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South Stirling Park & Ride

Stirling Council and Tactran

STAG Report

72794
May 2010

SOUTH STIRLING PARK & RIDE

Description:	**STAG Report**
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1 INTRODUCTION

1.1 Purpose of Report

SIAS Limited (SIAS) in association with Scotland Transerv as term consultants has been appointed by Stirling Council and Tactran to investigate the feasibility of a new Park & Ride site to the south of Stirling.

The Steering Group for the study consists of the following organisations:

- Stirling Council – the local government administration for the Stirling area
- Tactran – the Tayside and Central Scotland Transport Partnership
- Transport Scotland - the national transport agency for Scotland

The new Park & Ride's function would be to complement the two existing Park & Ride sites serving Stirling and potentially provide more of a Strategic interchange facility for trips to Edinburgh and Glasgow.

The key outcomes of the feasibility study, required by the Steering Group, are to establish the appropriate location of a site and to provide a supporting business case.

The study is being undertaken in accordance with the key processes describes in *Scottish Transport Appraisal Guidance* (*STAG*)[1]. The principle of a new Park & Ride has been established and accepted as part of the development of current transport strategies and project reviews. *STAG* has been used as an appraisal tool for the purpose of this study. This Report incorporates a Pre-Appraisal, *STAG* Part 1 and *STAG* Part 2 Stages which have been undertaken to inform this study.

The Steering Group's agreed set of Stakeholder consultees are listed in Appendix A. The list of consultees has been developed on the basis of both statutory requirements and relevance to the study in a proportionate and appropriate way. Questionnaire surveys at existing Stirling Park & Ride sites have also being undertaken to inform this study.

1.2 Background

The concept for a new Park & Ride south of Stirling is supported by local and regional transport strategy documents including Stirling Council's City Transport Strategy, Tactran's Regional Transport Strategy and Park & Ride Strategy. Scotland's National Transport Strategy also supports the concept for Park & Ride .

An early action arising from the Regional Transport Strategy was to develop a series of sub-strategies for Tactran. One of these sub-strategies is the Tactran Park & Ride Strategy and Action Plan. This was approved by Tactran Board on 28 October 2008.

The Tactran Park & Ride Strategy and Action Plan identifies and prioritises a series of Park & Ride sites and proposals in the Tactran area. To complement the two existing sites in Stirling, the Park & Ride Strategy identified a third site to the South of Stirling. It was proposed to give early consideration to this third bus based Park & Ride facility to the south of Stirling as a result of:

[1] http://www.transportscotland.gov.uk/files/documents/reports/j9760/j9760.pdf

- The success of the Springkerse PARK & RIDE to the east of the City and the growth of the recently introduced CastleView PARK & RIDE service to the West
- Recognition that there are benefits for linking the Durieshill Major Growth Area proposed to the south of the City to Park & Ride services serving Stirling and Glasgow/Edinburgh
- The desire to identify and protect a site within the Stirling Local Development Plan
- Transport Scotland's Strategic Transport Projects Review which includes Project 8 – Strategic Park & Ride/Park & Choose Strategy aimed at supporting the objectives to make public transport more competitive against the car and identifies Bannockburn as a possible Park & Ride site serving Stirling, Edinburgh and Glasgow without specifying whether this is to be rail or bus based Park & Ride.

Tactran and Stirling Council, with support from Transport Scotland, have now commissioned this study to develop the proposals contained in the Tactran Park & Ride Strategy and Strategic Transport Project Review (STPR) Project 8 to provide a robust STAG type appraisal and a working business case for a bus based Park & Ride Site to the south of Stirling.

1.3 Study Process

1.3.1 *STAG*

STAG ensures that potential options that address evidence based transport problems or opportunities are identified and appraised in a consistent manner and that such options will contribute to Government's purpose and meet the transport needs of Scotland. *STAG* can be used for all transport appraisal contexts, it should be applied proportionately, but comprehensively, relative to the scale of the impacts of the transport issue being addressed. Participation and consultation are key elements of a *STAG* study and should ensure the interests of stakeholders are considered in an inclusive, open, transparent and appropriate manner.

STAG is the best practise transport appraisal guidance and has a defined series of steps for practitioners to follow. These include: Pre-Appraisal, Part 1 Initial Appraisal and Part 2 Detailed Appraisal. Although there are steps to follow the *STAG* process is one process and this Report summarises all stages of the process.

1.3.2 Pre-Appraisal

The Pre-Appraisal element of the study included:

- Analysis of Problems and Opportunities including Environmental Issues
- Objectives Setting
- Option Generation and Sifting and Development

1.3.3 Part 1 Initial Appraisal

The Initial Appraisal element of the study included an appraisal of site options against the following:

- Transport Planning objectives
- *STAG* Criteria
- Established Policy Directives

- Feasibility
- Affordability
- Public Acceptability

1.3.4 Part 2 Detailed Appraisal

The Detailed Appraisal element of the study included a detailed appraisal of site options which have been appraised to be suitable as part of the Initial Appraisal against the following:

- Transport Planning objectives
- Environment
- Safety
- Economy
- Integration
- Accessibility and Social Inclusion
- Cost to Government
- Risk and Uncertainty

1.3.5 Operational Business Case and Site Selection Considerations

To determine the operational business case for the suitably identified sites that were derived from the Detailed Appraisal an assessment of bus numbers and frequency has been undertaken. Options for operational savings have also been highlighted.

To support the operational business case further, the identified sites have also been considered under opportunities and deliverability criteria that have been specified by the Steering Group. These criteria are more specific than the objectives of the study but may be useful for the final decision making process for site selection in this case. The considerations that have been discussed feature public transport operational considerations that contribute to a successful Park & Ride transport intervention. The additional site considerations include:

- Opportunities for a bus priority route to Stirling from sites, that includes consideration of the complementary nature of the route to other public transport corridors to the South of the City; and the advantages/disadvantages of serving different markets en route.
- Opportunities for a bus and coach based Park & Ride, including consideration of appropriate operational functions of all of the Stirling Park & Ride sites
- Opportunities for a bus service to serve both the Park & Ride site and the potential Durieshill major growth area
- Deliverability – as per STAG – but also considering:
    - Demand forecasting (including consideration of abstraction from other bus and rail Park & Ride in the area) and the consequences this may have for when a viable Park & Ride site could be introduced
    - Sustainable design/construction and safety and security standards

1.3.6 Post Appraisal

To review the success of a potential Park & Ride sites will require reference to the original planning objectives of the project, once the site is operational. A series of monitoring and evaluation indicators have been presented to assist in determining if outcomes meet objectives.

2 PRE-APPRAISAL

2.1 Introduction

The Pre-Appraisal element of the *STAG* process aims to identify problems and opportunities with Transport Planning Objectives set to target the identified problems and opportunities. The Pre-Appraisal has developed a range of site options and sifted these using the developed objectives to ensure a manageable list of options is taken forward to the Initial Appraisal.

2.2 Policy Directives and Background Studies

The principle of a Park & Ride facility to be located to the south of Stirling has been accepted in a number of strategies which make reference to the study area and is supported by national planning policy. This section summarises the review of transport strategies and planning policy which has been undertaken as part of this study.

The following project reviews, strategies and policy documents have been reviewed as part of this Pre-Appraisal:

- *Strategic Transport Projects Review – Final Report (Transport Scotland, October 2009)* [2]
- *Tactran Regional Transport Strategy (Tactran, 2008)* [3]
- *Tactran Park & Ride Strategy and Action Plan (Tactran)* [4]
- *Clackmannanshire and Stirling Structure Plan (Stirling Council, March 2002)* [5]
- *Stirling Council Local Transport Strategy (Stirling Council, 2006)* [6]
- *Stirling Council City Transport Strategy – Transport for 2020 Stirling (Stirling Council)* [7]
- *Stirling Council Local Plan (Stirling Council, December 1999)* and *2nd Alteration (Stirling Council, October 2006)* [8]
- *Scottish Planning Policy (Scottish Government, February 2010)* [9]

A review of these documents has been undertaken and is summarised in the following sections with a detailed appraisal of the above documents included in Appendix B.

2.3 Objective Setting

Objective setting is a key stage in the *STAG* process. Objectives should express the outcomes sought in the study with consideration of the relevant established policy directives.

[2] http://www.transportscotland.gov.uk/files/documents/reports/j11260a/j11260a.pdf
[3] http://www.Tactran.gov.uk/documents/ Tactran RTS-FinalNov2008.pdf
[4] http://www.Tactran.gov.uk/documents/1ParkandRideStrategyFinal.pdf
[5] http://www.stirling.gov.uk/sp-2004.pdf
[6] http://www.stirling.gov.uk/stirling_local_transport_strategy.pdf
[7] http://www.stirling.gov.uk/stirling_city_transport_strategy.pdf
[8] http://www.stirling.gov.uk/index/services/planning/developmentplan/localplan.htm
[9] http://www.scotland.gov.uk/Resource/Doc/300760/0093908.pdf

2.3.1 Park & Ride Strategy Objectives

Tactran *Park & Ride Strategy* objectives have been set based on the following overarching Tactran *Regional Transport Strategy* objectives:

- Economy: To ensure transport helps to deliver regional prosperity
- Accessibility: Equity and Social Inclusion: To improve accessibility for all, particularly for those suffering from social exclusion
- Environment: To ensure that the transport system contributes to safeguarding the environment and promotes opportunities for improvement
- Health and Well-Being: To promote the health and well-being of communities
- Safety & Security: To improve the real and perceived safety and security of the transport network
- Integration: To improve integration, both within transport and between transport and other policy areas

The Park & Ride Strategy objectives are described as follows and have been used to develop a series of specific objectives for this study through consultation with the Steering Group:

Economy

1. To ensure that Park & Ride improves access to town/city centres and areas of employment, helping to support economic growth
2. To improve the efficiency and reliability of the transport system through reduced town and city centre traffic levels and associated economic costs

Accessibility

3. To improve access to health, leisure and retail facilities by Park & Ride
4. To improve the physical accessibility of the transport system through the provision of increased Park & Ride

Environment

5. To respect the built environment through reducing the need to build new town and city centre car parks

Health and Well-Being

6. To help limit/manage travel by private car in urban areas to help meet statutory air quality requirements in the Tactran area

Safety & Security

7. To provide the highest levels of safety and security of passengers and vehicles when using Park & Ride

Integration

8. To ensure Park & Ride facilitates integration and is accessible by all modes of transport
9. To ensure integration between land-use planning and provision of public transport

2.3.2 STPR Corridor Objectives

Corridor and Node objectives were developed for the STPR. The most relevant to South of Stirling are Corridor objectives for Corridor 9 Glasgow to Perth and Corridor 10 Edinburgh to Stirling.

Corridor objectives – 9 Glasgow to Perth:

- To address current and forecast rail overcrowding into Glasgow
- To improve the efficiency and reliability of the operation of the southern sections of the M80 on approach to Glasgow, particularly for priority vehicles
- To reduce the severity of accidents to the national average
- To promote journey time reductions, particularly by public transport, between the Central Belt and Aberdeen/Inverness primarily to allow business to achieve an effective working day when travelling between these centres

Corridor Objectives – 10 Edinburgh to Stirling:

- To improve access to Grangemouth port and freight hub
- To address shortfalls in the provision of public transport to and from Edinburgh and increase public transport modal share
- To promote continuing reduction in accident rates and severity rates across the strategic transport network
- To promote efficient and effective transport links to support the development and implementation of the proposed national developments at Grangemouth and Edinburgh Airport identified in the NPF2

The detailed appraisal of STPR Project 8 – Strategic Park & Ride/Park& Choose in Annex 2 of STPR Report 3 contains the following intervention description:

> *This intervention supports the objectives to make public transport more competitive against the car. Located on major commuting routes, these sites would also assist in maintaining and enhancing the labour catchment areas in the city regions and reducing emissions. It would deliver a series of strategic Park-&-Ride/Park-&-Choose sites using common branding/marketing across Scotland. The sites would be served by either rail services or express bus links to and from the city centres and areas of economic activity, including appropriate bus priority measures at congested locations. These would interface with existing urban bus priority systems. Proposed sites for this strategy include creation of new facilities: At Bannockburn, serving Edinburgh, Glasgow and Stirling*

There may be a number of other STPR projects, which will affect the South of Stirling Park & Ride including Project 15 Edinburgh to Glasgow Rail Improvements.

2.3.3 Study Objectives

The study objectives were developed in a workshop by the Steering Group in January 2010. The starting point for the establishment of objectives was the existing Tactran Park & Ride Strategy. Integral to the process of developing objectives was also the relevant STPR Corridor 9 Glasgow to Perth and STPR Corridor 10 Edinburgh to Stirling objectives.

The resulting South Stirling Park & Ride study objectives are:

1. To improve the efficiency and reliability of the south of Stirling transport system without significant adverse effect on existing Stirling Park & Ride sites
2. To improve local access to major health, employment, tourist, leisure and retail facilities in Stirling and its city centre by Park & Ride
3. To improve strategic access to Edinburgh and Glasgow by Park & Ride from the south of Stirling
4. To manage travel by private car and encourage a shift to sustainable and active travel modes to tackle issues of climate change
5. To minimise impact on the natural and built environment
6. To maximise integration between Stirling Council's Local Development Plan (LDP) and the provision of public transport

2.4 Strategic Transport Project Review Objectives

Given the additional linkage with Transport Scotland's STPR Park & Ride intervention Projects 8, an additional assessment against National and Corridor objectives has been undertaken. The matrix in Table 2.1 indicates that there is a correlation between national objectives, the STPR corridor objectives and the proposed study objectives.

Table 2.1 : National Objectives/Study Objectives Matrix

	South Stirling Park & Ride Study Objectives					
	Improve transport efficiency in Stirling	Improve access to local facilities	Improve strategic access to Edinburgh & Glasgow by Park & Ride	Manage sustainable travel & tackle climate change	Minimise impact on environment	Integration with Local Development Plan
National Objectives	1	2	3	4	5	6
NO1	✓		✓			
NO2			✓			
NO3			✓			
NO4			✓			
NO5			✓			✓
NO6			✓			
NO7				✓	✓	
NO8				✓	✓	
NO9				✓	✓	
NO10			✓			
NO11		✓	✓			
NO12	✓	✓	✓	✓		
NO13			✓	✓		
STPR Objective 9.1			✓			
STPR Objective 9.2			✓			
STPR Objective 10.2			✓			

National Objective 1:	To promote 'competitive' inter-urban journey times.
National Objective 2:	To reduce inter-urban journey time on public transport.
National Objective 3:	Promote journey time reduction on the trunk road network for prioritised vehicles and users (e.g. HOV, freight, bus) or provide improvements to journey time reliability.
National Objective 4:	To promote journey time reductions between the Central Belt and Aberdeen/Inverness primarily to allow business to achieve an effective working day between these centres. [Any impacts identified here are relevant to similar, location specific objectives at Aberdeen, Dundee, Edinburgh and Glasgow, and corridor objectives on national Corridors 9 and 14.]
National Objective 5:	Maximise the labour catchment area in city regions (favouring PT and HOVs and balancing with other policy measures that promote reduction in need to travel).
National Objective 6:	Support the development and implementation of the emerging national development interventions. [Any impacts identified here are relevant to similar, location specific objectives at Edinburgh and on national corridors 10, 13 and 14.]
National Objective 7:	Reduce CO2e emissions per person km.
National Objective 8:	Stabilise total CO2e emissions.
National Objective 9:	Reduce CO2e emissions in line with expectations from the emerging climate change bill.
National Objective 10:	To promote continuing reduction in accident rates and severity rates across the strategic transport network, supporting the work of the Strategic Road Safety Plan.
National Objective 11:	To promote seamless travel.
National Objective 12:	Improve the competitiveness of public transport relative to the car.
National Objective 13:	To improve overall perceptions of public transport.

In addition to the National Objectives, the Park & Ride would also positively contribute to the following selected urban network and corridor objectives:

- STPR Objective 9.1 (Glasgow to Perth): To address current and forecast rail overcrowding into Glasgow
- STPR Objective 9.2 (Glasgow to Perth): To improve the efficiency and reliability of the operation of the southern sections of the M80 on approach to Glasgow, particularly for priority vehicles
- STPR Objective 10.2 (Edinburgh to Stirling): To address shortfalls in the provision of public transport to and from Edinburgh and increase public transport modal share

2.5 Analysis of Baseline Conditions, Problems and Opportunities

2.5.1 Baseline Conditions

An analysis of baseline conditions, problems to be considered and opportunities to be taken advantage of has been undertaken as per *STAG* guidance.

For the baseline it was important to establish the current operation and market capture of existing Park & Ride sites and competing Stirling City Centre parking. It was also important to establish traffic flow characteristics, site access issues and environmental constraints.

In terms of opportunities, a good understanding of existing local bus and strategic coach operations has been essential.

2.5.2 Existing Park & Ride Sites

There are two existing Park & Ride sites in Stirling, namely:

- Springkerse
- Castleview

Figure 2.1 shows the location of the sites in relation to Stirling as a whole and their associated bus service route.

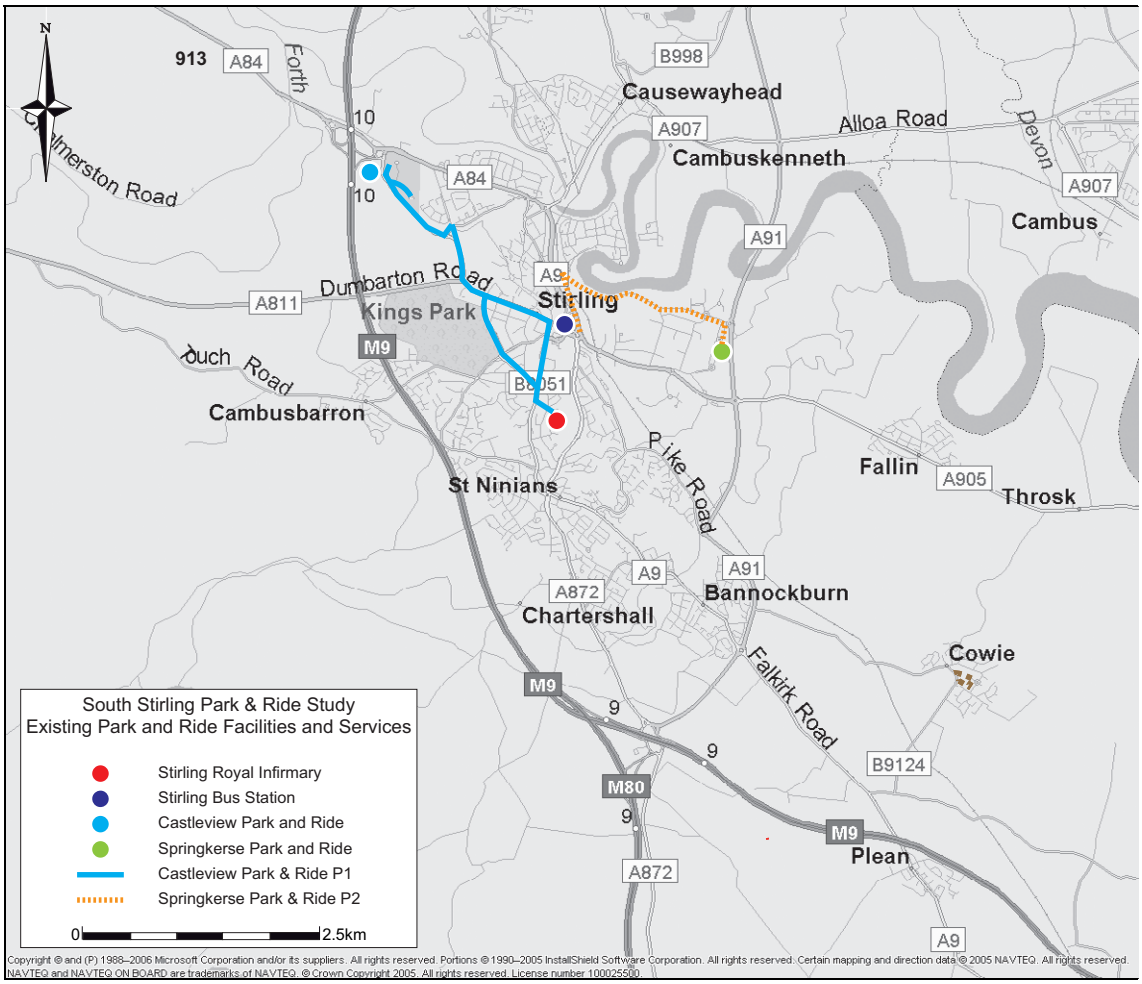

Figure 2.1 : Location Plan

2.5.3 Springkerse Park & Ride

Springkerse Park & Ride is located at the eastern edge of the city just inside the A91 at Springkerse Retail Park. The site has 205 car parking spaces and was opened in 2005. The parking provision is available in one car park of 150 car parking spaces and another adjacent car park of 55 spaces. Secure cycle lockers are also provided at the Park & Ride. The facility has an outside waiting shelter, public toilets and a small office that is manned throughout the day.

Figure 2.2 shows the form of Springkerse Park & Ride.

Figure 2.2 : Springkerse Park & Ride

The site connects to an established footway network. The site has a dedicated Park & Ride bus service running to Stirling Bus Station with the following intermediate stops:

- Morrisons
- Springkerse Retail Park
- Sports Village
- Springkerse Industrial Estate
- Forthside
- Abbey Road
- Rail Station
- City Centre
- Bus Station

Castleview Park & Ride

Castleview Park & Ride is located on the western edge of the city just off the M9 motorway interchange with the A84. The site has 200 car parking spaces and was opened in August 2008. The facility has a heated internal waiting area to high environmental standards with public toilets and a manned office, but does not connect to a footway network.

Figure 2.3 shows the form of Castleview Park & Ride.

Figure 2.3 : Castleview Park & Ride

The site has a dedicated Park & Ride bus service running to Stirling City Centre, Viewforth, Stirling Royal Infirmary and, from January 2010, Castle Business Park.

The parking and bus operating conditions at the two existing Park & Ride sites are the same. Car parking is provided free of charge with passengers charged for using the bus services. Table 2.2 summarises the charges which are applicable for users of both Park & Ride sites.

Table 2.2 : Park & Ride Charges

Ticket Type	Cost
Adult Single	£0.50
Adult Return	£1.00
Child Return	£0.50
Weekly	£4.80
4 Weekly	£17.50
12 Weekly	£48.00

A bus frequency of 12min is provided at both sites throughout the day. The Park & Ride services operate between 07:30 – 06.30 weekdays and Saturday. There are extended opening hours on Thursday, when the last bus leaves at 20.30.

Understanding the operation conditions of existing Park & Ride sites and the roles of their bus services will be essential for developing a business case for a new Park & Ride to the south of Stirling.

2.5.4 Existing Park & Ride Site Patronage

The Park & Ride sites have had a steady growth in patronage. Car entrance figures, shown in Figure 2.4 indicate that average use may now have stabilised at Springkerse with around 1,500 cars entering the site per week. Castleview has been established for less than 18 months and

looks to be still increasing in popularity, with the average use now being 1,000 cars entering per week. The annual average weekday traffic entering Springkerse for 2009 was 229 cars, on a Saturday the average was 328 cars. An annual average can not be relevant yet for Sprinkerse as patronage was growing during 2009, but daily vehicular attraction in January 2010 is shown in the profile assessment in Figure 2.5.

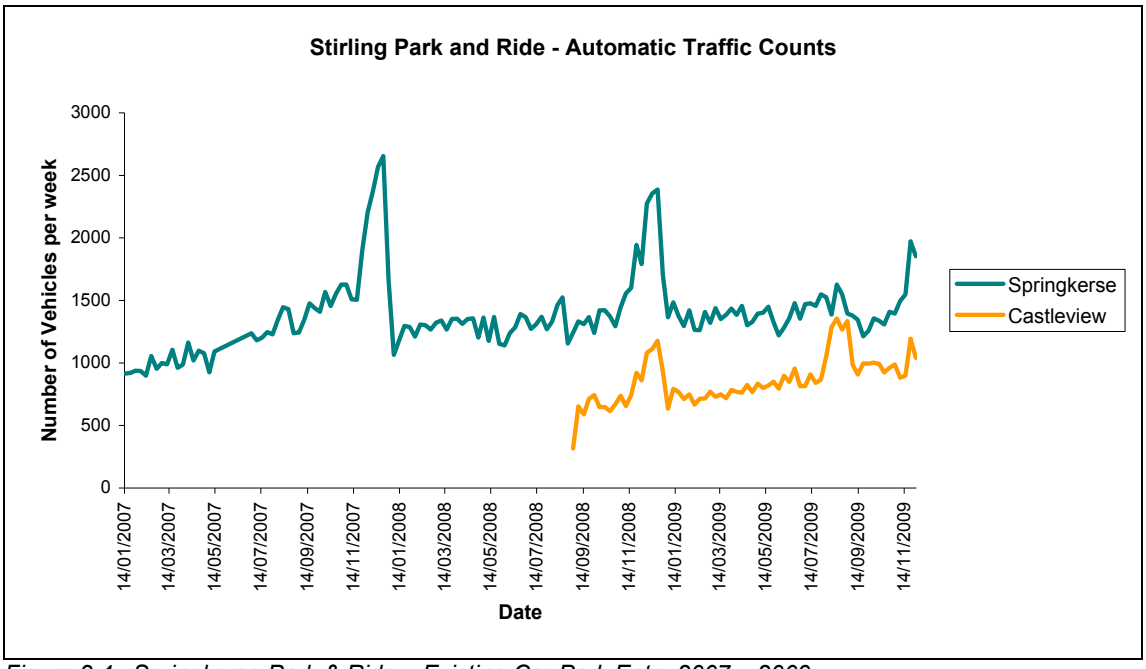

Figure 2.4 : Springkerse Park & Ride – Existing Car Park Entry 2007 – 2009

There are noticeable seasonal variations in the use of the Park & Ride sites. Both sites are very popular in the run up to the winter festive period from Mid-November through December, most probably due to shopping activity. Castleview also saw a peak in the summer months where an additional pilot bus service was provided for tourists by Historic Scotland to access Stirling Castle. The pilot increased the number of people using Castleview Park & Ride by approximately 1,000 passengers in August 2009. Due to the success of the pilot scheme it is hoped to repeat it in the summer of 2010.

Figures 2.5 and 2.6 show the arrival and departure profiles from traffic count data collected between 25 January – 6 February 2010 at the Springkerse and Castleview Park & Ride sites.

The average weekday vehicular arrivals attraction at Springkerse during this period was 189 cars and on a Saturday 291 cars. The average weekday vehicular attraction at Castleview was 147 cars and on a Saturday 125 cars. On review of traffic arriving before 09:00, the total weekday vehicular attraction at Springkerse was 31 cars and on a Saturday 29 cars. The total weekday vehicular attraction at Castleview was 20 cars and on a Saturday 8 cars.

The duration of stay reviewed from traffic surveys at both Park & Ride sites indicates that the majority of cars are parked for less than 4hr. On weekdays at Springkerse and Castleview approximately 70% of vehicles stayed for less than 4hr and 20% stayed for over 6hr. On Saturdays 80 - 90% of vehicles stayed for less than 4hr and 10 - 5% stayed for over 6hr.

A number of vehicles travelled in an out of the Park & Ride sites in under 10min (20 - 34% weekdays and (17 - 28%). Springkerse had the higher proportion of vehicles staying less than 10min. It is assumed that these vehicles were either dropping off passengers, using facilities at the Park & Ride or car sharing.

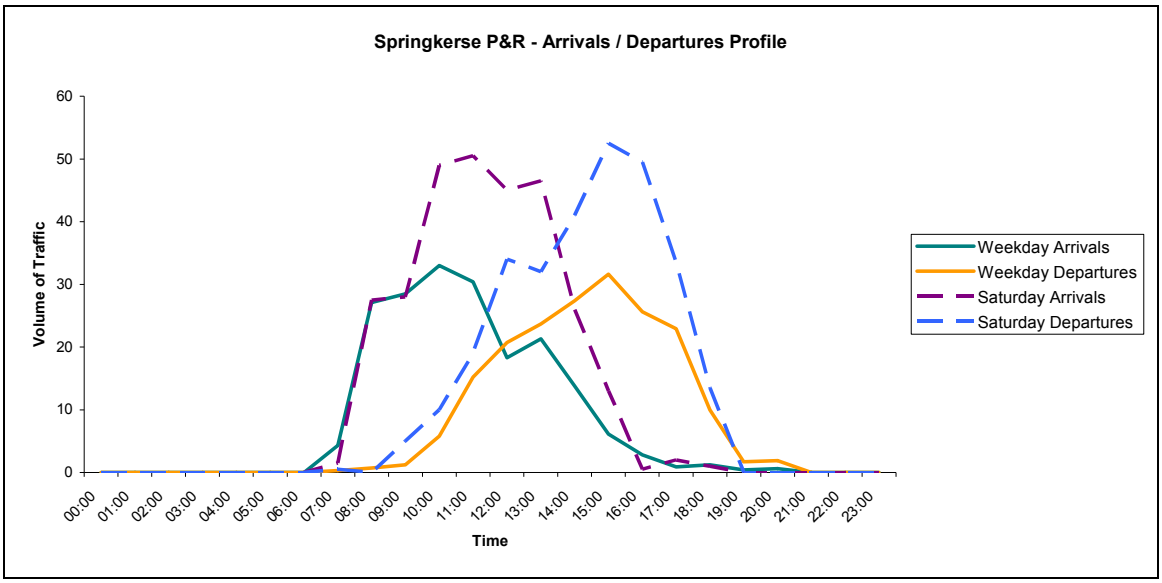

Figure 2.5 : Springkerse Park & Ride – Existing Car Park Arrival/Departure Profile

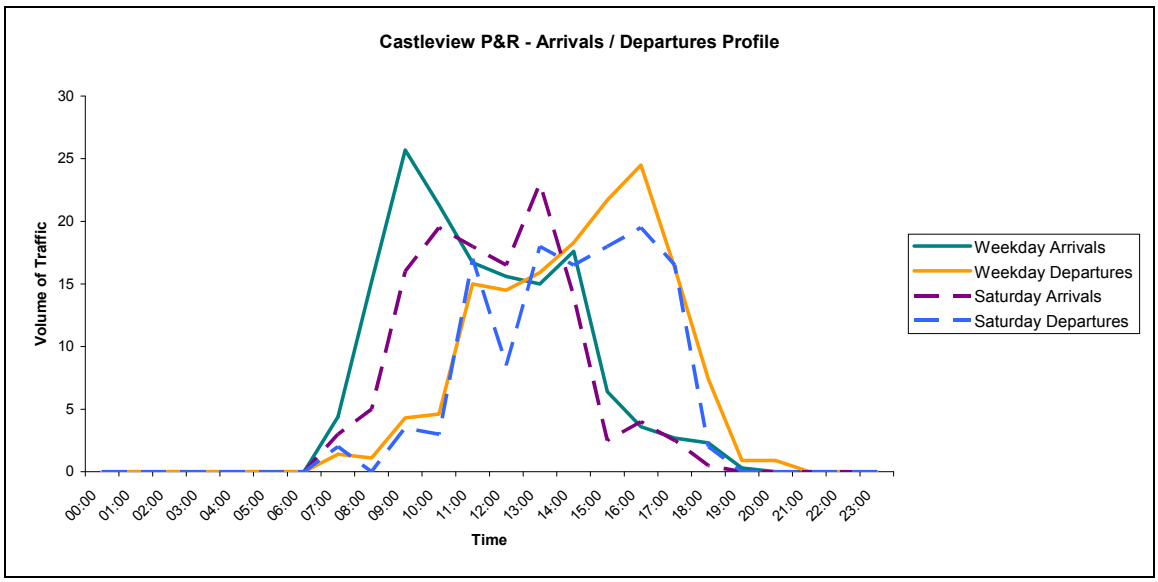

Figure 2.6 : Castleview Park & Ride – Existing Car Park Arrival/Departure Profile

The Springkerse site is shown to have a significant increase in its usage on a Saturday when compared to an average weekday of operation, whereas usage of the Castleview site appears to be similar. The peak period for arrivals to the Springkerse Park & Ride is reported to be between 09:00 – 11:00, which suggests that the facility is used by shoppers; whereas the peak period for arrivals to the Castleview Park & Ride is shown to be prior to 09:00, which suggests that it is used by commuters.

From the two week dataset, the peak period for departures for both sites is reported to be between 15:00 – 18:00 for both the average weekday and Saturday of operation.

Understanding existing profiles of existing Park & Ride sites in Stirling will enable the business case to be developed for a new Park & Ride and its associated bus services.

There are currently no reports from the Steering Group of the existing Park & Ride sites being over-capacity in terms of the car parks being full or buses being unable to accommodate the number of passengers wishing to use them. This has subsequently been confirmed by the bus operator Harlequin Coaches.

There is an existing agreement at Springkerse to allow overflow parking in the adjacent retail car park should it be required. There is no equivalent availability at Castleview, although there is land available for future expansion of the car park and the layout has been designed to facilitate expansion. It is understood that the Castle Business Park, located to the east of the Castleview Park & Ride, currently experiences issues with parking with on-site car parks operating at capacity. As of January 2010 the Park & Ride service now routes into the business park and there is potential for employees to park in the Park & Ride and either walk or use the bus service to access their place of employment. There has, however, been no evidence of this reported to date.

Initial inspection of passenger revenue figures for the dedicated Park & Ride bus services indicates that the buses are being used access into Stirling from the Park & Ride sites and operate as bus services in their own right from intermediate stops.

2.5.5 Existing Car Parking in Stirling City Centre

Stirling City Centre is subject to a Controlled Parking Zone (CPZ) where car parking is restricted. Stirling Council developed a *Parking Strategy* which was published in August 2005[10]. A primary objective of the Strategy confirmed that the Council would investigate how parking can support and promote Park & Ride. Special Consideration COS2 confirms that Stirling Council will:

Consider how alternative forms of parking provision can reduce the impact of traffic in the City Centre and how the Strategy can enhance accessibility to the City Centre through supporting:

- *Park & Ride at Springkerse and West of Stirling*
- *Park & Walk from Forthside*

Stirling City Centre Parking Review 2009/2010 [11] was published by Stirling Council in October 2009 to summarise a review of existing car park arrangements. The Review confirms that the following recommendation will adopted for consultation:

- Continue to promote and encourage the use of Park & Ride facilities as an alternative to parking in the City Centre

The Review confirms that Stirling Council 'currently manages a total of 1,551 on-street, and 2,058 off-street (car park) parking spaces within the City centre'.

Table 2.3 summarises a breakdown of the parking spaces managed by the Council.

[10] http://www.stirling.gov.uk/ps_part_1_assessm_t_frm_wk-4.pdf
[11] http://minutes.stirling.gov.uk/pdfs/scouncil/Reports/SC20091029Item18CityParking.pdf

Table 2.3 : Stirling City Centre Parking Provision (Council Operated)

On-street Parking		Off –street Parking	
Spaces by type	**No. of spaces**	**Car park**	**No. of Spaces**
Pay and Display	981	Goosecroft Road	135
Residents parking	512	Dalgleish Court	48
Disabled Parking	45	Wellgreen	36
Doctors' Parking	7	Burghmuir	176
Motorcycle	6	Linden Avenue	183
		Wellgreen Multi-Storey	530
		Forthside	600
		Viewforth (Saturday only)	350
Total	1,551	Total	2,058

The Review confirms that:

> *over the last 3 years, parking charges have been increased to support Council Transport Strategies and encourage the use of more sustainable transport, such as Park & Ride and public transport services; walking and cycling*

The Review goes on to confirm that:

> *Park & Ride is a key element in the management of parking in the City, and an important element of the City Transport Strategy in reducing the impact of traffic on the City area. The popularity of the Park & Ride services from Springkerse and Castleview are continuing to grow; with hassle free parking at the sites; high quality and frequent services; and good value for money when compared to parking in the City. The Castleview service has recently been extended to serve Stirling Royal Infirmary, and is to be extended further to serve the Castle Business Park to meet public demands.*

The Review proposes to rationalise current parking charges and adopt an area zoning system for the application of charges. A season ticket system will also be introduced at a number of city car parks. The Review suggests implementing the proposed parking arrangements in early Summer 2010 and Appendix C provides an indication of the location of the proposed car parking zones and the parking charges and maximum duration of stay which are to be associated with the parking areas. The proposed charges have been adopted for forecast testing in this study.

The policy of charging for car parking where it is in high demand, such as in the centre of Stirling, is consistent with the best practice principles for an integrated transport strategy that includes Park & Ride facilities. Car parking at the Park & Ride sites is free of charge and readily available; this makes the sites parking attractive to those seeking to access the city centre by car from their origin.

2.5.6 Privately Operated Car Parks in Stirling

In addition to publicly operated car parks in Stirling there is a comparable level of privately operated car parks.

Table 2.4 confirms the availability of these car parks.

Table 2.4 : Privately Operated Car Parks in Stirling

Car Park	Number of Spaces	Charges as of 23 December 2009
Marches	950	£1 for 1st hour Additional 50p for each hour after £8.50 for 7 hours or more
Thistles	385	£1 for 1st hour Additional 50p for each hour after £8.50 for 7 hours or more
Stirling Rail Station (pay and display – to south of Station)	276	£3.50/day £9/week £25/month £75 3months £125/year
Stirling Rail Station (permits – to north of station)	Included in above	£25/month £75 3months £125/year
Maxwell Place (Europark)	50	£1.35/hour £2.55/2hours £3.55/3hours £4.55/5hours £6.05 for over 5hours
Total Number of Spaces	**1,661**	

Stirling Council has no control over these commercially operated car parks. Wellgreen (NCP) is owned by the Council, but operated by NCP.

2.5.7 Existing Radial Route Traffic Flow Characteristics

A brief review of peak hour traffic flows in the Stirling area was undertaken to assess, at the most basic level, the potential from routes from the south to provide a source of potential patronage for a Park & Ride site. At the best performing Park & Ride sites up to 20% of traffic flow abstraction from a corridor can be expected as stated in Tactran's *Best Practice Guide*.

> *There are a number of ways in which the demand for Park & Ride can be estimated but as a general rule an average well located and well designed site is able to attract as much as 20% of the traffic travelling into a town/city centre.* [12]

In the am peak hour 08:00 – 09:00 a weekday survey undertaken for Stirling Council in June 2008 recorded that one way traffic flow towards the City Centre were:

- A905 Kerse Road westbound 750vehs
- A84 Millennium Way south-eastbound 800vehs
- A872 Glasgow Road northbound (inside A91) 930vehs
- A9 Bannockburn Road northbound (inside A91) 450vehs

The A905 Kerse Road is associated with the Springkerse Park & Ride site. The A84 Millennium Way is associated with the Castleview Park & Ride site. The A872 Glasgow Road and A9 Bannockburn Road are associated with the corridor for a new Park & Ride site to the south of Stirling.

[12] http://www.Tactran.gov.uk/documents/3BestPracticeReviewFinal3004.pdf

This preliminary review shows that the A872 corridor has a similar volume of peak hour traffic to routes corresponding to existing Park & Ride sites. In a basic sense the A872 exhibits potential necessary demand for a Park & Ride site of similar type to existing Park & Ride facilities in Stirling, and the A9 less so.

