<u>Amount</u>		
<b>Preliminaries</b>							
	Site Offices	1	item	£150,000.00	£150,000.00		
	Traffic Management	1	item	£75,000.00	£75,000.00		
						<u>£225,000.00</u>	<u>£225,000.00</u>
<b>Site Clearance (110m x 8.0m c/way )</b>							
	Site Clearance	1.0	ha	£1,105.00	£1,105.00		
						<u>£1,105.00</u>	<u>£5,000.00</u>
<b>Roundabout (70m ICD roundabout</b>							
	roundabout	4500	m2	£60.00	£270,000.00		
	tie in areas	11600	m2	£50.00	£580,000.00		
						<u>£850,000.00</u>	<u>£850,000.00</u>
<b>Section 1 Slip road onto A96 N/B (110m length) 3.65m c/way, 2m verge, total width 7.65m</b>							
<b>C/way</b>							
	Subbase 210mm thick	84	m3	£34.00	£2,866.71		
	Basecourse 140mm thick	402	m2	£18.65	£7,487.98		
	Binder course 55mm thick	402	m2	£8.50	£3,412.75		
	Tack coat	402	m2	£0.69	£277.04		
	Surface course 45mm thick	402	m2	£9.50	£3,814.25		
	HB Kerbing	220	m	£10.00	£2,200.00		
	Excavate Topsoil (500mm deep)	421	m3	£3.00	£1,262.25		
	Excavate Suitable	0	m3	£3.00	£0.00		
	Disposal Topsoil	421	m3	£10.00	£4,207.50		
	Disposal Suitable	0	m3	£5.00	£0.00		
	Compaction Fill	0	m3	£1.00	£0.00		
	Formation	402	m2	£0.25	£100.38		
	Earthworks Balance (due to lack of knowledge of Topography)		sum		£75,000.00		
						<u>£100,628.85</u>	<u>£150,000.00</u>
<b>Section 2 Eastwards (40m length) 14.6m c/way, 2m verge, 3m footway/cycletrack total width 24.6m</b>							
<b>C/way</b>							
	Subbase 210mm thick	123	m3	£34.00	£4,169.76		
	Basecourse 140mm thick	584	m2	£18.65	£10,891.60		
	Binder course 55mm thick	584	m2	£8.50	£4,964.00		
	Tack coat	584	m2	£0.69	£402.96		
	Surface course 45mm thick	584	m2	£9.50	£5,548.00		
	HB Kerbing	80	m	£10.00	£800.00		
	Heel kerb	160	m	£6.50	£1,040.00		
<b>Footway/cycletrack</b>							
	Subbase 100mm thick	24	m3	£2.00	£48.00		
	Paving 70mm thick	240	m2	£18.50	£4,440.00		
	Excavate Topsoil (500mm deep)	492	m3	£3.00	£1,476.00		
	Excavate Suitable	0	m3	£3.00	£0.00		
	Disposal Topsoil	492	m3	£10.00	£4,920.00		
	Disposal Suitable	0	m3	£5.00	£0.00		
	Compaction Fill	0	m3	£1.00	£0.00		
	Formation	824	m2	£0.25	£206.00		
	Earthworks Balance (due to lack of knowledge of Topography)		sum		£25,000.00		
						<u>£63,906.32</u>	<u>£100,000.00</u>
<b>Roundabout (20m ICD roundabout</b>							
	roundabout	1300	m2	£60.00	£78,000.00		
	tie in areas	300	m2	£50.00	£15,000.00		
						<u>£93,000.00</u>	<u>£100,000.00</u>
<b>Fencing &amp; Gates</b>							
	P&W Fencing w/netting	300	No.	£29.00	£8,700.00		
	Gates	4	No.	£175.00	£700.00		
						<u>£9,400.00</u>	<u>£10,000.00</u>
<b>Drainage</b>							
	Gullies	11	No.	£250.00	£2,678.57		
	Manholes	3	No.	£1,200.00	£3,600.00		
	Drainage pipe	300	m	£55.00	£16,500.00		
						<u>£22,778.57</u>	<u>£30,000.00</u>
<b>Settlement Ponds</b>							
	Headwalls : In-situ reinforced concrete structure inc. walls & base slab	2	No.	£800.00	£1,600.00		
	Settlement Ponds	50	m3	£3.00	£150.00		
						<u>£1,750.00</u>	<u>£5,000.00</u>

**Thainstone Roundabout**



**Preliminary Estimate**

<b>Item No.</b>	<b>Description of Work</b>	<b>Quantity</b>	<b>Unit</b>	<b>Rate</b>	<b>Amount</b>	
<b>Grassing &amp; Soiling</b>						
	<b>Soiling</b> at less than 10°	900	m2	£5.20	£4,680.00	
	<b>Grassing</b> at less than 10°	900	m2	£1.00	£900.00	
					<u>£5,580.00</u>	<u>£10,000.00</u>
<b>Street Lighting</b>						
					£80,000.00	
					<u>£80,000.00</u>	<u>£80,000.00</u>
				<b>Sub-total</b>	<b>£1,453,148.74</b>	<b>£1,565,000.00</b>
<b>Signing &amp; lining (3% of total cost above)</b>						
		sum		3%		
					<u>£43,594.46</u>	<u>£46,950.00</u>
				<b>Sub-total</b>	<b>£1,496,743.20</b>	<b>£1,611,950.00</b>
<b>Public Utilities (10% of total cost)</b>						
		sum		10%		
					<u>£149,674.32</u>	<u>£161,195.00</u>
				<b>Sub-total</b>	<b>£1,646,417.52</b>	<b>£1,773,145.00</b>
<b>Contingencies</b>						
				20%		
					<u>£329,283.50</u>	<u>£354,629.00</u>
				<b>Sub-total</b>	<b>£1,975,701.02</b>	<b>£2,127,774.00</b>
<b>Optimism Bias</b>						
				44%		
					<u>£869,308.45</u>	<u>£936,220.56</u>
				<b>TOTAL</b>	<b><u>£2,845,009.47</u></b>	<b><u>£3,063,994.56</u></b>



**B INVERURIE LOCAL ACCESSIBILITY APPRAISAL**

Draft



Draft



**Aberdeenshire Council  
Aberdeenshire Towns - Inverurie  
Local Accessibility Appraisal**

<i>Date :</i>	<b>14 May 2009</b>	<i>Distribution :</i>	
<i>Author :</i>	<b>Graeme Low</b>	<b>Peter MacCallum</b>	<b>Aberdeenshire Council</b>
<i>Reviewer:</i>	<b>Emma Gilmour</b>	<b>Mark Peters</b>	<b>Aberdeenshire Council</b>
<i>Reference :</i>	<b>TPATCINC/71004</b>	<b>Bob Nicol</b>	<b>SIAS Limited</b>
		<b>Peter Stewart</b>	<b>SIAS Limited</b>

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## 1 INTRODUCTION

SIAS Limited (SIAS) has been commissioned by Aberdeenshire Council under the term commission to provide transport consultancy advice with regard to the development of the following Aberdeenshire towns:

- Inverurie
- Kintore
- Westhill
- Stonehaven

As part of these studies, S-Paramics is being used to assess the impact of future expansion on the existing and committed road network in the vicinity of the towns. In addition, the accessibility of potential future development sites is to be appraised using Accession accessibility modelling software.

