TACTRAN Tayside and Central Scotland Transport Partnership

A90 West of Dundee Park & Ride Study

Final Report

July 2010

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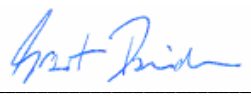
Prepared by: 

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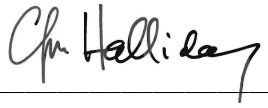
Approved by: 

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1 Introduction

1.1 Background

1.1.1 On behalf of TACTRAN, Colin Buchanan (CB) are assessing the potential for a new Park & Ride site on the A90, west of Dundee. The purpose of the study is to undertake a STAG type appraisal in order to identify the costs, benefits and deliverability of a Park & Ride facility at this location.

1.1.2 The TACTRANS Regional Transport Study (RTS) sets out a vision and programme for improving the region's transport infrastructure. A key sub-strategy was the development of a Park & Ride Strategy and Action Plan. This set planning objectives which nested within the overarching RTS objectives for the appraisal of a number of sites across the TACTRAN region. In combination with initial option appraisal, demand forecasting work led to the recommendation of two sites in the Dundee area as having a high priority for implementation. The first of these, at the southern end of the Tay Bridge has already been the subject of further investigation (The Cross Tay Sustainable Transport Study) which recommended the development of Park & Ride in this area. This study is intended to extend and develop options for the other priority location, adjacent to the A90 west of Dundee or in the Invergowrie area.

1.1.3 The Strategic Transport Projects Review (STPR) (Project 8) has also identified a Park & Ride site to the west of Dundee as a transport investment of national significance and one with potential to contribute to identified node and corridor objectives.

1.2 Appraisal process

1.2.1 The purpose of this report is to summarise all processes undertaken during the Pre-Appraisal, Initial and Detailed Appraisal Stages. The report includes an examination of all relevant existing policies and a review of potential problems, constraints and opportunities within the study area. Study objectives have then been set, based on STAG criteria and relevant policy objectives.

1.2.2 The report also summarises the option generation, sifting and development process. Potential options have been scored against the study objectives and STAG criteria. Based upon the outcomes of this process, options have either been rejected at this stage or taken forward to the qualitative Initial Appraisal stage.

1.2.3 Detailed demand forecasts have been undertaken together with a series of sensitivity tests. An economic appraisal has also been carried out and this is included within the Detailed Appraisal Stage. The Detailed Appraisal also assesses environmental, safety, accessibility and social inclusion impacts.

1.2.4 All options have been developed in consultation with the Steering Group (TACTRAN, Transport Scotland, Dundee City and Perth and Kinross Councils). Dundee City and Perth and Kinross Planning officers have been consulted with regards to the planning implications of each site; other key stakeholders consulted include bus operators National Express, Dundee and Stagecoach.

2 Policy background

2.1 Background information

Geographical context

2.1.2 The TACTRAN region covers a wide and varied area. It includes significant urban areas at Stirling, Perth and Dundee but the rest of the region is predominantly rural, with relatively low levels of public transport provision. Maintaining accessibility to key urban centres by car is therefore important to the continuing economic health of the region. Equally important, however, is managing the use of the car to protect and enhance the quality of the environment.

2.1.3 The A90 corridor is an extremely important part of the national trunk network. It provides a strategic function linking the central belt with Dundee and Aberdeen. It also serves an important commuter route to Dundee and in peak periods a significant proportion of traffic has an origin or destination in the city.

2.1.4 Approximately 40% of Dundee built area lies to the north of the A90 Kingsway. As a consequence, especially during peak hours, the road also functions as an urban distributor road linking the east and west of the city.

2.1.5 With a large number of competing movements, congestion occurs at peak periods. This has implications in terms of the local and national economy, and on the environment of the people who live and work in Dundee.

2.1.6 The Swallow Roundabout is one of a number of at grade junctions on the corridor and significant traffic congestion can occur, particularly in the morning peak. All strategic traffic travelling from the central belt to Dundee or Aberdeen must pass through the roundabout. There is also a large commuter market from the Perth and Kinross area to Dundee which must route through the junction. In the morning peak, the queue on the A90 eastbound, west of the roundabout, can reach 2km in length. Strategic traffic which continues via the A90 Kingsway may incur further delay.

2.1.7 A Park & Ride site on the A90, west of the Swallow Roundabout, provides an opportunity to reduce commuter traffic passing through the junction, reducing congestion and improving the level of service for strategic trips on the A90 trunk road. This would help meet STPR and RTS objectives to reduce conflict between longer distance and local trips.

Social context

2.1.8 Dundee City has an estimated population of 142,470 (GRO Scotland Mid Year Estimate 2008). 17.7% of the resident population are aged between 0-15 years, 64.6% aged 16-64 years and 17.7% aged 65+ years (Census 2001).

2.1.9 Dundee City has a total of 66,900 households, averaging 2.13 persons per household (Census 2001). 53.3% of households are owner occupied, 24.0% rented from the local authority, 7.8% rented from a Housing Association and 9.6% are privately rented. 5.0% are classed as other (Census 2001). Households in Dundee have a mean household income (gross) of £28,325 in 2008 (CACI Paycheck 2008).

2.1.10 The population of Dundee City is expected to age over the next 25 years. By 2033, the percentage share of all age groups below 65 years is expected to decline, and the share of the 65+ age group is expected to increase.

2.1.11 While the total population of Dundee is forecast to reduce slightly, total employment is expected to increase. This is anticipated to lead to further increases in the level of commuting to the city from its travel to work area.

Economic context

2.1.12 The number of jobs in Dundee stood at 80,190 in 2009; overall, in the period 2005-2009, total employment numbers fell by 3.1%. The largest sector in employment terms was wholesale and retail trade etc accounting for 16.2% of jobs in the City. Human health and social work activities provided 16.0% of jobs, whilst public administration and defence; compulsory social security provided 12.7% (Dundee Economic Profile January 2010).

2.1.13 In the year to June 2009, Dundee City has an estimated economically active population of 67,400 or 76.2% of the working age population, still marginally below the Scottish average of 79.7% (Dundee Economic Profile January 2010).

2.1.14 Of the 43,300 economically inactive persons 16-74 residing within its boundaries according to the 2001 census. Higher levels of inactivity are partly explained by the City's large student population which constituted 20% of all economically inactive persons compared to the Scottish average of only 12%.

2.1.15 A number of major new developments are proposed which in the medium term will significantly increase employment opportunities in the city. These include Dundee Waterfront, the new V&A at Dundee and developments at Dundee Port. Ninewells Hospital and Dundee University will also continue to expand.

2.1.16 No new net parking provision is proposed in the city centre. The Greenside car park has been constructed to serve the Waterfront and available parking in this area will reduce from present levels, as development proceeds. An increasingly limited parking supply will require charges and length of stay restrictions to be reviewed to better manage demand. Park & Ride has an important role to play in allowing less essential trips (commuter trips) to be relocated to lower cost locations while meeting national and local objectives with regard to the economy, transport and the environment.