2.5.8 Park & Ride Site Access Issues

A successful Park & Ride site should be accessible by car and by bus. To ensure sustainable and social access to a Park & Ride facility walking and cycling links should also be provided.

With regard to the search area for a Park & Ride in the south of Stirling the following issues are noted:

- Pedestrian routes in the Pirnhall area south of the A91 are currently poor as principal roads and motorways cause severance
- Pedestrian and cycle facilities are currently limited in the vicinity of the potential Park & Ride sites in the south of Stirling, however, infrastructure improvements will be a pre-requisite of any new development in the area
- Local bus routes use A872 Glasgow Road and A9 Bannockburn Road
- Strategic express coach routes use the A872 Glasgow Road
- Strategic express coaches current route passed Stirling on the M9
- Light traffic and goods traffic from the south and south-east to Stirling route via the M9/M80/A872/A91 Pirnhall Interchange
- Rail stations are remote from the area

2.5.9 Topography Issues

The selection of potential sites requires a number of engineering elements to be taken into consideration.

Preference would be for the site to be reasonably level and with little exposure to the weather. Natural barriers such as embankments, escarpments, cuttings, rivers, burns, wetlands, etc. also need to be considered during the course of the study.

In addition to natural barriers, the site selection process will also have to consider man-made barriers such as motorways, local roads, railway lines, canals, quarries, structures, etc. These are easily identifiable, however, hidden items such as underground services for communications, water, gas, power, etc, can be more difficult to identify.

A large element that can influence a potential site is ground conditions, especially in this area where coal mining has taken place with the repercussions of this on the surface stability. Elements also to recognise are contaminated land, soil makeup and flood risk. These elements can also influence drainage design for the site and potentially increase costs for any sustainable drainage systems that would be required.

2.6 Environmental Conditions

2.6.1 Study Area

A study area for the collation of baseline environmental information was identified and this encompasses the alternative Park & Ride locations from the Tactran *Park & Ride Strategy* being considered and the surrounding area. The study area covered is approximately a 2km radius from Pirnhall Interchange as shown in Figure 2.7.

2.6.2 Existing Baseline/Desk Study

Existing information on the current baseline environmental conditions in the area defined peviously has been gathered through a literature search including the current *Stirling Council Local Plan (December 1999*) and Scottish national and regional archaeological and architectural datasets (via PASTMAP website).

In addition consultations are to be progressed as part of the initial appraisal with the following organisations, the purpose of which is to obtain any additional environmental baseline data and also to gather initial comments on the proposed Park & Ride facility and the options being considered. Responses from this consultation exercise will be fed into the initial appraisal of options. The consultees list was agreed with the Steering Group to be proportionate to the study.

2.6.3 Consultees

Environmental Consultees List:

- Historic Scotland
- Scottish Environment Protection Agency
- Scottish Natural Heritage
- Scottish Government - relevant environmental departments
- Stirling Council - planning, biodiversity, archaeology, access and environmental health
- Scottish Wildlife Trust
- Scottish Badgers

Only the main issues raised during the desk study have been identified at this stage to assist with the identification of problems and objectives. A more detailed baseline study of the other *STAG* topics[13] will be provided as part of the initial appraisal of options.

2.7 Environmental Constraints Plan

Information obtained from the desk study has been reviewed and key environmental aspects, and potential constraints to development, summarised in Figure 2.7.

13 Transport Scotland (April 2009), *STAG* Technical Database Section 7 Environment.

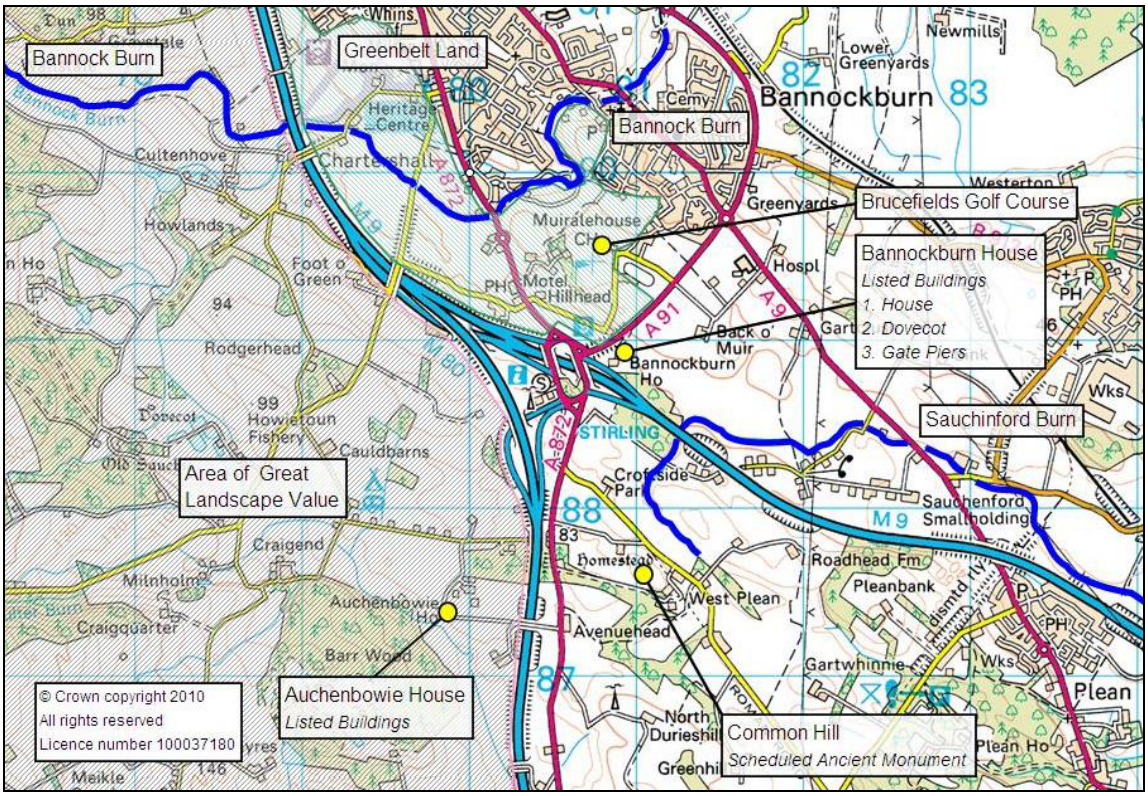

Figure 2.7 : Environmental Constraints
(Figure developed by Scotland Transerv)

2.8 Biodiversity and Habitats

There are no European or National designated sites of ecological importance (i.e. SAC, SPA, Site of Special Scientific Interest (SSSI)) in the study area.

With respect to non-statutory designated sites, the Scottish Wildlife Trust will be consulted to confirm the presence of any local Wildlife Sites in the study area. No such sites are identified in the Stirling Local Plan, nor are any other regional or local nature conservation sites in the study area listed in the Local Plan.

There are several areas of woodland in the study area, including: Bannockburn Wood in the east, Corse Hill and other scattered woodland copses in the west, and Auchenbowie Wood in the south. At this stage it has not been confirmed whether any of these woodlands constitute ancient, long-established or semi-natural woodland, however, this will be established through consultation with Scottish Natural Heritage (SNH).

Consultation with SNH and other local wildlife groups will provide any protected species records within the study area. Otter may be present on watercourses including the Bannock Burn and the Sauchenford Burn. The otter is a European Protected Species and the *Habitat Regulations 1994 and Conservation (Natural Habitats & co.). Regulations 1994* apply to any proposals which may affect them, resulting in the need for a European licence.

It is also likely that badgers are present in the study area, and again this will be clarified through consultation with the local badger group and, potentially, a focussed site visit once Park & Ride location options have been refined.

The great crested newt is also a European Protected Species and may be present where suitable aquatic and terrestrial habitats exist in the study area, and this will be established through consultation and site visits, once the Park & Ride location options have been refined.

The study area is expected to provide habitat to bird species, particularly during the breeding season. Areas of woodland and scrub and other habitat including hedgerows, wetland and low intensity grazing land, are all of value to farmland/woodland birds.

No other information on protected species that may be present is currently available at this time, but consultations undertaken as part of the detailed appraisal, will identify any species that need to be considered as relevant to the study area.

2.8.1 Cultural Heritage

There is only one recorded Scheduled Ancient Monument (SAM) in the study area. This SAM, Common Hill homestead (Roman outpost), lies to the north-west of West Plean, approximately 1km southeast of Junction 9. SAMs are nationally important sites and monuments that are legally protected under the *Ancient Monuments and Archaeological Areas Act 1979*. Permission from the Scottish Ministers must be obtained for any works that would affect such sites – this is referred to as Scheduled Monument Consent.

It is essential that the development does not impact adversely on the potential Inventory Area for the Battle of Bannockburn, which will be identified by Historic Scotland later this year (2010) as a draft for consultation.

There are also several Listed Buildings situated within the study area:

- Bannockburn House just east of M9 Junction 9
  This site includes a number of Listed Buildings:
  - Bannockburn House, Category A
  - Gatepiers, Bannockburn House, Category B
  - Dovecot, Bannockburn House, Category B
- Auchenbowie House approx. 1.5km southwest of M9 Junction 9
  Comprises:
  - Auchenbowie House, Category A
  - Sundial – Auchenbowie House, Category B.

Listed buildings are those buildings of special architectural or historic interest that help enrich cultural history. The list of buildings in Scotland is aimed at safeguarding the built heritage and promoting its understanding and is compiled and maintained by Historic Scotland on behalf of the Scottish Ministers, in accordance with the *Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997*. The listings are divided into three categories (A, B and C(S)) based on different levels of interest or importance.

There are several other sites noted on Sites and Monuments Record for the study area such as seven sites in the motorway service area triangle and a few noted sites immediately southeast of M9 Junction 9. Many of the sites relate to features recorded over time which may not necessarily pose significant constraints to development, but should be avoided if possible. A confirmed list of sites and their value will be obtained from Stirling Council Archaeology Department.

2.8.2 Landscape

The study area does not contain any Designed Landscapes or Gardens, although the area to west of the M80 is noted in the Local Plan as an Area of Great Landscape Value, within which there is a:

> *presumption against development with the exception of those required in relation to farming, forestry and appropriate tourist and recreation activities. Other developments may be permitted when their particular locational requirements cannot be satisfied elsewhere. All development will be subject to strict control over siting, design and landscape treatment.*

The Local Plan also defines land to the north-west of Bannockburn as Greenbelt, where there is a presumption against non-essential development. Areas of Greenbelt aim to prevent the coalescence of settlements, to protect landscape settings and to protect heritage features of national and/or regional importance.

2.8.3 Visual Amenity

There are a range of receptors that may be sensitive to changes in visual amenity resulting from development. Key receptors in the study area noted at this stage include:

- Residential receptors, including properties on the edge of Bannockburn; Croftside Park to south; Hillhead and Croftside Farm to north; Bannockburn House and Back o'Muir to east; and other individual farmsteads
- Pirn Hall Inn and the Travelodge situated to north of M9 Junction 9
- Brucefields Family Golf Centre to the north-east of M9 Junction 9.
- Corbiewood Greyhound Track is also located to the north-east of M9 Junction 9

Receptors will be more clearly defined during the Initial Appraisal of options.

2.8.4 Noise and Vibration

Stirling Council will be consulted with regard to the provision of any baseline noise monitoring and this aspect will be considered further as part of the initial appraisal of options.

2.8.5 Global and Local Air Quality

As part of its obligations under the Local Air Quality Management process Stirling Council regularly review and assess air quality at a number of sites within the Council area against national air quality objectives. Where exceedance are considered likely, the local authority must then declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP). The closest air quality monitoring site to the Park & Ride study area is Main Street, Plean (in the south-east of the study area). The results indicate that the NO_2 and PM_{10} air quality objectives were met during 2008 at all monitoring locations and no AQMA's were declared. It would, however, be expected that sites which are located in the vicinity of the M9/M80 interchange will record higher emissions than the air quality monitoring site in Plean.

No other baseline information has been obtained at this stage with regard to baseline air quality, although any available data will be sought from Stirling Council and this aspect considered further as part of the initial appraisal of options.

2.8.6 Water Quality, Drainage and Flood Defence

The main watercourses in the study area are the Bannock Burn and the Sauchenford Burn although there are likely to be other smaller unnamed tributaries and ditches present. Any available water quality data will be obtained from SEPA, together with confirmation of the status of watercourses in terms of the Water Framework Directive. Review of interactive maps provided on SEPA's website indicate that the Bannock Burn is currently classed as Poor status and, further west, as Bad ecological potential (heavily modified). The Bannock Burn is also designated as a salmonid water under the Freshwater Fish Directive. The Sauchenford Burn is a small watercourse and appears not to be classified under the Water Framework Directive.

2.8.7 Contaminated Land

Consultation with Stirling Council and the Coal Authority will aim to identify and appraise areas of contaminated land within the study area.

2.9 Key Environmental issues

From the desk study carried out to date, no environmental problems have been identified in the study area. Potential constraints to development of a Park & Ride facility have however been identified with regard to landscape, visual amenity and cultural heritage.

Landscape
Some Park & Ride option locations may be within Greenbelt land and the progression of these sites will require further discussion with Stirling Council.

Visual Amenity
Some Park & Ride option locations may be within the vicinity of several potentially sensitive receptors sites which may constrain development of the facility to varying degrees. Sensitive receptors include being close to Pirn Hall and the Travelodge hotel; residential properties on the edge of Bannockburn, the Brucefields golf course and the greyhound and harness racing track at Corbiewood. Receptors will be more clearly defined and issues considered further as the appraisal process moves forward.

Cultural Heritage
Cultural heritage features (of possible local/regional value) may potentially be impacted upon by any development at the Park & Ride site option locations. Constraints will be determined more precisely once consultation information is available as part of the initial appraisal of options.

The potential constraints outlined above will be considered further once details of options are confirmed and as part of the initial option appraisal process. For the other *STAG* environmental topics, further investigation and consultation will identify whether there are any other constraints that need to be taken into account, for example ecological issues.

2.10 Risks

There are a number of risks identified by the Steering Group that should be borne in mind within the feasibility study, these include:

- Uncertainty over the final LDP
- Uncertainty over the long term function of Stirling Royal Infirmary

- Medium term capacity issues at Pirnhall roundabout
- Potential difficulties with bus priority

2.11 Opportunities for Consideration

2.11.1 General

There are a number of opportunities to consider in the study area regarding bus and coach services, new health services, lorry parking and the forthcoming Stirling LDP.

2.11.2 Utilisation of existing Park & Ride bus routes/services

There is some potential to utilise existing Park & Ride dedicated bus services to serve a site to the south of Stirling.

The Castleview Park & Ride bus already extends as far south as Stirling Royal Infirmary. The operational issues with extending the service to serve any new site thus creating a route going between the two sites via the city centre, will be discussed in Initial Appraisal stages of the project and with operators.

2.11.3 Utilisation of existing bus routes/services

Existing bus service routes are shown in Figure 2.8. Existing strategic express services are shown in Figure 2.9.

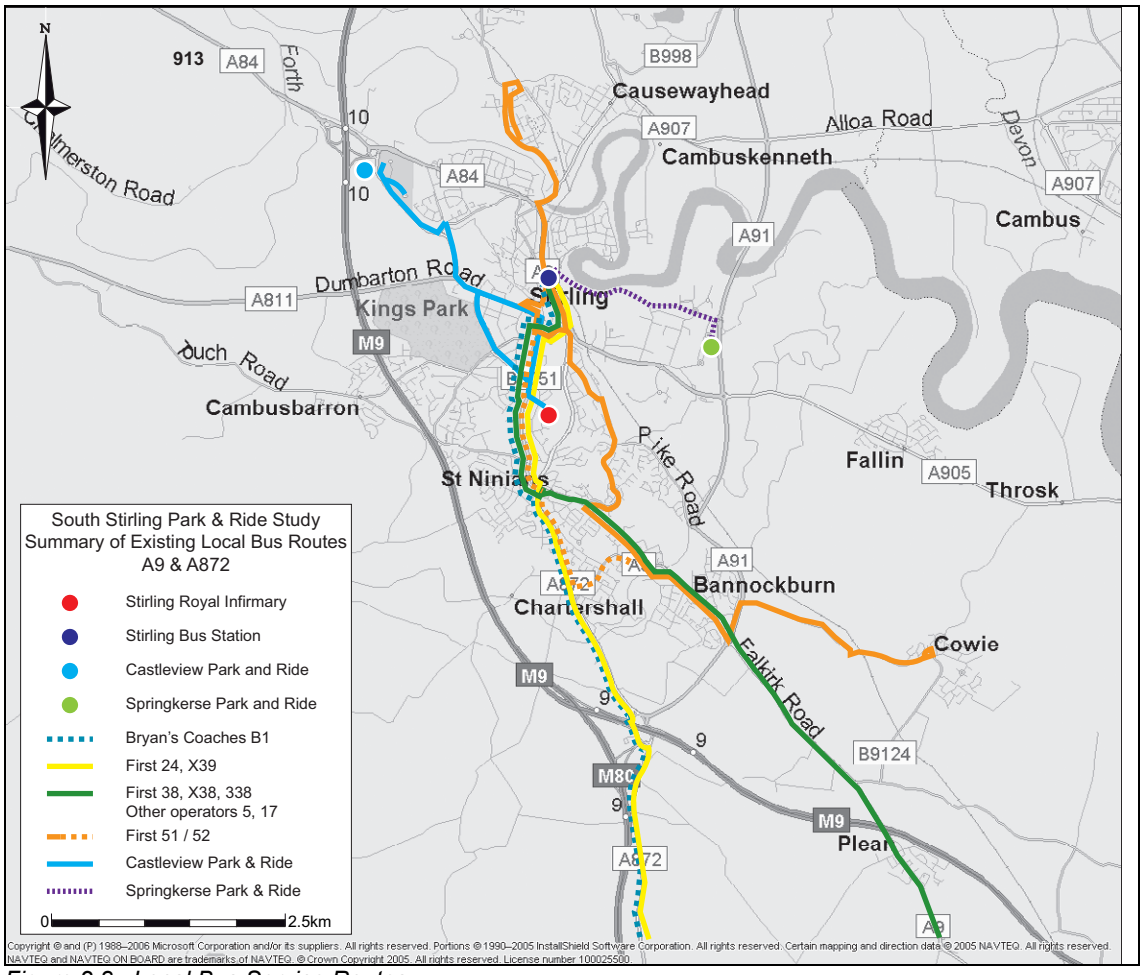

Figure 2.8 : Local Bus Service Routes

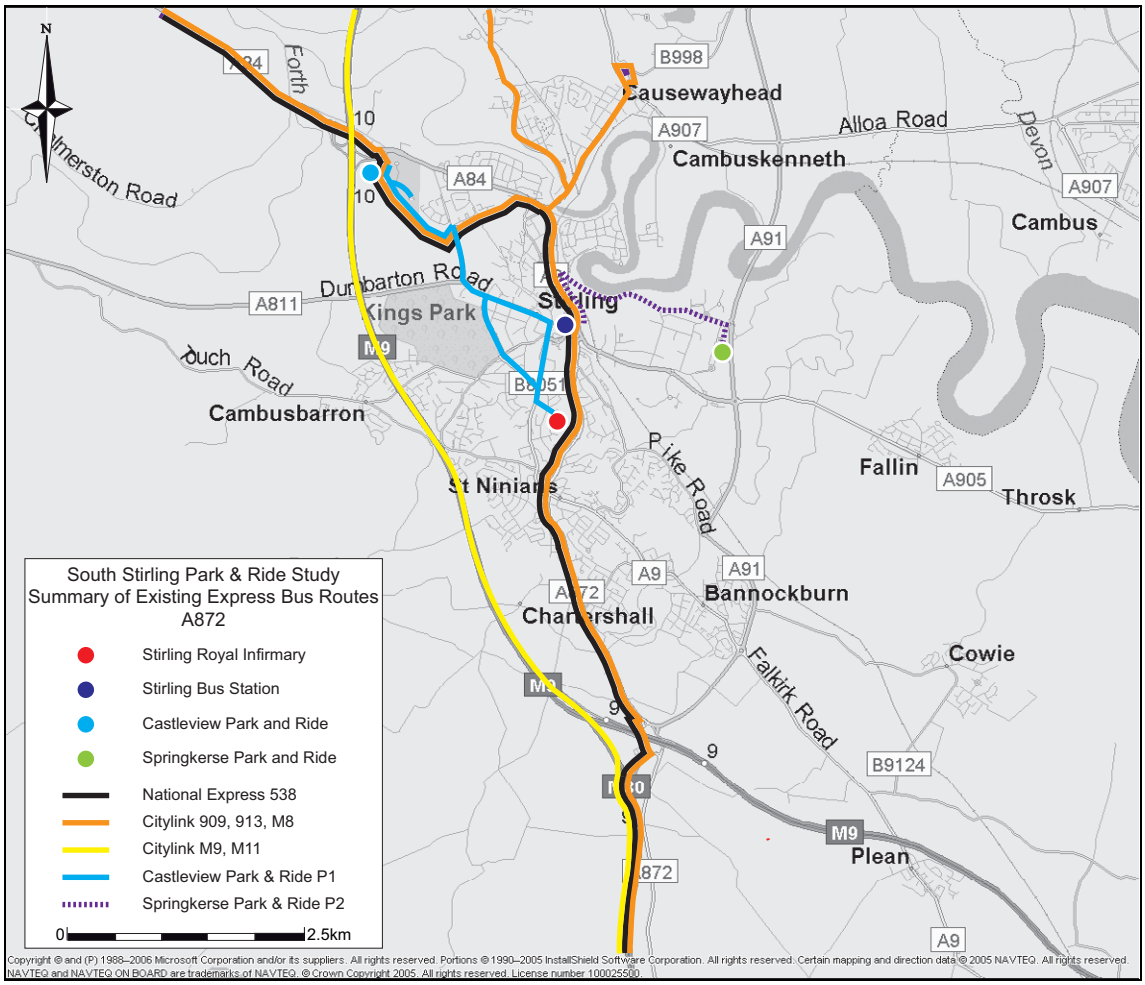

Figure 2.9 : Strategic Coach Service Express Routes

Details of the service frequencies are shown in Table 2.5 and Table 2.6 provide a summary of the number of buses which operate on the A9 and A872 corridors.

Table 2.5 : Bus Service Details

Service Operates Between	Service Number	Operator	Typical Frequencies (min) (Mon-Fri / Sat / Sun)
Local / Fare Stage Services			
Denny - Stirling (Via St Ninians)	B1	Bryans Coaches	60 / - / -
Plean - Stirling	5	Hamliton	60 / - / -
Plean - Bannockburn - Stirling - Stirling University	17	Mitchells Coaches	60 / 60 / -
Fallin - Stirling	55	Ferguson Mini Bus	30 / 30 -
Cambusbarron / Stirling - Falkirk (Via Fallin)	16	First	60 / 60 / 120
Glasgow - Stirling (Via Denny)	24	First	60 / 60 / -
Balfron - Stirling (Via Cambusbarron)	32	First	120 / 2 per day / -
Cowie - Stirling - Cornton (Via Braehead)	51	First	30 / 30 / 60
Cowie - Stirling - Cornton (Via Whins of Milton)	52	First	30 / 30 / 60
Whins of Milton - Stirling - Stirling University	53	First	30 / 30 / -
Bannockburn - Stirling - Fallin	56	First	60 (until 1500) / 60 (until 1600) / -
St Ninians - Stirling - Raploch	57	First	20 / 20 / 60
Stirling - Larbert (Via Forth Valley College)	338	First	1 Service / - / -
Plean - Fallin - Stirling	C34	Hunters	2 per day / - / -
Stirling (Royal Infirmary) - Callander	C49/C59	Morrison Travel	2 per day / 2 per day / 120
Stirling - Tillicoultry - Kinross	69	Wave	- / - / 2 per day
Castleview P&R - Stirling Royal Infirmary	Castleview Circular	Harlequin Coaches	12 / 12 / -
Springkerse P&R - Stirling Bus Station	Springkerse Line	Harlequin Coaches	12 / 12 / -
Strategic / Express Services			
Edinburgh - Stirling - University - Dunblane	909	Citylink	60 / 60 / -
Edinburgh - Stirling - Fort William	913	Citylink	4 per day / 4 per day / 4 per day
Glasgow - Stirling - Aberdeen	M8	Citylink	60 / 60 / 120
Glasgow - Perth - Dundee - Aberdeen	M9 / M11	Citylink	60 / 60 / 120
Stirling - Edinburgh (Via Bannockburn)	38	First	20 / 20 / 60
Stirling - Edinburgh (Via Kirkliston & Bridgend)	X38	First	1 Service / - / -
Stirling - Glasgow (Via Cumbernauld - M80)	X39	First	60 / 60 / 60
Glasgow - Stirling	X39	First	60 / 60 / 60
Glasgow - Stirling - Inverness	538	National Express	2 per day / 2 per day / 2 per day

Table 2.6 : Summary of Service Frequencies by Route Corridor

Service Corridor	Services Operating on Corridor	Average Service Frequency (buses per hour) Weekday	Saturday	Sunday
A9 (To south-east of A91)	5,17,38/X38	5	4	1
A872 (To north of Pirnhall)	B1,24,909,M8,X39	5	4	2
A872 (To south of Pirnhall)	B1,24,X39	3	2	1

The summary in Table 2.6 confirms that both service corridors are currently served by bus services which operate with a frequency of 3 – 5 buses per hour Monday – Friday. Express bus services enable the A872 to be served by an increased level of frequency to the north of the Pirnhall interchange when compared to the A872 to the south of the interchange. Service provision is shown to be reduced on a Sunday on both service corridors.

The A872 has irregular hourly bus services making up the average frequency value, whereas the A9 has a regular 20min frequency bus service. The A9 has a bus service that only operates during University term time, and when removed from the above service summary, the A9 corridor is shown to be served by 4 buses per hour in university holidays.

While it is considered that existing bus services could be utilised to serve a future Park & Ride there are potential issues with relying on existing services to service the Park & Ride. Peak hour bus services could be operating at or close to capacity with the result that passengers are unable to board from the proposed Park & Ride. Furthermore, passengers boarding bus services at the proposed Park & Ride could prevent existing passengers from boarding city centre bound services.

It is also suggested that a commercial service will offer a less attractive option than a dedicated Park & Ride services, as it will serve a greater number of bus stops and it is possible they may charge an increased level of tariff when compared to a Park & ride service supported by Stirling Council.

The use of services which currently route along the A9 corridor is unlikely to attract residents who currently live adjacent to the A9 to use the proposed Park & Ride.

The operational issues with using existing local fare stage services and strategic express services to serve any new site will be discussed in Initial Appraisal stages of the project in Section 3.

2.11.4 New Hospital – NHS Forth Valley, New Acute Hospital Larbert

A new acute hospital being built at Larbert by NHS Forth Valley. The building phase was largely complete by the end of 2009. The hospital will be delivered in three phases and the first patients will be seen in the hospital in the summer of 2010; the last phase will be complete within a year (summer 2011).

A *Transport Assessment*[14] is available for the new hospital and identifies buses between Stirling and Falkirk, which suggests that the A9 would provide the most direct access by public transport.

[14] http://www.nhsforthvalley.com/web/files/Healthcare_Strategy_files/Transport_Assessment_untagged.pdf

A Travel Plan is currently being developed for the site and Forth Valley NHS has been consulted as part of this study.

2.11.5 Lorry Parking

As part of Stirling Council's Local Transport Strategy there is a medium term action to "explore the feasibility of additional lorry parking on Stirling City outskirts utilising Park & Ride sites". The Steering Group have stated that Corbiewood currently has around 12 goods vehicles parked overnight. Lorry parking is being considered only in terms of additional cost and design in this study.

2.11.6 Traffic Flows

The Pre-Appraisal has included a preliminary review of traffic flows on key arterial routes, as shown in Section 2.5. From this review there does appear to be potential for establishing a Park & Ride site in the corridor to the south of Stirling, as peak hour traffic is at least as great as the flows associated with existing sites currently in use. Questionnaire surveys has been undertaken as part of the study to determine if any people using routes from the south currently use the existing Park & Ride sites and will be detailed in subsequent parts of the study.

Survey data confirms that 20% of passengers, who use the Springkerse Park & Ride on a weekday arrive from the south, via the M80, M9 and A872 with 27% of Saturday passengers reported to arrive from the south. The Castleview Park & Ride is recorded to generate a minimal proportion of passengers who arrive from the south (4% on a weekday and 0% on a Saturday). The data confirms that abstraction of Park & Ride users from Springkerse, who have travelled from the south, should be considered in the study. It also confirms that, although there may be some abstraction from Springkerse, the majority of existing Park & Ride users originate from areas other than the south and so impacts are likely to be seen, but those impacts are not expected to be substantial enough to render Springkerse an ineffective Park & Ride operation.

2.11.7 Local Development Plan (LDP)

The Stirling LDP is currently being developed by Stirling Council. A Main Issues Report is due to be published in May 2010 with the LDP currently planned for adoption in December 2012. Expressions of interest for the undeveloped areas to the south of Stirling are high. A Draft Main Issues Report was available from April 2010.

The area south of the M9 and east of the A872 is currently zoned for the Durieshill Major Growth Area, a development of up to 2,500 houses. The status of this development requires confirmation from Stirling Council planning department as the LDP develops.

2.11.8 Travel Plan linkages

There are opportunities to link Park & Ride sites to health, major employer and tourism travel plans, not only for access to bus based Park & Ride facilities, but also as bases for car sharing.

2.11.9 Carbon Reduction

In general terms there are opportunities to reduce tail pipe carbon emissions by removing cars from congested networks and replacing this travel by public transport that is more carbon efficient per person. This has been quantified as part of the detailed assessment. On longer distance trips from Stirling to Edinburgh and Glasgow there is also potential to reduce tail pipe carbon emissions.

2.12 Option Generation, Sifting and Development

2.12.1 Future Year Scenarios

STAG guidance confirms that options generated for a transport intervention must be tested against a Do-Minimum scenario going on to confirm that it may also be useful to develop a Reference Case against which interventions can be appraised. *STAG* defines the Do-Minimum scenarios as follows:

> *Do-Minimum – The options generated must be appraised against a Do-minimum option that includes transport improvement commitments that have policy and funding approval and from which it would be difficult to withdraw.*

The existing Stirling S-Paramics models are to be used to inform this study and assess traffic conditions for the following base and future year scenarios:

- 2008 Base
- 2012 Future Year Do-Minimum

The 2008 Base models have been used to validate logit models which will be used for forecasting purposes.

For the purpose of this study, it is proposed to appraise the developed options against a Do-Minimum scenario (2012) that includes transport commitments in the Stirling area that have policy and funding approval from which it would be difficult to withdraw. A reference case could also have been reviewed that includes as yet uncommitted transport schemes and development. This was not developed as growth assumptions were subsequently agreed to relate to Scottish Government Land-Use and Transport Integration in Scotland (LATIS) data. To coincide with the future year scenarios which have been appraised in the Stirling S-Paramics model, the proposed Park & Ride has been assumed to be operational by 2012.

The following scenario descriptions provide an indication of the status of the development/intervention, in brackets, at the time of the Study, January 2010.

2.12.2 Do-Minimum

It is proposed that the Do-Minimum 2008 committed scenario includes the following:

- Queens Road Improvement Scheme (Complete)
- Auction Mart Relocation (Complete)
- Drip Road Reopening (Complete)
- Clackmannanshire Bridge opening (Complete)
- Castleview Park & Ride (Complete)
- Goosecroft Road/Station Road Phase 1 (Complete)
- St Modans High School relocation (Complete)

The Do-Minimum 2012 committed scenario includes a 2012 Do-Minimum infrastructure network description, as follows:

- Millhall Roundabout Upgrade (Complete)
- A905 (Kerse Road) Toucan Crossing (Complete)

- Weaver Row Signals (Complete)
- Glasgow Road Improvements (Borestone Roundabout is retained, signals proposals are dormant and other elements are reflected in the model)
- Kings Knott Roundabout Upgrade (Complete)
- A91 Greenyards Improvement (Yet to be implemented)

A 2012 trip matrices of future developments would be:

- PPP Schools and Associated Housing (Ongoing)
- Raploch Regeneration (Ongoing)
- Forthside Offices, Hotel and Housing (Ongoing)
- Stirling Sports Village (Complete)

2.13 Option Generation

2.13.1 Best Practice

The Tactran Park & Ride Strategy suggests that local Park & Ride sites are best located on settlement boundaries. If too close to town, the traffic can be caught in congestion. If too far away, longer bus travel times and higher bus running costs can give a perception of lower convenience. This information was borne in mind when selecting sites for a preliminary 'long list' of site location options.

2.13.2 Long List Option Generation

A 'Long List' of ten sites was developed from existing studies and through the Pre-Appraisal Steering Group workshop discussion, as per *STAG* guidance. The description of these sites and their origins is shown below.

Sites originating from the Tactran *Park & Ride Strategy*, May 2008 are:

- S1 – A91 Corbiewood Stadium (former Park & Ride use)
- S2 – A872 Glasgow Road/Pirnhall
- S3 – M9/A872 Southeast of Pirnhall (Durieshill)

These sites (S1,S2,S3) had been included as they had been previously identified as possibilities within the Park & Ride Strategy and were considered suitable for inclusion on the option generation list.

Sites originating from the Extended *Tay Estuary Rail Study (Tactran, March 2009)*[15] are:

- Bannockburn Rail Station TERS Site 1
- Bannockburn Rail Station TERS Site 2 (Stirling Local Plan site)
- Bannockburn Rail Station TERS Site 3 (original station site)

[15] http://www.tactran.gov.uk/documents/ExtendedTERSSTAGTypeReportV3_0final.pdf

These sites (TERS1,TERS2,TERS3) had been included as they had been previously identified as possibilities within the Tay Estuary Rail Study and were considered suitable for inclusion on the first pass option generation list.

Sites originating from the Steering Group are:

- Other 1 – East of A872 Glasgow Road
- Other 2 – A9 South of the A91
- Other 3 – South of A91 between A872 and A9
- Other 4 – West of Pirnhall Moto Service Station

These sites (Other 1, 2, 3, 4) had been included further to a workshop with the Steering Group. These sites were generated in light of the emergence of STPR Project 8 Strategic Park & Ride/Park & Choose at Bannockburn serving Stirling, Edinburgh and Glasgow that had not been published at the time of the development of the Tactran Park & Ride Strategy.

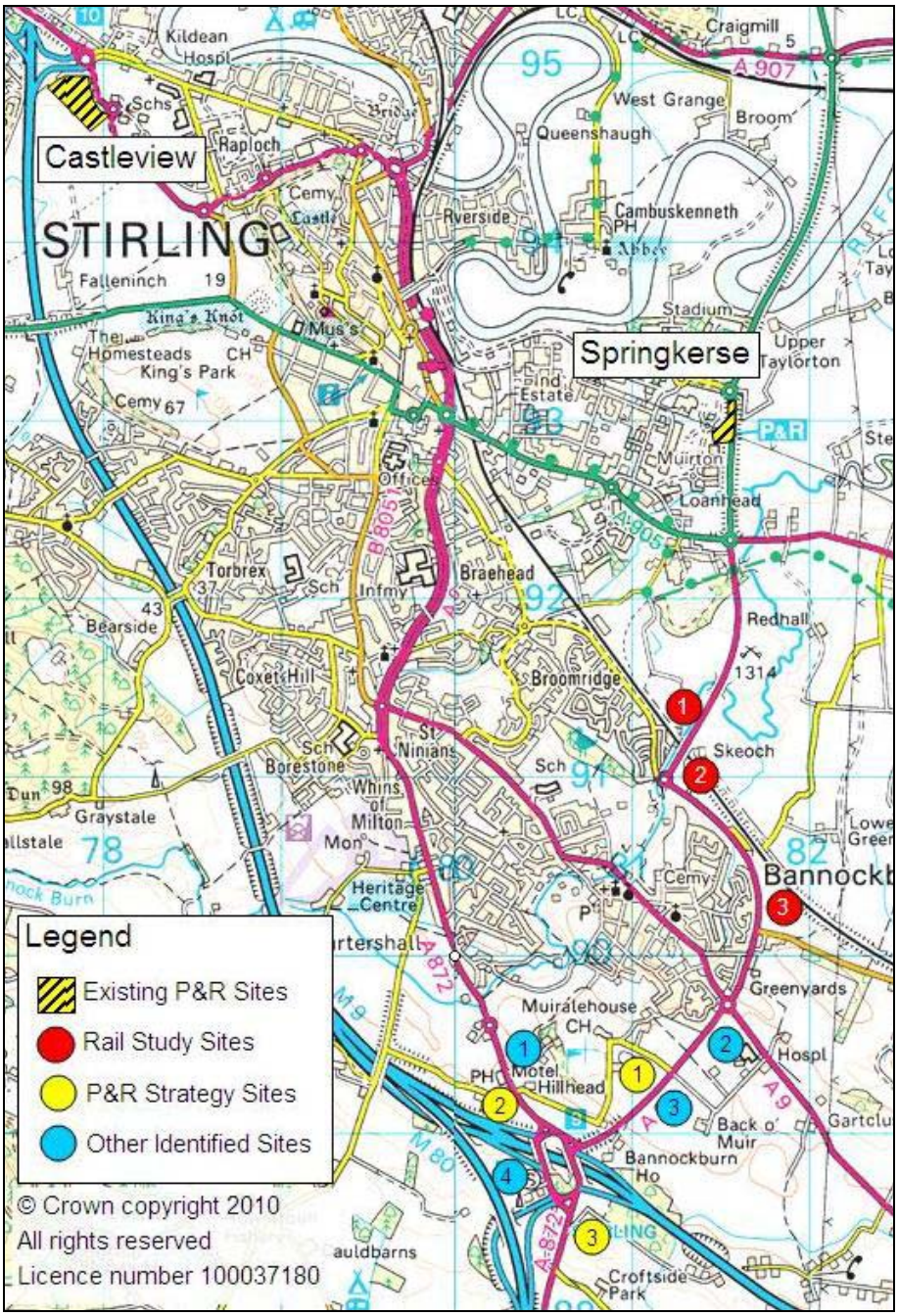

Figure 2.10 : Option Generation 'Long List' of potential sites
(Figure developed by Scotland Transerv)

2.14 Sifting

2.14.1 Sifting Criteria

In accordance with *STAG* guidance the 'long list' of sites was sifted against potential relevance to study objectives to enable a manageable number of sites to be investigated in initial appraisal.

STAG sets out the following guidance which should be adopted when undertaking an initial Sift of developed options:

2.3.17 The Option Sifting process should be undertaken when an unmanageably large number of options have been generated or where there is general consensus that a particular option or options generated will clearly not achieve the intended objectives or meet the identified transport problems and/or opportunities.

2.3.18 There are a number of ways in which options can be sifted and practitioners should agree the approach with stakeholders (and, where appropriate, decision makers).

2.3.19 At this stage it is essential to document why options have been recommended for Part 1 Appraisal or why they have been sifted out prior to Part 1 Appraisal.