The accessibility appraisal has been based on existing bus service details and has not investigated the accessibility of the sites in terms of rail travel due to the local nature of the studies. It is, however, suggested that this should be undertaken as part of the detailed appraisal of the potential development sites.

In addition, the impact of committed or potential future infrastructure improvements (including new Park & Ride sites and rail service improvements) could be appraised with regard to the potential development sites, however this has not been included in this study.

This Technical Note summarises the results of the accessibility appraisal for Inverurie.

## 2 POTENTIAL DEVELOPMENT SITES

### 2.1 Introduction

Inverurie has a population of around 11,000 and is located 27km to the north-west of Aberdeen. Direct bus and rail services provide connection between the town and Aberdeen City Centre, with the A96(T) providing access to the city.



The trunk road forms the western boundary of Inverurie and the town centre is located on the eastern edge of the town.

Aberdeenshire Council has requested that the accessibility of three potential development sites/areas be appraised. Two of the sites are located to the south of the town (Thainstone Business Park and Crichie Farm). Thainstone is assumed to be suitable for employment use and Crichie Farm is assumed to be a mixed-use development.

The areas of Howford, Portsdown, Boynds, Lofthillock and Western Keith Hall have been referred to as Uryside for the purpose of this appraisal. The Uryside development is to contain a mixture of residential and employment uses and is located to the north-east of Inverurie. The location of the sites is shown in Figure 2.1.

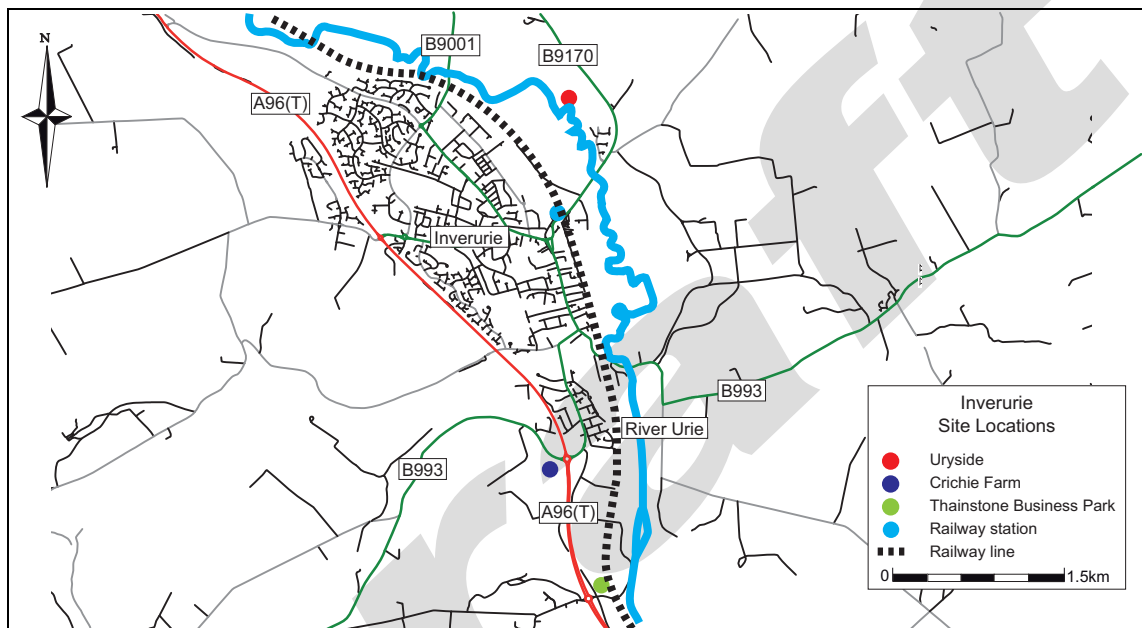


Figure 2.1 : Site Locations

## 2.2 Potential Development Sites

The Thainstone Business Park site is located to the south of Port Elphinstone and immediately to the east of the A96(T). The trunk road provides connection to Aberdeen and is of dual carriageway standard in the vicinity of the site. The Thainstone Roundabout provides an existing access into the Inverurie Paper Mill and will be used to provide access into the Thainstone Business Park. Bus stops are provided on the A96(T) immediately to the south of the Thainstone Roundabout and uncontrolled pedestrian crossing facilities are provided in the vicinity of the roundabout.

The Crichie Farm site is located to the south-west of Port Elphinstone and is bounded on the east by the A96(T). Access will be provided into the development site from the B993 which connects to the trunk road at the Port Elphinstone Roundabout, which is located immediately to the north-east of the Crichie Farm site. The A96(T) is of dual carriageway standard to the south of the roundabout and single carriageway standard to the north. Bus stops are provided on the B993 in Port Elphinstone and on the A96(T) around 500m to the south of the Port Elphinstone Roundabout. Uncontrolled pedestrian crossing facilities are provided in the vicinity of the bus stops.

The Uryside development area is located to the north-east of Inverurie and is bounded by the B9170 and River Urie to the east and west of the development area. The nearest bus stops are located in Inverurie, which is partly segregated from Uryside by the River Urie.



### 3 ACCESSIBILITY APPRAISAL

#### 3.1 Accession Modelling

Accession is a software package which was developed on behalf of the Department for Transport as a joint venture between MVA and Citilabs. The software enables the accessibility of an area to be appraised and has been approved by the Government for use in accessibility planning.

The software operates as a Geographical Information System (GIS) which brings together a number of data sources (including road network and public transport service information) to enable the accessibility of a potential development site or area to be appraised. ATCO Cif public transport service data (exported 11 February 2009) has been supplied by Aberdeenshire Council for use in the Aberdeenshire town studies.

Accessibility analysis calculations are generally based on travel time and results can be displayed graphically as contours or presented in a tabular format.

Accession can be used to undertake 'Local Accessibility' calculations which enable the accessibility of public transport services to be appraised for a particular area. 'Network Accessibility' calculations enable the accessibility of a destination to be determined from a user defined area. This study has made use of both local and network accessibility calculations.

The accessibility of the potential development sites have been appraised in terms of their proximity to local bus services in the morning peak (07:00 – 09:00) and off-peak (12:00 – 14:00) weekday periods. While it is acknowledged that the future developments will be supported by improvements to the public transport network to ensure they comply with national and local planning policy, in the first instance, the use of existing service information will enable an appraisal of the sites accessibility to be undertaken.

The parameters which have been used to inform the local accessibility analysis are as follows:

- Average walk speed – 4.8km/h
- Straight line walk distance factor – 1.2
- Maximum walk distance – 10min

The analysis has been undertaken to appraise the accessibility of the sites to 1, 2 and 4 buses per hour in the weekday peak and off-peak periods. A 60min service frequency would represent a minimum standard and a 15min frequency is considered to represent a high level of service frequency.

Network accessibility calculations have been undertaken to determine the accessibility of the potential development sites on foot, cycle and by bus. The parameters which have been used to inform the network accessibility analysis are as follows:

- Average walk speed – 4.8km/h
- Average cycle speed – 16km/h
- Straight line walk distance factor – 1.2
- Maximum connection distance – 1.0km
- Minimum time calculation undertaken
- All wait time included



For the purpose of this study it has been assumed that pedestrians and cyclists would be prepared to travel a maximum of 20min to access the development site or to access local amenities from the site.

In addition, the accessibility of the town to the centre of Aberdeen, has been appraised in the peak and off-peak periods. A maximum journey time of 60min has been assumed for the purpose of this study to provide an additional parameter against which to assess the accessibility of the potential development sites.