2.2 Existing policies

2.2.1 A number of existing policies have been reviewed to establish the existing findings of work in this area and how the potential interventions could contribute to achieving overall strategic aims. These documents include:

- National Planning Framework for Scotland 2
- National Transport Strategy
- Strategic Transport Projects Review
- TACTRAN Regional Transport Strategy
- TACTRAN Park & Ride Strategy
- Dundee Parking Strategy
- Dundee and Angus Structure Plan
- Perth and Kinross Structure Plan
- Dundee Local Plan
- Perth & Kinross Local Plan, and
- Extended Tay Estuary Rail Study

2.2.2 The SEStran Cross Tay Sustainable Transport Study has also been reviewed to ensure that the objectives and methodology adopted for this study are compatible. With two Park & Ride sites in Dundee, there may be opportunities for their combined operation. For

example, a single bus service linking the sites, may reduce operating costs while increasing the range of destinations served by each site.

National Planning Framework for Scotland 2

2.2.3 The National Planning Framework aims to guide Scotland's development to 2030, setting out strategic development priorities to support sustainable economic growth. It identifies key issues and drivers of change and identifies priorities and opportunities for each part of the country in spatial perspectives.

2.2.4 The Framework recognises that transport (excluding aviation) accounts for over 20% of Scottish greenhouse gas emissions and is the fastest growing contributor to emissions. Road transport is by far the biggest source of emissions from the transport sector. Heavy reliance on the private car and the trend towards greater mobility are contributing to climate change, growing congestion and the erosion of environmental quality. A key objective is the reduction of emissions from transport sources through a shift to more sustainable modes of transport, including walking, cycling and public transport. The relationship between transport and land use is central to this agenda and the framework recognises the need to promote compact settlements, mixed use development, effective walking and cycling networks and efficient public transport systems.

National Transport Strategy

2.2.5 The Scottish Government has set out five Strategic Objectives that underpin its purpose and describe the kind of Scotland that we want to live in. These are a Scotland that is:

- Wealthier and Fairer,
- Smarter,
- Healthier,
- Safer and Stronger, and
- Greener

2.2.6 The National Transport Scotland has introduced three key strategic outcomes which support the purpose of Government and respond directly to the above strategic objectives:

- Improve journey times and connections between our cities and towns and our global markets to tackle congestion and provide access to key markets - wealthier and fairer, safer and stronger
- Reduce emissions to tackle climate change - safer and stronger, wealthier and fairer
- Improve quality, accessibility and affordability of transport, to give people the choice of public transport and real alternatives to the car. - greener, healthier, smarter

Strategic Transport Projects Review

2.2.7 Transport Scotland has undertaken the Strategic Transport Projects Review (STPR) to define the most appropriate strategic investments in Scotland's national transport network. It concentrates on interventions which reflect the Scottish Government's aspirations for better connections to the rest of the UK. The STPR has been completed using STAG guidance, which allows for the identification and appraisal of interventions most likely to address key issues.

2.2.8 The STPR outlines a number of possible interventions which would contribute to the Scottish Governments purpose to create a more successful country, with opportunities for all of Scotland to flourish, through increasing sustainable economic growth.

2.2.9 Two of the interventions are significant to this study:

- Intervention 8 proposes the implementation of a strategic Park & Ride / Park & Choose site to be located on major commuting routes, aiming to increase labour catchment areas in the city regions are to reduce emissions. Proposed sites include around Dundee include: Invergowrie, Forfar Road, A92 and Forgan.
- Intervention 29 aims to reduce the conflict between strategic, longer distance travel and local traffic in Dundee, and to improve the connectivity between the Central Belt and Aberdeen. It proposes a new Northern Peripheral Bypass road around Dundee from the A90 west of Invergowrie to the A90 north of Dundee, or the upgrading of roundabouts and associated junctions on the A90 Kingsway.

2.2.10 A series of National and Node and Corridor objectives have also bee indentified. National objectives with particular relevance to Park & Ride are to:

- promote 'competitive' inter-urban journey times
- promote journey time reductions between the Central Belt and Aberdeen/Inverness primarily to allow business to achieve an effective working day between these centres
- maximise the labour catchment area in city regions (favouring public transport and high occupancy vehicles and balancing with other policy measures that promote reduction in need to travel).
- reduce CO2 emissions in line with expectations from the emerging climate change bill
- promote continuing reduction in accident rates and severity rates across the strategic transport network, supporting the work of the Strategic Road Safety Plan
- promote seamless travel
- improve the competitiveness of public transport relative to the car, and
- improve overall perceptions of public transport.

2.2.11 Key relevant corridor and node objectives are to:

- reduce the conflict between longer distance and local traffic
- improve bus/rail interchange opportunities
- improve the public transport accessibility and competitiveness to Dundee West

TACTRAN Regional Transport Strategy

2.2.12 The TACTRAN Regional Transport Strategy sets out a vision and programme for improving the region's transport infrastructure. The strategy recognises the importance of Park & Ride and Park & Choose in general and its particular application to urban areas with large rural hinterlands and limited rural public transport. Both rail and bus based Park & Ride schemes were considered to have a role to play in the TACTRAN area.

2.2.13 A more detailed policy and delivery framework has been developed as part of the TACTRAN Park & Ride strategy.

TACTRAN Park & Ride Strategy

2.2.14 The Park & Ride Strategy assessed in greater detail the potential for Park & Ride across the TACTRAN region. It identified the position of Park & Ride policy within overall transport and public transport provision patterns. The study assessed the potential for new bus and rail based Park & Ride across the major urban centres.

2.2.15 It appraised a number of potential sites and selected priorities for development. These included a site to the south of Dundee at the southern end of the Tay Bridge (now being taken forward) and a site to the west of Dundee which is the subject of this study.

Dundee Local Transport Strategy

2.2.16 This strategy makes use of relevant national, regional and local plans to develop its objectives which will address some of the transport issues affecting Dundee. The objectives which are relevant to this study, contained within the Dundee Local Transport Strategy (LTS), are:

- to reduce the need to travel and, where travel is necessary, to ensure accessibility by all forms of transport
- to minimise transport's demand for land, protect the City's built heritage and limit the visual intrusion caused by transport
- to maintain Dundee's current good air quality, minimise intrusion from traffic noise and to respond to the Governments CO_2 reduction target
- to ensure transport meets the needs of all in society
- to make it easier and safer to get around locally by walking
- to develop a safe, convenient and cohesive infrastructure that encourages and facilitates cycling
- to provide an efficient and reliable quality bus service that is accessible to all
- to provide a vital transport service to people who would otherwise be excluded from society
- to advocate far more frequent and convenient local services and to ensue proper integration with all forms of transport
- to ensure Dundee is accessible and has good transport links relative to its location, for all modes of transport: road, rail, sea and air.
- to ensure an efficient principal road network that facilitates good access to the city centre by all modes of transport
- to maximise the efficiency and safety of the existing transport network, particularly towards benefits for walking, cycling and to create road space for a reliable public transport provision, whilst minimising the need for a new road build
- to ensure journeys are 'seamless' and that public transport operates as a true network
- to achieve a balanced car parking strategy that will restrain the use of the private car by commuters and promote the economic prosperity of the city, and
- to reduce the forecast rate of growth in peak hour traffic in central Dundee.