Table 2.7 illustrates the process of sifting the long list of generated options against the study objectives. The Tactran *Park & Ride Strategy* objectives S1,S2 and S3 all have good potential to tie in with study objectives.

Table 2.7 : Potential for sites to meet objectives

Ref.	Description	Objectives 1	2	3	4	5	6	Comments	Initial Appraisal
S1	A91 Corbiewood Stadium	✓	✓	✓	✓	✓	✓	Potential	Yes
S2	West of A872 Glasgow Road	✓	✓	✓	✓	✓	✓	Potential	Yes
S3	M9/A872 South East Pimhall	✓	✓	✓	✓	✓	✓	Potential	Yes
TERS 1	Rail Study North Site	x	✓	x	✓	✓	x	Too close to existing Springkerse P&R, poor strategic access, limited support to new development	No
TERS 2	Local Plan Bannockburn Rail Station	x	✓	x	✓	✓	x	Too close to existing Springkerse P&R, poor strategic access, limited support to new development	No
TERS 3	Original Bannockburn Rail Station	x	✓	x	✓	✓	x	Too close to existing Springkerse P&R, poor strategic access, limited support to new development	No
Other 1	East of A872 Glasgow Road	✓	✓	✓	✓	✓	✓	Potential	Yes
Other 2	A9 South of the A91	✓	✓	x	✓	✓	✓	Not close to strategic express bus route	Yes
Other 3	South of A91 between A872 and A9	✓	✓	✓	✓	✓	✓	Potential	Yes
Other 4	West of Prinhall Service Station	✓	✓	✓	✓	✓	✓	Potential	Yes

Objectives Key:

1	To improve the efficiency and reliability of the south of Stirling transport system without significant adverse effect on existing Stirling P&R sites.
2	To improve local access to major health, employment, tourist, leisure and retail facilities in Stirling and its city centre by Park & Ride
3	To improve strategic access to Edinburgh and Glasgow by Park & Ride from the south of Stirling
4	To manage travel by private car and encourage a shift to sustainable and active travel modes to tackle issues of climate change
5	To minimise impact on the natural and built environment
6	To maximise integration between Stirling Council's Local Development Plan and provision of public transport

Sifting Key:

✓	Potential to meet objectives
x	Limited potential to meet objectives

The Pre-Appraisal of the site options is summarised in the following sections.

2.14.2 Site S1 – Retain for further appraisal

This site emerged as a potential site in the Tactran *Park & Ride Strategy*. The site is shown to have potential to meet all six study objectives and was considered suitable for initial appraisal to accommodate a future Park & Ride facility.

2.14.3 Site S2 - Retain for further appraisal

This site option also originates from the Tactran *Park & Ride Strategy*. The site is shown to have potential to meet all six study objectives and was considered suitable for initial appraisal to accommodate a future Park & Ride facility.

2.14.4 Site S3 – Retain for further appraisal

This site emerged as a potential site in the Tactran *Park & Ride Strategy*. The site is shown to have potential to meet all six study objectives and is considered suitable for initial appraisal to accommodate a future Park & Ride facility. The site has also been identified as a potential site for a Park & Ride/rail halt to serve the Durieshill MGA in indicative developer Masterplans.

2.14.5 TERS Sites (1 – 3) – Reject Options

The TERS site options have been developed as part of the *Tay Estuary Rail Study*. The sites have been rejected at this stage as the Steering Group considers the sites to be located too far from the M9 to enable express bus services to serve the sites. The sites were also considered to be located too close to the existing Park & Ride at Springkerse and have the potential to abstract users of the existing Park & Ride. TERS1, TERS2 and TERS3 would provide limited support to new development. It should also be noted that the implementability of these sites as a joint new rail station are now in question further to recent Edinburgh – Glasgow Improvements Programme (EGIP) rail studies as highlighted by Transport Scotland as part of the Steering Group, that indicated that a rail halt at Bannockburn was undesirable. There are no plans for a new rail station at Bannockburn in the STPR government investment programme for rail.

There is also a question of the role of a bus based Park & Ride at Bannockburn that may replace rail on this corridor and require a need for additional transfer, both of which are not objectives of this study.

2.14.6 Site Other 1 – Retain for further appraisal

This site option east of the A872 and north-east of the Pirnhall Interchange, has been identified as a potential option by this study's Steering Group. A current Planning Application has been lodged for a business park to be accommodated on the site *(APP Ref. 07/00277/DET)* [16], but is not currently being determined. The site is shown to have potential to meet all six study objectives and is considered to have potential to accommodate a future Park & Ride facility, subject to further investigation.

2.14.7 Site Other 2 – Retain for further appraisal

This site option has been identified by the Steering Group. The site is located adjacent to the A9 south of the A91 and so on a commuter route. It is unlikely to meet Objective 3, due to its relatively remote location in relation to the strategic road network (M9 and M80). Although it was not appraised to address Study Objective 3 it is proposed to retain the site for further investigation informed by public transport operator consultations.

2.14.8 Site Other 3 – Retain for further appraisal

This site option, located opposite Corbiewood, has been identified as a potential option by the Steering Group. The site has been included to provide an alternative to Site S1. The site is

[16] http://planpub.stirling.gov.uk/publicaccess/

shown to have potential to meet all six study objectives and is considered to have potential to accommodate a future Park & Ride facility.

2.14.9 Site Other 4 – Retain for further appraisal

This site option, located to the west of the Pirnhall Service Station, has been identified as a potential option by the Steering Group. The site can currently be accessed from the M9/M80 interchange and there is a live Planning Application lodged with Stirling Council for a business park to be constructed on the site. The site is shown to have potential to meet all six study objectives and is considered to have some potential to accommodate a future Park & Ride facility.

The resulting remaining sites available for initial appraisal are detailed in Table 2.8.

Table 2.8 : Sites To Take forward to Initial Appraisal

Ref.	Description	Study Reference No.
S1	A91 Corbiewood Stadium	1
S2	West of A872 Glasgow Road	5
S3	M9/A872 South East Pimhall	3
Other 1	East of A872 Glasgow Road	6
Other 2	South of A91 and west of A9	7
Other 3	South of A91 between A872 and A9	2
Other 4	West of Pimhall Service Station	4

2.15 Option Development

Further to the sifting process a list of seven sites were then available for initial appraisal. The location of the sites was indicative, but the area of the sites has been developed to give an indication of potential land take including car parking, bus turning facilities, landscaping and Sustainable Urban Drainage Systems (SUDS) features. The indicative site locations are shown in Figure 2.10.

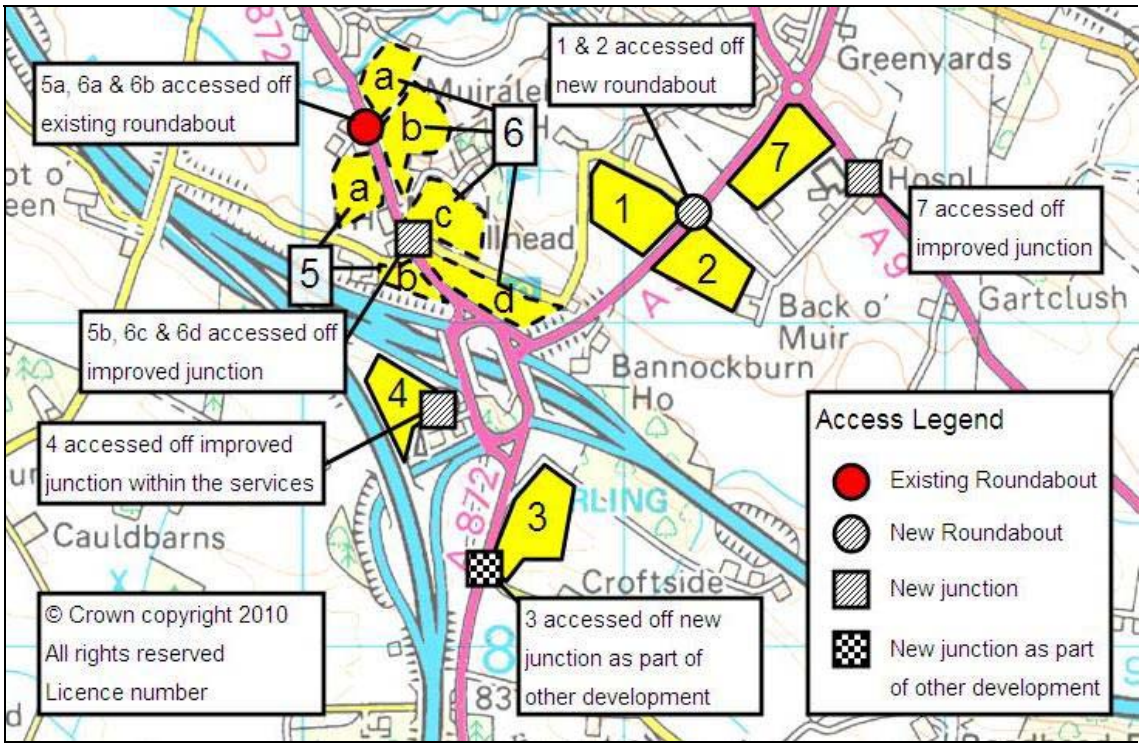

Figure 2.11 : Developed sites for Initial appraisal
(Figure developed by Scotland Transerv)

2.16 Conclusion

The Pre-Appraisal study process has collated an evidence base of information, taken cognisance of local and national objectives and developed a series of site options for a Park & Ride to the south of Stirling.

The next stage of the study will initially appraise the selected sites against the study objectives, implementability and *STAG* criteria. The Initial Appraisal is described in Section 3.

3 INITIAL APPRAISAL

3.1 Introduction

The Initial Appraisal is used to verify the suitability of options which have emerged as part of the Pre-Appraisal and accept or reject options for Detailed Appraisal. The developed options are checked against their suitability to meet Transport Planning Objectives, *STAG* Criteria and established policy directives. The feasibility, affordability and likely public acceptability of options has been appraised in accordance with *STAG* to support the Initial Appraisal. Public transport and environmental consultations were undertaken on the sites.

The Pre-Appraisal highlighted the following sites as being suitable for further appraisal:

- Site 1 – A91 Corbiewood Stadium
- Site 2 – South of A91 between A872 and A9
- Site 3 – M9/A872 South East Pirnhall
- Site 4 – West of Pirnhall Service Station
- Site 5 – West of A872 Glasgow Road
- Site 6 – East of A872 Glasgow Road
- Site 7 – A9 South of A91 and West of A9

In addition to the sites listed, consultation with Stirling Council Environmental and Planning stakeholders has resulted in the following additional site being developed for appraisal as part of this study, due to its more sympathetic impact on the landscape than Site 5:

- Site 8 – East of A872 Glasgow Road (east of Site 6)

Public transport operators were not re-consulted on Site 8, as it was directly adjacent to Site 6c and their opinions on that site had already been gathered. The site is slightly more remote from the A872 Glasgow Road than Site 6c and is likely to be slightly less attractive to public transport operators based on their existing comments.

3.2 Initial Appraisal

The eight options under consideration for Initial Appraisal are shown in Figure 3.1.

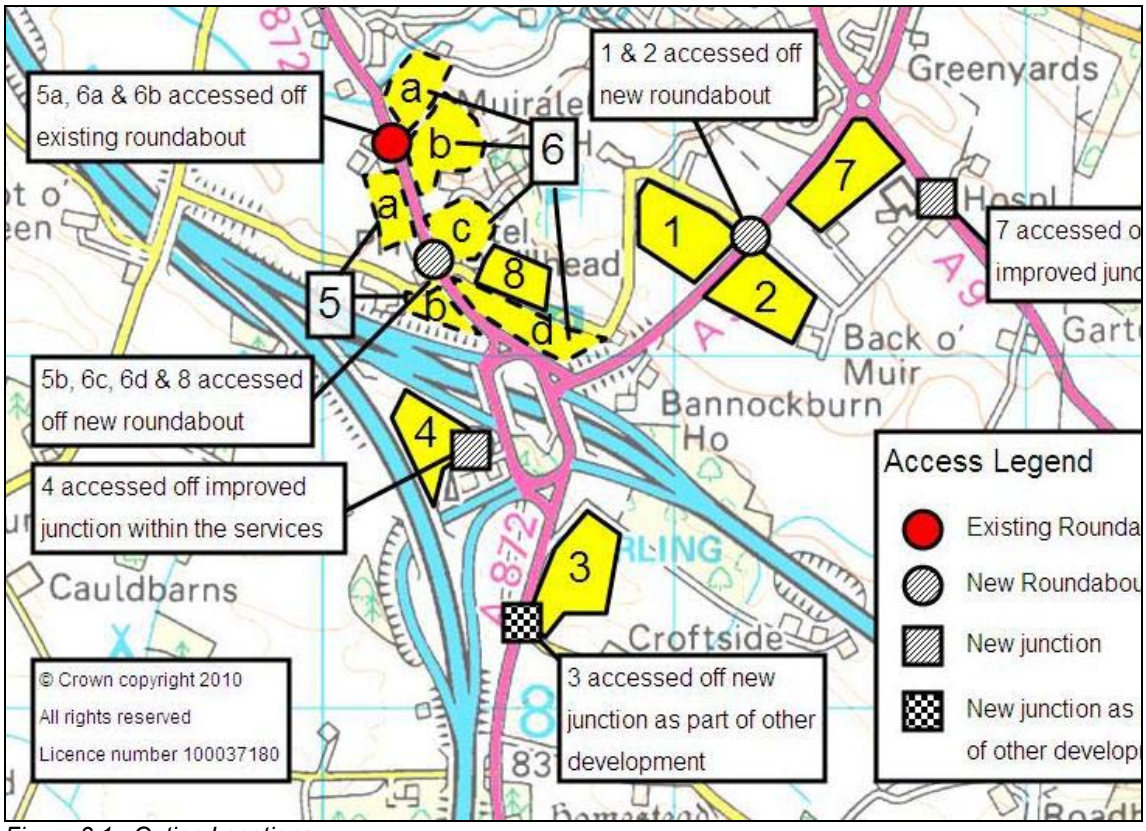

Figure 3.1 : Option Locations
(Figure produced by Scotland Transerv)

The site areas for Site 5 and Site 6 were demarcated into smaller areas during the final stages of Pre-Appraisal to better represent the land take of a Park & Ride site, with ancillary landscaping and Sustainable Urban Drainage (SUDS) features, to assist with consultation discussions. Site 5 has an area '5a' to the north and '5b' to the south. Site 6 has four distinct areas running from '6a', '6b', '6c' and '6d' from north to south on the east side of the A872. An indication of potential access arrangements are given in Figure 3.1, but these will be further refined as part of the detailed stage of the *STAG* Appraisal.

A summary of the Initial Appraisal is presented in *STAG* Appraisal Summary Tables (ASTs) as specified by *STAG*. The AST Tables are included in Appendix F.1.

3.3 Background Information

3.3.1 Introduction

The following sections provide geographic, social and economic background information on the areas within which the site options are located. A number of the site options are located within close proximity of each other and this is reflected by the similarity in the reported statistical data. A summary of the Detailed Appraisal is presented in *STAG* Appraisal Summary Tables (ASTs) as specified by *STAG*.

Where appropriate, data is recorded for individual sites.

3.3.2 Geographic Context

Site 1 – Corbiewood

The site is located at the Corbiewood Racing Track, north of the A91 midway between the A872 and A9. Access would be taken from the A91, for consistency purposes, along the route this has been assumed to be a roundabout junction replacing the existing priority junction.

The built and natural environment largely comprises a Brownfield site, but the southern boundary of Site 1 extends into Green Belt. Locally trees/hedgerows, grassland in the racing track compound and a small group of buildings associated with the racing track are present.

Site 2 – Back o'Muir

The site is located in land south of the A91 midway between the A872 and A9. Access would be taken from the A91, for consistency purposes, along the route this has been assumed to be a roundabout junction replacing the existing priority junction.

The built and natural environment comprises gently sloping improved grassland to the west of Back o' Muir farm. Locally ditches/patchy hedgerows and a few trees occur along the existing field boundaries.

Site 3 – Durrieshill

The site is located at the north end of the proposed Durieshill Development, midway between the A872 and the M9 in the southeast quadrant of Pirnhall Interchange. Access would be taken from the A872 with a roundabout that would also serve as access to the Durieshill development.

The built and natural environment comprises sloping improved grassland (consultation indicates this was under cereal cropping during 2009). Locally, patchy hedgerows and a few trees occur along existing field boundaries, with an area of deciduous woodland present adjacent to the southern corner of the site.

Site 4 – Pirnhall Service Station

The site is located at the rear of Pirnhall Service Station, between the M80 and M9. Access would be taken from the Pirnhall Service station access road that has an arm onto the Pirnhall roundabout.

Site allocated for commercial business development and subject to a current planning application. The site comprises an area of species-rich unimproved neutral grassland, adjacent to which is located the motorway service area facilities and petrol station. Scottish Wildlife Trust has made comment on the Planning Application due to the habitats present.

Site 5 – A872 West

The site is located north of the A91 and west of the A872. Access to Site 5a could be via the existing Milton roundabout on the A872 Glasgow Road/Ogilvie business area. Access to Site 5b would be via an improved A872/Pirnhall Road junction.

Sites 5a and 5b are currently within the Green Belt land, but under consideration as part of the LDP for commercial/business development. The built and natural environment comprises improved grassland fields with surrounding scattered farmsteads. Locally, hedgerows/trees

define the boundaries of part of Site 5a and the majority of Site 5b, with a linear strip of woodland present along the southern boundary of Site 5b providing a buffer between the site and the M9.

Site 6 – A872 East

The site is located east of the A872 and north of the A91. Access to Sites 6a and 6b would be via the existing Milton roundabout on the A872 Glasgow Road/Ogilvie business area. Access to Site 6c and 6d would be via an improved A872/Pirnhall Road junction.

All Site options (a, b, c and d) are within Green Belt land. The built and natural environment comprises improved grassland fields with surrounding scattered farmsteads. Locally, hedgerows/trees define the sections of the boundaries of Sites 6a, 6b and 6d, with a more substantial area of woodland present along the southeast boundary of Site 6d.

Site 7 – A9

The site is located on the A9 south of the A91. Access to Site 7 would be via the existing hospital access on the A9 due to junction spacing, a new access junction on the A91 principal distributor route would be undesirable between Corbiewood and the A9 Falkirk Road.

The built and natural environment comprises gently sloping improved grassland with local field boundary features to east, north and south and the hospital site to the south.

Site 8 – A872 East (Hillhead)

The site is located east of the A872 and north of the A91. Access to Site 8 would be via an improved A872/Pirnhall Road junction with a new access road.

The built and natural environment comprises improved grassland field with surrounding scattered farmsteads. Locally, trees and shrubs associated with the edge of the Brucefields Golf Centre bound part of the eastern edge of the site.

3.3.3 Social Context

Introduction

The *Scottish Index of Multiple Deprivation (SIMD) 2009*[17] provides details on an area's demographics including a relative ranking of an area's deprivation based on 38 indicators across 7 domains including: income, employment, health, education, skills and training, housing, geographic access and crime.

The Scottish Government calculate a Geographic Access Domain (GAD) rank[18] based on the accessibility of an area by both car and public transport, to a range of services including; GP surgeries, primary schools, secondary schools, retail centres, post office and petrol stations.

Scotland is divided into 6,505 output areas based on defined data zones. Data zones are groups of Census output areas with populations of between 500 – 1,000 residents. Each zone is allocated an SIMD rank and a GAD rank. The higher the SIMD Rank, the less deprived it is assumed to be. The higher the GAD rank, the more accessible it is.

[17] http://simd.scotland.gov.uk/Stirling
[18] http://simd.scotland.gov.uk/Stirling

Scottish Census OnLine (SCROL) 2001 Census data[19] has been interrogated to extract additional data on the areas within which the site options are located. Demographic data with regard to the proportion of the population who are economically active (*SCROL* Table KS09a – Economic Activity – All People Aged 16 – 74) and the proportion of households without access to a car (*SCROL* Table CAS059 – Accommodation type and car or van availability by number of people aged 17 or over in the household) has been extracted to inform the Part 1 Appraisal.

Demographic Indicators

The eight site areas are covered by the following two Datazones:

- Datazone S01006076, located in the Sauchenford area (east side of study area):
  - Site 1 – Corbiewood
  - Site 2 – Back o'Muir
  - Site 7 – A9
- Datazone S01006079, located in the Bannockburn area (west side of study area):
  - Site 3 – Durieshill
  - Site 4 – Pirnhall Service Station
  - Site 5 – A872 West
  - Site 6 – A872 East
  - Site 8 – A872 East (Hillhead)

Datazone S01006076 covers an area which is predominantly rural in nature and located to the south-east of the A91 on the A9 corridor. The zone also extends to the north-west of the A91 although the area remains rural in nature. The datazone forms the eastern boundary of Datazone S01006079.

Datazone S01006079 covers an area which is also predominantly rural in nature and extends from Chartershall to the north to the Falkirk Council boundary to the south. The area includes a section of the M9 and M80 motorways and the interchange between the motorways at Pirnhall.

Table 3.1 summarise the demographics of Datazone S01006076 which contain Sites 1,2 and 7.

Table 3.1 : Demographics for Datazone S01006076

Indicator	Site Value	Average Scotland Value
2009 Scottish Index of Multiple Deprivation Rank	1,531	3,253
Geographic Access Domain Rank	3,080	3,253
Economically Active Population (aged 16 – 74)	76.9%	83.1%
Proportion of Households Without Access to a Car	33.6%	34.2%

The data, shown in Table 3.1, suggests that Sites 1,2 and 7 will be located in an area which is assessed to be in the 25% most deprived areas in Scotland (SIMD Rank). The area is shown to generate an average score in terms of access to local facilities (GAD Rank).

[19] http://www.scrol.gov.uk/scrol/common/home.jsp

The area is shown to be slightly lower than the Scottish average when appraised in terms of the proportion of the population who are economically active and the proportion of households who do not have access to a car.

Table 3.2 summarises the demographics of Datazone S0100679 which contains Sites 3, 4, 5, 6 and 8.

Table 3.2 : Demographics for Datazone S01006079

Indicator	Site Value	Average Scotland Value
2009 Scottish Index of Multiple Deprivation Rank	2539	3253
Geographic Access Domain Rank	3078	3253
Economically Active Population (aged 16 – 74)	81.1%	83.1%
Proportion of Households Without Access to a Car	29.9%	34.2%

The data suggests that Sites 3, 4, 5, 6 and 8 will be located in an area which has similar SIMD and GAD Ranks to the Scottish average.

The area is shown to be slightly lower than the Scottish average when appraised in terms of the proportion of the population who are economically active and the proportion of households who do not have access to a car.

Datazone S01006079 (the A872 corridor) has a greater proportion of the population who are economically active when compared to Datazone S01006076 (the A9 corridor). This trend is replicated when comparing the proportion of households which do not have access to a car; with this proportion being greater for Datazone S01006076 when compared to Datazone S01006079, potentially reflecting the proportion of the population who are reported to be economically active.

3.3.4 Economic Context

Economic Indicators

For the purpose of this study, indicators have been obtained from data held by Stirling Council on the key population statistics for Stirling City. The data pertains to residential, education and employment population data and has been compiled in October 2009[20].

Stirling has a population of around 43,000 residents and became a city in 2002. The city accommodates a diverse range of employment sectors with the majority of city employees (79%) working in the leisure, finance & insurance and public sector, education & health sectors. This is a similar proportion to the average for Scotland which equates to 72%.

The study area to the south of Stirling is predominantly rural in nature with agriculture business, tourism and leisure accommodation. There are established businesses at Pirnhall Business Park undertaking office and building yard functions.

[20] http://www.stirling.gov.uk/2009_10_key_statistics.pdf

Factors Affecting Economic Performance

A recent Report *Stirling City Vision* (January 2010)[21] as been commissioned by Stirling Council to assist in developing the LDP. It is recognised in this Report that good local and strategic connections are essential to the future economy of Stirling of which a Park & Ride to the South of Stirling could contribute:

> *Economic consultants Yellowbook Ltd likened the process of building a vision that is ambitious and deliverable to building a building. It needs strong foundations, a clear plan of the way ahead and good quality materials to work with. The Yellowbook model understands that there are many forces acting on Stirling: it is well connected, but its economy needs to develop. The economic future will be different to the past. The Knowledge economy will be very important, as will quality of place and quality of life. It is important to consider both the city and the relationship of the city to its wider setting.*

The Report goes on to confirm that:

> *A key role of the city is to become a 'house of knowledge' to:*
>
> - *Grow the economic base of the wider Stirling area, exploit strategic and local connectivity and crucially build on the knowledge resources of the university and the colleges*
> - *Enhance the sense of place of Stirling by guiding the future form of development in a way that enhances the landscape setting, historic assets and urban quality of the area*
> - *Enable a new life and purpose for the city centre.*

It has been identified that Park & Ride projects can assist in the city's economic future. A suggested mechanism for delivery of the vision included:

> *Promote the development of a dynamic traffic management system for the city, which re-prioritises key spaces, including the castle esplanade as shared public spaces; strengthens strategic Park & Ride facilities, manages parking demand within the city area and promotes more integration of signage and urban form to enhance city legibility for pedestrians and cyclists.*

The south of Stirling area is also identified as offering a key gateway function to be taken into consideration in supporting economic growth:

> *Strategic development of the south side of the city as a gateway to the central belt, enabled by integrated traffic management, sustainable mixed use development and a high quality edge to the south city landscape*

Some sites are located in sensitive areas in relation to the visual gateway into Stirling from the south. Sites 5a, b and 6a, b, c and d are located at this gateway location. They have potential to influence the image of Stirling from the south and so the economic performance that the city is seeking.

[21] http://www.theblendfestival.co.uk/stirling_city_vision_28_01_10-2.pdf

Sites that perform well in both a strategic and local sense could contribute to bolstering the economic development through improved connectivity and a more seamless integration between modes. Sites 4, 5, 6 and 8 are best placed to perform this local and strategic function.

These suggestions will be taken into account in the development of Stirling's LDP and other policy documents.

3.4 Participation and Consultation

3.4.1 Public Transport Consultations

Consultation with a selected group of bus/coach operators was undertaken to inform the study, a full set of responses it shown in Appendix A (Site 8 had not been developed at the time of the consultation although the site is located directly adjacent to Site 6). Summaries are given as follows.

3.4.2 Local Bus Operators Summary

First Edinburgh (First) is the main bus company who operate services in and around Stirling and have been consulted for this study. The company operates services into Stirling which route along the A9 corridor and Service 38 currently operates with a 20min frequency Monday – Saturday. First confirm that there is potential to serve Site 7 using this service. Sites 1 and 2 are cited as being more difficult to serve using existing services. First only operates an hourly Service No. 24 on the A872 in the locale of site options on that corridor.

The local bus operator would consider 'back filling' sections of the A9 route to enable additional capacity to be provided at peak times without having an impact on journey times in the area. This would result in additional services being called upon to address increased demand over short stretches, for example from Stirling to the Park & Ride.

First suggested that a service frequency of 10 – 15min would be desirable at a future Park & Ride. The bus company confirms that they are well placed to serve the sites given the proximity of the sites, due to the location of their Bannockburn depot which would reduce the amount of dead mileage which would be associated with serving the proposed Park & Ride.

An opinion was sought on the suitability of Sites 1 – 8 as part of the consultation and Table 3.3 summarises its response.

Table 3.3 : Site Suitability

Site	Comment
1	Not favoured for commercial services – too remote and no existing pass-by services.
2	Not favoured for commercial services – too remote and no existing pass-by services.
3	This site has the benefit of allowing services to use either St Ninian's or Bannockburn Road routes to the city centre.
4	Not particularly useful in the context of existing First network, but closest to M9 motorway, so good for passengers arriving via that route.
5	Not favoured by First because of complexity of adjusting pass-by services to suit.
6	Not favoured by First because of complexity of adjusting pass-by services to suit.
7	Most favoured. Preference to access the site either from Falkirk Road (eastern boundary) or via new arm on the roundabout.
8	Not favoured by First because of complexity of adjusting pass-by services to suit.

3.4.3 Park & Ride Operator Summary

Harlequin Coaches operate Stirling Council subsidised bus services which serves the existing Stirling Park & Ride sites at Springkerse and Castleview. The company also operates a number of commercial services to the north of Stirling.

The operator confirmed that, while it does not currently operate any services in the vicinity of the site options, it can see a requirement for services to be introduced in association with the future development of Durrieshill. Harlequin Coaches confirmed that there is potential scope for the existing Castleview Park & Ride service to be extended south to serve a future Park & Ride development, although this would be subject to approval by Stirling Council.

Harlequin Coaches confirmed that the Kings Park section of the Castleview Park & Ride service's route does not currently attract many passengers. With regard to potential alterations to the existing service, the operator suggested that reducing the existing service frequency from 12 – 15min and removing the Kings Park section of the route would provide sufficient capacity to serve an additional Park & Ride site without the need for additional resources. Extending the Castleview Park & Ride service to the south without frequency adjustments is expected to require an additional vehicle and driver.

An opinion was sought on the suitability of Sites 1 – 8 as part of the consultation and Table 3.4 summarises its response.

Table 3.4 : Site Suitability

Site	Comment
1	Potentially too close to strategic roundabout.
2	Possibly too close to strategic roundabout. Only worthwhile if route used Bannockburn Road. Too many potential areas of congestion.
3	Possibly too remote.
4	Well located to serve hospital and integrate with other Park & Ride routes. Potential to meet requirements of new housing allocation.
5	Well located to serve hospital and integrate with other Park & Ride routes. Potential to meet requirements of new housing allocation.
6	Well located to serve hospital and integrate with other Park & Ride routes. Potential to meet requirements of new housing allocation.
7	Potentially too close to strategic roundabout.
8	Well located to serve hospital and integrate with other Park & Ride routes. Potential to meet requirements of new housing allocation.

3.4.4 Strategic Express Bus Operator Summary

Stagecoach (under the name Citylink) operate strategic bus services in the vicinity of Stirling connecting the city with Edinburgh and Glasgow. Express bus services currently access the centre of Stirling via the A872 Glasgow Road and route past a number of the site options.

Stagecoach confirm that there is potential to divert Citylink Services M8 and 909 to serve a future Park & Ride site which is to be located in the vicinity of the existing bus routes. The operator confirms that its preferred site would be either Site 5 or Site 6 given the proximity of the sites to the strategic road network and its existing service routes.

The operator confirms that the main focus of the express bus services will continue to be on traffic into Edinburgh and Glasgow although they would not be averse to increasing service

frequencies as has been implemented to serve other Park & Ride sites, such as those at Ferrytoll and Kinross in Fife.

3.4.5 Public Transport Unit Summary – Stirling Council

Stirling Council's Public Transport Unit (PTU) was consulted to inform this study and have suggested that it would be more efficient to serve the proposed Park & Ride by diverting commercial services into the new facility, as opposed to introducing a new subsidised bus service to serve the site. Nevertheless, the PTU considers that the service will require additional resources irrespective of whether it was integrated into an existing service or provided additionally.

The PTU acknowledges that the site's proximity to the M9/M80 interchange will be a factor in determining its attractiveness for use by express coach services.

It was suggested that the enhancement of public transport provision in the south of Stirling has the potential to provide alternative access options to employment opportunities (Stirling Council, Police Headquarters and the Stirling Royal Infirmary). In addition, any enhancement to bus services in the south of Stirling has the potential to serve the Stirling Major Growth Area at Durieshill.

The PTU suggests that 12min is the minimum frequency which most Park & Ride customers will consider to be attractive.

An opinion was sought on the suitability of Sites 1 – 8 as part of the consultation and Table 3.5 summarises their response.

Table 3.5 : Site Suitability

Site	Comment
1	Potential for abstraction of trips from Springkerse. Site would require large diversion of existing or provision of new services. Unattractive to express coach operators due to length of diversion required.
2	Potential for abstraction of trips from Springkerse. Site would require large diversion of existing or provision of new services. Unattractive to express coach operators due to length of diversion required.
3	Potential for linkage with Durieshill. Good scope for diversion of existing local bus services. Attractive to express coach operators only if an integral part of the Durieshill development. Possible reluctance to cross Pirnhall junction twice on each journey. Drivers approaching from M9/M80 may feel that they are turning away from Stirling.
4	Reasonable scope for diversion of existing bus services. Less attractive than Site 3. Well situated for strategic bus interchange. Car drivers less likely to feel that they are turning away from Stirling if direct access provided from Pirnhall Interchange. Very poor access for non car modes.
5	Possibility of access from existing roundabout. Site on key corridor towards city centre. Good scope for diversion of existing bus services. Southern end of the site is likely to be attractive to express coach operators. Drivers approaching from M9/M80 will not feel that they are turning away from Stirling. Site within current Green Belt.
6	Possibility of access from existing roundabout. Site on key corridor towards city centre. Good scope for diversion of existing bus services Southern end of the site is likely to be attractive to express coach operators. Drivers approaching from M9/M80 will not feel that they are turning away from Stirling.
7	Potential for facility to abstract trips from Springkerse. Would require large diversion or provision of new services to serve fully. Location of site will be unattractive to express coach operators. Site potentially more easily accessed by services currently travelling on the A9 including Service 38 which operates with a 20min frequency. A dedicated Park & Ride service (which picked up en route to Bannockburn) could undermine the viability of the 20min service between Stirling and Larbert Hospital.
8	Possibility of access from existing roundabout. Site on key corridor towards city centre. Good scope for diversion of existing bus services Southern end of the site is likely to be attractive to express coach operators. Drivers approaching from M9/M80 will not feel that they are turning away from Stirling.

3.4.6 Environmental Stakeholder Consultation

There were a series of environmental consultations undertaken with a key response coming from Stirling Council's Planning, Landscape and Archaeology services. A full response is shown in Appendix A. The general points were:

- Whichever site is eventually selected as the Park & Ride, it is essential that this major development makes a positive contribution and does not erode landscape character and sense of place.
- The roads leading north from the Pirnhall junction are key gateways into the historic city of Stirling and any development should only serve to enhance this feeling.

- It is essential that the development does not impact adversely on the potential Inventory area for the Battle of Bannockburn, which will be identified by Historic Scotland later this year as a draft for consultation. [Stirling Council has confirmed that this is a matter for consideration but not a significant constraint].
- Land will need to be made available for substantial planting within and around the facility and this may affect the land take required. All of this will need to be properly budgeted for.
- Screening in particular may be required to lessen any potential visual impact on the Battle of Bannockburn Site.
- Any proposals for lighting/security fencing etc will need to be carefully considered as most of the proposed sites are very open and visible and read as part of the countryside.
- SUDS, etc. should be incorporated into the scheme in an attractive, not overly engineered manner and planting of swales/detention basins, etc. and woodland areas should be designed to enhance nature conservation value.
- A long-term commitment to managing the planting must be secured, to ensure that the benefits can really be delivered.
- A programme of metal detecting and evaluation may be required depending on the site selected.

3.4.7 Passenger Survey - Travel Characteristics of Existing Park & Ride Sites

A comprehensive passenger survey was undertaken at the existing Park & Ride sites of Springkerse and Castleview. In addition to the passenger surveys, registration number plate surveys were undertaken to identify the occupancy of the car parks throughout the day.

The surveys were undertaken on Thursday 21 and Saturday 23 January 2010 at the Springkerse and Castleview Park & Ride sites to inform this study. The passenger survey is detailed in the Technical Note in Appendix D. A summary of the main findings are given as follows.

The Park & Ride daily passenger bus boarding demand until 15:00 on the Thursday at Springkerse was 260 people and at Castleview 168 people. On the Saturday at Springkerse the daily passenger boarding demand was 471 people and at Castleview 147 people.

Cars entering the Park & Ride sites on the Thursday to 15:00 were 139 cars at Springkerse and 97 cars at Castleview. On the Saturday 166 cars entered Springkerse and 53 cars entered at Castleview. Of these vehicles there were some that stayed for less than 10min duration as described in Section 2.5.4.

The results of the passenger survey suggest that the highest proportion of surveyed passengers were female and over the age of 46 in both the weekday and Saturday surveys. All surveyed passengers arrived by car with the majority of Springkerse passengers originating from the east and south (A91/A907 and M80/M9). The majority of Castleview passenger originated from the north and north-west (A9 and A84). The greatest proportion of passengers confirmed that their journeys were made by car prior to the opening of the Park & Ride facilities.

Parking availability and cost were cited as the main reasons for using the Park & Ride sites and the greatest proportion of passengers were travelling into the centre of Stirling on the day of the surveys. Commuting is the predominant journey purpose in the morning peak period at both

Park & Ride sites with shopping, social/recreational and personal business trips accounting for the majority of trips made outwith the weekday morning peak and on a Saturday.

There were a high number of national entitlement card holders using the Park & Ride sites. On a weekday 61-65% of users came into this category of ticket type and on a Saturday 49 – 50% of users held national entitlement cards.

The cost benefit of the Park & Ride was more important to fare paying passengers than national entitlement passengers. In the surveys, 39 – 42% of fare paying passengers had 'cost' as there main reason for choosing Park & Ride, where as only 18% of national entitlement holders cited this as a main reason. 'Parking availability' was very important to national entitlement holders with 69 – 73% citing this as a main reason for using Park & Ride. Of fare paying passengers, 50 – 56% had parking availability as a main reason.

The registration number plate surveys confirm that the Castleview car park was operating at less than 50% capacity in both the weekday and Saturday periods; whereas the Springkerse site was surveyed to be operating at around 50% of its capacity in the weekday period and approximately 70% of its capacity on a Saturday.

All surveyed passengers were satisfied or very satisfied with the Park & Ride facilities at Springkerse and Castleview.

3.4.8 Data Used for Forecasting and Business Case

The base data collected from surveys has been developed to be utilised for the forecasting process and the business case. Essentially, the characteristics of the existing sites have been developed to assist in forecasting use of a new site to the south of Stirling. These have been used in conjunction with data held in the Stirling S-Paramics models including the effect of some abstraction from Springkerse from those trips travelling from the south.

3.5 Appraisal Against Transport Planning objectives

An appraisal of each option against planning objectives has been based on the *STAG* seven point scale:

- +3 Major Benefit
- +2 Moderate Benefit
- +1 Minor Benefit
- No benefit or impact
- -1 Minor Impact/cost
- -2 Moderate Impact/cost
- -3 Major Impact/cost

The appraisal is detailed within the Appraisal Summary Tables which are included in Appendix F.1.

3.5.1 South Stirling Park & Ride Objectives

The following objectives were set by the Steering Group as part of the Pre-Appraisal process:

1. To improve the efficiency and reliability of the south of Stirling transport system without significant adverse effect on existing Stirling Park & Ride sites
2. To improve local access to major health, employment, tourist, leisure and retail facilities in Stirling and its city centre by Park & Ride
3. To improve strategic access to Edinburgh and Glasgow by Park & Ride from the south of Stirling
4. To manage travel by private car and encourage a shift to sustainable and active travel modes to tackle issues of climate change
5. To minimise impact on the natural and built environment
6. To maximise integration between Stirling Council's LDP and provision of public transport

Table 3.6 summarises the appraisal of Sites 1 – 8 in terms of these transport planning objectives.