Census population data has been applied to the network accessibility appraisal to determine the magnitude of existing (based on 2001 data) residents living within a 20min walk or cycle of the sites to provide an additional indicator of the site’s accessibility.

**3.2 Accessibility Appraisal – Local Accessibility**

**3.2.1 Public Transport Accessibility - Weekday Peak**

Figures 3.1 – 3.3 confirm the availability of bus services in the morning weekday peak period, which has been assumed to be 07:00 – 09:00 for the purpose of this appraisal. National planning policy guidance suggests that 400m (equivalent to a 5min walk) represents a convenient distance which residents would be prepared to walk to access a bus service, however, given the rural nature of a number of the development sites, this appraisal has set a maximum journey time of 10min or 800m.

Figure 3.1 shows the proportion of Inverurie and Port Elphinstone which is accessible to a bus service which operates with a minimum of a 60min frequency in the morning peak. The location of the Thainstone and Crichtie Farm sites are shown to be within a 5min walk of the bus services. The Uryside site has no bus stops in its vicinity, so is outwith a 10min walk of existing bus services, although services do route past the site on the B9170. The level of service provision may have to be enhanced to ensure the demand which is generated by the development can be met.

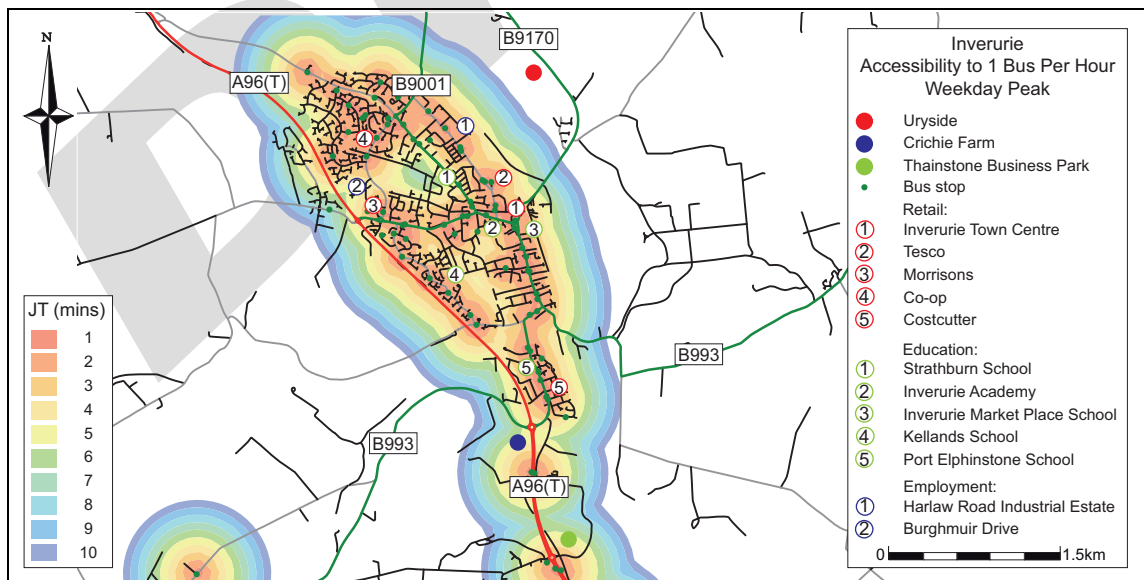


Figure 3.1 : Weekday Peak Accessibility to a 60 minute bus service

Figure 3.2 shows the proportion of Inverurie and Port Elphinstone which is accessible to a bus service which operates with a minimum of a 30min frequency in the morning peak. The contour plot is virtually unchanged from the output which detailed the accessibility of Inverurie to a 60min service frequency. The lack of bus stops ensures that the Uryside site remains inaccessible by bus, even though services currently route past the site.



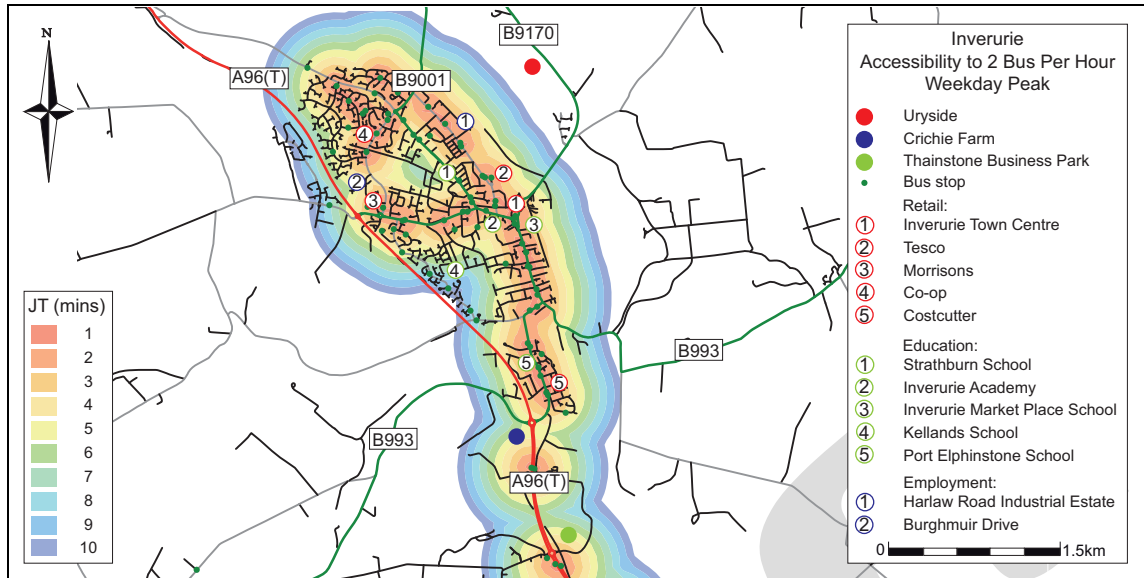


Figure 3.2 : Weekday Peak Accessibility to a 30 minute bus service

Figure 3.3 shows the proportion of Inverurie and Port Elphinstone which is accessible to a 15min frequency in the morning peak. While the proportion of Inverurie which is served by a 15min service frequency is reduced when compared to that which is served by a 30min frequency service, both the Thainstone and Crichie Farm sites are within a convenient 5min walk of a 15min service. The Uryside development site is again shown to be inaccessible by bus.