2.2.17 Dundee City council aim to ensure that traffic does not increase by more that 25% by 2021 compared to 1996 levels in central areas of Dundee during the morning and evening peaks. The purpose of the road traffic reduction target is to reduce congestion and pollution and to promote more sustainable forms of travel. Promoting alternative modes of travel, such as walking, cycling and public transport is key to achieving this target.

Dundee Parking Strategy

2.2.18 The Dundee Parking Strategy identified eight objectives which the strategy should support. These are to:

- support the economic vitality of the city by encouraging a high turnover of car parking for shoppers and visitors
- ensure that the provision and management of parking encourages and facilitates walking, cycling and public transport use
- provide safe and attractive parking facilities and contribute to improved road safety
- ensure that residents without off-street parking facilities in areas surrounding the city centre or major trip attractors are able to park their vehicles near their homes
- ensure the efficiency of the parking strategy through effective enforcement of parking restrictions

- ensure that there is no net increase or decrease in existing car parking facilities
- facilitate ease of access for all users to and from parking facilities including mobility impaired people, pedestrians, cyclists, motorcyclists and public transport users, and
- assist in meeting the National Air Quality Standards

2.2.19 Amongst the policies adopted, the strategy supports the implementation of a clear and uncomplicated parking restriction and tariff regime, favouring short stay on-street parking. Long term parking is not encouraged and should be directed to off-street car parks.

2.2.20 The strategy recommends that it is implemented within a wider strategy to improve public transport walking and cycling facilities. It must form one component of an overarching strategy to improve public transport, walking and cycling facilities so that car drivers have a genuine, practical, attractive alternative.

2.2.21 The strategy aims to ensure that there is no net increase or decrease in parking provision in the city centre and that the provision of parking spaces should support policies to encourage mode shift.

2.2.22 It recommends the implementation, where appropriate, of new Residents' Parking Zones (RPZs) where commuter parking makes parking for residents difficult. The strategy acknowledges that the implementation of RPZs on the periphery of the city centre is likely to become increasingly important to ensure that policies to discourage additional city centre parking provision encourage mode shift rather than a transfer of long stay commuter parking to the periphery.

2.2.23 Finally, the parking strategy acknowledges that the car will continue to be a primary of transport used by commuters from outside of the city and that Park & Ride could remove a substantial proportion of these trips from the city centre. This would reduce pressure for long stay parking in the city centre, help promote public transport and reduce total vehicle emissions.

Dundee and Angus Structure Plan

2.2.24 In accordance with the Planning Bill (Scotland) existing Structure and Local Plans are evolving into Strategic Development Plans (TAYPlan) and Local Development Plans. While initial outputs from these are beginning to emerge, existing documents remain current.

2.2.25 The Dundee and Angus Structure Plan recognises that efficient transport links within Dundee and Angus and good connections to the rest of Scotland, the UK and Europe are essential to the long-term economic prosperity of the area. The plan also identifies key locations where existing and future transport infrastructure can be most usefully harnessed to support and facilitate development. The key aims for land use and transport include reducing the need to travel and encouraging the use of alternative means of travel to the private car which have less environmental impact.

2.2.26 A key element of the structure Plan development strategy is provision for housing and employment opportunities to the west of Dundee. Improvements to key junctions on the A90(T) at the Swallow Hotel and Myrekirk Road, in conjunction with measures to extend public transport and to facilitate walking and cycling are an integral requirement of planned development.

Perth and Kinross Structure Plan

2.2.27 The Perth and Kinross Structure Plan supports the development of sustainable communities. It supports an integrated approach to land use allocations and policies is required in order to meet the objectives of sustainable development, in particular:

- reducing the need to travel and promoting alternatives to the use of the private car.
- ensuring that development promotes greater energy efficiency.
- protecting the viability of existing town centres and promoting them as key locations for development.
- protecting the environment and reducing pollution.

Dundee Local Plan / Perth & Kinross Local Plan

2.2.28 The Dundee Local Plan does not outline specific Park & Ride proposals, nevertheless, it does recognise that Park & Ride "could have positive benefits on Dundee's population and road congestion". It is the strategy of the local plan to:

- encourage development in the right location so to reduce the need for travel
- address accessibility issues by promoting alternative choice in the range of transport modes available for any particular journey
- control car use in a manner that is balanced with other modes, and
- encourage an improvement in air quality through the promotion of appropriate transport choice and promotion of sustainable transport modes

2.2.29 The Perth and Kinross Local Plan makes no specific reference to Park & Ride as it relates to Dundee; both plans offer information on existing land zoning patterns and permitted development areas.

Extended Tay Estuary Rail Study

2.2.30 Although the Tay Estuary Rail Study (TERS) does not directly consider the provision of Park & Ride, it does investigate the benefits of introducing an approximately hourly rail service, stopping at a number of local stations that are currently poorly served, this includes recommending increasing the number of stopping services at Invergowrie Station. In the medium to longer term the study recommends relocating Invergowrie station to Dundee West, 700m to the east of the existing station, on Riverside Avenue. TACTRAN is currently pursuing the conclusions of TERS with various stakeholders and at present no delivery or funding commitment has been secured.

2.2.31 The potential for Park & Ride in the vicinity of the station is considered as part of this study (Site 6B).

Sestran Cross Tay Sustainable Transport Study

2.2.32 While this study does not necessarily have a direct impact on the project in hand it has been reviewed to ensure that the objectives of the two studies are compatible and that all opportunities for combined operation of the two sites with a single bus services can be considered.

2.3 Ninewells Hospital and Dundee University travel plans

2.3.1 Two major sites outside Dundee City Centre which may generate Park & Ride demand are Ninewells Hospital and Dundee University. Both have developed travel plans to help manage car travel and parking and these are reviewed below.

Ninewells Hospital travel plan

2.3.2 The 2005 Travel Plan for Ninewells identified very high levels of car usage amongst staff when compared to averages for Dundee and Scotland. This, coupled with a low proportion of staff using sustainable modes puts pressure on the available parking spaces. A site audit found that there are 2440 car parking spaces throughout the site. There can be delays for cars trying to access the most popular car parks while others have spaces remaining and no delays. As a results of these delays some staff park off-site on the surrounding streets. A residents' permit scheme is in place to combat this "bad neighbour" parking.

2.3.3 A 2008 travel survey was completed by approximately1300 staff which highlighted the issues that they faced when travelling to Ninewells. Of the possible issues affecting mode choice both "convenience" and the "availability of public transport" rated highly. When asked what would encourage more sustainable travel the most highly rated responses were "more frequent bus services", "cheaper fares" and "more direct bus services from outlying towns". Although the survey was not directly concerned with parking issues several respondents suggested a park and ride site would be well used.