Table 3.6 : Option Impacts

	Planning Objective					
Site Option	**1**	**2**	**3**	**4**	**5**	**6**
1	+1	+2	+1	+1	-1 / 0	+2
2	+1	+1	+1	+1	-1	-1
3	+1	+2	+1	+1	-1	-1
4	+1	+1	+2	+1	-1	-2
5 (a,b)	+2	+2	+2	+2	-2 / -1	+1
6 (a,b,c,d)	+2	+2	+2	+2	-2 / -1	+2
7	+1	+1	0	+1	-1	-1
8	+2	+2	+2	+2	-1	+2

Key	
Major Benefit	+3
Moderate Benefit	+2
Minor Benefit	+1
No Benefit or Impact	0
Minor Impact / Cost	-1
Moderate Impact / Cost	-2
Major Impact / Cost	-3

3.5.2 Planning Objectives Corridor Summary

West of A872 (Sites 4, 5a and 5b)

In general, the sites located on the west of the A872 score well against Objectives 1 – 4 due, in part, to their location in relation to the strategic road network being on routes into Stirling on the A872 corridor, and expected ease which the sites could be served by express bus services. Stagecoach has indicated that it would consider serving the sites using their existing Citylink services which connect Stirling with Edinburgh and Glasgow.

Site 4

Site 4 would impart additional entry arm bus traffic movements at the Pirnhall Interchange services access in the AM peak that may have a negative impact on efficiency and reliability at

that location requiring capacity treatments. In the PM peak there may be a shift of traffic from the A872 southbound entry arm to the Services entry arm that would impart additional circulating cutting movements to the junction. Further into the city there may be slight journey time benefits from a reduction in traffic volume.

Site 4 is appraised to have a minor negative impact when appraised against the objective which aims to minimise impact on the natural and built environment, and is expected to generate a moderate negative impact when appraised against Objective 6. The appraisal score is a result of the site constraints which lacks potential to be incorporated and suitably connected within an area considered for future development. The site is not within the perceived city boundary of the A91 and it does not have potential development land around it. It has limited potential as a multimodal transport hub to support a local community is therefore limited.

Site 5a and 5b

For Sites 5a and 5b some diversion would be necessary from the A9 corridor for private transport (although demand from this corridor may be light due to the significant diversion) and may impart slight additional circulation cutting movements at Pirnhall Interchange in the AM peak from the A91 that may have a negative impact on efficiency and reliability at that location. Further into the city there may be slight journey time benefits from a reduction in traffic volume.

Sites 5a and 5b are appraised to have a moderate negative impact when appraised against the objective which aims to minimise impact on the natural and built environment, as it is expected to have an impact on hedgerows/trees, landscape/visual amenity and key receptors. The sites are expected to have a minor positive impact when appraised against Objective 6 as the site locations have some potential to be incorporated and suitably connected in an area considered for future development. The site is within the perceived city boundary of the A91 with potential development land around it, although west of the A872 that could be a barrier to potential development linkages to the east of the A872. The LDP is still in development, but the site may be being considered for future business uses to complement the business uses already adjacent.

Of the sites on this side of the A872, Site 5a has the most positive potential to meet objectives.

East of A872 (Sites 3, 6a, 6b, 6c, 6d and 8)

In general sites on the located on the east of the A872 score well against Objectives 1 – 4 with Sites 6a, 6b, 6c, 6d and 8 appraised to generate a moderate benefit for the objectives. The sites are situated in a location which is remote from the Springkerse Park & Ride and the removal of traffic on a key route into Stirling is likely to benefit journey times on the route. The sites have the potential to act as a hub for access to health services in Stirling and, to a lesser extent, Larbert, and the potential to provide access to the Bannockburn Heritage Centre.

The sites score well against Objectives 1 – 4 due, in part, to their location in relation to the strategic road network and expected ease which the sites could be served by express bus services. Stagecoach has indicated that they would consider serving the sites using their existing Citylink services which connect Stirling with Edinburgh and Glasgow although Site 3 is less well placed for this function.

Site 3

Site 3 would impart additional circulation cutting movements at Pirnhall Interchange in the AM peak from the M80 that may have a negative impact on efficiency and reliability at that location,

there may be a net reduction of traffic entering from the A872 northbound as traffic would be captured from this route before entering the interchange. In the PM peak there may be a shift of traffic from the A872 southbound entry arm to the A872 northbound entry arm. Further into the city there may be slight journey time benefits from a reduction in traffic volume.

Site 3 is appraised to generate at least a minor benefit when appraised against Objectives 1 – 4 due, in part, to its location in relation to the strategic road network and expected ease which the site could be served by express bus services. Stagecoach has indicated that they would consider serving the sites using their existing Citylink services which connect Stirling with Edinburgh and Glasgow. The location of the site will, however, require services to route south from the Pirnhall Interchange on the A872 rather than accessing the site directly from the interchange.

Site 3 is appraised to have a minor negative impact when appraised against Objectives 5 and 6, as it is located outwith Green Belt on an improved grassland field. The site is dissociated with the town of Bannockburn and located on rising ground potentially visually exposed with effect on landscape/visual amenity. The site location has some potential to be incorporated and suitably connected within an area considered for future development, but is remote from the city. The site is not within the perceived city boundary of the A91, but does have potential Durieshill development land to the south of it, although suitability to integrate with this development is not certain.

Site 6a, 6b, 6d and 6c

For Sites 6a, 6b, 6c and 6d, some diversion would be necessary from the A9 corridor for private transport (although demand from this corridor may be light due to the significant diversion) and this may impart slight additional circulation cutting movements at Pirnhall Interchange in the AM peak from the A91 that may have a negative impact on efficiency and reliability at that location. Further into the city there may be slight journey time benefits from a reduction in traffic volume.

Sites 6a, 6b, 6c and 6d are appraised to have a moderate negative impact when appraised against the objective which aims to minimise impact on the natural and built environment. The sites are expected to have an impact on Green Belt or improved grassland fields in addition to being located on rising ground potentially visually exposed with effect on landscape/visual amenity and key viewpoints. Site 8 is considered to have less of an impact on this objective as it is not located on rising ground and therefore appraised to have less of an impact on landscape/visual amenity and key viewpoints for Site 6.

The sites are expected to generate a moderate positive impact in terms of Objective 6, as the location of the sites has some potential to be incorporated and suitably connected within an area considered for future development. The sites are also located within the perceived city boundary of the A91 with potential development land around it.

Of the sites on the west side of the A872, Site 8 has the most positive potential to meet objectives.

Mid A872/A9 & West of A9 Corridor (Sites 1, 2 and 7)

In general sites located on the west of the A9 score less well against Objectives 1 – 4 than the A872 corridor. Sites 1 and 2 are located in relative remote locations from existing bus service corridors (the A9 and A872). Consultation with bus operators suggests that public transport trips would be most effectively assigned via A9 corridor to increase journey time reliability. There is potential for the sites to act as a hub for access to health services in Stirling and Larbert

and potential to provide access to the Bannockburn Heritage Centre if bus services route via the A872.

Site 1

Site 1 would impart additional circulation cutting movements at Pirnhall Interchange as drivers divert toward the A91 in the AM peak that may have a negative impact on efficiency and reliability at that location. In the PM peak there may be a shift of traffic from the A872 southbound entry arm to the A91 entry arm. Further into the city there may be slight journey time.

Consultation with Stagecoach (Citylink) has indicated that subject to time delays they would consider extending services M8 & 909 to serve Site 1, but would rather be closer to the A872. Sites 1 has been appraised to have a minor negative impact on the objective which aims to minimise impact on the natural and built environment. Site 1 will utilise an existing racing track and lorry park area, some trees would be lost, but potential to mitigate with marginal encroachment on Green Belt and possible location in a historic site and some effect on landscape/visual amenity.

Site 1 is predicted to generate a moderate positive impact when appraised against Objective 6. The site location has some potential to be incorporated and suitably connected in an area considered for future development. The site is within the perceived city boundary of the A91 with potential development land around it. Site 2 is appraised to generate a minor negative impact when compared against Objectives 6, as the site location has only limited potential to be incorporated and suitably connected in an area considered for future development. The site is not within the perceived city boundary of the A91,

Site 2

Site 2 would impart additional circulation cutting movements at Pirnhall Interchange in the AM peak that may have a negative impact on efficiency and reliability at that location. In the PM peak there may be a shift of traffic from the A872 southbound entry arm to the A91 entry arm. Further into the city there may be slight journey time benefits from a reduction in traffic volume.

Consultation with Stagecoach (Citylink) has indicated that subject to time delays they would consider extending services M8 & 909 to serve Site 2, but would rather be closer to the A872. Site 2 has been appraised to have a minor negative impact on the objective which aims to minimise impact on the natural and built environment. Site 2 is located within Green Belt on an improved grassland field and is dissociated with town of Bannockburn and located on rising ground potentially visually exposed with effect on landscape/visual amenity.

Site 7

Site 7 is predicted to generate lower benefits when appraised against Objectives 1 – 4 for the corridor. Site 7 would impart additional circulation cutting movements at Pirnhall Interchange as drivers divert toward the A9 in the AM peak that may have a negative impact on efficiency and reliability at that location. In the PM peak there may be a shift of traffic from the A872 southbound entry arm to the A91 entry arm. Further into the city there may be slight journey time benefits from a reduction in traffic volume.

It is considered that public transport trips would be most effectively assigned via the A9 corridor to increase journey time reliability. The site is located appropriately for the A9 corridor

but from the A872 corridor diversion would be necessary for both private and express coach transport. Of the two main routes into Stirling, the A872 and A9, Site 7 may abstract more passengers from Springkerse Park & Ride due to its closer proximity than a site located near the A872. The site is not within the perceived city boundaries of the A91.

There is some potential for Site 7 to act as a hub for access to health services in Stirling and Larbert. The no. 38 bus passing the site also serves the Forth Valley Acute Hospital, but does not currently divert into the Stirling Royal Infirmary. It does not have potential to provide access to the Bannockburn Heritage Centre using existing buses. To serve this site by express coach would require a significant deviation from existing routes which would detract from the express function. Consultation with Stagecoach (Citylink) has indicated that subject to time delays they may consider extending services M8 & 909 to serve this site but it is not a preferred option.

Site 7 is appraised to have a minor negative impact when appraised against Objectives 5 and 6 as it is located on improved grassland field, dissociated with the town of Bannockburn and located on rising ground potentially visually exposed with effect on landscape/visual amenity. The site has potential to integrate with adjacent hospital site.

Of the sites on this side of the mid A872/A9 and A9 corridor, Site 1 has the most positive potential to meet objectives.

3.6 Appraisal Against *STAG* Criteria

3.6.1 Introduction

An appraisal of each option against *STAG* Criteria has been based on the *STAG* seven point scale:

- +3 Major Benefit
- +2 Moderate Benefit
- +1 Minor Benefit
- No benefit or impact
- -1 Minor Impact/cost
- -2 Moderate Impact/cost
- -3 Major Impact/cost

The appraisal is detailed within the Appraisal Summary Tables which are included in the AST Tables which are included in Appendix F.1.

STAG Criteria

The definitions of *STAG* criteria[22] are:

Environment:

> *How the proposal will contribute towards reducing emissions of CO_2 and other pollutants, and promote better air and water quality. Are there adverse impacts on*

[22] http://www.transportscotland.gov.uk/files/*STAG*_Appraisal_Summary_Tables__ASTs__Part_1.doc

the environment? What are the distributional impacts, who will be the gainers and losers?

Safety:

How will the proposal enhance safety for different types of transport users? Will it involve gainers and losers in terms of safety? Are there impacts on personal safety/security?

Economy:

How will the proposal affect traffic volumes, journey times, or the reliability of travel times? Will there be gainer and losers, and if so what are the impacts on users and operators of different transport modes and in different areas? How might the proposal help attract new jobs, help existing businesses, open up appropriate land for development?

Integration:

How will the proposal promote or enhance transport integration? Will services be able to function in a more complementary manner? How does the proposal fit with wider government policy including national transport targets and the Government Economic Strategy?

Accessibility & Social Inclusion:

How does the proposal affect accessibility for transport users and for others, including access to jobs, communities, shops, services and other facilities? How does it impact in terms of tackling social exclusion?

Table 3.7 summarises the appraisal of Sites 1 – 8 in terms of the above *STAG* Criteria.

Table 3.7 : Option Impacts

	STAG Criteria				
Site Option	Environment	Safety	Economy	Integration	Accessibility & Social inclusion
1	-1 / 0	+1	+1	+2	+1
2	-1	0	+1	-1 / 0	-1
3	-1	0	+1	-1 / 0	+1
4	-1	-1	+1	-2	-2
5 (a,b)	-2 / -1	+1	+1	+2	+1
6 (a,b,c,d)	-2 / -1	+1	+1	+2	+1
7	-1	0	+1	-2	0
8	-1	+1	+1	+2	+1

Key	
Major Benefit	+3
Moderate Benefit	+2
Minor Benefit	+1
No Benefit or Impact	0
Minor Impact / Cost	-1
Moderate Impact / Cost	-2
Major Impact / Cost	-3

3.6.2 STAG Criteria Corridor Summary

West of A872 (Sites 4, 5a and 5b)

In general the sites located on the west of the A872 have quite differing scores against *STAG* criteria.

Sites 4, 5a and 5b are appraised to have at least a minor negative impact when assessed against the *STAG* criteria of Environment. Table 3.8 summarises the predicted impacts of the sites in terms of key environmental indicators.

Table 3.8 : Environmental Indicators

Indicator	Site 4	Sites 5a, 5b
Noise and Vibration	-1/+1	-1/+1
Global Air Quality CO_2	+1	+1
Local Air Quality NO_2	+1	+1
Local Air Quality PM_{10}	+1	+1
Water quality, drainage and flood defence	0	0
Geology	0	0
Biodiversity and habitats	-2	-1
Landscape	-1	-1
Visual amenity	-1	-2
Agriculture and soils	0	0
Cultural heritage	-1	-2

In terms of the *STAG* objective of Safety, the appraisal confirms that the main safety issue for Site 4 would be for pedestrian and cyclist accessing the Park & Ride facility. Although the existing access onto the roundabout would be utilised, the intensification in usage, on an already

busy junction would require further investigation. The only issue with access safety to Site 5a is with the increased usage of the Milton Roundabout and potential for conflict with employees entering or exiting the adjacent companies. A slight issue with access safety for Site 5b is with the proximity of the new roundabout or signalised junction on the A872 to the M9 Junction 9, with the possibility of traffic queueing. This would require modelling to confirm the affect of the new junction arrangement although a suitable arrangement is likely to be possible due to low side road traffic flows.

A new junction arrangement may assist in alleviating an existing accident problem at the cross roads. Sites 4 and 5a would take access off an existing junction and Site 5b would involve alteration of an existing priority junction to form a roundabout providing a safer arrangement than the current priority junction which provides access into the site.

The sites are appraised to generate a minor positive impact when appraised against the *STAG* criteria of Economy. At any site the proposal is likely to reduce traffic volumes on the road network in Stirling. There is potential to improve strategic coach journey times and the reliability of travel times. There may be impacts on existing bus users where buses are diverted. The proposal may attract new jobs to the city centre, help existing tourism businesses, and assist in sustainably opening up appropriate land for development.

When appraising the sites against the *STAG* Criteria of Integration, most sites are expected to enhance transport integration by allowing greater flexibility in access to local and strategic public transport. Services will be able to function in a complementary manner. Sites 4 and 7 lack potential to be incorporated and suitably connected in an area considered for future development; are not within the perceived city boundary of the A91 and it does not have potential development land around it. The accessibility of Sites 4 and 7 and ability to integrate as a multimodal transport hub to support a local community is limited.

Sites 1,5a, 5b and 8 are appraised to enhance transport integration by allowing greater flexibility in access to local and strategic public transport. Services will be able to function in complementary manner. The proposal fits with wider government policy as demonstrated through its inclusion in the STPR.

In terms of the *STAG* Criteria of Accessibility and Social Inclusion, the sites are expected to improve accessibility for transport users and for others, including access to jobs, communities, shops, services and other facilities. The increased support of public transport services can assist in tackling social exclusion. Site 4 is, however, not easily accessed by socially inclusive walking and cycling.

Of the sites on this side of the A872, Site 5a is expected to generate at least a minor benefit when appraised against the majority of *STAG* Criteria although it is expected to generate a minor – moderate impact when appraised against the *STAG* Criteria of Environment. Site 4 is, however, predicted to generate a minor – moderate impact when appraised against the majority of the *STAG* Criteria.

Site 5a is expected to best meet *STAG* Criteria. The site is predicted to generate minor – moderate benefits when appraised against the *STAG* Criteria of Safety, Economy, Integration and Accessibility & Social Inclusion although it is appraised to generate a minor impact when appraised against the Environment Criterion.

East of A872 (Sites 3, 6a, 6b, 6c, 6d and 8)

The sites located on the east of the A872 generate quite differing score against *STAG* criteria.

Sites 3, 6a, 6b, 6c, 6d and 8 are appraised to have at least a minor negative impact when assessed against the *STAG* criteria of Environment. Table 3.9 summarises the predicted impacts of the sites in terms of key environmental indicators.

Table 3.9 : Environmental Indicators

Indicator	Site 3	Sites 6a, 6b, 6c, 6d	Site 8
Noise and Vibration	-1/+1	-1/+1	-1/+1
Global Air Quality CO_2	+1	+1	+1
Local Air Quality NO_2	+1	+1	+1
Local Air Quality PM_{10}	+1	+1	+1
Water quality, drainage and flood defence	0	0	0
Geology	0	0	0
Biodiversity and habitats	-1/-2	-1	-1
Landscape	-1/-2	-1/-2	-1
Visual amenity	-1	-2	-1
Agriculture and soils	0	0	0
Cultural heritage	0	-2	-1

In terms of the *STAG* Criteria of Safety, the appraisal confirms that in terms of the safety of Site 3, there are no great technical safety issues for this site, apart from the pipelines running through the site, as the access from the A872 would be provided by the developer of Durieshill. The only issue with access safety for Sites 6a and 6b is with the increased usage of the Milton Roundabout and potential for conflict with employees entering or exiting the Pirnhall Business Park. The only slight issue with access safety for Site 6c is with the proximity of the new roundabout or signalised junction on the A872 to the M9 Junction 9, with the possibility of traffic queueing. A new junction arrangement may assist in alleviating an existing accident problem at the Pirnhall cross roads. Sites 6a and 6b can be accessed using an existing roundabout. Providing access into Sites 3, 6c, 6d and 8 would involve alteration of existing priority junctions to provide improved arrangements than the current priority junctions which allow access into the sites.

The sites are appraised to generate a minor positive impact when appraised against the *STAG* Criteria of Economy. The proposal is likely to reduce traffic volumes on the road network in Stirling with the potential to improve strategic coach journey times and the reliability of travel times. There may be impacts on existing bus users where buses are diverted. The proposal may attract new jobs to the city centre, help existing tourism businesses, and assist in sustainably opening up appropriate land for development.

When appraising the sites against the *STAG* Criteria of Integration, the sites are expected to enhance transport integration by allowing greater flexibility in access to local and strategic public transport with services able to function in complementary manner. The proposal fits with wider government policy as demonstrated through its inclusion in STPR. Consultation with the Planning Department suggests that Site 3 may not integrate with the Major Growth Area and Sites 4 and 7 would not integrate well with the LDP.

In terms of the *STAG* Criteria of Accessibility and Social Inclusion, the sites are expected to improve accessibility for transport users and for others, including access to jobs, communities, shops, services and other facilities. The increased support of public transport services can assist in tackling social exclusion. Based on the assumption that the Major Growth area will go forward then socially inclusive access would be possible to Site 3 from Durieshill. Non-car access to Site 4 would be virtually impossible; the ability to tackle social exclusion is not

present. Providing a new facility with car only access may increase social exclusion, as the gap between the number of transport choices available would increase between car and non-car owning households..

Of the sites on this side of the A872, Site 8 is expected to generate at least a minor benefit when appraised against the majority of *STAG* Criteria and no worse than a minor impact when appraised against the *STAG* Criteria of Environment. Sites 6a, 6b, 6c and 6d are expected to perform well against the majority of *STAG* Criteria however the sites are appraised to generate a minor – moderate impact when appraised against the *STAG* Criteria of Environment. Site 4 is predicted to generate a minor benefit when appraised against only one of the *STAG* Criteria (Economy).

Site 8 is expected to best meet STAG Criteria. The site is predicted to generate minor – moderate benefits when appraised against the STAG Criteria of Safety, Economy, Integration and Accessibility & Social Inclusion although it is appraised to generate a minor impact when appraised against the Environment Criterion.

Mid A872/A9 & West of A9 Corridor (Sites 1, 2 and 7)

The sites located on the west of the A9 generate quite differing score against *STAG* criteria.

Sites 1, 2 and 7 are appraised to have at most a minor negative impact when assessed against the *STAG* criteria of Environment. Table 3.10 summarises the predicted impacts of the sites in terms of key environmental indicators.

Table 3.10 : Environmental Indicators

Indicator	Site 1	Site 2	Site 7
Noise and Vibration	-1/+1	-1/+1	-1/+1
Global Air Quality CO_2	+1	+1	+1
Local Air Quality NO_2	+1	+1	+1
Local Air Quality PM_{10}	+1	+1	+1
Water quality, drainage and flood defence	0	0	0
Geology	0	0	0
Biodiversity and habitats	-1	-1	0
Landscape	-1	-1/-2	-1
Visual amenity	-1	-2	-1
Agriculture and soils	0	0	0
Cultural heritage	-1	0	0

In terms of the *STAG* objective of Safety, the appraisal confirms that in terms of the safety of Sites 1 and 2 an improved junction layout has the potential to improve road safety, however, an issue with access safety is with the visibility and sight stopping distance on the A91 from the west. This could be resolved by purchasing a strip of land as a visibility splay for the roundabout. In terms of Site 7, there may be issues with access safety from the A9 and A91. To ensure suitable junction spacing on the A9 joint access would have to be arranged with the hospital access. Alternatively, introducing a new junction onto the A91 would not have any safety benefits. The provision of development accesses into Sites 1, 2 and 7 will involve alteration of existing junction arrangements which will provide a safer arrangement than the current priority junction which allow access into the sites. There could be a disbenefit to pedestrian safety as they use any at-grade crossing facility provided on the A91 to facilitate access into Site 2 from the established residential area located to the west of the A91.

The sites are appraised to generate a minor positive impact when appraised against the *STAG* Criteria of Economy. The proposal is likely to reduce traffic volumes on the road network in Stirling with the potential to improve strategic coach journey times and the reliability of travel times. There may be impacts on existing bus users where buses are diverted. The proposal may attract new jobs to the city centre, help existing tourism businesses, and assist in sustainably opening up appropriate land for development.

When appraising the sites against the *STAG* Criteria of Integration, the sites are expected to be less likely than other corridors reviewed to enhance transport integration by allowing greater flexibility in access to local and strategic public transport with services able to function in complementary manner. The proposal fits less well than other corridors and with wider strategic government policy as set out in STPR. Consultations with the Planning Service have suggested that Sites 2 and 7 would be outside the built form of Stirling, so may not be desirable in terms of integration with planning proposals as the LDP develops, however, Site 1 is more likely to integrate with potential LDP housing or commercial allocations. There is uncertainty about any relationship between Site 7 and the Bannockburn Hospital, whose function may be under review.

In terms of the *STAG* Criteria of Accessibility and Social Inclusion, the sites are expected to improve accessibility for transport users and for others, including access to jobs, communities, shops, services and other facilities. The increased support of public transport services can assist in tackling social exclusion, however, Site 2 is severed from Bannockburn by the A91 and Site 7 is remote from Bannockburn.

Of the sites located to the west of the A9, Site 1 is expected to generate at least a minor benefit when appraised against the majority of *STAG* Criteria and no worse than a minor impact when appraised against the *STAG* Criteria of Environment. Site 2 is expected to generate a minor impact when appraised against the *STAG* Criteria of Economy with a neutral or minor impact expected against the remaining four Criteria. Site 7 is also expected to generate a minor benefit against the *STAG* Criteria of Economy with a moderate impact predicted against the *STAG* Criteria of Integration.

Site 1 is expected to best meet STAG Criteria. The site is predicted to generate minor – moderate benefits when appraised against the STAG Criteria of Safety, Economy, Integration and Accessibility & Social Inclusion although it is appraised to generate a minor impact – no impact when appraised against the Environment Criterion.

3.7 Feasibility, Affordability and Public Acceptability

3.7.1 Appraisal

An appraisal of each option against feasibility, affordability and public acceptability criteria has been detailed in the AST Tables included in Appendix F.1.

The feasibility element is broken down in AST tables into a review of Technical and Operational consideration.

3.7.2 Feasibility

In summary, the technical challenges for each site have been reviewed in terms of size to accommodate a 250 space car park, bus turning circle, landscaping and SUDS, gradient, expansion potential, access arrangements, utility issues and a review of footpath/cycle way accessibility potential. Technical risks have also been summarised. An initial review of access

arrangements was assumed for each site, but this may develop as selected site are assessed in more detail in the next stage of the *STAG* appraisal.

Operational consideration has reviewed factors which might adversely affect the ability to operate the proposal over its projected life.

Sites with significant technical challenges to overcome include sites on steeply sloping ground; these include sites 4, 5b, 6a, 6b and 6d. All sites would have to contend with potential risk of disruption to underground services, but some sites – notably Sites 3 and 4 – had major pipelines to address. Site 7 had the most issues with establishing an assumed access point as it would require a shared access with another development.

3.7.3 Affordability and Forecasting Use

Capital construction costs are likely to be similar between all options, in the region of £2 – 3m construction cost before optimism bias. Stirling Council has confirmed that it is unlikely that residents would use active travel modes to travel away from Stirling to access Site 4 and it has been assumed that a footbridge or signalisation of the roundabout would not be essential to support the development of this site for a Park & Ride. The construction of a footbridge is likely to cost in the region of £2 – 4m. Land use costs have not been a factor in this initial affordability assessment.

An indication of affordability of sites has been determined by reviewing their overall potential to minimise revenue support by attracting patronage.

Reduced revenue support will be possible where existing local or express bus services can be utilised. Where dedicated Park & Ride buses are needed then best value may be found through extending existing Park & Ride bus routes, such as the Castleview Park & Ride bus that already routes into the southern half of Stirling.

The likely forecast of use can also assist in providing an indication of how successful any business case might me.

An initial indication of weekday and Saturday daily attraction is given in the Figures 3.2 and 3.3. The forecast shows local patronage attracted to Stirling City Centre based on a locally derived probability factors from the existing Springkerse and Castleview Park & Ride sites that have been fed through a generalised cost logit model. Strategic forecast patronage attraction for long trips has not been included to date but will be reviewed in the next stage for the *STAG* study.

The logit model has been developed to estimate future levels of patronage for the proposed Park & Ride. The model takes account of a number of factors including the cost of parking in the centre of Stirling. A review of parking provision was undertaken in 2009 by Stirling Council[23] from which it was proposed to rationalise parking charges throughout the City. The logit model that is based on AM peak period attraction, takes account of the proposed reduction in daily charge for parking in Zones D and E which will see the charge reduced from £2.90 to £2.50, as agreed with Stirling Council. The 2012 forecast is based on the logit model. The 2022 forecast is base on the 2012 forecast, but with growth applied relative to LATIS growth for the catchment area applied by time of day. Abstraction from Springkerse Park & Ride is included in the assessment.

[23] http://minutes.stirling.gov.uk/pdfs/scouncil/Reports/SC20091029Item18CityParking.pdf

Detail of the background behind the forecasting methodology is discussed in a technical note which is contained in Appendix E.

Figures 3.2 and 3.3 summarise the forecast Park & Ride patronage for an average weekday and Saturday of operation. These are logit figures that have been increased to represent an annual average bus patronage forecast.

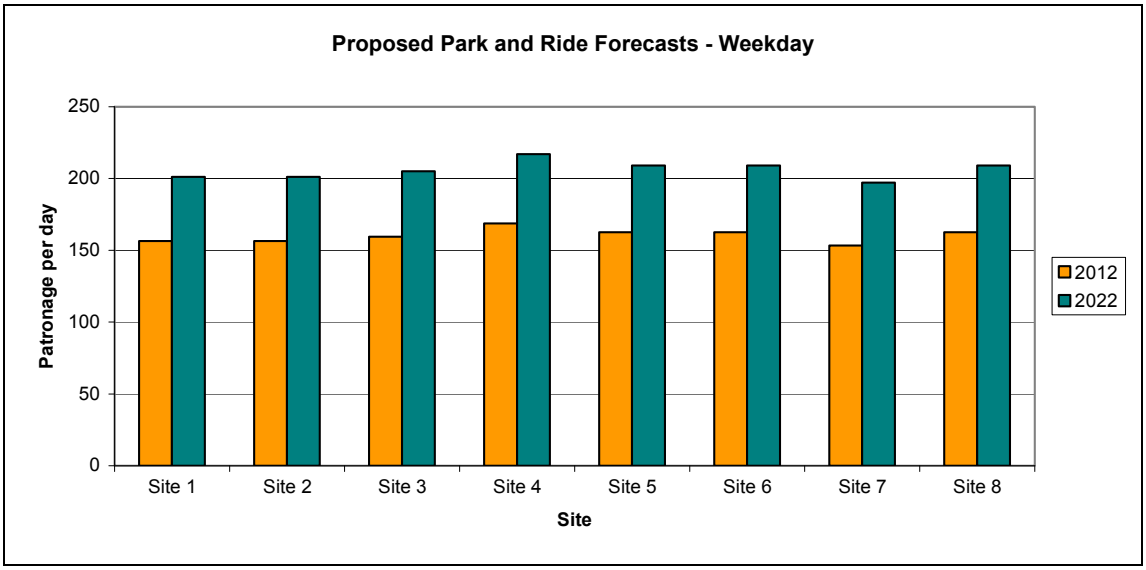

Figure 3.2 : Weekday Park & Ride Patronage Forecast, 2022

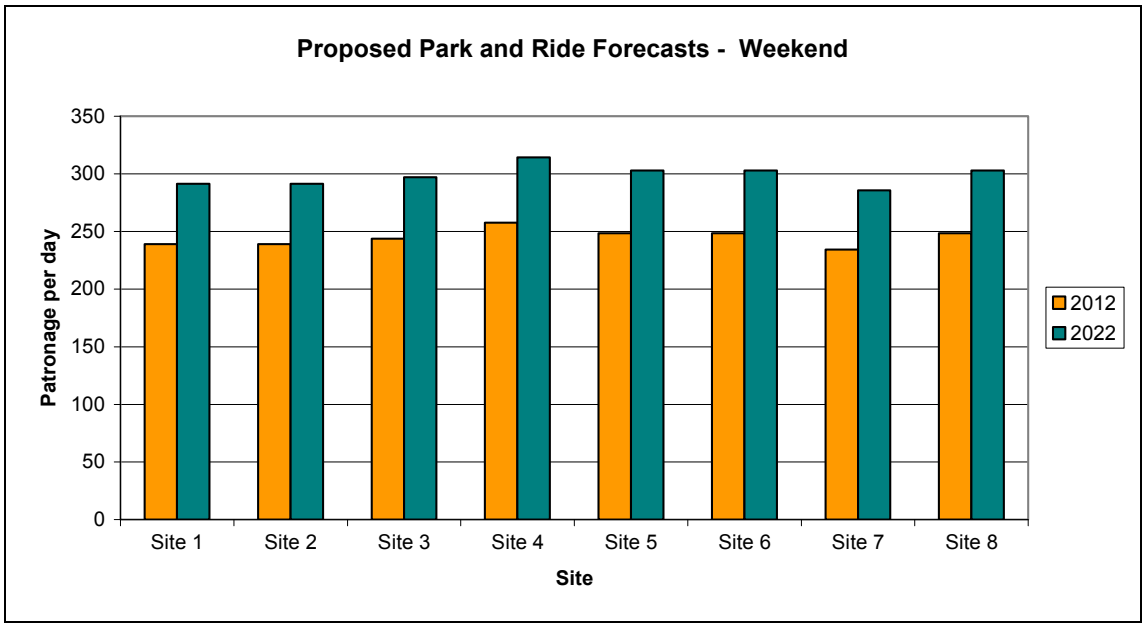

Figure 3.3 : Saturday Park & Ride Patronage Forecast, 2022

For the purposes of rationalising the modelling exercise, Site 2 was assumed to have the same attraction as Site 1. Site 6 and 8 were assumed to be the same as Site 5. As shown in Figures 3.2 and 3.3 this has resulted in the same level of attraction being predicted for the sites.

Site 4 has the greatest patronage attractiveness, possibly due to its overall pivotal location in the south of Stirling road network that provides the easiest access for the catchment area.

Site 7 has the least attractiveness of all the sites, due to its remoteness from the main Glasgow Road corridor that carries around double the volume of vehicular traffic than the A9 into Stirling, requiring a greater number of the catchment to divert further than other sites.

Table 3.11 shows the values pertaining to Figures 3.2 and 3.3, including the expected level of abstraction from Springkerse. It also demonstrates the corresponding expected vehicular attraction to the site and impact on Stirling City Centre.

Table 3.11 : Bus Patronage and Vehicular Impact

	Weekday 2012	Saturday 2012	Weekday 2022	Saturday 2022
Daily Average Patronage (Persons)				
Site 1	156	239	201	292
Site 2	156	239	201	292
Site 3	160	244	205	297
Site 4	169	258	217	314
Site 5	163	248	209	303
Site 6	163	248	209	303
Site 7	153	234	197	286
Site 8	163	248	209	303
Abstraction	45	82	58	101
Daily Average Vehicular Attraction (Vehicles)				
Site 1	113	148	145	180
Site 2	113	148	145	180
Site 3	115	151	148	184
Site 4	121	160	156	195
Site 5	117	154	151	188
Site 6	117	154	151	188
Site 7	110	145	142	177
Site 8	117	154	151	188
Abstraction	32	51	42	62
Daily Average Potential Vehicular Removal from City Centre (Vehicles)				
Site 1	64	77	83	94
Site 2	64	77	83	94
Site 3	66	79	85	97
Site 4	71	86	92	105
Site 5	68	82	87	99
Site 6	68	82	87	99
Site 7	63	75	80	91
Site 8	68	82	87	99

Notes.

	Weekday:	Saturday:
Daily annual average factor applied to Logit Forecast	1.039	1.100
Car occupancy factor	1.39	1.62
Former drivers factor	0.80	0.79

LATIS Growth 2012-2022 (42% AM peak, 22% Offpeak and Sat)

The difference between the least and most attractive site is not a large number but over a year this type of difference could make an impact to revenue income. The forecasts are not suggesting any great magnitude of difference between the site options therefore other factors in the study such as study objectives and *STAG* criteria will play an important role in determining site selection.

The forecasts, based on local factors, predict that the introduction of the proposed Park & Ride will see a net increase in the overall patronage of Park & Ride sites in the Stirling area by up to around 30% in an average weekday of operation. This includes abstraction from Springkerse Park & Ride. Full details of the modelling exercise are provided in the forecasting Technical Note contained in Appendix E.

West of A872 (Sites 4, 5a and 5b) Summary

In general the sites located on the west of the A872 have similar overall potential in terms of diversion of existing bus routes. Of the sites on this side of the A872, Site 4 has the most positive forecast potential, although this is only marginally different to Site 5.

East of A872 (Sites 3, 6a, 6b, 6c and 6d) Summary

Of sites located on the east of the A872, those sites north of Pirnhall Interchange have the most potential for utilising existing bus services without significant diversion. Of the sites on this side of the A872, Site 6 has the most positive forecast patronage potential, although this is only marginally different to Site 3.

Mid A872/A9 & West of A9 Corridor (Sites 1, 2 and 7) Summary

In general sites on the located between the A872 and A9 do not have any potential to utilise existing bus services as no bus services use the A91. Site 7, located on the A9 has some potential to use commercial services. Of the sites on this side of the A872, Site 1 and 2 have the most positive forecast patronage potential, although this is only marginally different to Site 7.

3.7.4 Public Acceptability

A summary of the approximate number of residential properties which are located within 200m of the sites is provided in Table 3.12.

Table 3.12 : Properties within 200m

Site	Approximate No. of Properties within 250m of Site
1	8
2	5
3	3
4	1
5	18
6	60
7	96
8	13

In addition, Site 7 is located adjacent to the Bannockburn Hospital.

The summary confirms that the sites are located in relatively remote locations from existing residential areas with the majority of sites appraised to have less than 20 properties located within 200m. Sites 6 and 7 are appraised to have the highest number of properties (60 and 96 respectively) located within 200m of the site.

3.8 Rationale For Selection Or Rejection

3.8.1 Process

The rational for selection or rejection of sites is based upon the appraisal of planning objectives, *STAG* criteria and implementability elements of feasibility, affordability and public acceptability. In total, including sub sections of sites, the assessment has reviewed 12 options. It was necessary, using *STAG* guidance, to accept or reject sites through an evidence based approach and through consultation input.

To assist with this process each site was reviewed in turn, but then also against competing sites in the same corridor. The rational for selection and rejection refers to strengths or weaknesses of one site or another in the corridor it finds itself in.

The corridors under consideration are:

- West of A872 (Sites 4, 5a and 5b)
- East of A872 (Sites 3, 6a, 6b, 6c, 6d and 8)
- Mid A872/A9 & West of A9 Corridor (Sites 1, 2 and 7)

3.8.2 Site Selection or Rejection from Further Detailed Appraisal

West of A872 Sites

Site 4 – Rejected

The proposal is being rejected from further consideration because the site lacks potential to be effectively integrated with potential LDP housing and/or commercial allocations due to being constrained and isolated by its surroundings within the motorway interchange. Due to its location, the site has poor active travel access that would require major mitigation and may never be fully effective due to walking distances involved. Development of the site may also have a moderate negative impact on biodiversity and habitat as it contains scarce plant species.

Of the two main sites located in the West of A872 corridor (Sites 4, 5a/b) Site 4 provided significantly less benefit to study objectives and *STAG* criteria than Sites 5a and 5b, particularly in terms of integration, accessibility and social inclusion.

The sites in this corridor are some of the closest situated to the strategic express coach routes to encourage potential additional strategic connectivity to Edinburgh and Glasgow. The site is also one of the furthest away from the existing Springkerse Park & Ride site discouraging abstraction. The forecast modelling has shown potential to attract the greatest level of patronage and Site 4 also has low impact on existing residential properties. Operationally the site is located off a minor arm of Bannockburn Interchange, which previous future year modelling has shown to be susceptible peak period congestion, so it has a heightened probability of being effected by congestion at this location than sites further north.

The site has technical risks due to gradient and services when compared to other sites and may incur significant active travel mitigation costs due to its currently inaccessible situation other than by vehicle.

Site 5 – Selected for Detailed Appraisal (5a)

The proposal in Site 5a is being accepted for further consideration because it has potential to be conveniently situated on a major commuter route into Stirling meeting local and strategic objectives. The site also has the potential to complement business functions adjacent to it and some potential to integrate into the future LDP. The site has potential to be accessible by active travel. On this corridor it is also less likely to abstract patronage from Springkerse Park & Ride than sites closer to the A9. Visual amenity and cultural heritage may be moderately negatively impacted which requires further investigation.