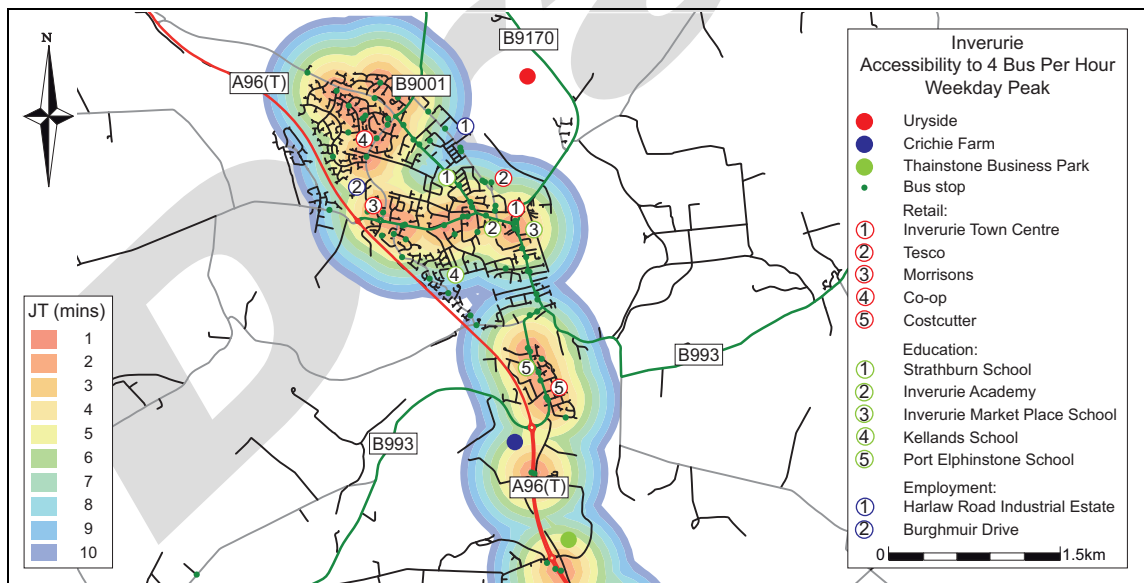


Figure 3.3 : Weekday Peak Accessibility to a 15 minute bus service

### 3.2.2 Public Transport Accessibility - Weekday Off-Peak

Figures 3.4 – 3.6 show the availability of bus services outwith the peak (12:00 – 14:00). The figures confirm that a similar level of service is provided in the off-peak period when compared to the peak.

Figure 3.4 shows the proportion of Inverurie and Port Elphinstone which is accessible to a bus service which operates with a minimum of a 60min frequency in the off-peak period. The location of the Thainstone and Crichie Farm sites are shown to be within a 5min walk of the bus services. The Uryside site has no bus stops in its vicinity, so is outwith a 10min walk of



existing bus services, although services do route past the site on the B9170. The level of service provision may have to be enhanced to ensure the demand which is generated by the development can be met.

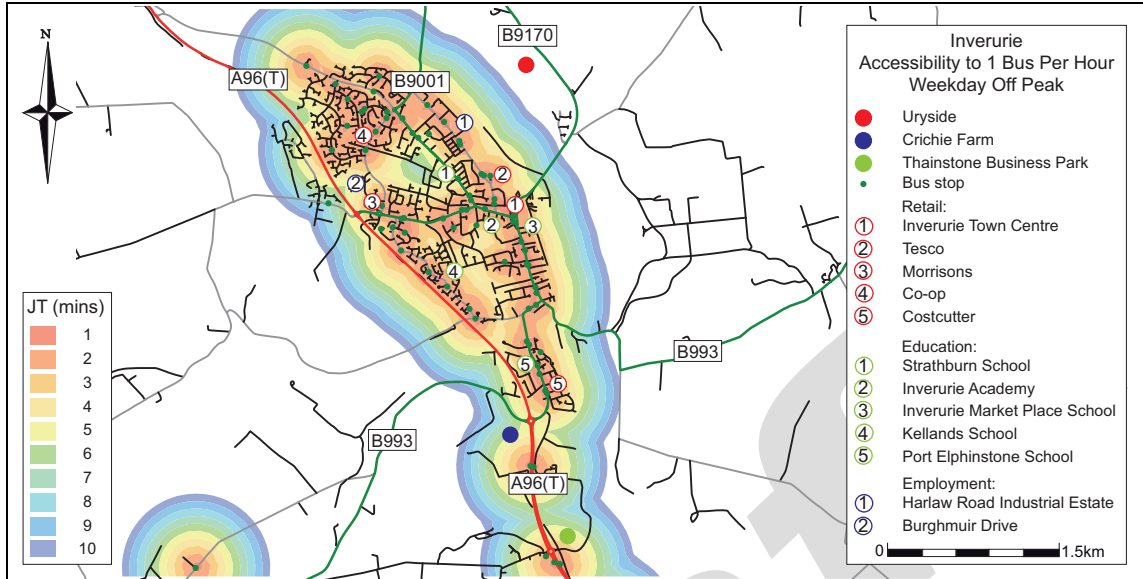


Figure 3.4 : Off-Peak Accessibility to a 60 minute bus service

Figure 3.5 shows the proportion of Inverurie and Port Elphinstone which is accessible to a bus service which operates with a minimum of a 30min frequency in the off-peak period. The contour plot is virtually unchanged from the output which detailed the accessibility of Inverurie to a 60min service frequency. The lack of bus stops ensures that the Uryside site remains inaccessible by bus, even though services currently route past the site.

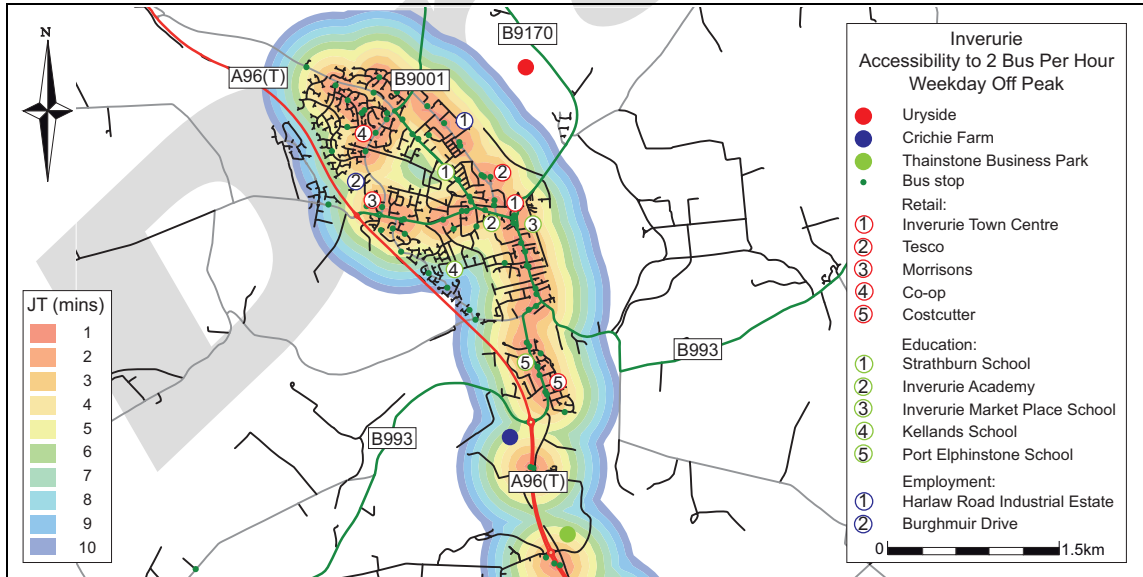


Figure 3.5 : Off-Peak Accessibility to a 30 minute bus service

Figure 3.6 shows the proportion of Inverurie and Port Elphinstone which is accessible to a 15min frequency in the morning peak. The contour plot is unchanged from the output which detailed the accessibility of Inverurie to a 30min service frequency. The Uryside development site is again shown to be inaccessible by bus.