2.3.4 Recent measures implemented on site are as follows:

- Introduction of short stay parking at some car parks to allow for regular turnover of spaces
- Compassionate free parking permits for regular frequent treatment patients
- Real time public transport information at Ninewells stops
- "Hospital link" bus service between Perth Royal Infirmary and Ninewells
- Introduction of "cycle to work" scheme and provision of cycle lockers and cycle routes

Dundee University travel plan

2.3.5 The travel plan of Dundee University seeks to address the following issues: accessibility of premises; restricted car parking provision; accessibility associated with the refurbishment and redevelopment of the University's Estate; rising cost of business travel; local and global pollution; impact of the local community, the changing needs of the university's operations, staff and students. Travel related targets have been identified; these include reducing single occupant car journeys, increasing travel by walking and cycling, reducing car use for business trips and increasing use of public transport.

2.3.6 Several measures have already been implemented which help progress towards these targets. They are as follows:

- Established Travel Plan Working Group
- Review of comprehensive car parking management and charging scheme including the implementation of short stay car parks.
- Private University lift share website through Dundeeliftshare.com
- Cycle lockers and parking facilities on Campus
- Pro-active Bicycle Users Group (BUG)
- Cycle events and rides throughout the year.
- Web based travel and transport information to include journey planning (Traveline Scotland), maps and directions.

3 Analysis of problems and opportunities

3.1 Introduction

3.1.1 The identification of existing and future problems is the starting point in the development of any new transport proposal. A fundamental element of the STAG process is to understand the transport problems within the study area and identify transport improvements which address these.

3.2 Problems and opportunities

3.2.1 There are a number of identified issues with the transport system in the west Dundee area. Some of these relate to specific problems with the road network which others relate to the existing development pattern and the provision of public transport.

A90 corridor

3.2.2 The A90 corridor is an extremely important part of the national trunk network. It provides a strategic function linking the central belt with Dundee and Aberdeen. It also serves an important commuter route to Dundee and in peak periods a significant proportion of traffic has an origin or destination in the city.

3.2.3 Approximately 40% of Dundee built area lies to the north of the A90 Kingsway. As a consequence, especially during peak hours, the road also functions as an urban distributor road linking the east and west of the city.

3.2.4 With a large number of competing movements, congestion occurs at peak periods. This has implications in terms of the local and national economy, and on the environment of the people who live and work in Dundee.

Swallow Roundabout

3.2.5 The Swallow Roundabout is one of a number of at grade junctions on the corridor and significant traffic congestion can occur, particularly in the morning peak.

3.2.6 All strategic traffic travelling from the central belt to Dundee or Aberdeen must pass through the roundabout. There is also a large commuter market from the Perth and Kinross area to Dundee which must route through the junction.

3.2.7 In the morning peak, the queue on the A90 eastbound, west of the roundabout, can reach 2km in length. Strategic traffic which continues via the A90 Kingsway may incur further delay.

3.2.8 Smaller queues occur in the evening peak on the eastbound approach to the roundabout. Until recently, queues also occurred on the Riverside Avenue approach to the junction in the evening. An extended left turn slip (from 70m to 360m) has recently been implemented which has helped to reduce congestion at this location.

3.2.9 A Park & Ride site on the A90, west of the Swallow Roundabout, provides an opportunity to reduce commuter traffic passing through the junction, reducing congestion and improving the level of service for strategic trips on the A90 trunk road. This would help meet STPR and RTS objectives to reduce conflict between longer distance and local trips.

Public transport

3.2.10 Both long distance and inter-urban bus services experience delays on the A90 corridor, especially in the vicinity of the Swallow Roundabout. Delays and poor journey time reliability reduce the attractiveness of services, further encouraging car use.

3.2.11 Potential bus priority measures implemented on the approach to the Swallow roundabout, in conjunction with a Park & Ride site, offer the potential to provide wider benefits to local and long distance bus services. Opportunities for bus priority measures on Riverside Avenue / Riverside Drive provide an chance to improve journey times for all public transport users on the corridor and not just those travelling by Park & Ride.

3.2.12 Local and inter-urban weekday bus services using the A90 corridor are summarised in Table 3.1.

Table 3.1: Bus routes on A90 corridor

No.	Operator	Route	Frequency
16/16A	Stagecoach	Perth – Errol – Inchture - Dundee	2
333	Stagecoach	Perth Royal Infirmary – Ninewells Hospital	1
M8/M9/M10	Citylink	Glasgow / Edinburgh – Perth – Dundee - Aberdeen	2

3.2.13 Additional local bus weekday routes within Dundee serve Ninewells Hospital and the Perth Road / Riverside Avenue corridors. These are summarised in Table 3.2.

Table 3.2: Bus routes on Perth Road / Riverside Avenue

No.	Operator	Route	Frequency
Via Perth Road			
9X	Travel Dundee	Forthill – Ninewells Hospital	2
14	Travel Dundee	Angus Gateway – Technology Park & Ninewells Hospital	2
17	Travel Dundee	South Road, Tesco Extra – Whitfield via Technology Park, Ninewells Hospital, Menzieshill, City Centre and Pitkerro Road	2
22/22C	Travel Dundee	Downfield – Ninewells Hospital	8
30	Travel Dundee	South Road, Tesco Extra – Liff Hospital – Liff – Fowlis – Birkhill - Tesco	1
31	Travel Dundee	Invergowrie – Ninewells Hospital – Liff Hospital - Invergowrie	1
42	Stagecoach	Cupar – Tayport – Dundee - Ninewells	1
77	Stagecoach	Kingoodie – Invergowrie – Ninewells – Dundee – Newport - Wormit - Gauldry	1
Via Riverside Avenue			
8X	Travel Dundee	Forthill – Broughty Ferry – City Centre – Ninewells Hospital	2
X42	Stagecoach	Ladybank – Cupar – Dundee City Centre – Ninewells Hospital	1

Ninewells Hospital and Dundee University

3.2.14 Ninewells Hospital and Dundee University are important employers and attractors outside the city centre.

3.2.15 At Ninewells Hospital access issues discourage the use of the largest formal car parks, resulting in overspill into adjacent streets. This in turn leads to a shortage of available

parking suitable for residents. The Menziehill Residents Parking Zone (RPZ) has been implemented to deter overspill parking on streets adjacent to the hospital.

3.2.16 Off the 5,700 staff at the hospital, 64% always or nearly always travel to work alone in the car. Approximately 73% are employed during regular office hours. With approximately 2440 spaces, this suggests that existing demand for parking exceeds supply by over 200 spaces.

3.2.17 Parking provision is also limited at Dundee University. Ongoing redevelopment of the campus is reducing the availability of parking while increasing demand from staff and students. Levels of on-street parking continue to increase and Dundee City Council are now considering options to extend the city centre controlled parking zone to better manage on-street demand.

3.2.18 Currently, there are approximately 3140 members of staff employed at the university, 33% of who travel to work via a single occupancy car journey, based on the 2008 Staff Travel Survey. Encouragingly, this figure shows a 38% reduction in the number of staff who travel to work alone compared with the 2004 survey. The university provides approximately 900 parking spaces, with a maximum of 700 parking permits issued.