Site 5b is rejected because although it exhibits some characteristics of site option 5a it has a significantly greater impact on the gateway entry to Stirling and would have significantly less potential to integrate with potential LDP housing and/or commercial allocations. The site also has significantly more technical implementability issues to contend with.

Of the two main sites located in the West of A872 corridor (Sites 4, 5a/b) Site 5 provided more benefit to study objectives and *STAG* criteria than other sites, particularly in terms of integration, accessibility and social inclusion.

The sites in this corridor are one of the closest situated to the strategic express coach routes to encourage potential additional strategic connectivity to Edinburgh and Glasgow. The site is also one of the furthest away from the existing Springkerse Park & Ride site discouraging abstraction. The forecast modelling has shown potential to attract patronage and Site 5 also has low impact on existing residential properties. Operation of the Park & Ride is unlikely to be affected by the Bannockburn interchange, but vehicles would need to route through that junction to access the site.

East of A872 Sites

Site 3 – Rejected

The proposal is being rejected from further consideration primarily because there are significant questions about the suitability of the site to be integrated into any future Durieshill masterplan and the overall integration of the site into the potential LDP housing and/or commercial allocations. The site would have poor active travel accessibility to the south of the Stirling (north of the A91) with minor to moderate landscape impacts.

Of the three main sites located in the East of A872 corridor (Sites 3, 6a/b/c/d, 8) Site 3 provided significantly less benefit to study objectives and *STAG* criteria than other sites. The site is operationally less beneficial requiring doubling back on the trip into Stirling on most routes.

There are some technical risks identified with pipeline locations Site 3, although impact on existing residential properties is expected to be light. When compared to other sites in the corridor forecast modelling has shown some potential to attract patronage but this would be lower than sites located further north.

Site 6 – Rejected

The proposal 6c was favoured over the other Site 6 alternatives as it has the potential to provide a convenient Park & Ride site for local and strategic trips and has potential to integrate with the potential LDP housing and/or commercial allocations and had lower landscape and cultural heritage impacts than 6a, 6b and 6d. These sites also had technical difficulties. An alternative site to Site 6c, Site 8 has been proposed through the consultation process that fits more sympathetically into the landscape with equal potential to contribute to the LDP. Site 6 sites have been rejected from further assessment in favour of pursuing Site 8.

Of the three main sites located in the East of A872 corridor (Sites 3, 6a/b/c/d, 8) Site 6 provided more benefit to study objectives and *STAG* criteria and less implementability risk than Site 3. The sites in this corridor are some of the closest situated to the strategic express coach routes to encourage potential additional strategic connectivity to Edinburgh and Glasgow. The sites are also one of the furthest away from the existing Springkerse Park & Ride site discouraging abstraction.

The forecast modelling has shown potential to attract more patronage than Site 3 and overall Site 6 has more impact on existing residential properties than Site 3. Operation of the Park & Ride is unlikely to be affected by the Bannockburn Interchange, but vehicles would need to route through that junction to access the site from the south.

Site 8 – Selected for Detailed Appraisal

Site 8 was included in the Part 1 Appraisal following detailed discussions with Stirling Council Planning and other relevant departments. The proposal is favoured over Sites 6c. It has the potential to provide an attractive Park & Ride site for local and strategic trips and is favoured in environmental and planning terms. As an alternative site to Site 6c, Site 8 has been proposed through the consultation process to fit more sympathetically into the landscape with equal potential to contribute to the LDP.

Of the three main sites located in the East of A872 corridor (Sites 3, 6a/b/c/d, 8) Site 8 provides more benefit to study objectives and *STAG* criteria than other sites and significantly more than Site 3. The sites in this corridor are some of the closest situated to the strategic express coach routes to encourage potential additional strategic connectivity to Edinburgh and Glasgow. The sites are also one of the furthest away from the existing Springkerse Park & Ride site discouraging abstraction.

The forecast modelling has shown potential to attract more patronage than Site 3 and overall Site 8 has less impact on existing residential properties than Site 6. Operation of the Park & Ride is unlikely to be affected by the Bannockburn Interchange, but vehicles would need to route through that junction to access the site from the south.

Mid A872/A9 & West of A9 Sites

Site 1 – Selected for Detailed Appraisal

The proposal is favoured for its overall good potential to integrate with potential LDP housing and/or commercial allocations on the north side of the A91 where active travel links can be effectively implemented. It also has low environmental impacts when compared to other sites. It has some potential to draw patronage from both the A91 and A9 corridors with a supported dedicated or extended Park & Ride bus service to Stirling City Centre.

Of the three sites located in the mid A872/A9 and A9 corridor Site 1 provided significantly more benefit to study objectives and *STAG* criteria than other sites, particularly notable in terms of integration. The site in this area is one of the closest situated to the strategic express coach routes to encourage potential additional strategic connectivity to Edinburgh and Glasgow. The site is also one of the furthest away from the existing Springkerse Park & Ride site discouraging abstraction.

The site has low technical risks, when compared to other sites and forecast modelling has shown potential to attract patronage. Site 1 also has low impact on existing residential properties. Operation of the Park & Ride may be impacted by the Bannockburn interchange, as buses would need to route through that junction to access the site. The majority of private vehicles would also need to route through that junction to access the site.

Site 2 – Rejected

The proposal is being rejected from further consideration primarily because of its lack of potential to be integrated with potential LDP housing and/or commercial allocations, low levels of active travel accessibility and minor to moderate negative landscape impacts. Site 2 did have some potential to draw patronage from both the A91 and A9 corridors with a supported dedicated or extended Park & Ride bus service to Stirling City Centre, but other factors, such as the lack of certainty of the ability for integration cause this site to be rejected.

Of the three sites located in the 'mid A872/A9 and A9' corridor Site 2 provided significantly less benefit to study objectives and *STAG* criteria than Site 1 but more than Site 2. The site in this area is similar to Site 1 in some operational aspects, with similar technical risks and impact on residential properties but with worse overall environmental impact than Site 1. Site 2 is also located outside the perceived A91 boundary.

Site 7 – Rejected

The proposal is being rejected from further consideration primarily because of its lack of potential to be integrated with potential LDP housing and/or commercial allocations and low levels of accessibility south of the A91. There is uncertainty about the relationship between this site and the Bannockburn hospital, whose function may be under review and future unknown. Technical difficulties with a junction arrangement on the A9 would involve a joint access arrangement with the hospital coupled with a lengthy access road that may be a risk to taking this site forward.

Of the three sites located in the 'mid A872/A9 and A9' corridor Site 7 provided the least benefit to study objectives and *STAG* criteria than other sites, particularly notable in terms of integration and strategic access to Edinburgh and Glasgow. The site is also the closest site to the existing Springkerse Park & Ride site that may encourage abstraction.

The site its self has low site technical risks but as previously stated the access arrangements are a difficultly. When compared to other sites forecast modelling has shown the least potential to attract patronage. Site 7 also has the highest impact on residential properties of any site, within 200m.

3.8.3 Summary

Following on from the initial appraisal of eight sites considered to have potential to accommodate a future Park & Ride facility, one site has been chosen for detailed appraisal from each of the three study corridors:

- West of A872 Sites - Site 1 – Corbiewood selected for detailed appraisal
- East of A872 Sites - Site 5a – A872 West selected for detailed appraisal
- Mid A872/A9 & West of A9 Sites - Site 8 – A872 East (Hillhead) selected for detailed appraisal

Section 4 summarises the detailed appraisal of the three sites which have been appraised as being suitable as part of the Initial Appraisal.

4 DETAILED APPRAISAL

4.1 Introduction

The Detailed Appraisal requires a more detailed assessment of the options which have been selected for further consideration as part of the initial appraisal. The developed options are checked in detail against their suitability to meet Transport Planning Objectives, *STAG* Criteria and in terms of their Cost to Government and the potential Risk and Uncertainty associated with the appraisal of the options.

The following sites have been selected for detailed appraisal:

- Site 1 Corbiewood
- Site 5a A872 West (with two access options)
- Site 8 A872 East (Hillhead)

The following sections provide a description of the above sites including figures showing the indicative layout of the sites and an estimate of the cost to develop each of the sites. The design and site construction costing exercise has been undertaken based on the following assumptions:

- Services
  Costs for diversionary public utilities works are estimates and assumptions have been made from with observations made from site visits, mappings and aerial photographs.
- Land Cost Estimates
  The value of the land is a crude estimate and is dependant upon what existing permissions and zoning are given upon it.
- Plans
  These layouts are purely indicative to give a better understanding of the possibilities at each site. They have been created with only information available from site visits, photographs, etc. For a more detailed layout to progress then a topographical survey would be required.

Costs for site operation are based on the detailed business case for Castleview Park & Ride, which has been supplied by Stirling Council.

The appraisal of options includes the actual development of the sites and the bus service options relative to each site. In each case it has been appropriate to assume a 12min frequency bus service that runs to and from the City Centre using dedicated Park & Ride buses provided for the site. It has been assumed that the return bus fare would be £1 as per existing park and ride services in the area.

4.1.1 Site 1 – Corbiewood

Figure 4.1 confirms a potential indicative access arrangement for Site 1, which can accommodate approximately 257 spaces.

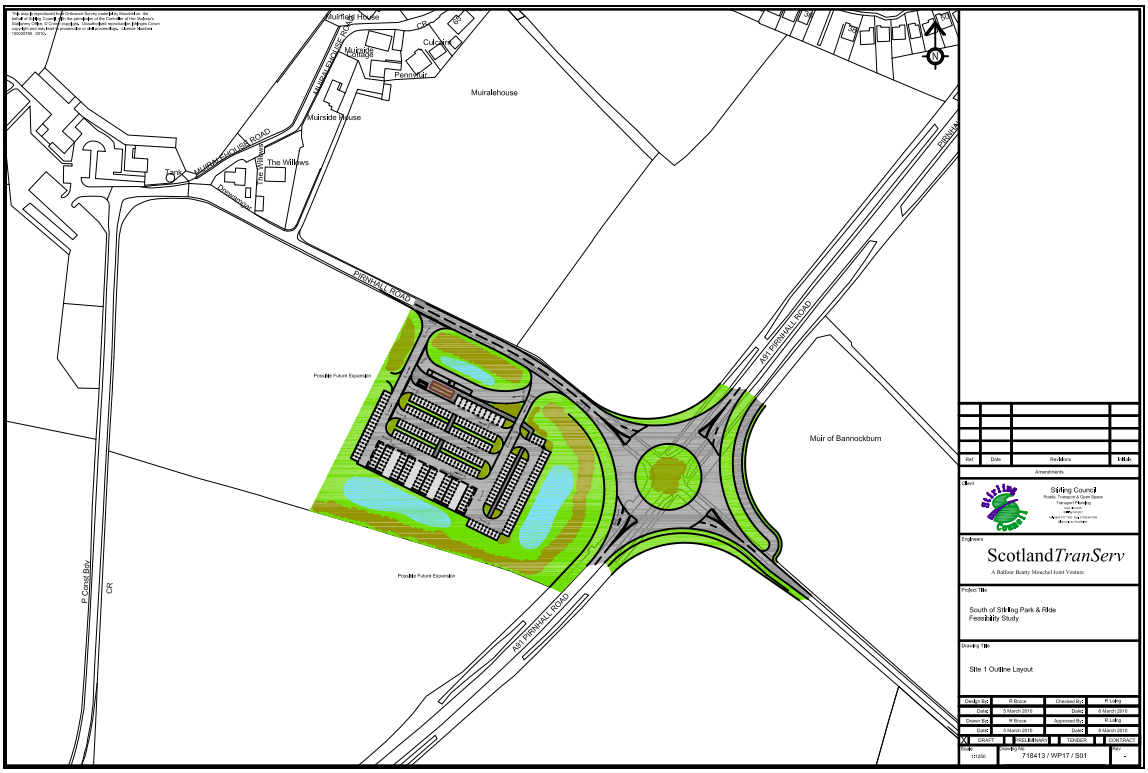

Figure 4.1 : Site 1 Indicative Site Layout

From a technical standpoint the site is of suitable size and shape. Access could be formed from the A91 at its existing junction with Pirnhall Road. The access would likely be in the form of a roundabout, maintaining the free flowing and common nature on the A91. The roundabout would improve access to the Brucefields Golf Centre and Back O'Muir Farm, and could be of a size suitable to allow any future development off the Pirnhall Road.

The site is reasonably flat which is favourable for earthworks costs however this may give design problems for drainage and any SUDS features. There is room for expansion, of similar size, to the west of the site, towards the Golf Centre, however, it may be more favourable to expand to the south of the site, along the A91 boundary. Access from Stirling by pedestrians and cyclists would be possible by the expansion of the current paths network. Public utilities are not onerous, however, there would be diversionary works for power and communications utilities on the A91 junction with the formation of the new roundabout.

Risks involved in developing or implementing the proposal are the costs involved with the diversionary works for the public utilities and the disruption to the local road network during construction, also the possibility of contaminated land from the existing racing facility and the patchwork of bituminous surfacing to the east of the site.

4.1.2 Site 5a – A872 West

Two options have been considered for Site 5a, the first of the two options which takes access from the A872 via an existing junction, was developed as part of the Initial Appraisal. The second option was developed following consultation with Stirling Council as part of the Detailed Appraisal. Two sets of Cost to Government figures have been developed for the site options.

Figure 4.2 confirms a potential indicative access arrangement for Site 5a which can accommodate approximately 252 spaces.

Figure 4.2 : Site 5a Indicative Site Layout - Initial Access Option

This site is in Pirnhall Business Park, 100m west of the Milton Roundabout on the A872, situated adjacent to two large company headquarters, namely Ogilvie Homes and FES Ltd. The site would be accessed from the western leg of the existing roundabout, continuing along to the end of the existing road. The access road would cross a builder's yard, possibly Ogilvie Homes, before continuing southwards to the area south of FES Ltd.

The site is on a slight gradient which is preferable for drainage and positioning of SUDS features. The site is an open field with ample opportunity to expand to the east and south. The new access road would also allow expansion of the business park to the west. The possibility of linking into Pirnhall Road (West) is there, along with the closure of the A872 junction at Pirnhall Inn, and a removal of a accident hotspot. Received public utility replies indicate that there are no potential problems. There are footway links along the A872 for pedestrians, with the core paths network approximately 130m from the Milton Roundabout.

There are a few technical risks involved in developing or implementing this proposed site, mainly the ground condition, as this is the site of the former Pirnhall Colliery.

Figure 4.3 confirms an alternative indicative access arrangement for Site 5a which can accommodate approximately 242 spaces.

Figure 4.3 : Site 5a Indicative Site Layout – Alternative Access Option

Site 5a is north of the Travelodge and Pirnhall Inn, and south of the FES company headquarters. Originally it was envisaged that the site would take access from the Milton Roundabout; however the idea of accessing the site directly from the A872 was investigated. The site would take access from the western leg of a new roundabout on the A872. This access road would continue past the site and connect to the Pirnhall Road, West of Pirnhall Cottages. The Travelodge and Pirnhall Inn would gain access from this road, along with Pirnhall Farm and cottages. This would allow the closure of the Pirnhall Road junction with the A872. The roundabout would also have an eastern leg which would provide future development and allow properties at Croftside Farm to gain access to the A872.

Once development to the east has taken place then a new access for Hillhead Farm Steadings could be created allowing the total closure of the Pirnhall Road (East) junction with the A872. The site has room for expansion to the west, and as shown on the indicative layout, room between the east of the site and the A872. These access roads and changes for safety reasons are rather costly and not fully contributable to the Park & Ride site, but this gives the best layout for any future development both to the east of the A872 and at Pirnhall Business Park.

The site falls gently from the south to the north, and is suitable for incorporating SUDS. Received public utility replies indicate that there are no significant problems. There are footway links along the A872 for pedestrians, with connections to the path network within a reasonable distance.

There are very few technical risks involved in developing or implementing this proposed site.

4.1.3 Site 8 – A972 East (Hillhead)

Figure 4.4 confirms a potential indicative access arrangement for Site 8 which can accommodate approximately 264 spaces.

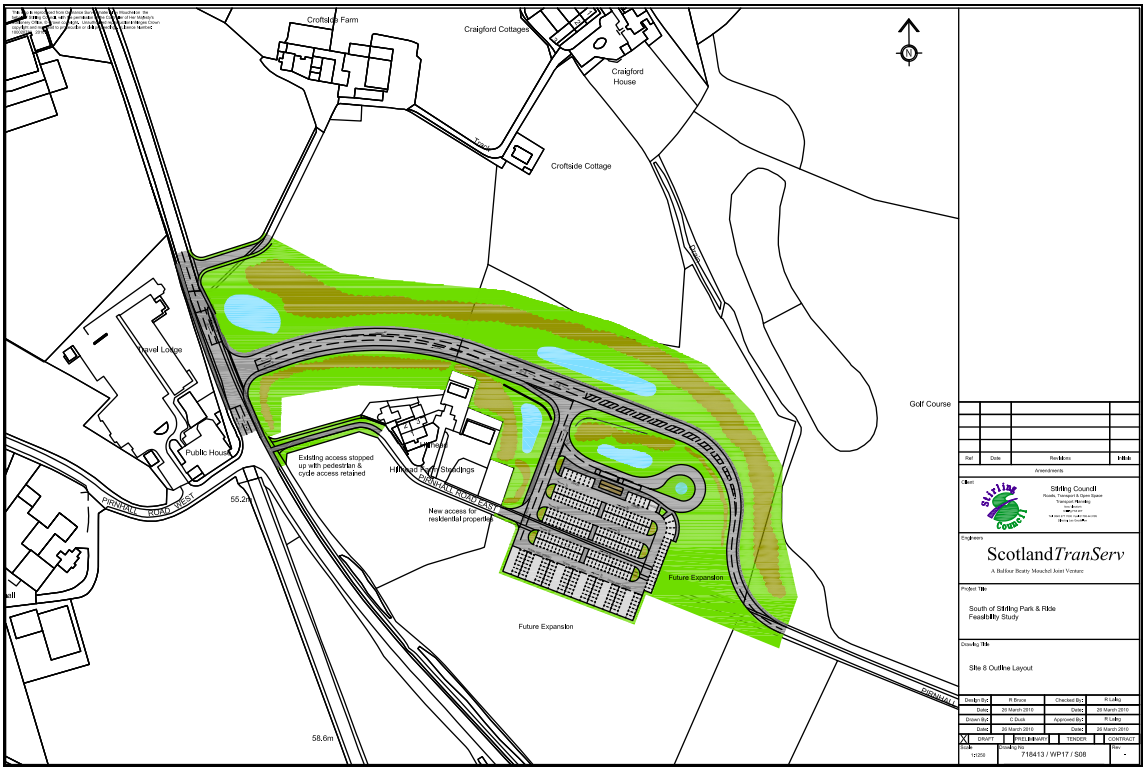

Figure 4.4 : Site 8 Indicative Site Layout

This site is to the east of Hillhead Farm Steadings, sitting across Pirnhall Road (East). The indicative layout has shown an access from the A872 via a signalised junction; however a layout similar to Site 5a, with a roundabout is also viable. The site is accessed from the east arm of the junction, along a road that may be a possible point for extending into future residential and business developments to the east of the site. It was also considered that any future development would realign the Pirnhall Road (East) east of the site, this is the reason for the proposed layout tying into the existing road with a *DMRB* non-compliant horizontal alignment in the indicative site layout.

The layout also indicated the closure of the Pirnhall Road (East) junction with the A872, retaining non motorised users access. Hillhead Farm Steadings would take vehicular access from the road into the Park & Ride. This layout may not be preferred however these layouts are only indicative. Future expansion is available to the south towards the A872, and if the Pirnhall Road is realigned, to the east. The site falls gently from the north to the south which is preferable for drainage and positioning of SUDS features. Received public utility replies indicate that there is are no significant problems on this site.

The technical risks involved in developing or implementing this proposed site are mainly the unknown ground conditions and disruption to traffic during construction of the junction on the A872 and the cutting of the Pirnhall Road.

Table 4.1 summarises the indicative cost of the three site options including the two options for accessing Site 5a. The costs include construction and estimated land costs at the time of the study.

Table 4.1 : Scheme Costs

Site	Cost
Site 1	£2,669,020
Site 5a – Initial Access Option	£1,758,920
Site 5a – Alternative Access Option	£3,214,075
Site 8	£2,561,905

As can be seen from the summary in Table 4.1, utilising the existing roundabout to provide access into Site 5a is expected to result in the least cost of the options. Construction of a new access to serve Site 5a is expected to result in the greatest construction cost with Sites 1 and 8 estimated to generate similar levels of cost.

4.1.4 Opportunity for HGV Parking

The potential for each of the sites to be used for overnight HGV parking has been investigated and the subsequent additional construction cost which is associated with the accommodation of HGVs in the proposed Park & Ride site is specified in Table 4.2.

Table 4.2 : Additional Cost Associated with Accommodating HGVs

Site	Additional Cost	Total Cost
Site 1	£249,850	£2,918,870
Site 5a – Initial Access Option	£317,281	£2,076,201
Site 5a – Alternative Access Option	£233,130	£3,447,205
Site 8	£230,736	£2,792,641

The summary in Table 4.2 confirms that the sites are estimated to require similar levels of additional cost to accommodate HGV parking although it is estimated that a significant increase in cost will be associated with the provision of HGV parking at Site 5a if the site is to be accessed via the existing Milton Roundabout.

4.2 Transport Planning Objectives

The following objectives have been set by the Steering Group as part of the Pre-Appraisal process:

1. To improve the efficiency and reliability of the south of Stirling transport system without significant adverse effect on existing Stirling Park & Ride sites
2. To improve local access to major health, employment, tourist, leisure and retail facilities in Stirling and its city centre by Park & Ride
3. To improve strategic access to Edinburgh and Glasgow by Park & Ride from the south of Stirling
4. To manage travel by private car and encourage a shift to sustainable and active travel modes to tackle issues of climate change
5. To minimise impact on the natural and built environment
6. To maximise integration between Stirling Council's LDP and provision of public transport

It is considered that the developed objectives are still relevant for the Detailed Appraisal. Table 4.3 summarises the appraisal of Sites 1, 5a and 8 in terms of these transport planning objectives.

Table 4.3 : Objective Appraisal

	Planning Objective					
Site Option	**1**	**2**	**3**	**4**	**5**	**6**
1	+1	+2	+1	+1	-1 / 0	+2
5a	+2	+2	+2	+2	-1	+1
8	+2	+2	+2	+2	-1	+2

Key	
Major Benefit	+3
Moderate Benefit	+2
Minor Benefit	+1
No Benefit or Impact	0
Minor Impact / Cost	-1
Moderate Impact / Cost	-2
Major Impact / Cost	-3

The summary in Table 4.3suggests that the three site options will generate a benefit when appraised against the majority of the study objectives. All three sites are however predicted to generate a minor impact when appraised against the option which pertains to minimising impact on the natural and built environment. It has now been possible to distinguish the impact of Site 5a as minor impact, as previously a range of site options for Site 5 had been reviewed in the Initial Appraisal.

Part 2 Appraisal Summary Tables, which detail the appraisal of the three site options, are included in Appendix F.2.

4.3 Rational for selection rejection

In accordance with *STAG*, the rational for selection of the three site options has been reviewed. It is however, considered that the reason for selection of the three site options remains as per the review undertaken in the Initial Appraisal which is detailed in Section 3.8.2. No contrary information has come forward in the Detailed Assessment.

4.4 Consultation

Consultation was undertaken with NHS Forth Valley and Falkirk Council to inform the detailed appraisal. A full transcript of this is contained in Appendix A.

4.4.1 NHS Forth Valley

NHS Forth Valley is the health authority covering the Clackmannanshire, Stirling and Falkirk areas.

In general NHS Forth Valley supports the development of new Park & Ride sites in the south of Stirling area. Of the detailed sites available, Site 1 holds the most potential to divert the No. 38 bus services to link in with the new Larbert hospital with commercial services. All the sites available have good potential to act as hubs for car sharing. Of the sites on the A872 Glasgow Road there may be some long term potential to develop a new bus service that links Stirling

Community Hospital with Falkirk Community Hospital stopping via a potential South Stirling Park & Ride site and the Larbert Hospital.

4.4.2 Falkirk Council

Falkirk Council, as the neighbouring authority to the south of Stirling was consulted as part of the South Stirling Park & Ride study. They had some general and specific comments.

In general Falkirk Council supports any moves to introduce more Park & Ride sites in the Stirling area to promote the use of public transport.

In the south Stirling study area Falkirk Council see some potential benefits in providing a Park & Ride. The Park & Ride may provide for more strategic travel choices to its residents, particularly to those in the north Falkirk areas of Larbert and Stenhousemuir.

To summarise the view of Falkirk Council; a Park & Ride to the south of Stirling on a main corridor would be desirable. Clarity on the use of sites for car sharing may be useful and the provision of more public transport choice for strategic trips would be welcomed.

4.5 *STAG* Criteria

4.5.1 Environment

A detailed review of the environmental impact of the three site options is contained in Appendix G. The following sections summarise the key issues highlighted within the Environmental Assessment.

Comparison of Sites

Table 4.4 indicates that all three sites are generally comparable in terms of potential environmental benefits or negative impacts. There are a couple of marginal differences, highlighted in green, where a lesser level of impact (compared to the other two sites) is predicted at this stage. Site 8 scores better for two environmental sub-criteria and Sites 1 and 5A on one each., however, it should be noted that, based on this strategic level assessment and considering the nature, scale and characteristics of the proposals, there are no overriding environmental reasons why any of the three sites could not be further progressed.

Table 4.4 : Site Comparison

Environmental Sub-criteria	Site 1	Site 5a	Site 8
Noise and Vibration	No benefit or impact	No benefit or impact	No benefit or impact
Global Air Quality	Minor benefit	Minor benefit	Minor benefit
Local Air Quality	Minor benefit	Moderate benefit	Moderate benefit
Water Quality, etc	No benefit or impact	No benefit or impact	No benefit or impact
Groundwater	Minor impact	No benefit or impact	Minor impact
Geology	Minor impact	Minor impact	No benefit or impact
Biodiversity and Habitats	Moderate – Minor impact	Moderate – Minor impact	Minor impact
Landscape	Minor impact	Minor impact	Minor impact
Visual Amenity	Moderate impact	Moderate impact	Moderate impact
Agriculture and Soils	Moderate impact	Moderate impact	Moderate impact

Summary of Key Issues

The following sections summarise the key issues which have been highlighted as part of the Environmental Assessment. These issues should be considered for any future development of the sites.

Water Quality, Drainage and Flood Defence:

- Appropriate and adequate site drainage – SUDS should be included
- Consider where shallow groundwater might be an issue

Geology:

- Obtain Coal Mining Reports to gather more information of former coal mining activity – particularly applies to Sites 1 and 5a
- If any evidence of contamination became evident during development of any of the sites Stirling Council Environmental Health department should be notified and the contamination investigated and the area remediated as necessary

Biodiversity:

- Avoid tree loss where possible.
- Avoid bird breeding season during site clearance
- Bat emergence survey required to confirm presence/absence of bats within buildings/trees for Sites 1 and 5a
- Retain linear vegetation features which provide bat commuting route
- Sensitive lighting design

Landscape:

- Sites 5a and 8 are within Greenbelt land and the progression of either of these sites will require further discussion with Stirling Council
- Design, implement and maintain appropriate site screening/landscaping and lighting

Visual Amenity

- Receptors to be more clearly defined and issues considered further as the appraisal process moves forward

Agriculture and Soils

- Consider land take issues and land ownership

Cultural Heritage

- Confirm Battle of Bannockburn site boundary with Historic Scotland once information is available and review with Stirling Council
- Further consider potential impact on 18th – 20th century smallholdings for Sites 5A and 8

Global Air Quality CO_2 - Overview

Climate is strongly influenced by changes in the atmospheric concentrations of a number of gases that trap heat radiated from the earth's surface (the 'greenhouse effect'). Carbon dioxide (CO_2) has been singled out as the most important transport induced greenhouse gas having a direct impact on global warming. Climate change is now widely recognised as a threat to the environment. In broad terms, the UK has committed itself to reduce emissions of key greenhouse gases by 12.5% from 1990 levels by 2010, though there are different targets for individual pollutants. CO_2 emissions are taken as a proxy in *STAG* for global air quality.

In Scotland, the Climate Change (Scotland) Act 2009 sets an interim target of a 42% reduction in greenhouse gas emissions for 2020 and an 80% reduction target for 2050. This covers the six greenhouse gases, including CO_2. To help ensure the delivery of these targets, the Scottish Ministers will set annual targets, in secondary legislation, for Scottish emissions from 2010 to 2050.

In addition, the *Government Economic Strategy* (November 2007) presents a set of national targets that aim at ensuring that the Government's purpose is met. Among them, two environment specific targets, promoting sustainability:

- To reduce emissions by 80 per cent by 2050
- To reduce emissions over the period to 2011

Following the Stern Review, the issue of CO_2 emissions has become significantly more prevalent and there are moves to monetise the impact of CO_2 emissions, in terms of the Shadow Price of Carbon (SPC). Department for Environment, Food and Rural Affairs (DEFRA) have recently issued guidance on the monetisation of greenhouse gases. This was adopted within the current *STAG* Appraisal.

The first stage is to calculate the Greenhouse Gas impact of the option being examined; total CO_2 emissions for road traffic were calculated according to the method in *DMRB* 11.3.1 (the unit of account used was t CO_2 rather than t C). The impact of a project on emissions was calculated for each year over the 60 year appraisal period. This has been undertaken within the environmental assessment with data supplied from the transport modelling as detailed in Appendix G.

Indicators used include the change in:

- CO_2 emissions (expressed in tons of CO_2 and tons of carbon equivalent t C)
- The monetised present value of the change in CO_2 emissions

Site 1

The likely carbon emissions impacts associated with Site 1 are of the order of 0.56% decrease in terms of total carbon emissions. This results in a slight benefit to society with the associated costs of CO_2 emissions decreasing from £47,919,914 (Discounted Monetised Value over 60 years without scheme) to £47,603,473 (Discounted Monetised Value over 60 years with scheme).

The net change in CO_2 with the proposed scheme in place has been calculated as -363 tonnes per year, which is considered to relate to a **Minor benefit** significance level.

Site 5a

The likely carbon emissions impacts associated with Site 5A are of the order of 0.56% decrease in terms of total carbon emissions. This results in a slight benefit to society with the associated costs of CO_2 emissions decreasing from £47,919,914 (Discounted Monetised Value over 60 years without scheme) to £47,651,603 (Discounted Monetised Value over 60 years with scheme).

The net change in CO_2 with the proposed scheme in place has been calculated as -308 tonnes per year, which is considered to relate to a **Minor benefit** significance level.

Site 8

The likely carbon emissions impacts associated with Site 8 are of the order of 0.56% decrease in terms of total carbon emissions. This results in a slight benefit to society with the associated costs of CO_2 emissions decreasing from £47,919,914 (Discounted Monetised Value over 60 years without scheme) to £47,651,603 (Discounted Monetised Value over 60 years with scheme).

The net change in CO_2 with the proposed scheme in place has been calculated as -308 tonnes per year, which is considered to relate to a **Minor benefit** significance level.

Table 4.5 summarises the total emission impacts associated with each of the three site options.

Table 4.5 : Global Air Quality CO_2

		Discounted Monetised Value over 60 years		
	CO2 tonnes saving per year	Without scheme	With scheme	Monetary Benefit
Site 1	-363	£47,919,914	£47,603,473	£316,441
Site 5a	-308	£47,919,914	£47,651,603	£268,311
Site 8	-308	£47,919,914	£47,651,603	£268,311

4.5.2 Safety

Accident Appraisal

Personal injury accident data was supplied by Stirling Council for the following junctions which are located in the vicinity of the three site options:

- A872/Pirnhall Road junction
- A972 Milton Roundabout
- A91/Pirnhall Road junction

Data was obtained for 1999 – 2008 and is summarised in terms of severity in Tables 4.6 – 4.8.

Table 4.6 : A872/Pirnhall Road Junction

Year	Fatal	Serious	Slight	Total
1999	0	0	0	0
2000	0	0	0	0
2001	0	0	0	0
2002	0	0	1	1
2003	0	0	0	0
2004	0	0	0	0
2005	0	0	1	1
2006	0	0	0	0
2007	0	0	1	1
2008	0	0	1	1
Total	**0**	**0**	**4**	**4**

Table 4.7 : A872 Milton Roundabout

Year	Fatal	Serious	Slight	Total
1999	0	0	0	0
2000	0	0	0	0
2001	0	0	0	0
2002	0	0	1	1
2003	0	0	1	1
2004	0	0	0	0
2005	0	0	0	0
2006	0	1	0	1
2007	0	0	0	0
2008	0	0	0	0
Total	**0**	**1**	**3**	**4**

Table 4.8 : A91/Pirnhall Road Junction

Year	Fatal	Serious	Slight	Total
1999	0	0	0	0
2000	0	1	0	1
2001	0	0	1	1
2002	0	0	0	0
2003	0	0	4	4
2004	0	1	0	1
2005	0	0	2	2
2006	0	1	2	3
2007	0	0	0	0
2008	0	0	1	1
Total	**0**	3	10	13

An accident assessment has been undertaken using Transport Scotland's Network Evaluation from Survey and Assignment (NESA) software to provide an indication of the benefit of altering an existing junction to provide access into the Park & Ride sites. Default accident rates have been adopted. Where a roundabout is introduced as a replacement for an existing priority

junction, there are safety benefits as the number and severity of injury accidents is predicted to be reduced.

NESA has been used to appraise the following access options for Sites 1, 5a and 8:

- Site 1 Roundabout access from the A91
- Site 5a Access from the A872 Milton Roundabout
- Site 5a alternative access arrangements
  Direct access from the A872 via a new roundabout
- Site 8 Direct access from the A872 via a new signalised junction

Table 4.9 summarises the results of the NESA assessment for the above scenarios.

Table 4.9 : NESA Assessment of Access options

		Base (2012)	Design (2027)	Benefits
Site 1	Accidents	34.8	14.5	20.3
	Fatal Casualties	1.2%	0.5%	
	Serious Casualties	9.8%	5.1%	
	Slight Casualties	89.0%	94.4%	
	Total Cost (£m)	1.702	0.418	1.284
Site 5a	Accidents	34.8		
	Fatal Casualties	1.2%		
	Serious Casualties	9.8%		
	Slight Casualties	89.0%		
	Total Cost (£m)	1.702		
Site 5a (alternative)	Accidents	34.8	14.5	20.3
	Fatal Casualties	1.2%	0.5%	
	Serious Casualties	9.8%	5.1%	
	Slight Casualties	89.0%	94.4%	
	Total Cost (£m)	1.702	0.418	1.284
Site 8	Accidents	34.8	62.7	-28.0
	Fatal Casualties	1.2%	0.4%	
	Serious Casualties	9.8%	6.5%	
	Slight Casualties	89.0%	93.1%	
	Total Cost (£m)	1.702	2.238	-0.536

NESA has been used to appraise the benefits generated by the three site options based on the access arrangements detailed in Section 4.1. Site 1 is to be accessed via a new roundabout to be constructed on the A91. Site 5a has two options for access, one which utilises the existing roundabout to provide access from the A872. Following consultation with Stirling Council, an alternative access option was developed which involved construction of a new roundabout on the A872. For the purpose of this study, Site 8 is assumed to be accessed via a signalised junction to be formed on the A872. The new junctions are to be constructed at the locations of existing priority junctions.

As previously highlighted, the initial access option for Site 5a involves the use of an existing junction (the A872 Milton Roundabout) and there is predicted to be no net benefit or disbenefit associated with the use of the existing junction. Future year tests have not been undertaken due to the low sensitivity of NESA where there is no significant change in traffic volume (greater

than 1,000 vehicles per day). Link safety has also not been considered for this reason as 'with' and 'without' the scheme was expected to be less than 1,000 vehicles variance.

The construction of a new roundabout on the A872 to provide access into Site 1 or Site 5a is forecast to generate a benefit in terms of safety when compared to the operation of the existing priority junctions. Over the 60 year period which NESA uses to appraise the impact of a proposed infrastructure scheme, the conversion of a priority junction to a roundabout is predicted to decrease the number of accidents by 20 which equates to a £1.284m saving. The proportion of fatal or serious injury accidents is forecast to be reduced with the conversion of a priority junction to a roundabout.

The provision of an access into Site 8 in the form of a signalised junction is forecast to generate a net disbenefit in terms of safety when compared to the operation of the existing priority junction. NESA predicts that the conversion of a priority junction to a signalised junction will increase the number of accidents by 28 which equates to a cost of £0.536m. The proportion of fatal or serious injury accidents is forecast to be reduced with the conversion of a priority junction to a roundabout. This is a function of the NESA programme with associated standard factors.

Roundabouts are expected to offer the safest form of junction when compared to priority and signalised junctions and are appraised to generate the fewest number of accidents when compared to the operation of priority and signalised junctions. Although a signalised junction arrangement is forecast to generate the greatest number of accidents, the accident severity ratio is predicted to be similar to that generated by the installation of a roundabout.

Security

The Park & Ride will be designed to a Park Mark Safer Parking Scheme standard, which is an initiative of the Associations of Chief Police Officers and is aimed at reducing both crime and the fear of crime in parking facilities. The award of a Park Mark confirms that:

- The car park has been vetted by Police to ensure it's fully secured
- Measures taken to deter anti-social behaviour and criminal activity
- The site receives expert consultation from Development Managers to help keep the security up to a high standard
- The site belongs to a nationwide scheme dedicated to combating crime and raising standards for public services

4.5.3 Economy

The Economics section contains the following assessments:

- Transport Economic Efficiency (TEE)
- Wider Economic Benefits (WEBS)
- Economic Activity and Location Impacts (EALIs)

4.5.4 Transport Economic Efficiency (TEE)

The central principle of transport economic efficiency analysis is to estimate the welfare gain which results from transport investment, as measured by the individual's willingness to pay for such an improvement and the financial impact on private sector transport operators.

Willingness to pay should be consistent with the demand response to the improved transport opportunities.

In this assessment there are a series of elements that have been taken into consideration under the main headings of:

- User Benefits
- Private Sector Operator Impacts

In order to assess TEE and other costs the daily forecast for Park & Ride use at the various sites had to be extended to an annual patronage figure. A slight seasonality increase was also allowed for because surveys had been undertaken in January. This again was extended using LATIS growth 2012 – 2022 for the catchment to assess patronage over the 60 year assessment period. Discount Rate of 3.5% applied for 0 to 30 year assessment and 3% for 31 to 60 year. Inflation was assumed to be 2.5%[24].

User Benefits

Non-User Benefits in Travel time

In this study the user benefits of the general road network have been established, these are sometimes termed non-users of the scheme in question. Modelling has suggested that routes from the south of Stirling to the city centre may benefit by a slight improvement in journey time in peak periods. Site 1 had a journey time improvement of 1s and Sites 5a and 8 had a 3s benefit for the non Park & Ride traffic on the A872 route into Stirling which applies to around 450 vehicles that make this journey during peak times of day.