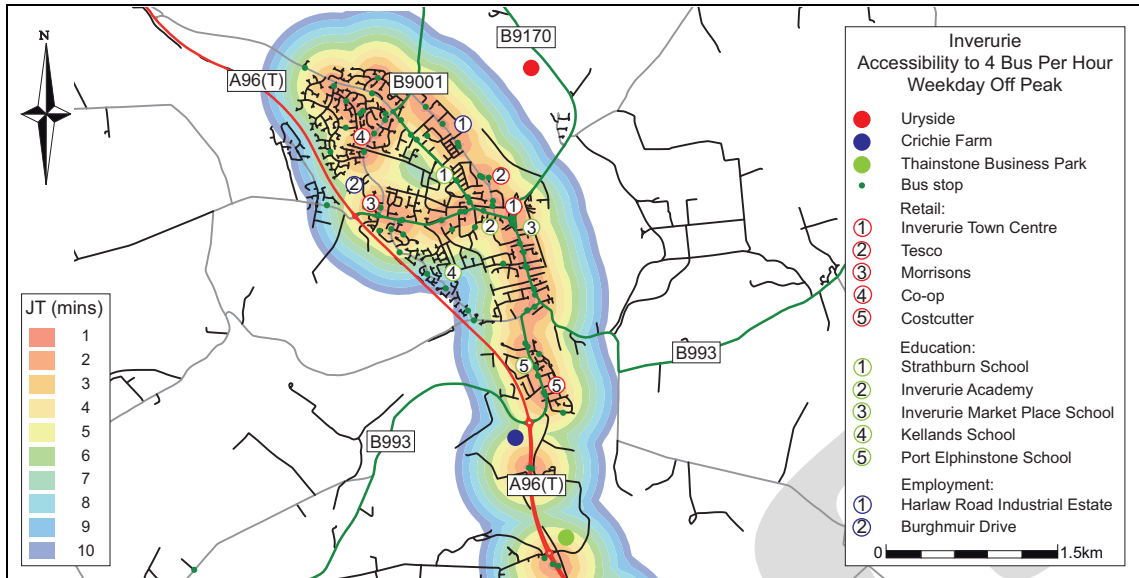


Figure 3.6 : Off-Peak Accessibility to a 15 minute bus service

### 3.3 Accessibility Appraisal – Network Accessibility

#### 3.3.1 Pedestrian and Cycle Accessibility

Figures 3.7 – 3.12 show the accessibility to local amenities on foot and by cycle, of the Thainstone, Crichtie Farm and Uryside sites. For the purpose of this study, the approximate location of the sites was assumed. Given the expected size of a number of the development sites, the location of the centre of the site could vary from that which has been assumed. It is, however, expected that the assumed site centroid locations will enable a robust appraisal of the accessibility of the sites to be made.

Figure 3.7 shows the predicted accessibility of the Thainstone site on foot. As can be seen from the output, only a limited number of Port Elphinstone residents are shown to live within a 20min walk of the site. It is considered unlikely that the accessibility could be improved by new infrastructure given the location of the development site in relation to Inverurie and Port Elphinstone.



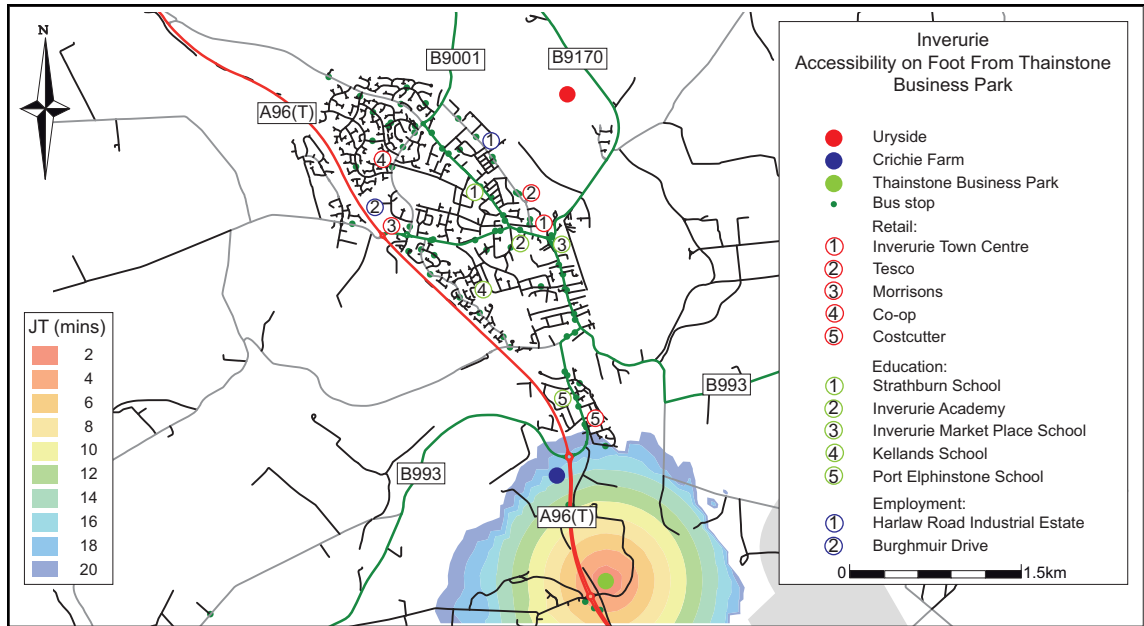


Figure 3.7 : Pedestrian Accessibility to Thainstone Site

The accessibility of the Crichtie Farm site on foot is shown in Figure 3.8. As can be seen from the output, the whole of Port Elphinstone is shown to be within a 14min walk of the site. This includes a Costcutter convenience store and Port Elphinstone School. In addition, a proportion of Inverurie is shown to be within a 20min walk of the site. It must be highlighted, however, that the accessibility appraisal has not taken account of the severance issue created by the A96(T). It is considered necessary to introduce a form of crossing on the trunk road to ensure that the site is accessible from Port Elphinstone and Inverurie in accordance with the results of the accessibility appraisal.

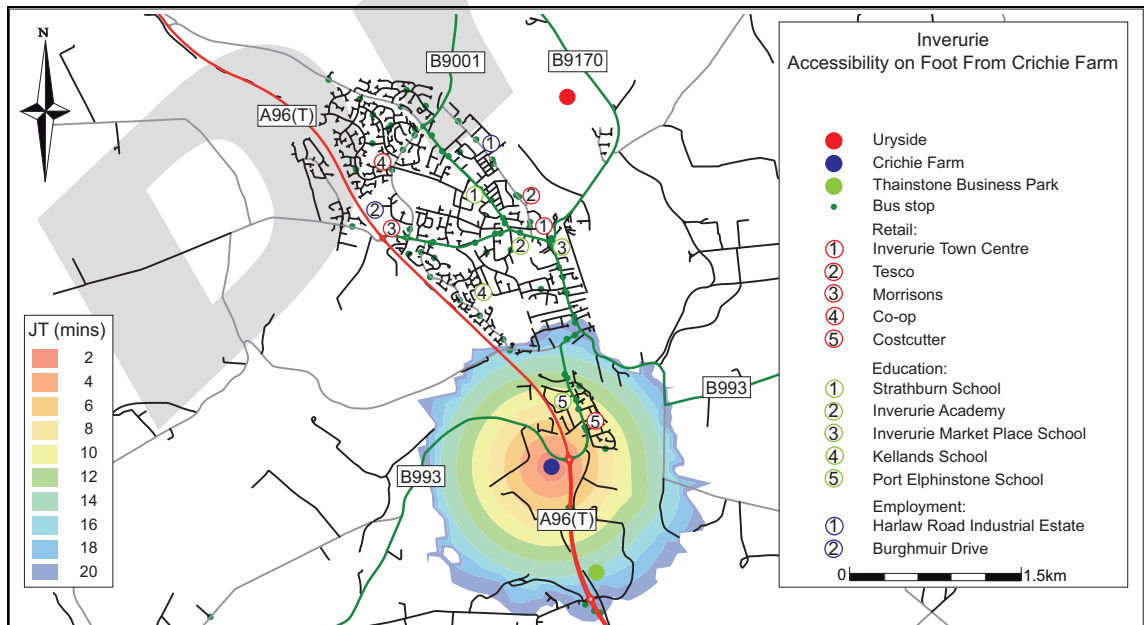


Figure 3.8 : Pedestrian Accessibility to Crichtie Farm Site

Figure 3.9 shows the predicted accessibility of the Uryside site on foot. The appraisal is, however, expected to provide an overly optimistic estimation of the site's accessibility as it takes no account of the barrier to movement which is created by the River Urie. While it is considered that the town centre and Inverurie rail station, will remain within a 20min walk of the site, the Harlaw Road employment area can only be made accessibility to Uryside if a new