3.2.19 In conjunction with on-street controls, Park & Ride has the potential to provide additional off-street parking to serve the above locations. It will help meet economic objectives, ensuring access to these important employers, while minimising the impact that each site has on the adjacent road network.

Dundee City Centre

3.2.20 Dundee City Council continue to actively manage parking supply and parking charges are periodically reviewed. The focus is to encourage short and medium stay use while managing long stay supply.

3.2.21 Park & Ride provides an opportunity to reduce the number of long stay commuter trips parking in the city centre. This in turn allows the provision of more short stay supply, increasing parking turnover, benefiting the city centre economy.

3.2.22 Development pressures including Dundee Waterfront and the new Victoria and Albert museum will increasingly result in a greater demand for parking.

3.2.23 The waterfront is a major development and the approved Masterplan includes:

- the extension of the city centre to the waterfront
- provision of sites for a variety of mixed use developments
- the formation of a major new civic space and reopened docks
- the provision of a new rail station and arrival square, and
- improved provision for walking cycling and buses

3.2.24 The V&A at Dundee will be a major focal point of the development and will help speed the regeneration of the area. Importantly, no new net parking provision is proposed and the policy is to ensure the overall number of parking spaces serving Dundee city centre will not increase or decrease. An increasingly limited parking supply will require charges and length of stay restrictions to be reviewed to better manage demand, increasing the need for Park & Ride.

3.2.25 Furthermore, new development increases land values as available development land becomes scarce. Over time, land currently used for parking may be better used for other purposes. Park & Ride allows less essential trips (commuter trips) to be relocated to lower cost locations while meeting overall economic, transport and environmental objectives.

3.3 Issues

3.3.1 A new Park & Ride site serving the west of Dundee must take into account existing and proposed development.

3.3.2 Land to the north of the A90 is allocated to be developed as part of the Dundee Western Gateway. Potential development includes:

- the Balgarthno Business Park – 50,000sqm of office, research and development space and light industrial space
- the Scottish Crop Research Institute Science Park, and
- Western Gateway Housing – 750 houses to be developed within three villages

3.3.3 No development has taken place to-date; partly because of the difficulty in providing access to the development areas from the A90. Various access proposals have been considered with the preferred option being to significantly enlarge the Swallow Roundabout, with possible signal control.

3.3.4 As part of the appraisal of a new park & Ride site, alternative access options are being considered. A number of these aim to allow Park & Ride traffic (or the bus service serving the site) to bypass the eastbound queue on the approach to the Swallow Roundabout. The journey time savings which accrue may significantly improve the economic case for Park & Ride.

3.3.5 Future improvements at the Swallow Roundabout may mitigate existing delays, reducing the potential journey time savings that Park & Ride might provide. Conversely, no improvement will likely result in longer queues on the eastbound approach and increased delay. As a result, the Park & Ride may eventually lie to far inside the boundary of congestion to be sufficiently attractive to users.

3.3.6 Proposals must also take cognisance of the Dundee Northern Relief Road, as identified in the Strategic Transport Projects Review. This could take the form of a new peripheral bypass around Dundee or an upgrading of the existing A90 Kingsway. It would reduce conflicts between local and long distance traffic and would help reduce congestion at the Swallow Roundabout. The relief road is considered to be a long term intervention - the STPR identifies projects to be developed over the next 20 years and Project 29 is not allocated to be implemented at a specific point in this timeframe.

3.3.7 Many of the Park & Ride sites being considered lie in green field locations or are currently zoned for business development - none have been specifically identified in relevant local plans. Though reallocation of land from business to Park & Ride uses is not likely to prove controversial there may be limited public support for the development of green field sites, particularly where these will require considerable access works.

3.4 Constraints

3.4.1 Although there are a number of sites suitable for Park & Ride development, site access constraints limit the suitability of certain locations.

3.4.2 A site at the edge of congestion zone (midway between the Longforgan and Swallow junctions) would require a major new grade separated junction at a high cost. A new distributor road from the junction could allow Park & Ride traffic (or buses) to bypass queuing traffic on the A90, providing significant journey time benefits. It would also open up the Western Gateway site for development. However, the total cost of the works, even taking into account development opportunities, is considered too large to be justifiable and there would be significant barriers to delivery.

3.4.3 Potential sites must consider bus operations. Sites located furthest from Dundee are more costly to serve by local bus services - and may only be attractive to longer distance operators. This may result in either a reduced level of service or high operating costs, weakening the economic case for the scheme.

3.4.4 All sites considered have been reviewed with Perth and Kinross and Dundee City Council Planning Officers. At this stage, no sites are considered to be constrained in terms of planning policy, landscape or ecological importance. These issues will be considered in more detail at the Initial Appraisal Stage. Similarly, while an early review of environmental issues has highlighted no significant issues, a more detailed assessment will be undertaken as part of the Initial Appraisal.

4 Objective setting

4.1 STAG requirements and existing objectives

4.1.1 While the STAG guidance does not set specific objectives noting that these will necessarily be unique to each project, it does provide five criteria which act as a framework to ensure that all impacts are considered. These are:

- environment
- safety
- economy
- integration
- accessibility and social inclusion

4.1.2 It is important that the objectives set for this study are compatible with existing national and regional policies.

National Transport Strategy key strategic outcomes

4.1.3 Three key outcomes are identified in the National Transport Strategy and are as follows:

- Improving journey times and connections, to tackle congestion and the lack of integration and connections in transport that impact on the potential for continued and economic growth;
- Reducing emissions, to tackle the issues of climate change, air quality and health improvement; and
- Improving quality, accessibility and affordability, to give people a choice of public transport, where availability means better quality transport services and value for money or an alternative to the car

4.1.4 These outcomes are used by the Strategic Transport Projects Review (STPR) to inform a series of National and Node and Corridor objectives. Those objectives relevant to this study are listed in Table 4.1 and cross referenced to relevant A90 P&R study objectives outlined below.

Regional Transport Strategy objectives

4.1.5 The six overarching objectives of the RTS are listed below:

- 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
- The 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

TACTRAN Park & Ride Strategy objectives

4.1.6 The objectives of this strategy were informed by the RTS objectives and are also listed in Table 4.1.

4.2 Objectives for the A90 West of Dundee Park & Ride study

4.2.1 The objectives for this study are as follows:

- Improve the public transport accessibility to employment, health, leisure and recreational locations in the west of Dundee and the City Centre
- Encourage a shift toward sustainable and healthier modes of transport
- Reduce traffic congestion for longer distance trips in the west of Dundee
- Contribute to national and local air quality targets and reducing the impact on climate change
- Minimise the impacts of the scheme upon the natural and built environment

4.2.2 The following table shows how these objectives relate to relevant objectives extracted from the Strategic Transport Projects Review, TACTRAN Regional Transport Strategy and the TACTRAN Park & Ride strategy.