User Charges Benefits

Those using the new Park & Ride would benefit from having a reduced charge for parking, as the parking at the Park & Ride sites has been assumed to be free and return bus fares have been assumed to be £1, the current standard rate for other Park & Ride sites in Stirling. There is a net benefit to users of the Park & Ride in terms of payment charges. National Entitlement Card (NEC) holders do not pay for bus tickets themselves, so have more benefit that those who pay for tickets on the bus. The proportion of these users has been derived from weighted survey information and applied as per the Table 4.10.

Table 4.10 : Ticket Type Summary

Ticket Type	Weekday 07:00-10:00	Weekday 10:00-15:00	Weekend
Adult Return equvalent	59%	37%	55%
National Entitlement Card Ticket	41%	63%	45%
Total	100%	100%	100%

In the weekday morning peak it had been assumed for logit model forecasting purposes, as agreed with Stirling Council, that 100% of those using the Park & Ride were utilising long stay public car parking and this has been carried through into car parking revenue loss assessment, with an average proposed cost of £2.50 per day. In terms of the car parking loss assessment this

[24] http://www.hm-treasury.gov.uk/data_greenbook_index.htm

includes those NEC users who may use other medium term public car parks and pay around the same value for parking for a shorter period.

Throughout the interpeak and the weekend it has been assumed that medium term public car parking would be impacted, in addition to all privately operated car parks. The average interpeak and Saturday duration of stay at Park & Rides was between 2 – 3hr, as derived from survey data. The proportion of public parking to private parking has been determined from the parking areas referred to in the recent assessment of parking charges by Stirling Council. Parking Area C on street and off street is the key area to lose patronage, as public parking duration is possible between 2 – 3hr, as shown in Appendix C. It has been assumed that 30% of car parking is being abstracted from public on street and off street car parks in the interpeak and Saturday. The proposed cost for public parking at medium term car parks is £2.50 per 3hr.

It has been assumed that there are no user time benefits to Park & Ride patrons as no bus priority has been assumed to be possible within the outline schemes.

Vehicle Operating Costs Benefits

Vehicles operating cost benefits are included. These are the vehicle operating savings from a reduced number of vehicle kilometers travelled by patrons of the Park & Ride. Fuel and non fuel costs are based on the guidance in WebTAG[25] . The reduction in driving distance one way from the sites into Stirling is on average:

- Site 1 4.9km
- Site 5a (milton r/b) 4.3km
- Site 5a (alternative) 4.4km
- Site 8 4.3km

Private Sector Operator Impacts

Investment Costs

For the purposes of this study it is not expected that there will be private sector investment costs associated with the proposals.

Operating & Maintenance Costs

For the purposes of this study it is not expected that there will be private sector operating and maintenance costs associated with the proposals. All bus and site operating and maintenance costs are assumed to be associated with the public sector. This is the same business case model as the existing Park & Ride sites in Stirling.

Revenues

It is expected that there will be a loss of private sector revenue for use of private car parks in Stirling city centre but that this is not a material consideration in this study.

[25] http://www.dft.gov.uk/webtag/documents/expert/unit3.5.6.php#013

Grant/Subsidy payments

It has been assumed that there will be no private sector grant funds will be available. There may be opportunities to review this in the future subject to the emerging Local Development Plan but no assumption has been made in this assessment.

TEE Monetised summary

A TEE monetised summary is given in the costs to government summary shown in Tables 4.11, 4.12 and 4.13.

Catchment Growth

The level of road traffic growth over time has been established using LATIS catchment data. The growth between 2012 and 2022 for all cars was shown to be 42% in the morning peak and 22% in the interpeak and Saturday.

LATIS support have confirmed that - there does appear to be a considerable increase in traffic growth throughout the data sets. This trend is likely to stem from a number of key factors:

1. Changes in car ownership and car availability levels over time resulting from assumed National economic growth would increase the general level of car trip making across Scotland. Note that the National change in car trip making between 2007 and 2022 is around 20%, but does vary by area.
2. The majority of traffic growth is likely to reflect the land use development and population aspirations of Local Authorities, and is associated with the plans received from various authorities.

In terms of anticipated changes in employment levels, the model forecasts suggest that the Stirling area would have the second highest percentage growth in jobs across Scotland (up to 2022). This increase in attractiveness would attract a number of additional trips from surrounding Local Authorities.

Furthermore, the forecasts also indicate a large population growth in surrounding Local Authorities (some of the largest population increases across Scotland). For example West Lothian is anticipated to grow significantly, and the Falkirk area also demonstrates a large increase in population. In the case of Falkirk, there is not a similar increase in employment, therefore a proportion of the additional population may have to travel further to access new employment areas – potentially in the Stirling area.

3. Finally, the infrastructure changes assumed to be introduced over this time scale will also affect the level of trip making. For example the M80 Upgrade is forecast to reduce the travel costs/time between Glasgow and Stirling, and therefore is likely to increase trip making between these areas (as this journey becomes more accessible).
4. It should also be noted that a considerable population growth in Glasgow is also forecast, and as the movements between Glasgow and Stirling are relatively small in the base year, this is likely to account for the large (%) growth between Glasgow and Stirling over time.

In summary, the considerable growth in trip making to/from Stirling is due to a combination of factors: the underlying growth in car ownership, the particular nature of the planning data in this

area and the committed transport infrastructure schemes (although noting that some percentage growth figures relate to fairly small base year (absolute) travel movements.

The assessment by LATIS for projected traffic growth on the corridor supports the need for Park & Ride in the south of Stirling to enable transfer to public transport for local and strategic trips, this may be particularly effective for new trips on the network where changing mode may be achieved through new trip choice rather than existing trip persuasion.

Potential Strategic Park & Ride Test

LATIS support also suggests that where focussing on strategic journeys, although it is difficult to judge the potential outcomes of proposed interventions prior to actually running the model, the data prepared to date does suggest some potential for a new Park & Ride interchange at the South of Stirling. Although the data also suggests that there would be a number of competing interchange locations to choose to travel between Stirling and Glasgow and Edinburgh. Furthermore, to provide a competitive alternative for many motorists, bus services may also have to provide reasonable access to areas out with Glasgow and Edinburgh city centre.

Another key feature would relate to the payment of parking charges in central Stirling, and whereby the new Park & Ride site would provide free parking and potentially a cheaper fare to travel between the major cities (compared to rail) - features that the National Model covers.

These potential impacts, coupled with the predicted increase in trips to and from Stirling over time do suggest some value in running a test using TMfS:07, however, it was noted that a proportion of demand associated with new Park & Ride facilities is likely to be associated with a transfer effect from other existing or planned interchange options; as a point for future consideration the Park & Ride could be tested on a national level.

4.5.5 Wider Economic Benefits (WEBs)

Wider Economic Benefits are described by *STAG* as being derived from the impact of transport upon agglomeration and the underlying relationship of impacts on agglomeration upon productivity. *STAG* goes on to confirm that schemes should be appraised in terms of the following transport impacts:

- Agglomeration economies
- Increased output in perfectly competitive markets
- Wider benefits arising from improved labour supply

STAG confirms that a scheme's impact on agglomeration economies can be identified through a qualitative appraisal of the change in effective density and employment patterns which is expected as a result of the scheme. It is considered that the proposed Park & Ride will not have an impact on local employment patterns.

In terms of appraising a scheme's impact on competitive markets, *STAG* confirms that the scale of expected time savings should be quantified focusing on business time savings. It is considered that the proposed Park & Ride will have a negligible impact on competitive markets given the scale and form of the proposed scheme.

STAG confirms that a schemes impact on improving the labour supply should be quantified in terms of its impact on the labour market focusing on identifying gains and losses resulting from the redistribution of employment. The Guidance suggests that this should only be appraised

where relevant and it is not considered to be relevant to the proposed Park & Ride which is supported by this study.

Given the scale and form of development which is proposed and the expected minor impact of the Park & Ride development on WEBs, it is not intended to undertake a WEB appraisal as part of this *STAG*.

It is, however, expected that the proposed Park & Ride will go some way to assisting with the economic growth of Stirling. The Report *Stirling City Vision* (Stirling Council, January 2010) [26] confirms that

> *A key role of the city is to become a 'house of knowledge' to grow the economic base of the wider Stirling area, exploit strategic and local connectivity and crucially build on the knowledge resources of the university and the colleges.*

The Report confirms that the location of Stirling in relation to large employment centres in the central belt acts a disadvantage encouraging the majority of residents to travel outwards with little return for the city. The Report goes on to confirm that

> *The movement systems should be designed to enable and encourage choices. If Stirling is to enjoy the benefits of its connected position without becoming a commuter settlement, it must increase its internal connectivity so that it is as easy to go to the centre of Stirling as it is to go to the centre of Edinburgh or Glasgow.*

With regard to the A9 corridor, the Report confirms that

> *The A9 is a strategic corridor which forms a backbone of the urban structure of Stirling, connecting the strategic motorway network through the city to the university. The route connects the two strategic gateways to the north and the south, and passes through a diverse range of character areas.' The report goes on to confirm that 'the spine both acts as an opportunity to pull the structure of the city together and form the opportunity to develop a series of mixed use, mixed tenure sustainable communities.*

It is considered that the proposed Park & Ride will enhance the economy of the town by encouraging employees to access opportunities which are provided in the centre of Stirling.

It has not been possible to quantify the wider economic benefits in this case.

Strategic Impact

A review of strategic potential has been undertaken by abstracting data from the LATIS model.

Notes that came with the data suggest that - within the more strategic analysis of Stirling to Edinburgh and Glasgow travel movements, the data suggests that there are relatively few car based trips travelling from the Stirling area to the Central areas of Edinburgh and Glasgow. However, there is a much larger proportion of public transport trips travelling between the central areas of these cities. These trends are likely to reflect the cost of parking in these areas and the existing provision of Public Transport services along these routes.

The analysis also indicates that car orientated trips tend to destinate in the more peripheral areas of Glasgow and Edinburgh, which perhaps suggests a more dispersed nature of car travel, compared with public transport trip making. Although, in terms of potential Park & Ride interventions this might suggest opportunities for new services accessing the outskirts of these major cities where appropriate.

[26] http://www.stirling.gov.uk/stirling_city_vision_28_01_10-2.pdf

The catchment area analysis indicates that the vast majority of car trips heading to the centre of Stirling originate from the Falkirk and North Lanarkshire local authority areas.

There are also a number of trips originating from the Bannockburn area to the south of Stirling, although, with potentially being located to the north of a new Park & Ride site, it might be unlikely that these motorists would choose to use Park & Ride into Stirling.

Although West Lothian only has a relatively small amount of trips heading to Stirling centre in the base year, these are forecast to increase over time. This trend reflects the land use and development aspirations of the relevant Local Authorities.

The select link matrices illustrate the general travel patterns of traffic using each of the relevant routes. Obviously the vast majority of traffic is located on the Motorway network, and the longer distance and dispersed nature of this traffic is illustrated in the routeing analysis maps. The origins and destinations of traffic using the two other roads have much more local catchment areas.

Appendix H contains select link analysis plots of key routes to the south of Stirling. This demonstrated the branchlike nature of traffic using these corridors. Traffic originates and is destined for a variety of places, i.e. not all travelling to or from the centre of towns or cities.

4.5.6 Economic Activity and Location Impacts (EALIs)

An Economic Activity and Location Impacts (EALI) assessment provides an assessment of the impact of transport investment on the economy measured in terms of income (GDP or GVA) and/or employment.

STAG confirms that the Economic Activity and Location Impacts of a scheme should be appraised in terms of the following:

- Local Economic Impacts
- National Economic Impacts
- Distributional Impacts

Given the form and scale of the proposed facility, it is considered that a qualitative assessment of the impact of the Park & Ride is appropriate to support this study.

Local Economic Impacts

In terms of qualitative information, *STAG* requests that local sectors which are likely to gain or loose economic activity as a result of the proposal be highlighted in addition to identifying geographic areas which are likely to gain or loose.

The proposed Park & Ride is expected to have a positive impact on the local economy by providing a means with which residents living in and around the south of Stirling can conveniently access employment opportunities provided in Stirling. The Park & Ride bus service will route past the Stirling Royal infirmary, Police Headquarters and Stirling Council's office in addition to providing access to employment opportunities located in the centre of Stirling.

In addition to attracting employees, Stirling provides a number of tourist attractions including Stirling Castle and Bannockburn Heritage Centre which currently attract tourists to the city. It is

considered that the Park & Ride will provide an alternative means of accessing the city and its associated facilities for tourists potentially attracting trade which currently passes the city on the strategic road network. The Castleview Park & Ride site includes a waiting area which has a range leaflets providing information on a range of local attractions. Local maps are also available in the waiting area. The proposed Park & Ride could potentially offer similar information within the waiting area and it is suggested that this could offer a facility which complements existing Stirling tourist information points and could be used (if appropriately signed) to attract tourists to the city from the south.

It is considered that the development of any of the three site options as a Park & Ride will not have an impact on the Inverbervie slip roads.

In summary, it is considered that the proposed Park & Ride will have a minor benefit on the local economy of Stirling by providing an additional means and alternative to the car, to directly access the centre of Stirling with its associated employment and tourist facilities.

National Economic Impacts

As when identifying local economic impacts, *STAG* requests that national sectors which are likely to gain or loose economic activity as a result of the proposal be highlighted in addition to identifying geographic areas which are likely to gain or loose.

It is considered that the proposed Park & Ride will have a negligible impact when measured against the national economy. The Park & Ride is, however, likely to generate a minor benefit by providing an additional means for local residents to access strategic express bus services which provide access to employment opportunities located in the major employment centres of Edinburgh and Glasgow.

Distributional Impacts

With regard to identifying the distributional impact of the proposed scheme, *STAG* requests that information be supplied on the local economy including clarification if the economy is economically depressed or otherwise deprived. In addition, information is to be supplied where there is expected to be specific gains or loses in designated regeneration areas including in terms of social groups which stand to gain or lose as a result of the development.

The area within which the three sites are located, is rural in nature and therefore currently sparsely populated although there are plans to introduce significant levels of development to the area which will be defined in the emerging Stirling Council LDP. The *Stirling City Vision* [27] confirms that it is perceived that "there is a large outward commuting population to the main cities of Glasgow and Edinburgh for high value employment opportunities." While the provision of a Park & Ride in a location which is accessible by express bus services could further encourage local residents to commute to opportunities in Edinburgh and Glasgow, it is expected that the Park & Ride will also encourage employees to commute to opportunities in Stirling.

A review of the area in terms of the demographics of the population has been undertaken in Section 3.3. The review confirms that the A872 corridor (Sites 5a and 8) has a greater proportion of the population who are economically active when compared to the A9 corridor (Site 1). This trend is replicated when comparing the proportion of households which do not have access to a car; with this proportion being greater for the A9 corridor when compared to

[27] http://www.theblendfestival.co.uk/stirling_city_vision_28_01_10-2.pdf

the A872 corridor, potentially reflecting the proportion of the population who are reported to be economically active.

This data would suggest that there would be benefit in locating the Park & Ride on Site 1, although the size of the datazones from which the data has been extracted, may potentially have an impact on the suitability of the derived data as the sites are located on the northern edge of the datazones from which the statistical data has been extracted.

For the purpose of this study it has been assumed that the proposed Park & Ride would be served by an extension of the existing Castleview Park & Ride service. Borestone is located approximately 2km to the south of Stirling City Centre immediately to the west of the A872. This Scottish Index of Multiple Deprivation confirms that the area is within the 5% most deprived areas in Scotland and it considered that improving the service provision on the A872 corridor will provide additional opportunity for local residents to access employment opportunities in Stirling.

4.5.7 Integration

STAG sets out the following three sub-criteria which should be considered to inform the Detailed Appraisal:

- Transport Integration – the degree to which an option fits with other transport infrastructure and services
- Transport and Land-Use Integration – the fit between an option and established land-use plans and land-use/transport planning guidance
- Policy Integration - the appropriateness of an option in light of wider policies including those of both Central and Local Government

Transport Integration

The provision of a Park & Ride facility to the south of Stirling will provide integration between the car and the strategic and local bus networks. This will in turn afford connection into the centre of Stirling and its associated rail station for the opportunity for onward travel by rail.

Both Sites 5a and 8 have the potential to be served by express bus services given their proximity to the M9/M80 interchange and their location adjacent to the A872, which is currently used by strategic bus services connecting Stirling with Edinburgh and Glasgow. It is considered that Site 1 has limited potential to be served by strategic bus services given its location in relation to the A872 corridor, 0.6km from the A872.

It is envisaged that the ticketing system currently in place at the existing Stirling Park & Ride sites will be introduced at the proposed Park & Ride. This system provides free parking with tickets purchased when boarding the bus. Discounts are available for multiple journey tickets. It is expected that the facility will be able to be used by non Park & Ride specific bus services (including strategic express services) with passengers purchasing tickets on boarding. It is considered that there is limited opportunity to introduce a seamless ticketing system in association with the proposed Park & Ride.

All three site options are expected to enhance transport integration by allowing greater flexibility in access to local and strategic public transport with services able to function in complementary manner.

Transport and Land-Use Integration

Site 1 has some potential to be incorporated and suitably connected within an area considered for future development. The site is within the perceived city boundary of the A91 with potential development land around it. The site is located within 1km of an established residential area (Bannockburn) with opportunity to be accessed on foot without the need to cross the A91. A large proportion of the residential area is located to the north-east of the A9 which presents a barrier to movement although there are crossing facilities provided in the form of pedestrian refuges, on the A9 to the north-west of the A91. Development of the area in the vicinity of the site is likely to incorporate a comprehensive network of pedestrian facilities and improve the accessibility of the site from the surrounding area.

Site 5a has some potential to be incorporated and suitably connected in an area considered for future development. The site is within the perceived city boundary of the A91 with potential development land around it, although west of the A872 that could be a barrier to potential development linkages to the east of the A872. The LDP is still in development, but the site may be being considered for future business uses to complement the business uses already adjacent. The nearest established residential area is located approximately 500m to the north of the site and is located to the west and east of the A872. The road presents a barrier to movement and currently has limited pedestrian crossing facilities with none provided to the south of Milton Grove. Lit footways are, however, provided adjacent to the A872.

Site 8 has some potential to be incorporated and suitably connected within an area considered for future development. The site is also located within the perceived city boundary of the A91 with potential development land around it. The site is located approximately 1km to the south of the nearest residential areas of Borestone and around the same distance to the south-west of Bannockburn.

Sites 1 and 5a are allocated in the current Local Plan (1st Alteration, Stirling Council 2 August 2007) for employment use although the LDP is currently under review. Site 8 is not shown to be allocated for any for of development in the current Local Plan although it is the closest of the three sites to the Major Development Area at Durrieshill. All Sites land areas are shown for development consideration in the preferred option of the draft Main Issues Report, April 2009.

All three sites are located in locations which are unlikely to be convenient to access on foot due to the location of the sites in relation to existing residential areas. There may, however, be opportunity to improve the accessibility of the sites should the surrounding area be developed to include a comprehensive network of pedestrian facilities with connection between the sites and areas of residential development. The development of a Park & Ride is intended to contribute to national policy by encouraging a switch from private cars and therefore minimising emissions.

Policy Integration

The proposed Park & Ride is primarily targeted at car users and encouraging a mode shift to public transport for journeys into Stirling and into the centre of Edinburgh and Glasgow. The facility can also be used as a convenient point to meet by those wishing to car share. By targeting car drivers, it is expected that the proposed Park & Ride will provide an attractive facility for those who live in rural areas where public transport provision is at a level which is less than the equivalent urban area.

The proposed site will also be made accessible by cycle and on foot with secure cycle lockers provided for the storage of cycles. The Park & Ride will enable those accessing the site on foot or by cycle to continue their journey by bus or car share. The provision of a Park & Ride site on

any of the proposed sites will provide a location at which residents will be able to access local and strategic bus services. Encouraging access to the sites by active modes of travel, accords with national policy on health.

The introduction of a Park & Ride with its associated bus service providing connection to the city centre will increase the service frequency on the A872 corridor improving the service provision for residents currently travelling into the centre of Stirling introducing benefits in terms of social inclusion. This is considered to be of significant importance given the demographics of the area through which the services will travel. As highlighted previously, the area of Borestone is shown to be in the top 5% of the most deprived areas in Scotland.

It is expected that the Park & Ride will be served by low floor buses similar to those currently serve the existing Stirling Park & Ride sites. The facility will be designed to be *Disabilities Discrimination Act 2005 (DDA)* compliant and to be accessible by all.

4.5.8 Accessibility and Social Inclusion

For the Detailed Appraisal, *STAG* confirms that the following aspects are required to be assessed to appraise a scheme's impact in terms of accessibility and social inclusion:

- Community Accessibility:
  - Public Transport Network Coverage
  - Local Accessibility
- Comparative Accessibility:
  - People group
  - Geographic location

Community Accessibility

The introduction of a proposed Park & Ride to the south of Stirling will provide an additional location at which residents will be able to access local and strategic bus services. The facility may be served by an extension of the existing Castleview Park & Ride bus service which will operate on an existing bus service corridor. While this will not increase the public transport network coverage it will increase the frequency of services on the A872 corridor, so increase the attractiveness of the service corridor.

The existing Castleview Park & Ride service currently terminates at the Stirling Royal Infirmary. It is proposed to extend this south with the service route altered from its existing alignment to return to the city centre via its outbound route. This will provide a local service connecting the south of Stirling with the city centre and its associated employment opportunities, including Stirling Council's office (Viewforth). The service will also provide direct access into the Royal Infirmary site enhancing the accessibility of the facility for residents living in the south of Stirling.

The proposed Park & Ride facility will generate an effective extension to the existing catchment which is served by the bus network by offering an opportunity to access the network by car.

The nature of the proposals has required the site options to be located within easy access of key routes into Stirling to ensure that they are accessible by car. While the sites will be accessible on foot and by cycle, their locations are unlikely to result in the facilities being located within convenient walking distance of established residential areas.

The location of Sites 1 and 8 provide opportunity for access from the Bannockburn residential area without the need to cross any major roads although the area in the vicinity of the sites currently has limited provision for pedestrians and cyclists which will present a barrier to movement. The A872 presents a barrier to movement between Site 5a and the established residential area which is located to the north-east of the site. It is suggested that consideration be given to improving facilities for pedestrians and cyclists in association with the development of the Park & Ride. Facility improvements could include the provision of additional crossing facilities on the A872 in the vicinity of Site 5a.

Comparative Accessibility

The proposed Park & Ride is expected to benefit all social economic groups. Passengers who access the site by car are expected to be in the upper end of the groups, however, the sites will also be accessible on foot and by cycle to ensure those who do not have access to a car are not excluded from using the facility.

The introduction of a Park & Ride will be associated with the extension of the existing Castleview Park & Ride site bus service. This will improve the service frequency offered by the A872 bus service corridor and enhance the accessibility of the Royal Infirmary site and the city centre for residents living on the route. This Scottish Index of Multiple Deprivation confirms that Borestone which is located adjacent to the A872, is within the 5% most deprived areas in Scotland and it considered that improving the service provision on the A872 corridor will provide additional opportunity for local residents to access employment opportunities in Stirling.

Equality Impact Assessment

STAG provides the following guidance when undertaking an appraisal of a scheme in terms of its impact on equality:

> *The Public Sector Equality Duties require public bodies to promote race, disability and gender equality. As part of this requirement public bodies should take due consideration of the impact of their policies and practices on race, disability and gender issues through the undertaking of an Equality Impact Assessment. It is also good practice for account to be taken of age, sexual orientation and faith.*

It is considered that the proposed Park & Ride will not have a negative impact in terms of equality.

Although the facilities will be targeted at all users, the survey of existing Stirling Park & Ride passengers suggests that the greatest proportion of passengers are female. In addition, a large proportion of users are recorded as being aged 60 or over confirming the importance of ensuring that the Park & Ride site is safe and secure.

As described in Section 4.4.2 of this report, the Park & Ride will be designed to a Park Mark Safer Parking Scheme standard. This is an initiative of the Associations of Chief Police Officers aimed at reducing both crime and the fear of crime in parking facilities.

4.6 Cost to Government

4.6.1 Investment Costs

Government investments costs in this case have included a summation of site construction and land costs plus two new buses at £110,000 each. They could then be leased thereafter.

4.6.2 Operating and Maintenance Costs

Operating and maintenance costs in this case have included a summation of annual bus service costs (drivers, fuel, tyre, maintenance, etc.) and Park & Ride operation. Data for this was abstracted from the *Stirling Western* (*Castleview) Park & Ride Business Case (October 2007)* that was recently opened in 2008. Based on the *Castleview Business Case*, annual bus service costs are around £145,000 - £160,000 depending on the site (based on two new buses being operated). Park & Ride site operation costs are £75,000 per annum. A breakdown of costs is shown in Table 5.2.

4.6.3 Grant and Subsidy Payments

It was assumed that there would be no grant payments or developer contributions.

4.6.4 Revenues

Bus Revenue was determined from forecasting that had been annualised and projected for the study period. Adult returns were assumed to be £1 and National Entitlement Cards were assumed to render 67% income from central government. No internal bus trips have been assumed. It should be noted that not all Park & Ride users have been abstracted from city centre parking, a small proportion are new users as derived from survey data (16%-26% depending on time of day). A proportion of Park & Ride users have also been abstracted from Springkerse Park & Ride and the income from these has not been taken as a benefit as it would be abstracted from Springkerse Revenue.

4.6.5 Indirect Tax Revenue

Indirect tax revenue can be affected by a reduction in vehicle kilometers and subsequent reduction in the use of fuel that is taxed. This is not a material consideration in this case.

4.6.6 Summary of Economic Assessment

Tables 4.11 – 4.13 show the headline figures that are used for economic assessment for each of the site options.

Site 1 has the most carbon savings due to its relative distance from the centre of Stirling. Safety benefits are accrued by Site 1 and Site 5a where they provide a new roundabout access arrangement replacing existing priority junctions. A signalised junction exhibits some negative safety impacts at the Site 8 location.

Reductions in journey time in Stirling due to slightly reduced traffic volumes give some user benefits to Site 5a and 8 and less so to Site 1, but these are minor benefits. User charges benefits from the net difference between the cost of city centre parking and the cost of bus travel are the highest where the highest patronage is evident from sites 5a and 8. Vehicle operating costs benefits are the highest where the greatest distance from Stirling centre is saved, this occurs at Site 1. There are no private sector impacts assessed and there were no wider economics impacts assessed.

Public sector investment costs relate to the costs of the site construction and the costs of acquiring buses. The highest public sector investment costs are associates with Site 5a with a new roundabout junction mainly sue to costs of construction. The least expensive investment costs are associated with Site 5a which has the least investment costs. Public sector operating and maintenance costs that include site and bus operation are marginally the highest at Site 1, as

it has a longer bus route. There are no grant/subsidy payments assumed in the assessment, these may have come from the private sector if they had been available, but none have been identified to date.

In the case of public sector revenues there are three elements that have been included. These are, bus fare revenue including NEC payments, loss of council owned parking revenue and loss of bus revenue from Springkerse. The most bus fare revenue comes from the most patronage at Sites 5a and 8, this equally effects loss of parking revenue and loss of bus fare revenue from Springkerse. Overall, the bus fare income revenue assists in offsetting the loss of parking revenue and Springkerse bus revenue with Sites 5a and 8 having the least negative impact.

Through a combination of the factors described above the Present Value of Benefits (PVB) is the highest at Sites 1 and 5a with a proposed roundabout, this is primarily from accrued monetary safety benefits from accident reduction. The Present Value of Costs (PVC) to government is the least at Site 5a using the existing junction access primarily the difference between the site is due to cost of construction.

The Net Present Value (NPV) of each site is negative as the costs out way the benefits. Of the sites, Site 5a using the existing junction access has the least negative value although there is not a large variance between the sites. The Benefit to Cost Ratio (BCR) of the sites is used as a measure of overall performance of an option. The BCR of Site 1 is the highest at but this is very closely followed by Site 5a where it has a proposed roundabout. Site 5a with the existing roundabout follows, with Site 8 having the least beneficial BCR.

A secondary test was undertaken where the loss of Stirling parking revenue was not included. Where a BCR is one or above then there is a clear case for investment by government. The BCR of each site showed an improvement where parking loss was removed, but were still less than one. The economic tests in this study give a means of comparison between the sites on the monetary values derived. By removing the car parking loss element the relative BCRs of the sites remained the same. The BCR of Site 1 is the highest at but this is very closely followed by Site 5a where it has a proposed roundabout. Site 5a with the existing roundabout follows, with Site 8 having the least beneficial BCR.

4.7 Option Summary Tables

STAG Option Summary Tables have not been produced for this study, further to instruction from Transport Scotland.

Table 4.11 : Economic Assessment of Site 1

	Option: Access Option: New buses:	Site 1 Proposed Roundabout 2
Economic Assessment Criteria	**STAG Ref.**	**Value**
Environment		
Global Air Quality – CO_2	PV1	£316,441
Physical Fitness	PV2	£0
Environment Monetised summary	PV1+PV2	£316,441
Safety		
Accidents,Total Discounted Savings	PV3	£1,284,000
Economy (Transport Economic Efficiency)		
User Benefits		
User Benefits Travel Time	PV4	£20,884
User Charges	PV5	£376,029
Vehicle Operating Costs	PV6	£2,554,683
Private Sector Operator Impacts		
Investment Costs	PV7	£0
Operating & Maintenance Costs	PV8	£0
Revenues	PV9	£0
Grant/Subsidy payments	PV10	£0
TEE Monetised summary	PV11	£2,951,595
Wider Economic Benefits		
Agglomeration economies (WB1)	PV12	£0
Increased output in perfectly competitive markets (WB3)	PV13	£0
Wider benefits arising from improved labour supply (WB4)	PV14	£0
WEBS Monetised summary	PV15	£0
Cost to Public Sector		
Public Sector Investment Costs	PV16	-£3,350,347
Public Sector Operating & Maintenance Costs	PV17	-£8,982,797
Grant/Subsidy Payments	PV18	£0
Bus Fare Revenue from new site		£1,996,822
Loss of Parking Revenue to Public Sector		-£1,255,964
Loss of bus revenue from Springkerse		-£636,428
Revenues	PV19	£104,430
Taxation impacts	PV20	£0
Monetised Summary		
Present Value of Transport Benefits	PVB	£4,552,036
Present Value of Cost to Government	PVC	-£12,228,714
Net Present Value	NPV	-£7,676,677
Benefit-Cost to Government Ratio	**BCR**	**0.37**
Benefit-Cost to Government Ratio (including WEBs)	BCR (inc WEBS)	0.37
Benefit-Cost to Funding Agency Ratio	BCR (F. Agency)	0.37
BCR Ratio (No Loss Parking Revenue)	**BCR(NLPR)**	**0.44**
Total Public Sector Funding Requirement:		
Capital costs/grant (undiscounted)		£2,669,020
Optimism bias		1.44
Bus Investment (undiscounted)		£220,000
Capital costs/grant (undiscounted) with Optimism Bias		£4,063,389
Annual revenue support (undiscounted)		£191,315
Present Value of Cost to Govt	PVC as above	-£12,228,714
Amount of Application		TBA

Notes:
Prices are at a 2002 base unless otherwise stated. A 60 year period of assessment was undertaken.
Retail Price Index 2002-2009 was applied at 0.804, Inflation 2.5% thereafter
Discount Rate of 3.5% applied for 0 to 30 year assessment and 3% for 31 to 60 year

Table 4.12 : Economic Assessment of Site 5a (Initial and Alternative Access Options)

	Option:	Site 5a Initial (Existing Milton Roundabout)	Site 5a Alternative (Proposed Roundabout)
	Access Option:	2	2
	New buses:		
Economic Assessment Criteria	**STAG Ref.**	**Value**	**Value**
Environment			
Global Air Quality – CO_2	PV1	£268,311	£268,311
Physical Fitness	PV2	£0	£0
Environment Monetised summary	PV1+PV2	£268,311	£268,311
Safety			
Accidents,Total Discounted Savings	PV3	£0	£1,284,000
Economy (Transport Economic Efficiency)			
User Benefits			
User Benefits Travel Time	PV4	£57,857	£57,857
User Charges	PV5	£396,078	£396,078
Vehicle Operating Costs	PV6	£2,329,781	£2,383,962
Private Sector Operator Impacts			
Investment Costs	PV7	£0	£0
Operating & Maintenance Costs	PV8	£0	£0
Revenues	PV9	£0	£0
Grant/Subsidy payments	PV10	£0	£0
TEE Monetised summary	PV11	£2,783,716	£2,837,897
Wider Economic Benefits			
Agglomeration economies (WB1)	PV12	£0	£0
Increased output in perfectly competitive markets (WB3)	PV13	£0	£0
Wider benefits arising from improved labour supply (WB4)	PV14	£0	£0
WEBS Monetised summary	PV15	£0	£0
Cost to Public Sector			
Public Sector Investment Costs	PV16	-£2,269,777	-£3,997,496
Public Sector Operating & Maintenance Costs	PV17	-£8,420,759	-£8,420,759
Grant/Subsidy Payments	PV18	£0	£0
Bus Fare Revenue from new site		£2,160,431	£2,160,431
Loss of Parking Revenue to Public Sector		-£1,355,537	-£1,355,537
Loss of bus revenue from Springkerse		-£686,632	-£686,632
Revenues	PV19	£118,262	£118,262
Taxation impacts	PV20	£0	£0
Monetised Summary			
Present Value of Transport Benefits	PVB	£3,052,027	£4,390,208
Present Value of Cost to Government	PVC	-£10,572,273	-£12,299,992
Net Present Value	NPV	-£7,520,246	-£7,909,784
Benefit-Cost to Government Ratio	**BCR**	**0.29**	**0.36**
Benefit-Cost to Government Ratio (including WEBs)	BCR (inc WEBS)	0.29	0.36
Benefit-Cost to Funding Agency Ratio	BCR (F. Agency)	0.29	0.36
BCR Ratio (No Loss Parking Revenue)	**BCR(NLPR)**	**0.36**	**0.43**
Total Public Sector Funding Requirement:			
Capital costs/grant (undiscounted)		£1,758,920	£3,214,075
Optimism bias		1.44	1.44
Bus Investment (undiscounted)		£220,000	£220,000
Capital costs/grant (undiscounted) with Optimism Bias		£2,752,845	£4,848,268
Annual revenue support (undiscounted)		£174,882	£174,882
Present Value of Cost to Govt	PVC as above	-£10,572,273	-£12,299,992
Amount of Application		TBA	TBA

Notes:

Prices are at a 2002 base unless otherwise stated. A 60 year period of assessment was undertaken.

Retail Price Index 2002-2009 was applied at 0.804, Inflation 2.5% thereafter

Discount Rate of 3.5% applied for 0 to 30 year assessment and 3% for 31 to 60 year

Table 4.13 : Economic Assessment of Site 8

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	Option: Access Option: New buses:	Site 8 Proposed Signal junction 2
Economic Assessment Criteria	**STAG Ref.**	**Value**
Environment		
Global Air Quality – CO_2	PV1	£268,311
Physical Fitness	PV2	£0
Environment Monetised summary	PV1+PV2	£268,311
Safety		
Accidents,Total Discounted Savings	PV3	-£536,000
Economy (Transport Economic Efficiency)		
User Benefits		
User Benefits Travel Time	PV4	£57,857
User Charges	PV5	£396,078
Vehicle Operating Costs	PV6	£2,329,781
Private Sector Operator Impacts		
Investment Costs	PV7	£0
Operating & Maintenance Costs	PV8	£0
Revenues	PV9	£0
Grant/Subsidy payments	PV10	£0
TEE Monetised summary	PV11	£2,783,716
Wider Economic Benefits		
Agglomeration economies (WB1)	PV12	£0
Increased output in perfectly competitive markets (WB3)	PV13	£0
Wider benefits arising from improved labour supply (WB4)	PV14	£0
WEBS Monetised summary	PV15	£0
Cost to Public Sector		
Public Sector Investment Costs	PV16	-£3,223,168
Public Sector Operating & Maintenance Costs	PV17	-£8,420,759
Grant/Subsidy Payments	PV18	£0
Bus Fare Revenue from new site		£2,160,431
Loss of Parking Revenue to Public Sector		-£1,355,537
Loss of bus revenue from Springkerse		-£686,632
Revenues	PV19	£118,262
Taxation impacts	PV20	£0
Monetised Summary		
Present Value of Transport Benefits	PVB	£2,516,027
Present Value of Cost to Government	PVC	-£11,525,665
Net Present Value	NPV	-£9,009,638
Benefit-Cost to Government Ratio	**BCR**	**0.22**
Benefit-Cost to Government Ratio (including WEBs)	BCR (inc WEBS)	0.22
Benefit-Cost to Funding Agency Ratio	BCR (F. Agency)	0.22
BCR Ratio (No Loss Parking Revenue)	**BCR(NLPR)**	**0.27**
Total Public Sector Funding Requirement:		
Capital costs/grant (undiscounted)		£2,561,905
Optimism bias		1.44
Bus Investment (undiscounted)		£220,000
Capital costs/grant (undiscounted) with Optimism Bias		£3,909,143
Annual revenue support (undiscounted)		£174,882
Present Value of Cost to Govt	PVC as above	-£11,525,665
Amount of Application		TBA

Notes:

Prices are at a 2002 base unless otherwise stated. A 60 year period of assessment was undertaken.
Retail Price Index 2002-2009 was applied at 0.80, Inflation 2.5% thereafter
Discount Rate of 3.5% applied for 0 to 30 year assessment and 3% for 31 to 60 year

4.8 Risk and Uncertainty

4.8.1 Introduction

STAG requires that all risks and uncertainties be fully identified and accounted for in the appraisal of the developed options. The Guidance goes on to refer to the *HM Treasury Green Book (2003)* and confirms that there is likely to be some difference between what is expected and what actually happens citing bias unwittingly inherent in the appraisal process, and risks and uncertainties that materialise.

STAG suggests that practitioners have a tendency to be overly optimistic when appraising scheme options and the Guidance goes on to confirm the importance of identifying and mitigating the potential risks making allowances for Optimism Bias.

The following sections set out the risks and uncertainties which could be associated with the appraisal presented in this Report.

4.8.2 Risk Management

There are a series of risks associated with the Park & Ride site options and associated transport interventions and the methodology used to inform this study:

- Uncertainty over the final LDP.
- Traffic generation estimated using a Logit model which was based on AM peak travel habit data and commuter costs only.
- LATIS has derived growth assumptions based on data supplied by Local Authorities in 2007 which could over estimate the growth and resultant number of passengers attracted to the sites in the future year development scenarios.
- The value of the land is a crude estimate and is dependant upon what existing permissions and zoning are given upon it. Land prices are particularly volatile in the current economic climate.
- These layouts are purely indicative and have been created with only information available from site visits, photographs, etc.
- Costs for diversionary public utilities works are estimates and assumptions have been made from with observations made from site visits, mappings and aerial photographs.
- Costs associated with disruption to the local road network during development access construction both in terms of traffic management and user delay costs.
- Potential cost involved with the disposal of contaminated ground which is expected to have an impact on the development of Site 1 and the construction of the alternative access option to support the development of Site 5a.
- Unknown ground conditions in the vicinity of Site 8.
- Environmental Assessment has been undertaken at a strategic level and does not include the detailed quantification of air pollutant concentrations and noise levels, which generally take place later when assessing a scheme at a local project level.