river crossing is provided. With the construction of a new river crossing, it is expected that the appraisal will present a realistic prediction of the accessibility of Uryside with the town centre, Tesco superstore, Harlaw Road employment area and Strathburn School being located within a 20min walk of the Uryside development area.

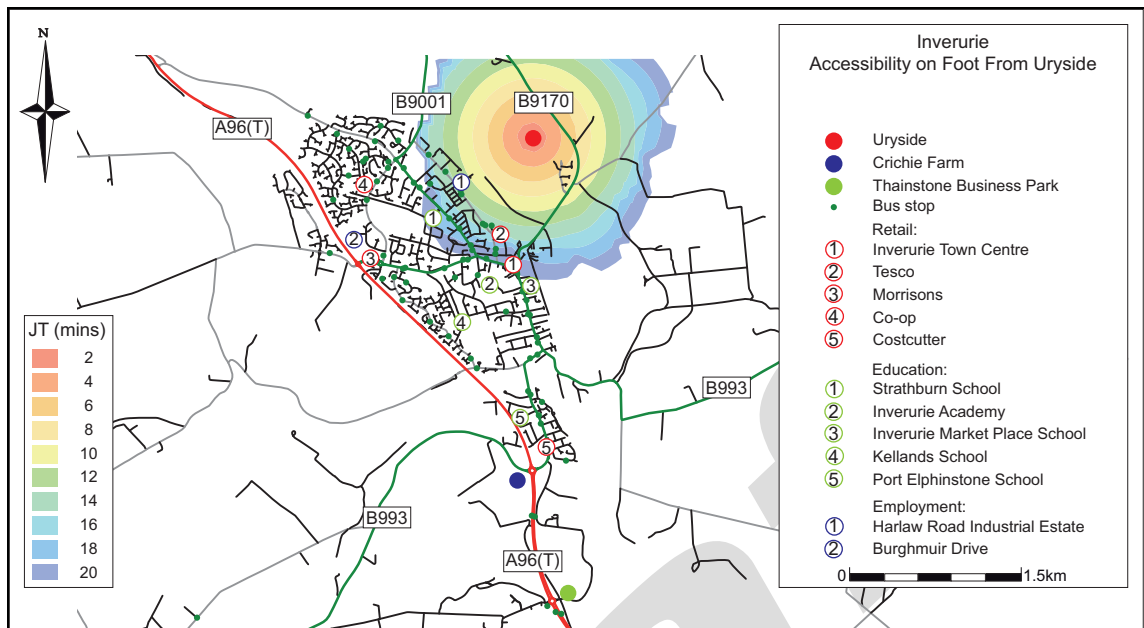


Figure 3.9 : Pedestrian Accessibility to Uryside Site

Figure 3.10 predicts the accessibility of the Thainstone site by cycle with all Port Elphinstone residents shown to live within a 10min cycle of the site and the majority of Inverurie residents living within a 20min cycle of the site.

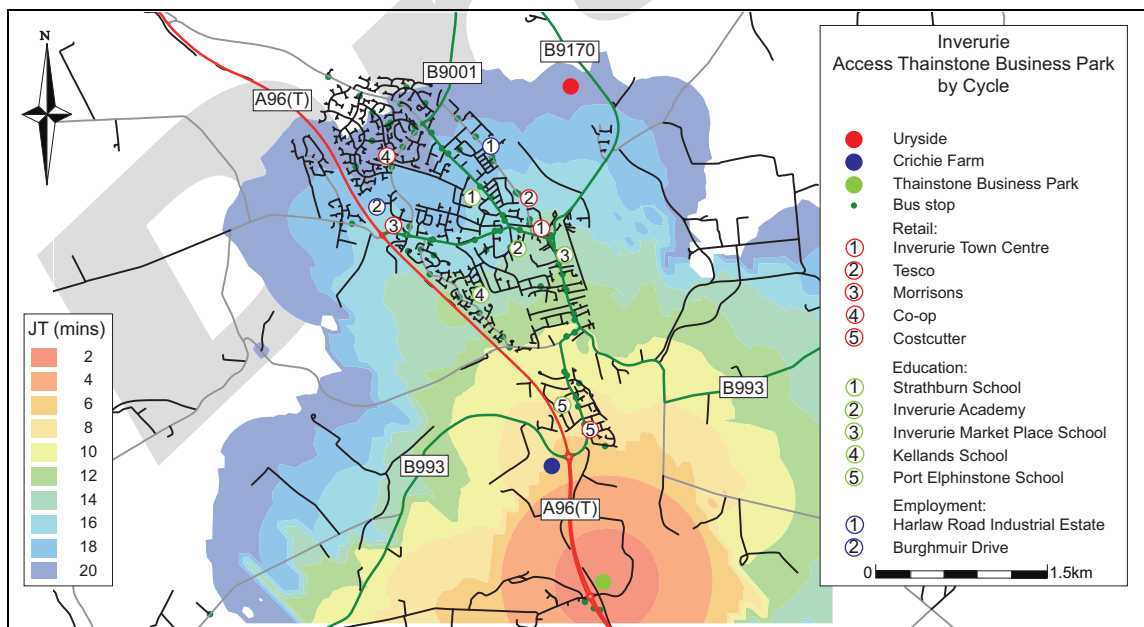


Figure 3.10 : Cycle Accessibility to Thainstone Site

The accessibility of the Crichtie Farm site by cycle is shown in Figure 3.11. Accession predicts that the Costcutter convenience store and Port Elphinstone School are within a 3min cycle of the site, with the whole of Inverurie and its amenities located within an 18min cycle of the Crichtie Farm site. As with the pedestrian accessibility of the site, the A96(T) is expected to present a more significant barrier to movement than that predicted by Accession. It is considered necessary to introduce a new crossing of the A96(T) for pedestrians and cyclists to ensure that



the accessibility of the Crichie Farm site accords with the level of accessibility predicted by Accession.