Table 4.1: Study objectives related to STPR, TACTRAN RTS and TACTRAN P&R strategy

Study objectives	Improve the public transport accessibility to employment, health, leisure and recreational locations in the west of Dundee and the City Centre	Encourage a shift toward sustainable and healthier modes of transport	Reduce traffic congestion for longer distance trips in the west of Dundee	Contribute to national and local air quality targets and reducing the impact on climate change	Minimise the impacts of the scheme upon the natural and built environment
STPR national objectives					
To promote 'competitive' inter-urban journey times.			✓		
To reduce inter-urban journey time on public transport.			✓		
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.	✓				
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.			✓		
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).	✓				
Support the development and implementation of the emerging national development interventions.	✓		✓	✓	
Reduce CO_2 emissions per person km.		✓		✓	
Stabilise total CO_2 emissions.		✓		✓	
Reduce CO_2 emissions in line with expectations from the emerging climate change bill.		✓		✓	
To promote continuing reduction in accident rates and severity rates across the strategic transport network, supporting the work of the Strategic Road Safety Plan.		✓	✓		
To promote seamless travel.	✓				

Study objectives	Improve the public transport accessibility to employment, health, leisure and recreational locations in the west of Dundee and the City Centre	Encourage a shift toward sustainable and healthier modes of transport	Reduce traffic congestion for longer distance trips in the west of Dundee	Contribute to national and local air quality targets and reducing the impact on climate change	Minimise the impacts of the scheme upon the natural and built environment
Improve the competitiveness of public transport relative to the car.	✓				
To improve overall perceptions of public transport.		✓			✓
STPR corridor objectives					
To promote continuing reduction in accident rates and severity rates across the strategic transport network; and			✓		
To promote journey time reductions, particularly by public transport, between the Central Belt and Aberdeen primarily to allow business to achieve an effective working day when travelling between these centres.			✓		
STPR node objectives					
To reduce the conflict between longer distance and local traffic	✓	✓	✓		
To improve bus/rail interchange opportunities	✓				
To improve the public transport accessibility and competitiveness to Dundee West;	✓				
To promote continuing reduction in accident rates and severity rates across the strategic transport network;			✓		
To promote journey time reductions, particularly by public transport, between Aberdeen and the Central Belt primarily to allow business to achieve an effective working day when travelling between these centres.		✓	✓		
TACTRAN RTS objectives					
Economy: To ensure that transport helps to deliver regional prosperity	✓		✓		
Accessibility, Equity and Social Inclusion: To improve	✓	✓			

Study objectives	Improve the public transport accessibility to employment, health, leisure and recreational locations in the west of Dundee and the City Centre	Encourage a shift toward sustainable and healthier modes of transport	Reduce traffic congestion for longer distance trips in the west of Dundee	Contribute to national and local air quality targets and reducing the impact on climate change	Minimise the impacts of the scheme upon the natural and built environment
accessibility for all, particularly for those suffering from social exclusion.					
The 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.	✓				
TACTRAN P&R strategy objectives					
To ensure that P&R improves access to town / city centres and areas of employment, helping to ensure economic growth	✓				
To improve the efficiency and reliability of the transport system through reduced town and city centre traffic levels and associated economic costs		✓	✓		
To improve access to health, leisure and retail facilities by P&R	✓				
To improve the physical accessibility of the transport system through the provision of increased P&R	✓				
To respect the built environment through reducing the needs to build new town and city centre car parks		✓			✓
To help limit / manage travel by private car in urban areas to help meet statutory air quality requirements in the TACTRAN area		✓		✓	
To provide the highest levels of safety and security of passengers and vehicles when using P&R		✓			

Study objectives	Improve the public transport accessibility to employment, health, leisure and recreational locations in the west of Dundee and the City Centre	Encourage a shift toward sustainable and healthier modes of transport	Reduce traffic congestion for longer distance trips in the west of Dundee	Contribute to national and local air quality targets and reducing the impact on climate change	Minimise the impacts of the scheme upon the natural and built environment
To ensure the P&R facilitates integration and is accessible by all modes of transport	✓	✓			
To ensure integration between land-use planning and provision of public transport					✓

5 Option generation, sifting and development

5.1 Generation of preliminary options

Site locations

5.1.2 Figures A1 and A2 in Appendix A summarise the locations and possible access arrangements for the potential Park & Ride sites identified.

5.1.3 Initial options for assessment were developed through consideration of previously identified sites, consultation with the Steering Group, consultation with Dundee City and Perth and Kinross Planning Officers, and site visits. Existing land use and local plan maps were examined to identify suitable areas of open land and to identify any restricted or environmentally sensitive areas. Further work is being undertaken and details of the environmental assessment will be summarised in the Initial Appraisal Report.

5.1.4 Sites 3, 4 and 7 were previously identified as part of the development of the Park & Ride Strategy, with Site 7 primarily included as a potential option to be included within the Tay Estuary Rail Study.

5.1.5 Sites 1A, 1B and 1C are variations making use of the existing grade separated junction at Longforgan. They are located some distance from the edge of the congestion zone which may make them less attractive to potential users. While they could be served by existing inter urban bus services, extending local services to the sites would increase operating costs significantly.

5.1.6 Sites 2A, 2B and 2C are located at the edge of the congestion zone – in theory, the optimal location to attract Park & Ride users. Being located closer to Dundee, the cost of extending local bus services to the sites is reduced, however, a new junction would be required on the A90, as discussed below.

5.1.7 Site 5 is zoned for development and can be readily accessed from the Swallow Roundabout. While located inside the congestion zone, it has the potential to serve a wider catchment from northwest Dundee as well as the A90 corridor.

5.1.8 In addition to providing a Park & Ride function to Dundee City Centre, Site 6A is well situated to serve Ninewells Hospital. It's location means that it could be readily served by existing bus services, minimising operating costs.

5.1.9 Site 6B is proposed to be situated adjacent to a relocated Invergowrie Station on Riverside Avenue. Its advantages are similar to Site 6A, however, it also has the potential to operate as a parkway, providing Park & Ride capacity for the wider rail network.

5.1.10 Site 6C is located south of the Swallow Roundabout between Riverside Avenue and Greystane.

5.1.11 As noted above, sites located furthest west on the A90 would have the highest operating costs. There are a limited number of passing bus services. Extending local bus services to serve sites at Longforgan and attractive frequency would be expensive. Conversely, Site 6A is located adjacent to an existing high frequency service; additional operating costs would therefore be minimal.

Site access locations

5.1.12 Site access arrangements have been carefully considered whilst generating preliminary options. Lengthening queues on the eastbound approach to the Swallow roundabout may limit the effectiveness of Park & Ride in future years as Park & Ride sites work best if they are situated outside the boundary of the congested area. As congestion levels increase there is a risk that the end of the queue may pass the site limiting its attractiveness. Proposals which can offer real travel time benefits have the potential to attract significant levels of Park & Ride demand while performing well in terms of economic benefit.

5.1.13 As noted above potential sites 1A, 1B and 1C make use of the existing Longforgan junction. Two sub options have been considered:

- No bus priority – westbound buses queue on the approach to the Swallow roundabout with general traffic
- Full or partial bus lane – a bus lane is provided on the eastbound carriageway in order that buses can bypass all or part of the queue

5.1.14 Sites 2A, 2B and 2C would require a new grade separated junction on the A90. A sub option has also been considered – a new spine road would link the site with the Swallow Roundabout via the Dundee Western Gateway development. This would serve a similar function to a bus lane, allowing buses to bypass queuing traffic on the A90.