It is suggested that the identified risks should be mitigated by:

- Detailed investigation of potential issues as part of the detailed design process

- Detailed design of infrastructure associated with the proposed Park & Ride facility
- Topographical survey required to inform the detailed design of the developments
- Obtain Coal Mining Reports to gather more information of former coal mining activity – particularly applies to Sites 1 and 5A.
- If any evidence of contamination became evident during development of any of the sites Stirling Council Environmental Health department should be notified and the contamination investigated and the area remediated as necessary.
- Confirm Battle of Bannockburn site boundary with Historic Scotland once information is available and review with Stirling Council.
- Further consider potential impact on 18th – 20th century smallholdings for Sites 5A and 8

There is potential for other wider issues to have an impact on the introduction of a Park & Ride to the south of Stirling:

- Emerging Stirling Council LDP land allocations
- Capital and revenue funding
- Availability and national funding of National Entitlement Cards
- Changes in inflation and fuel prices

4.8.3 Quantified Risk Assessment (QRA)

Tables 4.13 – 4.15 summarise the Quantified Risk Assessment for Sites 1, 5a and 8 in terms of the potential risks which have been identified in the previous section.

Table 4.14 :Quantified Risks Assessment - All Sites

Policy Risk	Legislative Risk	The risk that changes in legislation increase costs. This can be sub-divided into general risks such as changes in corporate tax rates and specific ones which may change the relative costs and benefits of different procurement routes. [National Entitlement Card provision could potentially be at risk, the new rate of 67% reimbursement has been used]
	Policy Risk	The risk of changes of policy direction not involving legislation. [The risk associated with a rationalisation of parking charges in Stirling has been used. The effective change is that there is a drop of charges from £2.90 to £2.50 per trip applicable to this study]
Risk on Delivering the Asset	Construction Risk	The risk that the construction of the physical assets is not completed on time, to budget and to specification. The risk of inflation differing from assumed inflation rates, particularly for any schemes where construction is not expected to start until some years in advance. [Optimism bias has been applied at 44% on construction costs]
	Planning Risk	The risk that the implementation of a project fails to adhere to the terms of planning permission, or that detailed planning cannot be obtained, or, if obtained, can only be implemented at costs greater than in the original [Land costs have also had 44% applied as a proxy for this risk, there is a real risk about not knowing the form of the emerging LDP]
	Residual Value Risk	The risk relating to the uncertainty of the value of physical assets at the end of the contract. [No residual value risk has been assessed]
Risk on Operating the Asset	Operational Risk	The risk that operating costs vary from budget, that performance standards slips or that the service cannot be provided. [a substantial bus operation cost has been included of £143,260 that includes operator profit margins of 20%. Site operation costs have been checked against 09/10 Casleview budget and actual 08/09 estimated actual costs, this allows for 43% opimism bias. In sites 5a and 8 this cost would halve if a 15 minute bus frequency was acceptable. Site 1 can not achieve a 15 min freq with just one more bus operating]
	Inflation Risk	The risk that actual inflation differs from assumed inflation rates. [2.5% has been assumed as per Green Book]
	Maintenance Risk	The risk that the costs of keeping the assets in good condition vary from budget. [A substantial cost for site operation has been included £75,000 pa based on a previous estimate, this includes among other things: employee costs, CCTV costs and rates]
Risks on Demand and Revenue	Demand Risk	The risk that demand for the service does not match the levels planned, projected or assumed. As the demand for a service may be (partially) controllable by the government, the risk to the public sector may be less than that perceived by the private sector. [The quantifed site use is felt to be a conservative estimate. There may be some slight risk from high demand from strategic services or car sharing that could over run the 250 spaces available but an allowance for site expansion to 400 spaces has been included]
	Design Risk	The risk that the design cannot deliver the services at the required performance or quality standards. [If traffic congestion increased then quality of service may be effected. Monitoring this service promptness should be part of the tender for the bus services.]
	Availability Risk	The risk that the quantum of the service provided is less than required under the contract. [This has not been an issue to date as bus services are under contract to Stirling Council and closely monitored]
	Volume Risk	The risk that actual usage of the service varies from the level forecast. [Sensitivity tests have shown that under the forecasting methodology used it is the price of car parking that effects patronage the most. An allowance has been made for rationalised parking charges therefore a a conservative estimate of patronage has been used]
	Technology Risk	The risk that changes in technology result in services being provided using non optimal technology. [Green technologies will be adopted from the outset for the waiting area building]

4.8.4 Optimum Bias

There is a requirement in *STAG* to make an adjustment for optimum bias which is the tendency for practitioners to be overly optimistic when appraising potential scheme options. The Guidance sets out the following steps which should be undertaken to quantify the level of Optimum Bias which should be applied to the options:

- Step 1 Determine the nature of the project

- Step 2 Identify the stage of scheme development
- Step 3 Apply the recommended Optimism Bias factor to the risk adjusted transport cost estimate
- Step 4 Provide sensitivity analysis around the central estimate

Step 1

The development of a Park & Ride to be located on the southern edge of Stirling, is categorised as a Roads project following the guidance provided in *STAG* Technical Database Section 13 [28].

Step 2

The scheme is being promoted by Stirling Council and Tactran and with this study supporting its inclusion in emerging planning policy documents. It is considered that the proposed public transport scheme can be assumed to be at Stage 1 of the development process (Programme Entry).

Step 3

Following on from Stages 1 and 2, *STAG* recommends the application of a 44% Optimum Bias uplift to costs identified for the three site options identified within this study.

Step 4

STAG confirms that a sensitivity analysis should be undertaken around the core uplift value to examine the impact of other possible levels of Optimism Bias on the cost estimates reported in the TEE tables. A sensitivity test has been undertaken, as an example on the rate of optimism bias on Site 1 BCR values, as follows:

- Optimism bias 22%, BCR = 0.39
- Optimism bias 44%, BCR = 0.37
- Optimism bias 66%, BCR = 0.36

Optimism bias has been applied to capital costs of site construction and land values. What the sensitivity test illustrates is that the assessment is not that sensitive to optimism bias because the operating costs in this study are high relative to capital costs.

4.8.5 Assessing Uncertainty

STAG confirms that it is essential to consider how future uncertainties could affect the choice between options.

The sites are located within a relatively small study area and are expected to be affected by similar uncertainties. The allocation of land for development in the vicinity of the sites is expected to have an impact on the development of the sites, however, there is uncertainty with regard to the location of future developments as the LDP is currently being prepared.

Unknown ground conditions and the potential for contaminated ground to be discovered on any of the sites or routes of access roads, is expected to provide a similar level of uncertainty for the development of each of the sites prior to detailed survey work being undertaken.

[28] http://www.transportscotland.gov.uk/files/STAG_technical_database_Section_13_December_2009.pdf

4.8.6 Sensitivity Analysis

Park & Ride Patronage

A logit model has been developed to inform this study and is described in the Logit modelling report which is contained in Appendix E. The logit model has been used to estimate the level of patronage which will be generated by the proposed Park & Ride in addition to undertaking a sensitivity analysis of potential future year scenarios. The volume of abstraction of trips from Springkerse Park & Ride differs between the sensitivity tests.

The following potential scenarios have been set by the Steering Group to inform the sensitivity analysis:

- Existing Stirling car parking charges reduced in accordance with that derived by Stirling Council in their review of City Centre parking (Base scenario)
- Existing Stirling car parking charges doubled
- Reduction in bus frequency to 15min (to replicate effect on just one more bus at sites 5a and 8
- 2min reduction to bus journey time (to replicate bus priority or rationalization of the route

These scenarios have been appraised in the Logit model with the level of Park & Ride patronage estimated for each site.

Figures 4.5 and 4.6 summarise the level of patronage which is predicted to be generated by the proposed Park & Ride in 2022 on a weekday and Saturday of operation.

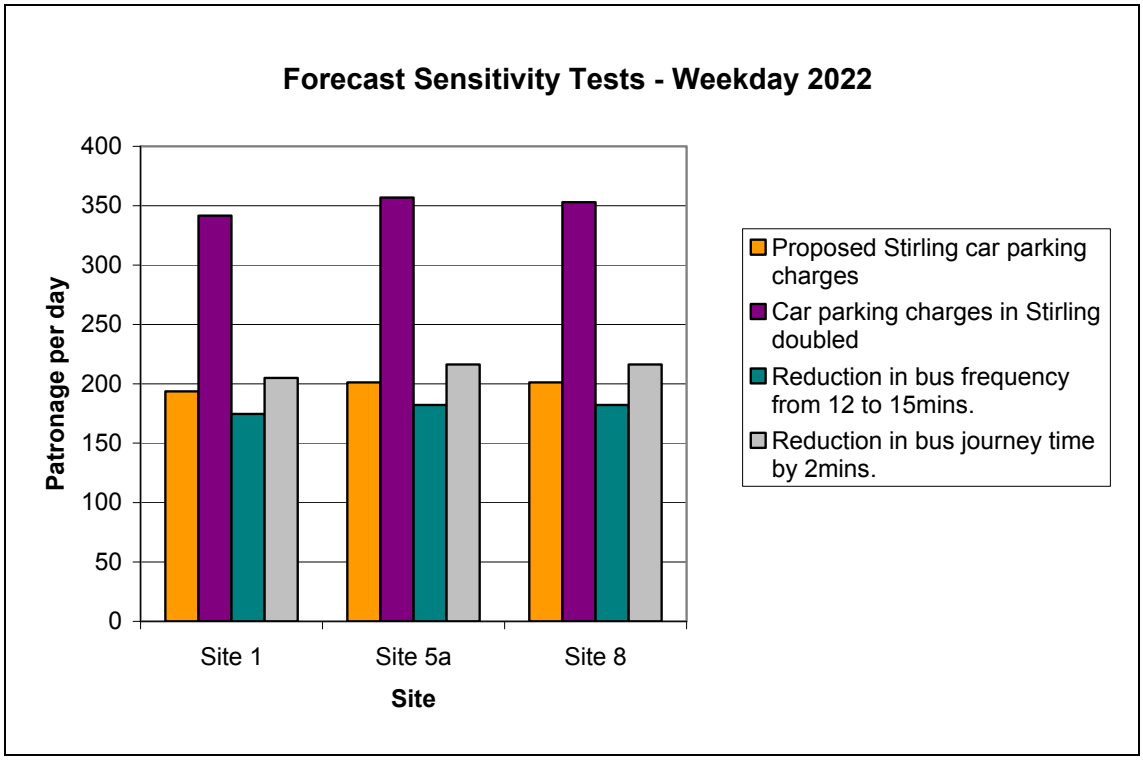

Figure 4.5 : Daily Patronage – Weekday

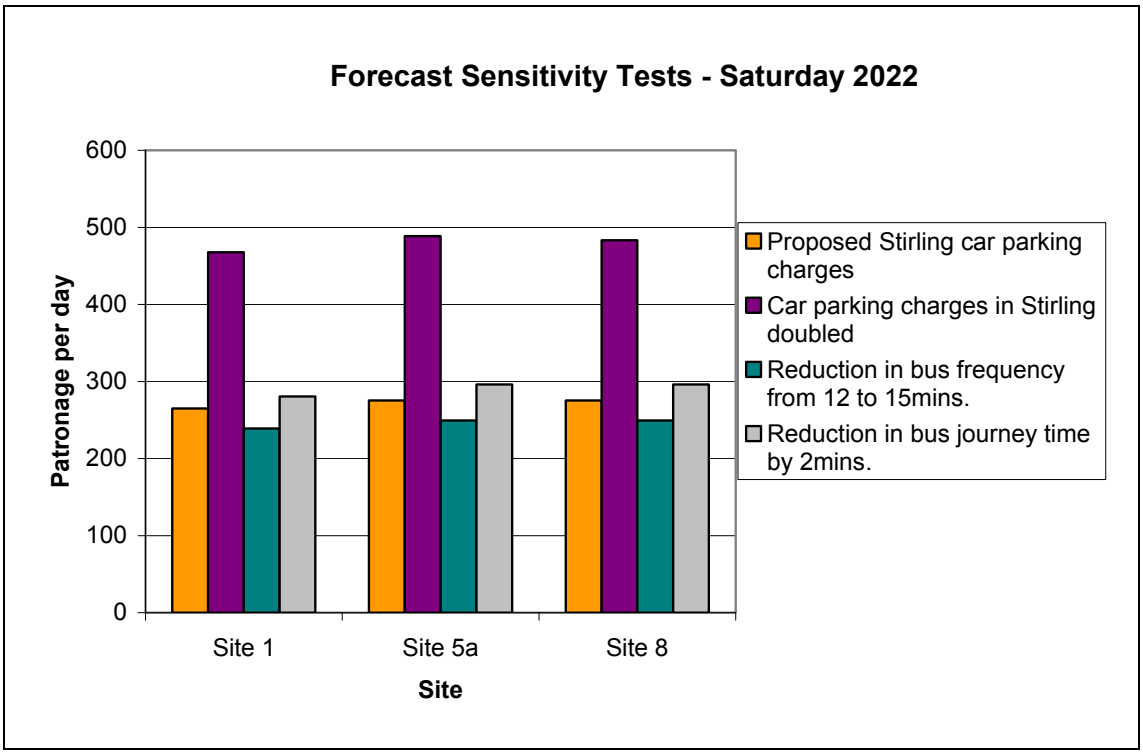

Figure 4.6 : Daily Patronage – Saturday

As can be seen from the presented summary, the Park & Ride is expected to replicate the patronage trend which is generated by the existing Stirling Park & Ride facilities with a greater number of passengers expected to be attracted to the site on a Saturday when compared to a typical weekday of operation.

The doubling of Stirling parking charges is predicted to have the most significant impact on the number of passengers attracted to the Park & Ride with the patronage predicted to almost double with the doubling of Stirling car parking charges. The reduction in bus service frequency from 12 – 15min is expected to have only a minor impact (a maximum reduction of 6%) on the patronage of the proposed Park & Ride with a maximum increase in patronage of around 8% generated by a 2min reduction in journey time.

Car Park Occupancy

The maximum occupancy of the proposed Park & Ride's car park has been estimated using a correlation between patronage and car park occupancy for the existing sites at Springkerse and Castleview. The maximum number of car parking spaces occupied as a factor of total daily bus boarding patronage was similar between the sites. The maximum was at Springkerse where, on a weekday, 0.54 car parking spaces were required relative to the total number of daily passengers boarding the bus and 0.37 spaces per passenger on a Saturday. It is thought that the difference may be due to the fact that Saturday has less overall long stay commuters (6%) than in the weekday (21%), so there is a higher turn around of car parking spaces used per bus passenger at the weekend.

Table 4.16 provides a summary of the estimated maximum car park occupancy in terms of the number of spaces which are used, which will be generated at the three potential sites in the scenarios described previously.

Table 4.15 : Maximum Number of Spaces Required

	Proposed Stirling car parking charges Weekday	Proposed Stirling car parking charges Saturday	Car parking charges in Stirling doubled Weekday	Car parking charges in Stirling doubled Saturday	Reduction in bus frequency from 12 to 15mins. Weekday	Reduction in bus frequency from 12 to 15mins. Saturday	Reduction in bus journey time by 2mins. Weekday	Reduction in bus journey time by 2mins. Saturday
Site 1	104	97	183	172	94	88	110	103
Site 5a	108	101	191	179	98	92	116	109
Site 8	108	101	189	178	98	92	116	109

The summary in Table 4.15 confirms that a maximum of 191 spaces will be required for Sites 5a and 8 with a maximum of 183 spaces required to accommodate the maximum demand generated by Site 1 if parking charges are doubled.

The sensitivity test demonstrates that the sites are well within the proposed capacities of the car parks which range in size from 242 spaces for Site 5a to 264 spaces for Site 8. It is considered that the size of the proposed car parks will be able to accommodate the demand generated on an average Saturday of operation with a minimum of around 17% spare capacity predicted with the greatest demand and smallest car park (Site 5a and the doubling of car parking charges). It is considered that there will be sufficient capacity for the Park & Ride to accommodate potential future changes to parking charges or accommodate seasonal variations in patronage.

There is also spare capacity to accommodate parking for potential car sharing or strategic coach traffic within the first ten years of operation. The car park at Ferrytoll, in Fife, demarcates around 15% of its parking spaces for car sharing purposes; these are the ones most remote from the bus stop waiting area.

BCR Sensitivity to Operating Costs and Revenue

The BCR in the main economic tests are less than 'one' indicating that the transport benefits have not been demonstrated to equate or exceed the present value of costs to government. To achieve better value for money a secondary test has been undertaken where ten years operating costs support would be provided then it is assumed that bus services become viable due to LDP expansion. Long term support for the operation of the site itself using estimated actual costs from Castleview Park & Ride has been included as it is expected that the site would still be manned by the Council. The results are shown in Table 4.16, this indicates that better value for money would be achieved by aiming to make use of service bus routes after ten years of operation.

Table 4.16 : BRC Summary

Option Access Option New buses	Site 1 Proposed Rdbt 2	Site 5a Initial (Existing Milton Rdbt) 2	Site 5a Alternative (Proposed Rdbt) 2	Site 5a Alternative (Proposed Rdbt) 1	Site 8 Proposed Signal junction 2
60 Year Operational Funding:					
Benefit-Cost to Funding Agency Ratio	0.37	0.29	0.36	0.44	0.22
BCR Ratio (No Loss Parking Revenue)	0.41	0.33	0.40	0.51	0.25
10 Year Bus Operating* Costs:					
Benefit-Cost to Funding Agency Ratio	0.58	0.45	0.52	0.54	0.32
BCR Ratio (No Loss Parking Revenue)	0.69	0.56	0.61	0.65	0.39
10 Year Bus Operating Costs & Target Patronage Forecast**					
Benefit-Cost to Funding Agency Ratio	0.83	0.72	0.74	0.75	0.59
BCR Ratio (No Loss Parking Revenue)	1.14	1.07	1.01	1.03	0.83

*Estimated actual costs assummed

** 85% usage of proposed parking spaces at weekday peak

The revised operational model that is based on a ten year operational support for bus services and 60 year actual operational costs of the Park & Ride sites show much improved value for money in terms of cost to government. The ten year support example has been further tested with a target for patronage or overall equivalent revenue income. Should the South Stirling Park & Ride meet this patronage/income target of around 85% utilisation of the Park & Ride car parking spaces (around 220 spaces on a weekday) then there is potential for overall transport benefits to government to be economically justified, where parking charges are not taken into consideration and junction safety improvements are made.

5 OPERATIONAL BUSINESS CASE & SITE SELECTION CONSIDERATIONS

5.1 Introduction

A business case for the proposed Park & Ride would be required to prepare for funding applications to construct and support the daily operations of the Park & Ride site and associated dedicated bus services. This section of the study prepares an outline business case that will require updating and investigating in more detail once a site has been selected for detailed design.

The business case for the proposed Park & Ride site focuses on an operational model that emulates the existing sites. The model, including dedicated bus services on a 12min frequency, would then give the same level of service across Stirling. The requirement for bus service alterations has been reviewed to determine the capacity and practicality of these proposals. An option for sites to use a slightly reduced level of service has also been investigated, to show potential efficiency savings and adaptability of these sites.

The business case demonstrates the existing market capture for Park & Ride sites in Stirling and identifies how these may apply to the proposed site in the south of Stirling. A series of potential other operational savings have also been identified subject to varying future conditions.

5.2 Requirement for Bus Service Alterations

5.2.1 Introduction

The suitability of the existing Castleview Park & Ride service to be extended to serve the proposed Park & Ride has been appraised. Bus service timetable information (extracted March 2010) has been used in conjunction with journey time data from the Stirling S-Paramics model to inform this study.

It is proposed to extend the existing bus service to serve the proposed Park & Ride by extending the service south from Stirling City Centre with the service to return to the centre en-route to the Castleview Park & Ride. The service would no longer route through King's Park although it is understood from consultation with Harlequin Coaches that the service does not currently attract many passengers on this section of the route.

Figure 5.1 confirms the route of the existing service and proposed alterations required to serve the proposed Park & Ride.

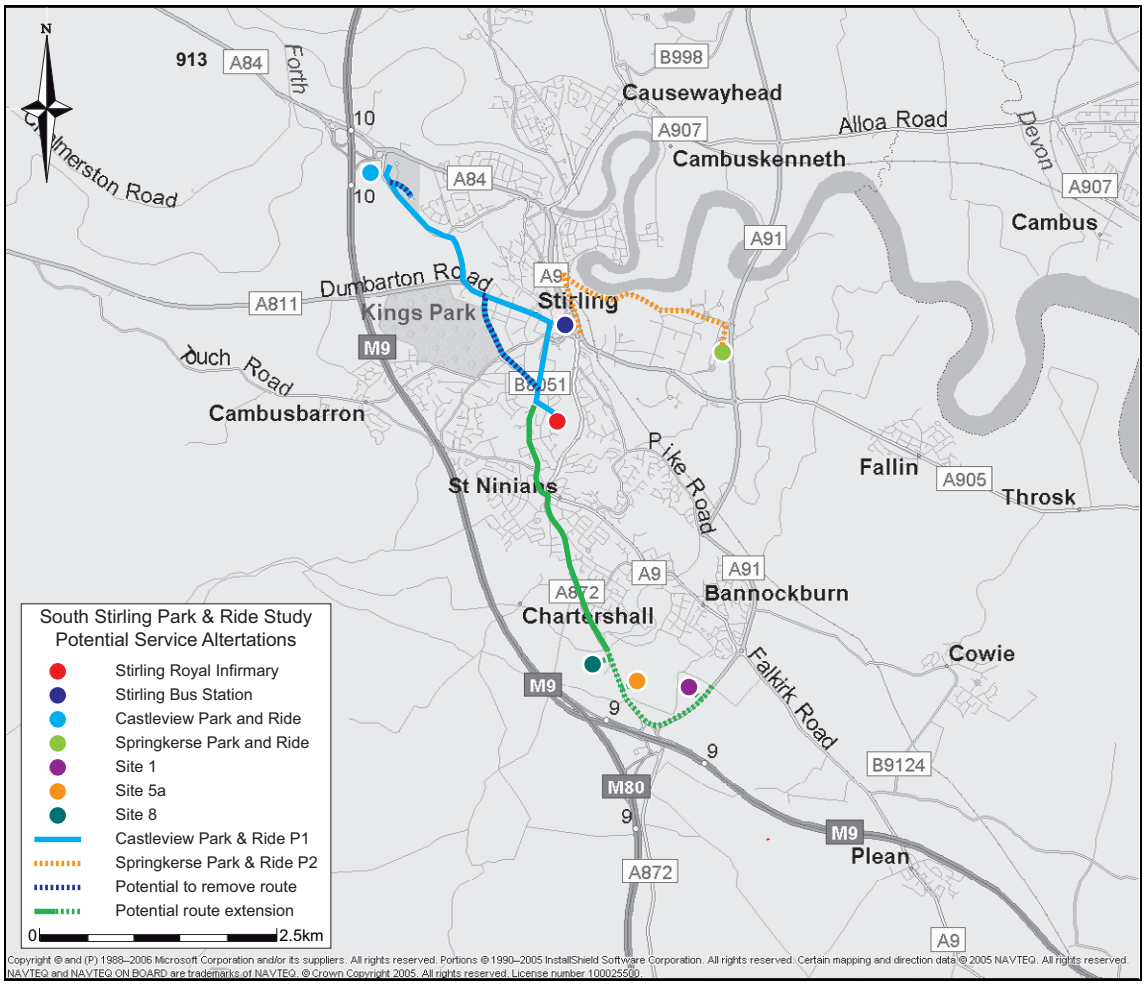

Figure 5.1 : Proposed Bus Service Alterations

5.2.2 Journey Time Data Extraction

Existing bus service journey time data has been extracted from the Castleview Park & Ride timetable with a journey time for the extension to bus services estimated using the Stirling S-Paramics model.

This study has made use of the AM Peak period Stirling S-Paramics model and there is potential for the model to provide an overly pessimistic estimate of journey time as they are based on inbound journeys over a three hour period where the network is at its busiest. It is suggested that there would be merit in undertaking a more detailed appraisal prior to the Park & Ride becoming operational to determine the most appropriate means of serving the Park & Ride site.

The following assumptions have been made for the purpose of extracting journey times from the S-Paramics model:

- Park & Ride access arrangements are assumed in advance of any detailed design
- Park & Ride services assumed to stop for 7s at Stirling Royal infirmary, Viewforth (Stirling Council offices) and City Centre stops
- Journey times are quoted from the bus service leaving the Park & Ride to the time which the service leaves the city centre bus stop

- A 12min bus service frequency has been assumed
- The journey time values have been averaged from all bus services which start and finish their journey in the model period (07:00 – 10:00)

The S-Paramics model has derived journey times based on buses travelling north into the city centre from the Park & Ride. To provide an robust appraisal, the northbound journey time has been applied to services travelling to the Park & Ride site from the city centre.

5.2.3 Bus Service Alterations

A journey time comparison has been undertaken with regard to the three site options (Site 1, 5a and 8) to enable the requirements for a service provision including the requirement for additional buses, to be established.

For the purpose of this assessment it has been assumed that the existing 12min service frequency will be retained in association with the existing Castleview Park & Ride service being extended to serve the proposed Park & Ride.

5.2.4 Potential Bus Service Timetable

Figures 5.2 – 5.4 summaries the number of buses which will be required to implement an extension of the existing Castleview Park & Ride service to serve a future Park & Ride on Sites 1, 5a and 8.

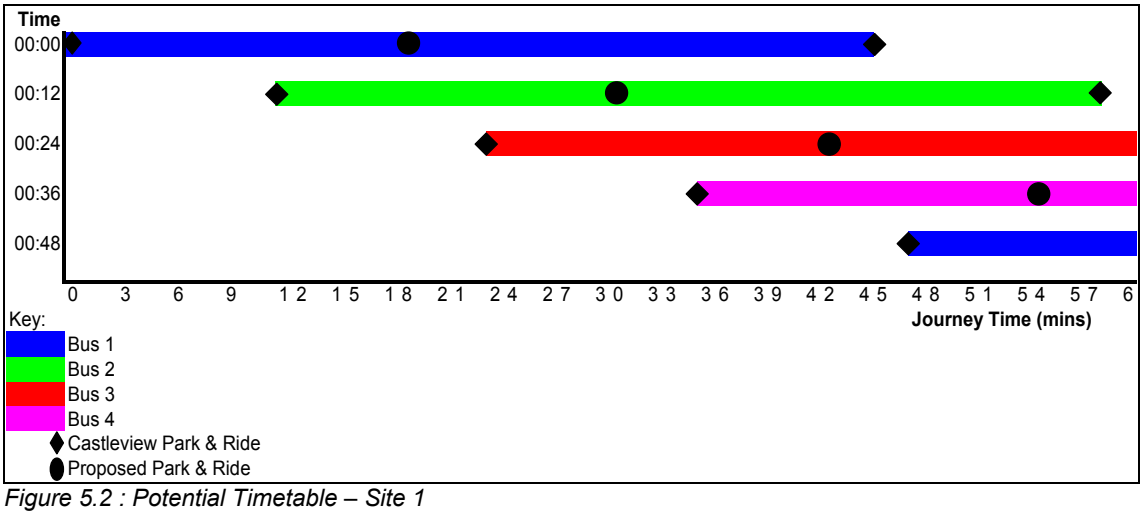

Figure 5.2 : Potential Timetable – Site 1

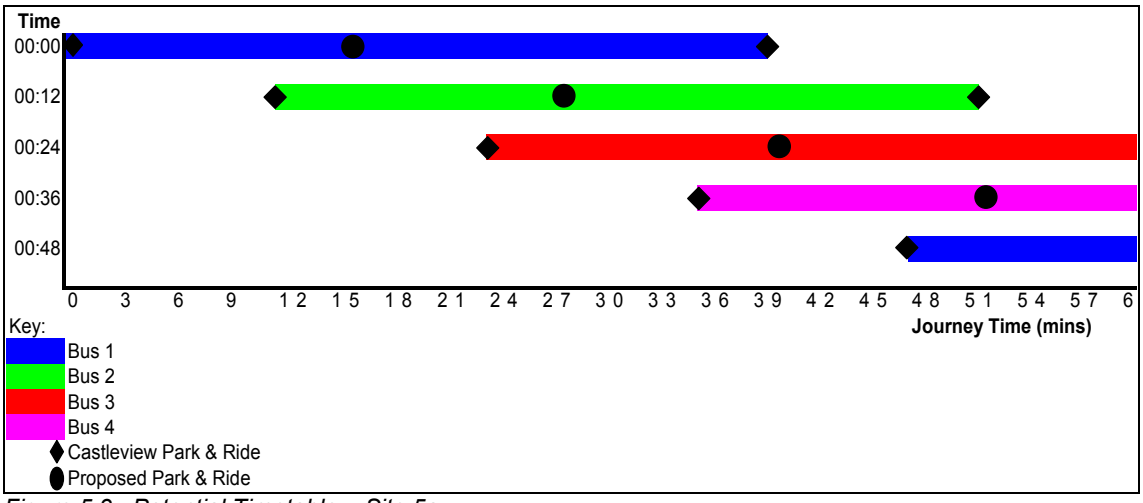

Figure 5.3 : Potential Timetable – Site 5a

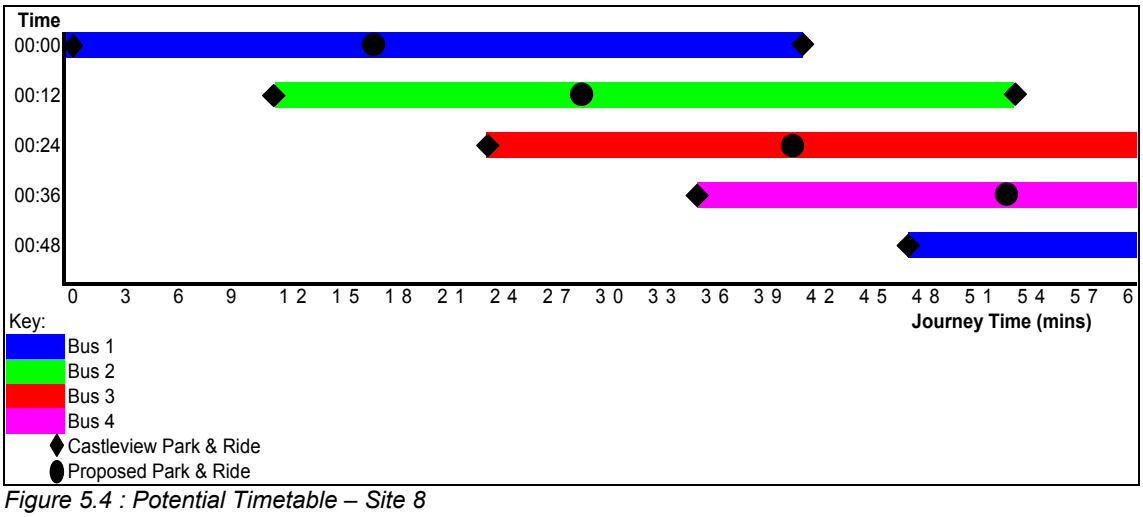

Figure 5.4 : Potential Timetable – Site 8

As can be seen from the summaries in Figure 5.2 -Figure 5.4, it is predicted that Sites 1, 5a and 8 will require a total of four buses (an additional two buses over the existing provision) to enable a 12min service frequency to be achieved. A 12min frequency is shown to be the most efficient service to serve Site 1 as it is predicted to result in the potential for a 2min lay over time at Castleview Park & Ride. Sites 5a and 8 are expected to result in an inefficient service operation with an 8 and 6min lay over generated respectively for the two site options maintaining the current 12min service frequency. Although one advantage of this could be better punctuality and reliability at the Park & Ride sites.

The location of Site 5a results in the shortest journey time of the three sites with the possibility of achieving a 14min service frequency and enabling a 2min wait time to be offered at the Castleview Park & Ride with the introduction of one additional bus and driver (i.e. a total of three buses operating on the route). This frequency could only be achieved with the removal of the Castle Business Park stop from the route of the existing Castleview Park & Ride service.

It is expected that while Site 8 could be served by a total of three buses (the addition of one bus over the existing provision) at a 14min service frequency, there is unlikely to be any spare time

in the timetable to enable buses to wait at either of the Park & Ride sites. This frequency could only be achieved with the removal of the Castle Business Park stop from the route of the existing Castleview Park & Ride service.

Table 5.1 summarises the requirement for buses and lay over time associated with a service provision at a 12min and 15min frequency retaining the existing route for the Castleview Park & Ride service with an extension to serve the proposed Park & Ride.

Table 5.1 : Potential Bus Requirements

	Site		
	1	**5a**	**8**
Total Journey Time (mins)	46	40	42
Frequency	No. of Buses Required		
12min	4	4	4
15min	4	3	3
	Potential Lay Over at Castleview P&R		
12min	2	8	6
15min	14	5	3

As can be seen from the above summary, all three site options are predicted to require a total of four buses (two additional bus) to operate with a 12min service frequency. This will provide opportunity for services to lay over at the Castleview Park & Ride for between 2 and 8min with the greatest time.

Sites 5a and 8 are predicted to require a total of three buses (one additional bus) to maintain a 15min frequency with Site 1 requiring a total of four buses to enable the frequency to be achieved. The operation generates a 14min lay over time compared to between 3 and 5min for the alternative sites highlighting the inefficiency of the service when serving Site 1.

5.3 Target Market

A survey of existing passenger travel habits was undertaken at the existing Springkerse and Castleview Park & Ride sites on Thursday 21 and Saturday 23 January 2010 to inform this study. A range of data was obtained on the day of the survey including data pertaining to the demographics of those using the existing sites.

The survey confirmed that the majority of passengers who used the Springkerse and Castleview Park & Ride sites in the weekday and Saturday survey periods were female (59% - 87%). The survey also highlighted that a large proportion (35% - 46%) of passengers were aged 60 and over. It is considered that this trend will be replicated for the proposed Park & Ride and the facility will be designed to be accessible to all. As described in Section 4, the Park & Ride will be designed to a Park Mark Safer Parking Scheme standard which is an initiative is aimed at reducing both crime and the fear of crime in parking facilities. The award of a Park Mark confirms that:

- The car park has been vetted by Police to ensure it's fully secured
- Measures taken to deter anti-social behaviour and criminal activity
- The site receives expert consultation from Development Managers to help keep the security up to a high standard

- The site belongs to a nationwide scheme dedicated to combating crime and raising standards for public services

The Park Mark initiative is in place at the existing Park & Ride sites and it is intended to design the development to adhere to the Park Mark standard.

It is expected that commuters will make up the greatest proportion of passengers who will utilise the Park & Ride in the morning peak period. Outwith the peak and on a Saturday it is anticipated that a large proportion of trips will be travelling to retail facilities located in the centre of Stirling.

The existing Park & Ride facilities are not currently served by express services providing connection to strategic destinations. There is, however, potential for the proposed Park & Ride to be served by strategic bus services providing access to a range of destinations including Edinburgh and Glasgow to the south. It is expected that in as with the Broxden Park & Ride site at Perth, the facility will attract a greater number of passengers by offering access to services which provide direct connection to major employment destinations.

It is considered that the proposed Park & Ride could attract a greater number of trips than that assumed for the purpose of this study by providing access to express and local bus services to provide connection to strategic destinations in addition to the centre of Stirling.

The key catchment area for the sites will be from the immediate vicinity, towns to the south such as Falkirk and from further afield from the south. Drivers would be the main target audience for those commuting and those on shopping of leisure activities. Tourists could also be targeted from the south. Marketing of the sites will be essential via the media, radio/newspapers and websites. Information could also be given to those using city centre car parks and via public and private sector Travel Plans. Survey data has revealed that families do not tend to use the Park & Ride sites at the moment; this may be due to having to pay a bus fare for all car occupants. Some initiatives could be pursued, such as free child bus tickets (with an adult) that could be promoted through schools for trips to the centre of Stirling. This could encourage not only parents/guardians but also grandparents and other child carers to use the Park & Ride service with children.

5.4 Operational Costs

5.4.1 Annual Costs

Annual costs have been developed based upon the detailed business case for Castlview Park & Ride. The annual running costs and an indication of bus investment costs are shown in Table 5.2.

Table 5.2 : Annual Running Costs

	Site 1 (12min bus frequency)	Site 5a, 8 (12min bus frequency)	Site 5a, 8 (15min bus frequency)
Additional Vehicles Required	2	2	1
Vehicle miles	115,331	85,099	68,079
Annual Costs of Service			
Drivers	£74,155.00	£74,155.00	£37,077.50
Fuel	£19,222.38	£14,183.50	£11,346.80
Tyre	£2,306.06	£1,701.56	£1,361.24
Maintenance /security /rates	£34,599.42	£25,529.67	£20,423.73
Standing cost (MOT etc)	£6,000.00	£6,000.00	£3,000.00
Operator profit	£23,870.00	£23,870.00	£14,641.86
Total Bus Running Costs	£160,152.85	£145,439.72	£87,851.13
Fare Income	£43,838.09	£45,557.23	£41,090.84
Park & Ride Site Operation	£75,000.00	£75,000.00	£75,000.00
Annual costs	£191,314.75	£174,882.49	£121,760.29

The most expensive annual running costs occur at Site 1 with a 12min frequency (five buses per hour). Sites 5a and Site 8 have slightly less annual running cost than Site 1 with the same bus frequency because of less overall mileage costs. Site 5 and 8 also have the possibility of running a reduced bus frequency of every 15mins (four buses per hour) which could be more cost efficient, but may attract less overall patronage and fare income revenue. To achieve the 15min service with only one additional bus would require the Castleview bus services to also be on a 15min bus frequency, as the same buses would be used travelling between the two sites.

The benefit to cost ratio would improve slightly with reduced operating costs, for example Site 5a with the proposed roundabout access would change from a BCR of 0.40 to 0.49.

5.4.2 Potential Savings

The key areas for potential saving are the operating costs of the Park & Ride and its associated bus services. There is some potential for savings depending on circumstances, as follows:

- A reduced service frequency at off peak times
- Reduced levels of manning sites (possibly via joint CCTV to one central point)
- Commercial bus services become frequent enough to remove the need for a dedicated service (potentially via the Durieshill Major Growth Area)
- Increased patronage offsets operating costs (possibly via parking charge increases)

5.5 Site Selection Considerations

5.5.1 Considerations

To support the operational business case further, the identified sites have also been considered under opportunities and deliverability criteria that have been specified by the Steering Group. These criteria are more specific than the objectives of the study but may be useful for the final decision making process for site selection. The additional site considerations include:

- Opportunities for a bus priority route to Stirling from sites, that includes consideration of the complementary nature of the route to other public transport corridors to the South of the City; and the advantages/disadvantages of serving different markets en route.
- Opportunities for a bus and coach based Park & Ride, including consideration of appropriate operational functions of all of the Stirling Park & Ride sites
- Opportunities for a bus service to serve both the Park & Ride site and the potential Durieshill major growth area
- Deliverability – as per STAG – but also considering:
    - Demand forecasting (including consideration of abstraction from other bus and rail Park & Ride in the area) and the consequences this may have for when a viable Park & Ride site could be introduced
    - Sustainable design/construction and safety and security standards

5.5.2 Bus Priority

During the initial stages of the project an outline site investigation of the potential for bus priority on the key routes from the South of Stirling was undertaken, the routes included were the A872 Glasgow Road and the A9 Falkirk Road/Bannockburn Road. It was found that each route was in general physically constrained by the proximity of properties to the highway boundary but there were some locations at junctions that may offer potential for bus priority measures.