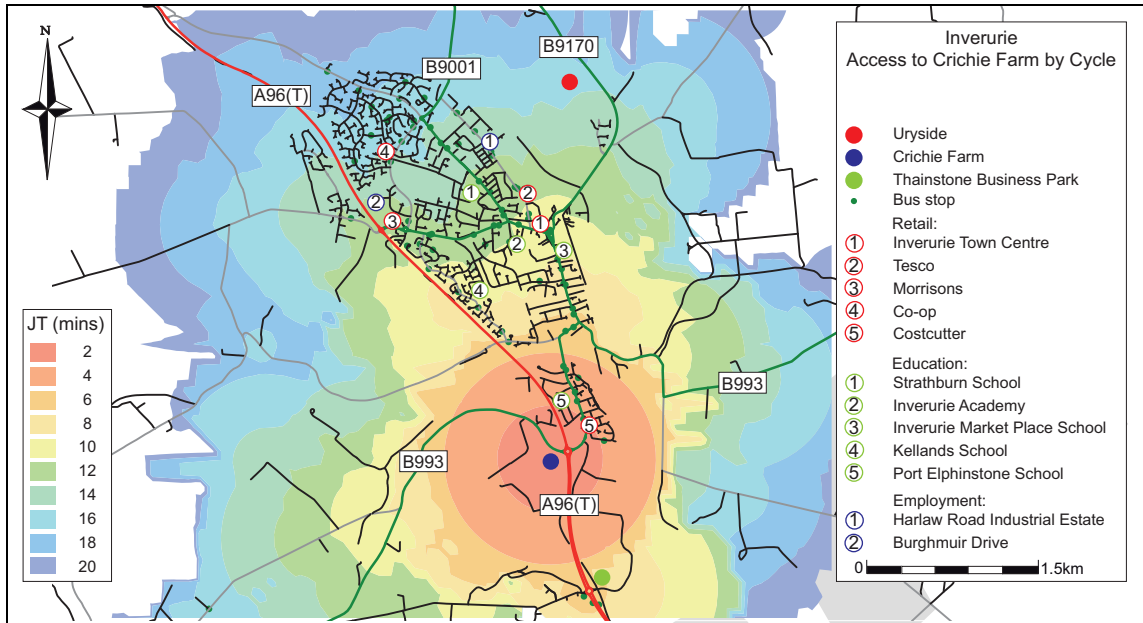


Figure 3.11 : Cycle Accessibility to Crichie Farm Site

Figure 3.12 shows the accessibility of the Uryside site by cycle. The location of the Uryside site results in a large proportion of Inverurie being predicted to be within a 12min cycle of the site. As with the pedestrian accessibility of the site, it is expected that the predicted level of accessibility will only be possible with the construction of a new bridge over the River Urie to provide an additional connection between Uryside and Inverurie and to ensure that the majority of amenities are located within a convenient cycle of the site. The centre of Inverurie is, however, expected to remain within a 6min cycle of Uryside even without the construction of a new crossing.

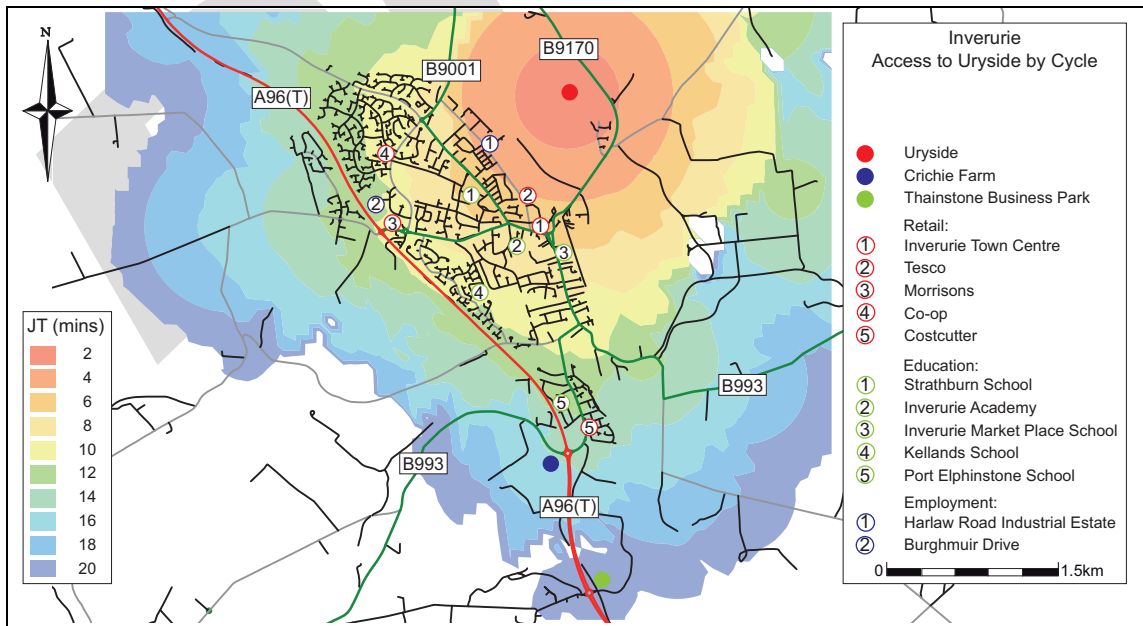


Figure 3.12 : Cycle Accessibility to Uryside Site



3.3.2 Census Population Data Analysis

Tables 3.1 – 3.3 summarise the results of the accessibility appraisal with regard to the proximity of the sites to existing Inverurie and Port Elphinstone residents.

Table 3.1 : Accessibility to Thainstone Site

Pedestrian Accessibility		Cycle Accessibility	
Journey Time (mins)	Population	Journey Time (mins)	Population
20	111	6	111
<b>Total</b>	<b>111</b>	8	992
		10	489
		12	1,013
		14	1,527
		16	1,980
		18	1,742
		20	2,538
		<b>Total</b>	<b>10,392</b>

Table 3.2 : Accessibility to Crichton Farm Site

Pedestrian Accessibility		Cycle Accessibility	
Journey Time (mins)	Population	Journey Time (mins)	Population
8	466	2	210
10	586	4	1,083
12	241	6	436
18	174	8	1,160
20	262	10	1,398
<b>Total</b>	<b>1,729</b>	12	2,024
		14	2,233
		16	2,486
		18	316
		<b>Total</b>	<b>11,346</b>

Table 3.3 : Accessibility to Uryside Site

Pedestrian Accessibility		Cycle Accessibility	
Journey Time (mins)	Population	Journey Time (mins)	Population
14	491	4	286
16	436	6	1,407
18	351	8	3,155
20	415	10	3,715
<b>Total</b>	<b>1,693</b>	12	1,728
		14	591
		16	117
		18	347
		<b>Total</b>	<b>11,346</b>

The above results suggest that marginally more Inverurie/Port Elphinstone residents live within a 20min walk of the Crichton Farm site, when compared to the Uryside site. The appraisal suggests that around 100 residents live within a 20min walk of Thainstone, whereas around 1,700 residents live within a convenient walk of the Crichton Farm and Uryside sites. It is, however, suggested that the age of the Census data (2001) may have had an impact on the



results of the appraisal given the amount of residential development which has been constructed in the town in recent years.

The Uryside site is shown to be the most accessible of the three sites by cycle with a total population of 8,563 predicted to live within a 10min cycle of the site. This compares favourably with the population who live within a 10min cycle of the Crichie Farm site (4,287) and the population living within a 10min cycle of the Thainstone site (1,592).

### 3.4 Bus Accessibility to Aberdeen

The accessibility of the sites to the Aberdeen was appraised based on local bus services. Rail service information could also be included in the appraisal to enable a fuller appraisal of the town's accessibility to the centre of Aberdeen to be undertaken.