5.1.15 Three alternative site access options have been considered for the Site 3. These are:

- direct access from the Swallow Roundabout (Option 3)
- a short eastbound off slip from the A90 – buses then have direct access through the site to the Swallow Roundabout (Option 3i)
- as above but with a longer eastbound off slip, allowing Park & Ride users to leave the A90 earlier (Option 3ii)

5.1.16 Sites the south of the A90 either require a new grade separated junction or for vehicles to pass through the Swallow Roundabout to gain access, limiting their appeal. Both access options have been considered for Site 4.

5.1.17 Site 5 would be directly accessed from the Swallow Roundabout. Sites 6A, 6B and 6C would be accessed from the local road network.

5.1.18 In addition to motorised access it is important that Park & Ride design should consider access by non-car modes at an early stage. Well located and designed sites can act as transport hubs, providing a highly accessible transport node. However, unless high quality walk and cycle links are provided, sites can also encourage short distance car trips which might easily have been made by cycle or on foot. Sites 3, 5, 6A, 6B and 6C are well located to be integrated within existing walking and cycling networks.

5.2 Long list of sites for sifting

5.2.1 A long list of all the sites considered at this, pre-appraisal stage, is as follows:

- 1A, B, C - access via existing Longforgan junction
- 1A, B, C - access via existing Longforgan junction with full or partial bus lane on the A90
- 2A, B, C - access via a new grade separated junction on the A90
- 2A, B, C - location 2B – access via eastbound off slip and development spine road
- 3 – access from the Swallow roundabout
- 3i – access via a short eastbound off slip from the A90
- 3ii –access via a longer eastbound off slip from the A90

- 4 – access via new eastbound off slip and upgraded westbound on slip at Invergowrie
- 5 – access via Swallow Roundabout
- 6A – access from the local road network
- 6B – access from the local road network
- 6C – access from the local road network
- 7 - associated with a discontinued station proposal

5.3 Option sifting

5.3.1 An initial option sifting exercise has been undertaken in order to identify those proposals which either do not meet the study objectives, would be too costly or would be prohibitively complex to deliver.

5.3.2 As noted above, all the options are considered to be feasible in planning and environmental terms.

5.3.3 Key drivers in determining those sites which should be taken forward to a STAG1 appraisal are:

- capital costs
- operating costs and
- deliverability

Sites 1A, 1B and 1C

5.3.4 Sites 1A, 1B and 1C lie outside the existing congestion boundary; they make use of an existing grade separated junction, reducing capital costs. While existing inter-urban buses pass by the site, extending local bus services or providing a dedicated Park & Ride service, to provide a greater frequency would significantly impact on total operating costs.

5.3.5 The primary option being considered assumes that no bus priority would be provided on the A90 corridor, however, a sub option considers the impact that a full or partial eastbound bus lane would have on the economic case for the scheme.

5.3.6 Perth & Kinross Council have some reservations about the locations in terms of their impact on their ability to limit future housing in the Longforgan area. Nevertheless, is considered that these issues could be overcome. Given the relatively low capital outlay it is recommended that these sites are taken forward to the Initial Appraisal stage.

Sites 2A, 2B and 2C

5.3.7 In order to access sites 2A, 2B and 2C there would be a need for an entirely new grade separated junction, a significant length of new distributor road (or both). The capital cost of providing access to a new Park & Ride site alone is considered prohibitive.

5.3.8 Although a new junction would open up the Western Gateway area, the timescale for its development are unclear. Opportunities to share costs are therefore limited and would make the delivery of a site at this location extremely complex. Given these issues, Sites 2A, 2B and 2C are ruled out at this stage.

Sites 3, 4 and 5

5.3.9 Site 3 can be accessed through a combination of an upgraded access from the Swallow Roundabout and/or a new eastbound off slip from the A90. Longer off slips would be more expensive but would help to open up the development area, future proof the site and would allow Park & Ride traffic to bypass queues on the A90. It is located close to Dundee

reducing public transport operating costs in comparison to sites 1 A, B and C. For these reasons, Site 3 is taken forward to the full appraisal stage.

5.3.10 Site 4 is discounted, mainly due to the expensive access work needed to access the site. It would require a new crossing of the A90 without offering any particular advantages over Site 3.

5.3.11 It is proposed that Site 5 would be accessed directly from the Swallow Roundabout. No bus priority measure are considered and the site lies within the congestion zone. Nevertheless the site has the potential to attract demand from a wider catchment and is therefore taken forward to the Initial Appraisal stage.

Sites 6A, 6B and 6C

5.3.12 While Sites 6A, 6B and 6C would neither reduce congestion at the Swallow Roundabout or reduce commuter traffic on the A90 corridor, they meet other local study objectives. They would provide alternative parking for city centre users and could be well served by local public transport services. They would help reduce congestion in Dundee City Centre and on the Perth Road and Riverside Avenue corridors between the A90 and city centre. Construction and operating costs would be comparatively low and they could be fully integrated into existing walking and cycling networks.

5.3.13 Sites 6C is located on a narrow strip of land between Riverside Avenue and Greystane. Landscaping shelters nearby residents on Greystane from the traffic noise and visual intrusion impacts of Riverside Avenue. In order to provide adequate parking, this would need to be removed or significantly reduced in scale and this is unlikely to acceptable to nearby residents. It's visual impact from Riverside Avenue would also be significant, with only limited opportunity for landscaping.

5.3.14 Access to the site is potentially limited. A new access from Riverside Avenue is unlikely to be permitted and, consequently, it would be necessary to provide an access from the existing Apollo Way junction. With only one access to a long and narrow car park, internal movements would be constrained, especially for buses. Given these issues Site 6C is not considered further; Sites 6A and 6B are taken forward to the Initial Assessment stage.

Site 7

5.3.15 Site 7 was originally proposed as a Park & Choose site, complimenting the then current version of the Tay Estuary Rail Study which proposed a station in this area. The Extended Tay Estuary Rail Study has recommended the relocation of Invergowrie station 700m east to Riverside Avenue in the medium to longer term. Without a station, the site is too remote from the road network and, consequently, Site 7 is discounted at this stage.

Summary

5.3.16 Table 5.1 summarises each site and its scoring during the option sifting process based on a three point scale.

5.3.17 Sites 2A, 2B, 2C, 4, 6C and 7 have been discounted at this stage. Sites 1A, 1B 1C, 3, 3i, 3ii, 5, 6A and 6B are all taken forward for Initial Appraisal.