Bus priority potential was identified on the northbound A872 Glasgow Road approaches to St. Ninian's Roundabout. At this location the road already widens to dual carriageway. The width of carriageway allows for the introduction some form of bus priority such as a priority control or signal controlled system. The bus priority at this location will be restrained by the dual road length providing access to any priority measures. The available length is only around 70m, only marginal benefits to journey times would be possible.

The A9 north of St. Ninian's Roundabout is a four lane dual carriageway almost along its entire length to Craig's Roundabout. The dualled section offers some potential for bus priority, but a bus route on this road would not front key drop off and pick up destinations and so may be unattractive to passengers. There is no rear access to the Stirling Royal Infirmary Site, but there is some access from Randolph Road. There is some rear access to the Council offices via Linden Avenue Car Park (by a series of steps), however, the dualled A9 is inter-urban in nature and not attractive to waiting passengers from a safety and security point of view, which would be a disadvantage.

The proposed bus route that has been used in this assessment is a route via St. Ninian's Road. The proposed bus route provides frontage access to both the Stirling Royal Infirmary and Council offices. The streetscape typically has frequent pedestrian interactions which provide natural surveillance which would be an advantage. The opportunities for bus priority are limited on St. Ninian's Road, but it is the main route for local buses into Stirling from the south. If bus priority is not taken forward then this does not preclude other general route efficiency and reliability improvements for all traffic that also may improve bus journey times.

Due to their location Site 5a and Site 8 would have one bus route choice but Site 1 may have potential to use a route via the A9 rather than the A872. There may be some disadvantages in

the A9 in that the bus route would not pass the Bannockburn Heritage Centre and may compete directly with the frequent First No. 38 service.

5.5.3 Bus & Coach Based Park & Ride

The function of the existing Springkerse, Castleview and potential Park & Ride sites has been considered in light of detailed investigation of bus and coach routes, passenger survey information and bus and coach operator consultations. A summary of the markets applicable for each Park & Ride is given in Table 5.3. In general, the purpose of the Park & Ride sites is aimed at making public transport access more competitive against the car, this can be particularly appropriate to areas, such as Stirling that have rural hinterlands with less accessibility to public transport. Strategic public transport access may also become more attractive against the car because of ease of access and no parking charges that are applicable to the current Strategic coach access points in Stirling.

In terms of local access to Stirling each Park & Ride site has a role to play and a range of markets including being utilised for car sharing. Castleview has a function for local commuters, shopping, social/recreation and health visits from the north and west. It also is a point of access for tourists being located adjacent to the trunk road network

Springkerse Park & Ride acts as a local Park & Ride, providing an attractive service for commuters, shoppers and those wishing to interchange to rail services into Stirling from the east, it has also provided access from the south to date but this function may be partially replaced by a Park & Ride to the south. The replaced function may abstract between 20 – 30% of Park & Ride boarding patronage from Springkerse, however, the Springkerse Park & Ride bus service does attract a significant level of additional patronage as a bus service alone. The additional patronage is due to the good connection between Stirling City Centre and retail developments on its route to Sprinkerse Park & Ride, so the impact on income revenue will be less affected than the Park & Ride boarding abstraction figures suggest.

The potential Park & Ride site in the south would provide local access to Stirling for commuter, shopping and health. It would also prove an access into Stirling for tourists from the south. The tourism connection may only be valid if the site is of the same quality and manned as at Castleview. Should savings be made on manning levels it may be more appropriate to consolidate the tourist attraction facility to one high quality site that is signed from both the north and south. Sites 5a and Site 8 have the advantage over Site 1 that they are adjacent to the as A872 Glasgow Road for strategic, tourism functions and commuters on that route.

In terms of strategic coach access to Edinburgh and Glasgow a two tier approach has become apparent. The opportunities are for:

- New strategic coach services for Stirling
- Additional stops for existing strategic coach services from Stirling

The opportunity has come forward to investigate improved access to the M9/M11 Megabus services that currently route around Stirling from Glasgow to Aberdeen via Perth and Dundee. This service does not currently stop in Stirling, but the Megabus operator, a budget internet-based inter-city coach service, has indicated that it may review this position. The operator has suggested that it may consider stopping at Castleview Park & Ride but not any of the proposed Park & Ride sites to the south of Stirling. This would provide new choices for strategic coach travel from Stirling to other cities in the Tactran area, to Glasgow and also to Aberdeen.

Additional stops in the south of Stirling for existing strategic coach services have been considered by the operator Citylink. Of the potential Park & Ride sites that have been investigated in detail Sites 5a and Site 8 have the most attractiveness to all the other existing strategic coach routes that connect Stirling with Edinburgh and Glasgow. The attractiveness comes from their location adjacent to the A872 Glasgow Road where the express coaches currently route.

However, select link analysis indicates that the majority of current strategic car traffic to Glasgow and Edinburgh is not travelling to the city centres, but to other destinations within these cities. This would suggest that any strategic trips via coach services stopping at either Castleview or south of Stirling Park & Ride sites may be transferred from existing public transport journeys, either rail or coach, rather than from private car.

Survey data suggests that Springkerse Park & Ride is currently used for access to the rail network, particularly on weekdays and it is expected that this function will continue, due to the direct connection of the bus service to Stirling Railway Station and the relatively high car parking costs.

Table 5.3 : Potential Park & Ride Markets

Markets	Castleview	Potential South Stirling Site	Springkerse
Local Access:			
Employment	✓	✓	✓
Shopping	✓	✓	✓
Social/Recreation/Leisure	✓	✓	✓
Health	✓	✓	
Strategic Access:			
New Coach Services	✓		
Existing Coach Services		✓	
Train service connection			✓
Other Access:			
Tourism	✓	✓	
Car Sharing	✓	✓	✓

The potential Park & Ride markets are illustrated in Table 5.3. This demonstrates that there are common roles for access to employment, shopping, recreation and car sharing for all sites. Castleview and the potential South Stirling Park & Ride site have important functions in terms of access to health facilities, express coaches and tourism. Sprinkerse is likely to retain an access to rail market. To complement the market capture strategy potential Site 5a or Site 8 would have advantages over Site 1.

5.5.4 Durieshill Major Growth Area

The Durrieshill Major Growth Area to the south of Stirling continues to feature in planning documentation. The recent *Main Issues Report (Draft for Stirling Council , April 2010)(MIR)* shows three options and Durrieshill Major Growth Area features in two of those options, the medium and high growth options with a total allocation of 2,500 residential units and 10Ha of business land. The preferred option in the MIR is the medium growth strategy. The MIR preferred spatial strategy proposed phasing indicates an implementation timetable for

Durrieshill. The MIR suggests in 'Figure 9' that the Major Growth Area may be implemented in the long term from 2022.

Patronage assessments has demonstrated that there is existing demand for Park & Ride in the south of Stirling, subject to a sufficient level of parking control and charges within Stirling City centre. Durrieshill Major Growth area would have contributed to projected growth and also may have provided an opportunity to use service buses rather than dedicated Park & Ride bus services. Utilising service buses would significantly reduce the operational running costs of any future Park & Ride. The future requirements for service buses from Durieshill have not been established but due to the scale of the development it is anticipated that an improved level of service would be necessary from either extended or new bus services to link to Stirling. Sites 5a and 8 would be the most appropriate to utilise Durieshill buses.

It is also worthy of note that the MIR describes areas of greenbelt land that may be subject for review due to settlement expansion. The indicative diagram 'Figure 13' in the MIR illustrates that Site 5a and Site 8 may have their designations as greenbelt reviewed by the Council. In the general southern area of Stirling (north of the A91) there is also a strategic development area allocation of 800 residential units and 10Ha of business land in every option. The timescale for bringing this forward is described as medium term to 2022.

5.5.5 Viability of Introduction

The viability of introduction of a Park & Ride to the south of Stirling in some part relates to the introduction of Durieshill Major Growth Area when considering operational costs, but also to the desire to complete the market capture and functionality of the ring of Park & Ride sites around Stirling.

The Park & Rides not only aim to reduce peak hour congestion in Stirling but also provide choice for access to shops, for social engagements, leisure activities and access to health facilities. The Park & Ride sites have the potential to improve access to inter-urban public transport by offering choice for express coach travel, thereby supporting national sustainable economic growth aims. The sites also offer suitable locations for car-sharing meeting points to reduce city centre congestion and emissions that contribute to climate change.

The majority of Park & Ride users at the potential site would be intercepted from car trips that had been destined for Stirling City Centre. There may also be some Park & Ride users who currently use other modes of transport or make new trips because of the new transport opportunity.

The national LATIS model has suggested that there will be significant growth in travel requirements in the catchment area of a Park & Ride to South of Stirling. The growth is projected to come from a number of factors, such as increased car ownership, local planning data and a projected increase in those travelling into Stirling for employment from Falkirk, West Lothian and Glasgow. Committed transport schemes, including the M80 Upgrade is forecast to reduce the travel time between Stirling and Glasgow, so is likely to increase trip making between these areas as this journey becomes more accessible.

To accommodate sustainable growth the most effective approach is likely to be a two fold approach, but Park & Ride plays a role in both parts. The two trip types under consideration will be:

- New Trips (from traffic growth or new journeys)
- Existing Trips (background transport levels)

There will be those people making new journeys that cause the traffic growth and those on existing journeys. The new trips may come from a home or job relocation or buying a second car. In new trips the travel patterns have not yet been established but on existing trips travel habits have already been formed. It may be more effective to tackle influencing behavior change for new trips where individuals will consciously assess their own travel options. It is important to have transport facilities in place for people to have the choice to establish sustainable travel patterns from the outset if traffic growth is to be tackled. That is not to say that people's travel behaviour can not be influenced by additional choices that are advertised to them, this is the whole basis of introducing Travel Plans into businesses, local authorities and schools. The difference will be that the people making new trips make an active decision to review their transport options, but that existing trip makers must be convinced about changing their behaviour.

The national transport modelling has suggested that the catchment area will see traffic growth between 2012 and 2022 of 42% in the morning peak and 22% at interpeak times of day. The local preferred MIR development scenarios suggest local development may occur north of the A91 in the medium term to 2022 and south of the A91 in the long term from 2022. It is therefore suggested that a Park & Ride to the south of Stirling should ideally be established prior to local and national traffic growth taking hold between 2012 and 2022. It is suggested that the South Stirling Park & Ride should be established in the first quarter of this period to provide access to public transport for the majority of new trips that may enter the network, but this must be accompanied with a maintained or strengthened city centre car parking charges policy. Demand forecast sensitivity tests indicate that city centre parking charges have a high level of influence on patronage on both existing parking and ride facilities and those proposed for south Stirling. Annual financial support will be required for dedicated Park & Ride bus services in the short to medium term and private developer contributions associated with developments in the Major Growth Area, the A91 and A872 areas should be sought.

The timing of introduction should also be balanced against the need for on-going annual operational costs. If patronage attraction and subsequent income from bus fare revenue was more in early years of operation then it could assist in offsetting an increased proportion of the day to day operational costs.

In addition to the above considerations there may be public acceptability advantages to earlier introduction of a Park & Ride site. A Site could have public acceptability issues if it was timed to be introduced to a location adjacent to residential property that was already established.

5.5.6 Park & Ride Site Standards

In developing the potential Park & Ride sites consideration has been given to access junction options and suitable multi-modal access as well as onsite standards.

There have been two access arrangements developed for Site 5a, one using the existing Milton Roundabout and one with a new Roundabout replacing the Pirnhall road cross-roads. Site 8 has one access arrangement developed with a signalised junction but this could equally be a roundabout located slightly further north. Future capacity testing will be required when the extent of Local Development Plans have been established to determine the best arrangement. A roundabout option was also designed for Site 1.

Site 5a already links to an established footway network on the A872 Glasgow Road, as does Site 8. Site 1 does not have an established footway network connecting it to Stirling but there is footpath access to housing to the east via Muiralehouse Road. As the Local Development Plan emerges it will be possible to tie the proposed sites into a new framework of streets and

footways. Site 5a may be located further west of the housing development areas than Site 1 and Site 8. If this situation occurs then Site 5a will require additional pedestrian crossing facilities across the A872 to ensure connectivity with new development areas. Site 5a may ultimately be less attractive and not promote active travel as well to these new housing areas because of a greater walking distance to the Park & Ride site, however, it is assumed that the new housing areas will be designed to be served by public transport, possibly utilising the Park & Ride bus service, without the need to access the Park & Ride site itself.

Initial designs have allowed for suitable on site parking bay and road standards. Waiting facilities would be of the same standard as Castleview Park & Ride, particularly if aimed at the tourist market.

5.6 Summary

5.6.1 Operational Business Case

The results of the journey time analysis suggest that all three sites will require an additional two buses to maintain a 12min service frequency. It is, however, considered that a 15min service frequency would provide a more financially efficient service to serve Sites 5a and 8, but would also have to apply to the Castleview service and may have an adverse effect on patronage. Other operational savings have also been identified but some may erode the quality of the service being provided.

While the presented analysis has enabled a comparison of the site options to be made, it is recommended that further investigation be undertaken with key stakeholders to enable the most efficient solution to be adopted to serve the proposed Park & Ride site.

It is expected that the demographics of passengers attracted to the proposed Park & Ride will follow that of the existing Springkerse and Castleview Park & Ride sites. That is, the greatest proportion of passengers will be female with a large proportion aged over 60. The services are likely to be used for commuting by those arriving in the morning peak period and for shopping by those arriving outwith the weekday peak or using the service on a Saturday. The facility will be designed to a Park Mark Safer Parking Scheme standard to ensure that all users feel safe and secure using the Park & Ride.

There is potential for the development to be served by strategic bus services and it is expected that the availability of services offering direct connection to strategic destinations including Edinburgh and Glasgow could attract an increased number of passengers to use the Park & Ride, but this would be best served by Sites 5a and 8.

5.6.2 Site Selection Considerations

Site selection considerations have been reviewed using a series of concerns defined by the Steering Group. These include; bus priority potential, the function of a new Park & Ride, the Durieshill Major Growth area, viability of introduction and site standards. From this assessment initial indications are that:

- There is some limited potential for bus priority measures at St. Ninians Roundabout – supporting bus services from all Sites 1, 5a and 8
- There are roles for all sites for access to local facilities and specific roles for strategic access – Sites 5a and 8 have strategic coach attractiveness advantages

- In the catchment area there is potential for local growth in the medium to long term and strategic growth over the same period, a possible suitable opening time for a South Stirling Park & Ride may be in the first quarter of the period of growth 2012 to 2022 to capture new trips and be more publically acceptable – Sites 5a and 8 have the advantage that they may be more adaptable to using long term Major Growth Area buses, potentially reducing operational support requirements
- Vehicular access arrangement for the site require further refinement and capacity analysis - supporting all Sites 1, 5a and 8
- The accessibility of sites by active travel may be more clearly defined as the Local Development plan develops - early indications are that Site 8 and Site 1 will have the most advantages for being within active travel range of strategic development areas in the south of Stirling

6 POST APPRAISAL

6.1 Introduction

STAG confirms that an implemented scheme should be monitored and evaluated to determine its effectiveness. It is suggested that data should be collected to enable the effectiveness of the scheme to be determined when appraised against the following objectives which have been set as part of this study. The objectives and indicators agreed with the Steering Group are as follows:

1. To improve the efficiency and reliability of the south of Stirling transport system without significant adverse effect on existing Stirling Park & Ride sites. Indicators – measure of abstraction, journey times on corridors.
2. To improve local access to major health, employment, tourist, leisure and retail facilities in Stirling and its city centre by Park & Ride. Indicators – change in number and frequency of services.
3. To improve strategic access to Edinburgh and Glasgow by Park & Ride from the south of Stirling. Indicators – change in number of coaches using Park & Ride sites.
4. To manage travel by private car and encourage a shift to sustainable and active travel modes to tackle issues of climate change. Indicators – a mode shift survey.
5. To minimise impact on the natural and built environment. Indicators – environmental mitigation measures implemented.
6. To maximise integration between Stirling Council's LDP and provision of public transport. Indicators – Park & Ride site safeguarded in the LDP, number of people living within 800m.

The proposed Park & Ride development is expected to go some way toward meeting all of the above objectives and it is proposed to monitor the usage of the scheme to identify its effectiveness with regard to meeting the above objectives.

6.2 Monitoring and Evaluation

The existing Park & Ride sites at Springkerse and Castleview have Automatic Traffic Counters (ATCs) embedded into the site access to continually record the number of vehicles which arrive at and depart from the site.

The Springkerse Park & Ride ATC data is not complete as is was only introduced from 2007 but the data available suggests that it took around two years for the facility to reach its current level of usage. The Castleview Park & Ride is still establishing itself since it opened in August 2008.

The usage of the proposed Park & Ride can be compared to the existing Park & Ride sites to establish its effectiveness at meeting the study objectives. It is, however, suggested that the operation of the site should only be appraised once it has become established and the operation of existing sites suggests that this is around two years after the facility becomes operational.

Arrival/departure data can be used to determine the occupancy of the proposed Park & Ride throughout an average operational day with comparison made with the existing sites at Springkerse and Castleview.

Should the proposed Park & Ride not be operating at its expected level after two years measures and incentives could be introduced to encourage greater use of the facility. Measures could

include introducing additional signage highlighting the location of the Park & Ride with associated marketing of the facility undertaken by Stirling Council. The Client may also wish to undertake a survey of passengers to highlight any deficiencies in the service or areas for improvement.

7 SUMMARY

7.1 Introduction

SIAS Limited (SIAS) in association with Scotland Transerv as term consultants has been appointed by Stirling Council and Tactran to investigate the feasibility of a new Park & Ride site to the south of Stirling.

The key outcomes of the feasibility study, required by the Steering Group, are to establish the appropriate location of a site and to provide a supporting business case.

The study has been undertaken in accordance with the key processes describes in *Scottish Transport Appraisal Guidance* (*STAG*). The principle of a new Park & Ride has been established and accepted as part of the development of current transport strategies and project reviews. *STAG* has been used as an appraisal tool for the purpose of this study.

This STAG Report summarises the results of a Pre-Appraisal in addition to detailing the Initial (Part 1) Appraisal and Detailed (Part 2) Appraisal. It also discusses an Operational Business Case, Considerations for Site Selection and Post Appraisal.

7.2 Pre-Appraisal

The Pre-Appraisal section of the *STAG* process involved a review of existing problems and opportunities and including the setting of study objectives to address the highlighted problems. The concept for a Park & Ride to the South of Stirling is supported through the Stirling Council City Transport Strategy, Tactran's Regional Transport Strategy and Park & Ride sub-strategy and Transport Scotland's Strategic Project Review Project 8 – Strategic Park & Ride/Choose Strategy aimed at supporting the objectives to make public transport more competitive against the car and identifies Bannockburn as a possible Park & Ride site serving Stirling, Edinburgh and Glasgow. Transport Scotland has subsequently confirmed that this was a bus based strategy for Bannockburn.

The objectives for the study were developed by the Steering Group. The starting point for the establishment of objectives was the existing Tactran Park & Ride Strategy. Integral to the process of developing objectives was also the relevant STPR Corridor 9 Glasgow to Perth and STPR Corridor 10 Edinburgh to Stirling objectives. The study objectives were set as follows:

1. To improve the efficiency and reliability of the south of Stirling transport system without significant adverse effect on existing Stirling Park & Ride sites
2. To improve local access to major health, employment, tourist, leisure and retail facilities in Stirling and its city centre by Park & Ride
3. To improve strategic access to Edinburgh and Glasgow by Park & Ride from the south of Stirling
4. To manage travel by private car and encourage a shift to sustainable and active travel modes to tackle issues of climate change
5. To minimise impact on the natural and built environment
6. To maximise integration between Stirling Council's Local Development Plan (LDP) and the provision of public transport

A total of 10 site options were developed through consultation with relevant stakeholders including the Steering Group, to meet the study objectives. The sites were all located on or to the south of the southern edge of Stirling on the A9 and A872 corridors.

The developed site options were sifted using the developed objectives to ensure a manageable list of options was taken forward to the Initial Appraisal. A total of seven site options were taken forward to the Initial Appraisal. Potential Sites that had come forward from the TERS study were rejected from further appraisal at this point as they did not meet key objectives.

7.3 Initial Appraisal

An Initial Appraisal was undertaken of a total of eight site options which included the seven options which emerged from the Pre-Appraisal with an additional site included following consultation with Stirling Council Environmental and Planning stakeholders.

A passenger questionnaire survey was undertaken at the existing Castleview and Springkerse Park & Ride sites. Detail from this survey combined with data from the Stirling Council S-Paramics micro-simulation transport model was used to develop a locally calibrated logit model to give patronage forecasts for the potential sites. Abstraction from Springkerse Park & Ride to the potential sites was also taken into consideration. Abstraction from Castleview Park & Ride was expected to be minimal as the origins of passengers using that site did not overlap with the catchment for the potential new sites to the south.

The site options were checked against their suitability to meet Transport Planning Objectives, *STAG* Criteria and established policy directives. The feasibility, affordability and likely public acceptability of options has been appraised in accordance with *STAG* to support the Initial Appraisal. Consultation with public transport operators played a key role in the selection and rejection of sites for further assessment. The sites were grouped into three corridors for initial appraisal, with one site being selected from each corridor. Environmental impacts, planning and accessibility considerations were integral to rejecting and selecting suitable sites.

The list of site options has been refined as part of the Initial Appraisal with the result that a total of three site options have been selected for detailed appraisal. The resulting three sites for detailed assessment were:

- Site 1 – located at north of the A91 at Corbiewood
- Site 5a – located west of the A872 Glasgow Road between the Pirnhall Road crossroads and the Milton Roundabout
- Site 8 – located east of the A872 Glasgow Road just east of Hillhead

The Site 1 proposal was favoured for its overall good potential to integrate with potential LDP housing and/or commercial allocations on the north side of the A91 where active travel links can be effectively implemented. It also has low environmental impacts when compared to other sites. It has some potential to draw patronage from both the A91 and A9 corridors with a supported dedicated or extended Park & Ride bus service to Stirling City Centre. Of the three sites located in the mid A872/A9 and A9 corridor, Site 1 provided significantly more benefit to study objectives and *STAG* criteria than other sites, particularly notable in terms of integration. The site has low technical risks, when compared to other sites and forecast modelling has shown potential to attract patronage. Site 1 also has low impact on existing residential properties. Operation of the Park & Ride may be impacted by the Bannockburn interchange, as buses would need to route through that junction to access the site. The majority of private vehicles would also need to route through that junction to access the site.

The proposal in Site 5a is being accepted for further consideration because it has potential to be conveniently situated on a major commuter route into Stirling meeting local and strategic objectives. The site also has the potential to complement business functions adjacent to it and

some potential to integrate into the future LDP. The site has potential to be accessible by active travel. On this corridor it is also less likely to abstract patronage from Springkerse Park & Ride than sites closer to the A9. Visual amenity and cultural heritage may be moderately negatively impacted which requires further investigation. Of the sites located in the West of A872 corridor (Sites 4, 5a/b), Site 5a provided more benefit to study objectives and *STAG* criteria than other sites, particularly in terms of integration, accessibility and social inclusion. Operation of the Park & Ride is unlikely to be affected by the Bannockburn interchange, but private vehicles would need to route through that junction to access the site.

Site 8 was included in the Part 1 Appraisal following detailed discussions with Stirling Council Planning and other relevant departments. It has the potential to provide an attractive Park & Ride site for local and strategic trips and is favoured in environmental and planning terms. As an alternative site to Site 6c, Site 8 has been proposed through the consultation process to fit more sympathetically into the landscape with equal potential to contribute to the LDP. The forecast modelling has shown potential to attract more patronage than other sites on the corridor and has less impact on existing residential properties than other sites. Operation of the Park & Ride is unlikely to be affected by the Bannockburn Interchange, but vehicles would need to route through that junction to access the site from the south.

The sites selected in each corridor were the closest situated to the strategic express coach routes to encourage potential additional strategic connectivity to Edinburgh and Glasgow. The sites were also some of the furthest away from the existing Springkerse Park & Ride site, to discourage abstraction.

7.4 Detailed Appraisal

7.4.1 Option Development

The Detailed Appraisal required a more detailed assessment of the options which had been selected for further consideration as part of the Initial Appraisal. Outline site layouts were designed for this purpose that included access junction arrangements and internal layouts. Indicative construction and land costs were developed from those outline designs with assumptions made for services and land costs. Topographical surveys and full design is still necessary to achieve a fully robust cost estimate. An option for bus service route and frequency was also developed in more detail for the Park & Ride sites based on the current operating model of existing sites. The existing arrangement acted as a bench mark for other option tests where operational saving were investigated.

Capital construction costs range from £2.76million to £4.85 million in April 2010 prices; this includes an uplift optimism bias factor of 44% to anticipate risks. When further detailed design is undertaken these costs may reduce subject to initial assumptions being validated and risk allowances being reduced. The main difference in cost between the options is the requirement to provide a proposed junction or utilise an existing junction. There may be safety advantages to providing new roundabout access points, by removing a cross road priority junction. There may also be a significant benefit and dual purpose to providing a ready made access junction for potential LDP development. There may be an opportunity to investigate developer's contributions towards any proposed junction. As with the development layouts the capacity of junctions to accommodate all future requirements, such as the emerging LDP, needs further investigation. It may be possible to rationalise the size and location of the access junctions when design and capacity testing exercises have been undertaken.

The developed options have been checked against their suitability to meet Transport Planning Objectives, *STAG* Criteria and in terms of their Cost to Government and the potential Risk and Uncertainty associated with the appraisal of the options. Consideration of Planning objectives remained consistent with the Initial Appraisal. The *STAG* Objectives of impacts on the Environment, Safety, Economy, Integration, Accessibility and Social Inclusion with Equality Impact Assessment were considered in much more detail.

7.4.2 Site 1

Site 1 (Capital Cost around £4.07million) was assessed under *STAG* Criteria. It was established that Environmentally Site 1 may have minor benefits for local and global air quality. There may be some moderate impact on biodiversity habitats, visual amenity, agriculture and soils that would require to be mitigated. The site is not in a greenbelt area and is assessed as having minor landscape impact. In Safety terms, a proposed roundabout may reduce road traffic accidents. In Economic terms, the site would accrue some transport economic efficiency benefits, not least through reduced vehicle operating costs for private vehicles. There may also be some wider economic benefits by improving labour supply and local, national and distributional economic benefits but it has not been possible to quantify these impacts.

In terms of Integration Site 1 has some benefits but fitted less well than other sites from the view point of transport integration as it is remote from existing bus routes. In terms of Transport and Land-Use integration it had benefits in that it may be within active travel distance of the emerging LDP Strategic sites, but the disadvantage that it may be remote from the bus routes from the potential Major Growth Area. As with other sites community accessibility and comparative social group accessibility was anticipated to be improved by the Park & Ride bus service that could be picked up en route, as it passed by an area in the top 5% areas of Scottish deprivation. The development of active travel linkages to the Park & Ride sites would also be socially inclusive. Site 1 has a slight disadvantage in that it is not on an existing footway network but could connect by footpath to Bannockburn.

7.4.3 Site 5a

Site 5a (Capital Cost around £2.76million using an existing junction and £4.85million with a new junction) was assessed under *STAG* Criteria. It was established that Environmentally Site 5a may have moderate benefits for local and minor benefits for global air quality. There may be some moderate impact on biodiversity habitats, visual amenity, agriculture and soils that would require to be mitigated. The site is in a greenbelt area but this area may be subject to revision under the emerging MIR and is assessed as having minor landscape impact. In Safety terms, a proposed roundabout may reduce road traffic accidents. In Economic terms, the site would accrue some transport economic efficiency benefits, not least again through reduced vehicle operating costs for private vehicles. There may also be some wider economic benefits by improving labour supply and local, national and distributional economic benefits but as with other sites it has not been possible to quantify these impacts.

In terms of Integration Site 5a has benefits over Site 1 from the view point of transport integration as it is adjacent to existing bus routes. In terms of Transport and Land-Use integration it has benefits in that it may be within active travel distance of the emerging LDP Strategic sites but potentially less so than other sites being west of the A872. It has the advantage that it may be on the bus routes from the potential Major Growth Area. As with other sites community accessibility and comparative social group accessibility was anticipated to be improved by the Park & Ride bus service that could be picked up en route, as it passed by an area in the top 5% areas of Scottish deprivation. The development of active travel linkages to

the Park & Ride sites would also be socially inclusive. Site 5a is already linked to an existing footway network.

7.4.4 Site 8

Site 8 (Capital Cost £3.91million) was assessed under *STAG* Criteria. It was established that Environmentally Site 8 may have moderate benefits locally and minor benefits for global air quality. There is some advantage that there may be only minor impact on biodiversity habitats when compared to other sites. Visual amenity would require to be mitigated. The site is in a greenbelt area but this area may be subject to revision under the emerging MIR and is assessed as having minor landscape impact. In Safety terms, the proposed signal junction may not reduce road traffic accidents so the design could be revisited should it be taken forward. In Economic terms, the site would accrue some transport economic efficiency benefits, not least again through reduced vehicle operating costs for private vehicles. There may also be some wider economic benefits by improving labour supply and local, national and distributional economic benefits but as with other sites it has not been possible to quantify these impacts.

In terms of Integration, Site 8 has benefits over Site 1 from the view point of transport integration as it is adjacent to existing bus routes. In terms of Transport and Land-Use integration it has benefits in that it may be within active travel distance of the emerging LDP Strategic sites, potentially more so than Sites 5a being west of the A872. It has the advantage that it may be on the bus routes from the potential Major Growth Area. As with other sites community accessibility and comparative social group accessibility was anticipated to be improved by the Park & Ride bus service that could be picked up en route, as it passed by an area in the top 5% areas of Scottish deprivation. The development of active travel linkages to the Park & Ride sites would also be socially inclusive. Site 8 could readily to linked to an existing footway network.

7.4.5 Costs to Government

In Cost to Government terms Site 1 had the most beneficial Benefit to Cost Ratio but this was similar to other sites, such as Site 5a with a proposed roundabout access. Initial findings, using conservative estimates where many risks are taken into account, suggest that none of the options have direct economic benefits that outweigh the costs to government. The economic assessment was based upon trips to Stirling alone as it had not been possible to quantify transport benefits from strategic trips or car sharing potential, so the present value of transport benefits may be underestimated in the main economic assessment.

A revised operational model that is based on a ten year operational support for bus services and 60 year actual operational costs of the Park & Ride sites show much improved value for money in terms of cost to government. This operational model is based on Durieshill Major Growth Area making a commercial bus service from/to the city centre more likely by 2022 and as such sites 5a and 8, being located on the A872 route to Durieshill would be more likely to fulfil this scenario than Site 1. The ten year support example has been further tested with a target for patronage or overall equivalent revenue income. Should the South Stirling Park & Ride meet this patronage/income target of around 85% utilisation of the Park & Ride car parking spaces (around 220 spaces on a weekday) then there is potential for overall transport benefits to government to be economically positive, where parking charges are not taken into consideration and junction safety improvements are made.

Both Site 1 and 5a proposed access arrangements had road safety benefits. The signal arrangement assumed for Site 8 did not afford economic safety benefits; so a revision of this

layout may be appropriate should it be taken forward. Site 5a, using the existing access junction, has the most beneficial Net Present Value due to its lowest investment costs.

7.4.6 Risks

A quantified risk assessment has been undertaken and a series of risk identified that require management. A set of mitigation measures have been identified that should be considered, including:

- Detailed investigation of potential issues as part of the detailed design process
- Detailed design of infrastructure associated with the proposed Park & Ride facility
- Topo graphical survey required to inform the detailed design of the developments
- Obtain Coal Mining Reports to gather more information of former coal mining activity – particularly applies to Sites 1 and 5A.
- If any evidence of contamination became evident during development of any of the sites Stirling Council Environmental Health department should be notified and the contamination investigated and the area remediated as necessary.
- Confirm Battle of Bannockburn site boundary with Historic Scotland once information is available and review with Stirling Council.
- Further consider potential impact on 18th – 20th century smallholdings for Sites 5A and 8

There is potential for other wider issues to have an impact on the introduction of a Park & Ride to the south of Stirling:

- Emerging Stirling Council LDP land allocations
- Stirling Car Parking Charges
- Capital and revenue funding
- Availability and national funding of National Entitlement Cards
- Changes in inflation and fuel prices

7.5 Operational Business Case and Site Selection Considerations

7.5.1 Operational Business Case

A business case for the proposed Park & Ride has been reviewed. The business case for the proposed Park & Ride site focuses on an operational model that emulates the existing sites. The model including dedicated bus services on a 12min frequency gives the same level of service across Stirling. The requirement for bus service alterations has been reviewed to determine the capacity and practicality of these proposals. An option for a two sites to use a slightly reduced level of service has also been investigated, to show potential efficiency savings and adaptability of these sites.

Sites 5a and Site 8 were demonstrated to have the most potential for efficiency savings in operating costs. These sites are also the most favoured by bus and coach operators, being located on the main A872 Glasgow Road corridor.

The business case demonstrates the existing market capture for Park & Ride sites in Stirling and identifies how these may apply to the proposed site in the south of Stirling. A series of potential operational savings have also been identified subject to varying future conditions.

An assessment of total on-going annual revenue support requirements for the bus service and the Park & Ride site operations has been derived for each site and are as follows:

- Site 1 £192,000
- Site 5a £175,000
- Site 8 £175,000

Should a reduced bus service frequency be implemented (every 15mins.) then total on-going annual revenue support requirements for the bus service and the Park & Ride site operations may be revised to around £122,000, assuming same patronage levels at Castleview. There is only potential at Site 5a and Site 8 to apply this efficiency saving as Site 1 has a longer bus route that could not accommodate this timetable with a reduced number of buses.

The demand forecasts suggest that the most productive sites for attracting Park & Ride users are Site 5a and Site 8. On an annual average weekday basis Site 5a and Site 8 are expected to attract around 163 – 209 passengers per day in the first ten years of operation. Site 1 is expected to attract marginally less patronage at 156 – 201 passengers per weekday. Weekends at Site 5a and Site 8 are expected to be busier with 248-303 passengers on an annual average Saturday. Again, Site 1 would be expected to attract less patronage than the other sites with 239-292 passengers on a Saturday.

7.5.2 Site Selection Considerations

In addition to the STAG appraisal Site selection considerations have been reviewed using a series of criteria defined by the Steering Group. These include; bus priority potential, the function of a new Park & Ride, the Durieshill Major Growth area, viability of introduction and site standards. From this assessment initial indications are that:

- There is some limited potential for bus priority measures at St. Ninians Roundabout – supporting bus services from all Sites 1, 5a and 8
- There are roles for all sites for access to local facilities and specific roles for strategic access – Sites 5a and 8 have strategic coach attractiveness advantages
- In the catchment area there is potential for local growth in the medium to long term and strategic growth over the same period, a possible suitable opening time for a South Stirling Park & Ride may be in the first quarter of the period of growth 2012 to 2022 to capture new trips and be more publically acceptable – Sites 5a and 8 have the advantage that they may be more adaptable to using long term Major Growth Area buses, potentially reducing operational support requirements
- Vehicular access arrangement for the site require further refinement and capacity analysis - supporting all Sites 1, 5a and 8
- The accessibility of sites by active travel may be more clearly defined as the Local Development plan develops - early indications are that Site 8 and Site 1 will have the most advantages for being within active travel range of strategic development areas in the south of Stirling

On dissemination of the advantages and disadvantages of the site selection criteria either 'Site 5a' or 'Site 8' would appear to have the most land use and transport potential although this is dependent on the location of land allocations in the emerging LDP.

7.5.3 Timing

To support the LDP and target the predicted growth in transport demand the Park & Ride site could be introduced in the first quarter of the growth period 2012-2022 to make public transport more competitive against the car for local and strategic trips. The introduction must also be supported by appropriate car parking charges within Stirling to maintain the business case. The timing of introduction could also be balanced against the need for on-going annual operational costs. If patronage attraction and subsequent income from bus fare revenue was more in early years of operation then it could assist in offsetting more of the day to day operational costs.

Another timing issue for consideration may be that late implementation could present public acceptability issues that would not be as prevalent in earlier years of growth. mAs residential development becomes more established within the Strategic Growth Area residents may not support retrospective introduction of a Park & Ride.

7.6 Post Appraisal

The Post Appraisal has considered suitable indicators against which to monitor success in meeting the objectives of the South Stirling Park & Ride, the indicators are:

- Measure of abstraction from Sprinkerse, journey times on corridors
- Change in number and frequency of services
- Change in number of coaches using Park & Ride sites
- A mode shift survey
- Environmental mitigation measures implemented
- Park & Ride site in the LDP & number of people living within 800m

7.7 Conclusion

The study has found that two potential Park & Ride sites, 'Site 5a' and 'Site 8', could fulfil the objectives of a Park & Ride to the South of Stirling.

There are key similarities between the two sites. They are both located on the major A872 Glasgow Road corridor and are expected to attract similar levels of patronage with the beneficial effect of improving global and local air quality. They are both suitable for use by existing and potential local bus services and existing strategic coach services. Both of the sites would require dedicated bus services to be implemented from the outset, but both also have potential to be adaptable to make operational savings and utilise potential new bus services that may be required for new development. Both sites also have potential to provide a dual purpose access roundabout that could promote road safety and support the emerging Local Development Plan.

There are also some differences between Site 5a and Site 8. At Site 5a there may be more financial adaptability and options available for introduction. Site 5a could potentially have a phased access arrangement, where the initial capital cost of implementation could be kept low by utilising an existing junction in the first instance; this is not an option for Site 8 introduction. Site 8 may have some different advantages over Site 5a, in that it may be more accessible by

active travel to potential new residents in the emerging Local Development Plan, providing direct integration to a source of public transport. Site 8 may also have the least environmental impacts to mitigate, however, Site 8 could have public acceptability issues if it was placed adjacent to established residential property, making the introduction timing of the Park & Ride site less flexible. The public acceptability issue may also be applicable to Site 5a although it appears less likely from the information available to date.

The availability of finances and the relationships of the Park & Ride sites to the emerging Local Development Plan will determine which site should be investigated in further detail. Either of the sites, Sites 5a or Site 8, has the potential to complete the a ring of bus based Park & Ride sites suggested by the Tactran Park & Ride Strategy and Stirling Council City Transport Strategy. Either site would also fulfil the STPR Strategic Park & Ride/Choose Strategy aimed at supporting the objectives to make public transport more competitive against the car as a possible Park & Ride site serving Stirling, Edinburgh and Glasgow.