Figures 3.13 and 3.14 show the accessibility of Inverurie and Port Elphinstone to the centre of Aberdeen by bus, with a maximum journey time of 60min displayed for the morning peak and off-peak scenarios. The results of the appraisal suggests that it would require a journey time of around 48min to access Aberdeen from Thainstone in the morning peak, with Crichie Farm located around a 60min journey of the city centre. Outwith the peaks, the journey time is reduced to 42min and 48min for the Thainstone and Crichie Farm sites. Uryside is shown to be outwith a 60min journey of the centre of Aberdeen in both peak and off-peak periods, reflecting the fact that there are no bus stops in the vicinity of the development area although bus services currently route past the site on the B9170.

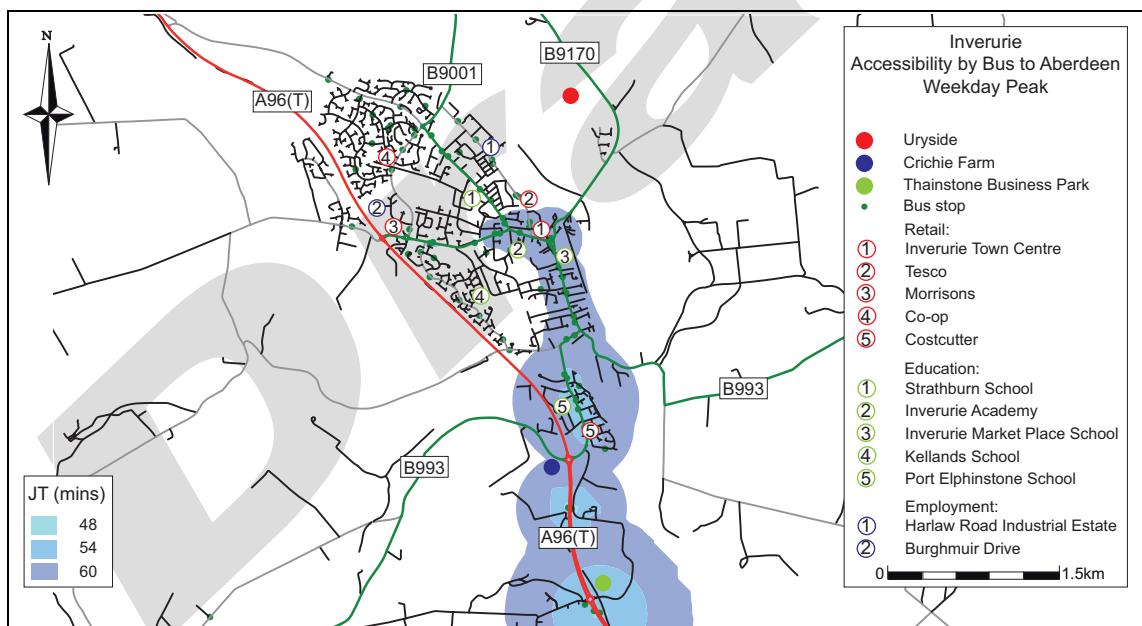


Figure 3.13 : Weekday Peak Accessibility to Aberdeen



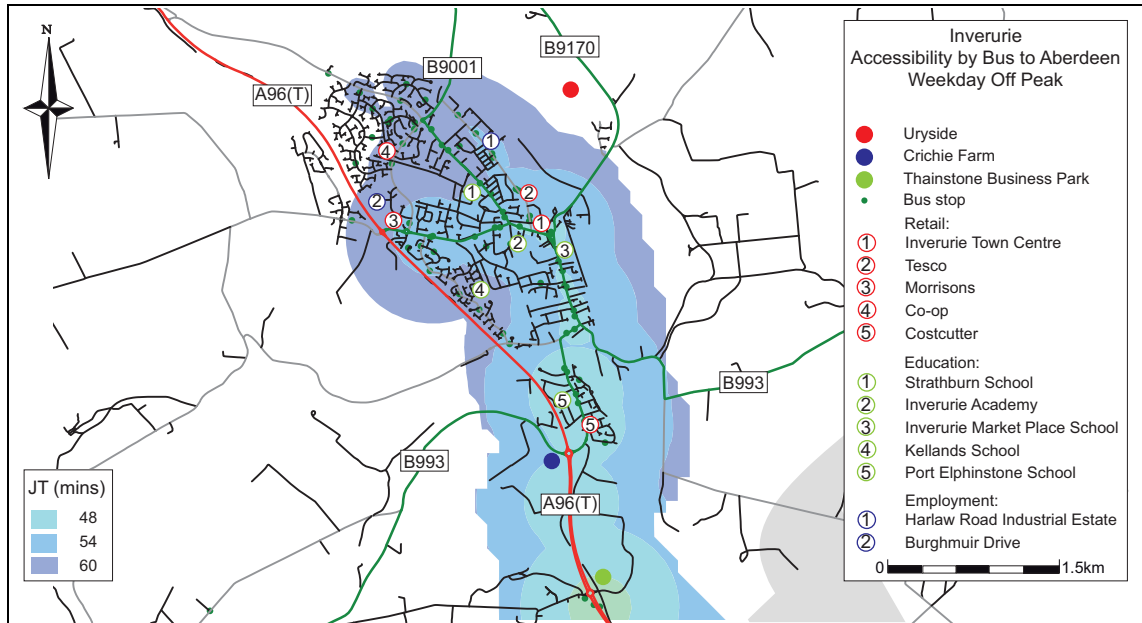


Figure 3.14 : Weekday Off-Peak Accessibility to Aberdeen

## 4 SUMMARY AND CONCLUSIONS

### 4.1 Summary

SIAS has been commissioned by Aberdeenshire Council under the term commission to provide consultancy advice with regard to the development of Inverurie.

The accessibility of the following potential development sites has been appraised:

- Thainstone Business Park
- Crichtie Farm
- Uryside

Accession software has been used to appraise the accessibility of the above sites by bus, cycle and on foot. ATCO Cif public transport data which was exported 11 February 2009, and 2001 Census population data has been used to inform this appraisal.

### 4.2 Conclusions

The Thainstone site is shown to be the most accessible by bus given its proximity to bus stops which are located on the A96(T) adjacent to the site, however, only a few residents currently live within a convenient walk of the site.

The Crichtie Farm site is also located close to existing bus services. The site is more accessible on foot than the Thainstone site with all of Port Elphinstone and a proportion of Inverurie located within a convenient walk of the site. This may, however, be an optimistic prediction of the site's accessibility as Accession takes no account of the severance issues created by the A96(T), which is located between the site and Inverurie/Port Elphinstone.

There are currently no bus stops located in the vicinity of the Uryside site and the River Urie segregates the site from a large proportion of Inverurie. The town centre is shown to be within a 20min walk of the site, however, it is considered that the site will require enhancements to the pedestrian network, potentially including the provision of a new bridge over the River Urie, to

ensure that the site is accessible from Inverurie. The bus services (Service No. 240 and 493) which currently route past the site could serve the development, however, the frequency and hours of operation of the services may need to be increased to ensure that the demand which is generated by the development, can be met.

#### **4.3 Further Work**

It is suggested that the impact of future infrastructure and service improvements should be tested to provide a detailed appraisal of the accessibility of the development sites.

In addition to considering local travel by bus, it is suggested that rail services should be included in any detailed accessibility analysis to enable the accessibility of the potential development sites to be appraised on a wider network for all modes of travel

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