Table 5.1: Option sifting

Site	Capital cost	Operating cost	Deliverability	Planning acceptability	Environmental impact
1A	✓✓	✓	✓✓	✓	✓
1B	✓✓	✓	✓✓	✓	✓
1C	✓✓	✓	✓✓	✓	✓
1A, B, C (with bus lane)	✓	✓	✓	✓	✓
2A	×	✓	×	✓✓	✓
2B	×	✓	×	✓✓	✓
2C	×	✓	×	✓✓	✓
3	✓✓	✓	✓✓	✓✓	✓
3i	✓	✓✓	✓	✓✓	✓
3ii (extended slip)	✓	✓✓	✓	✓✓	✓
4	×	✓	×	✓✓	✓
5	✓✓	✓✓	✓✓	✓✓	✓
6A	✓✓	✓✓	✓✓	✓	✓
6B	✓✓	✓✓	✓✓	✓	✓
6C	✓✓	✓✓	×	×	×
7	×	✓✓	✓	✓	✓

✓✓ Major benefit
✓ Minor benefit
× Disbenefit

5.4 Do-minimum and reference cases

Do-minimum

5.4.2 The do-minimum scenario provides a baseline for appraisal in each of the future assessment years. This should reflect the situation existing in those years if only those schemes currently committed are implemented.

5.4.3 In the case of the A90 west of Dundee and the Swallow roundabout, there are no committed schemes which would significantly alter the surrounding road network. Consequently, the existing network will form the basis of the do-minimum scenario.

5.4.4 Both do-minimum and with scheme proposals will take account of forecast traffic growth and the impact of the proposed Dundee Waterfront developments.

Reference case

5.4.5 For the purposes of this study it is considered that the reference and do-minimum stages are the same.

5.4.6 Potential impacts of the development of the Western Gateway will be considered as sensitivity tests during the Detailed Appraisal stage.

6 Initial appraisal

6.1 Overview

6.1.1 The Initial Appraisal stage involves a qualitative assessment of the preferred options selected during the Pre-Appraisal stage, assessing their likelihood of meeting the transport planning objective. This chapter:

- states the transport planning objectives for the study;
- assesses the options against these objectives and against the STAG criteria and established policy directives;
- assesses the feasibility of the options;
- estimates the affordability of the options;
- assesses the public acceptability of the options; and,
- selects or rejects options for the detailed Part 2 Appraisal.

6.1.2 Options taken forward for Initial Appraisal are:

- 1A, B, C – access via existing Longforgan junction
- 1A, B, C – access via existing Longforgan junction with full or partial bus lane on the A90
- 3 – access via Swallow Roundabout
- 3i – access via short eastbound off slip on A90 and Swallow Roundabout
- 3ii – access via longer eastbound off slip on A90 and Swallow Roundabout
- 5 – access via Swallow Roundabout
- 6A – access from the local road network
- 6B – access from the local road network, and

6.1.3 Full Appraisal Summary Tables are provided in Appendix B.

6.2 Site locations and access arrangements

6.2.1 Existing and potential land uses have been noted and site access arrangements have been carefully considered whilst assessing each option. Lengthening queues on the eastbound approach to the Swallow roundabout may limit the effectiveness of Park & Ride in future years as Park & Ride sites work best if they are situated outside the boundary of the congested area. As congestion levels increase there is a risk that the end of the queue may pass the site limiting its attractiveness. Proposals which can offer real travel time benefits have the potential to attract significant levels of Park & Ride demand while performing well in terms of economic benefit.

6.2.2 The locations of the sites, possible access arrangements and known constraints are described below. In addition Figure A.1 in Appendix A shows the locations of all of the sites allowing them to be placed in context.

Options 1A, 1B and 1C

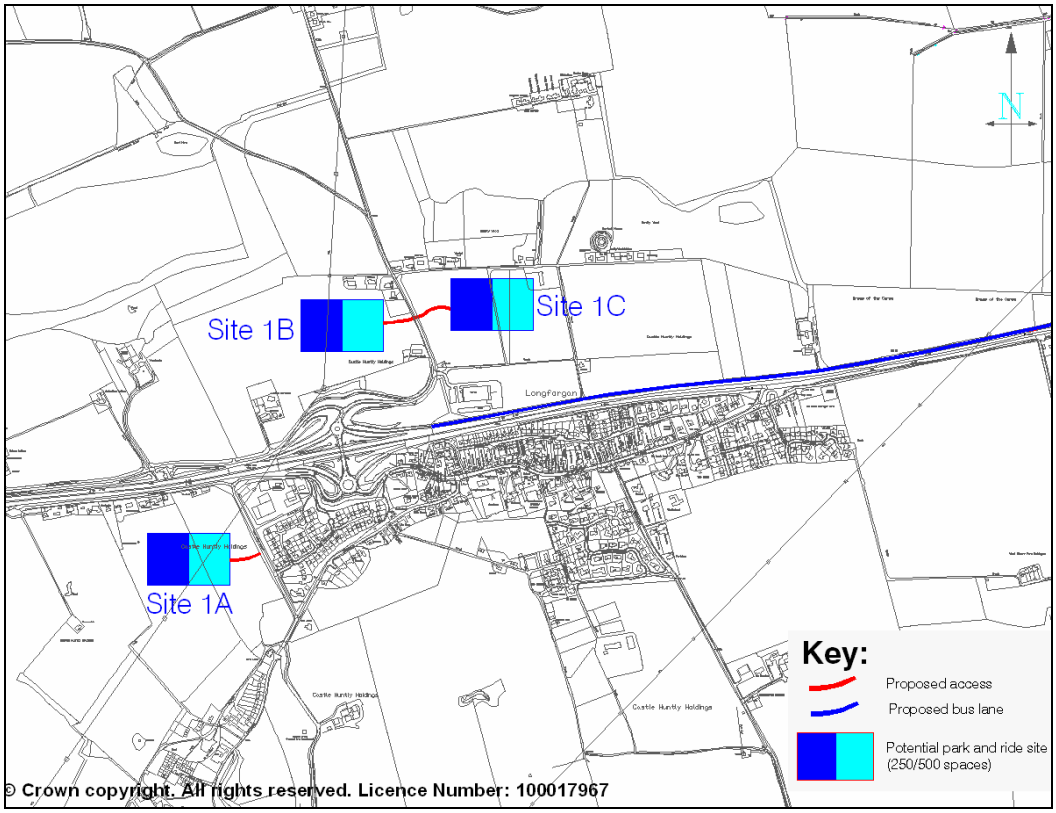
6.2.3 Options 1A, 1B and 1C make use of the existing grade separated junction at Longforgan (Figure 6.1). Option 1A is south of the A90 and west of Longforgan while Options 1B and 1C are north of the A90 and, respectively, west and east of the local access leaving the Longforgan junction to the north. All of these three sites are currently farmland and are not zoned for development under the Perth & Kinross Local Plan. Indicative access to all three sites is from the existing local roads. A proposed bus lane on the A90 east of the sites is also shown. Three options for this have been considered:

- no bus lane
- one eastbound traffic lane with the second lane reallocated as a bus lane
- a widened eastbound A90 carriageway with two traffic lanes and a bus lane

6.2.4 Due to the existing access construction costs for all of these three sites will be relatively low and they are well outside the existing congestion boundary and, in combination with bus priority measures, so have scope to reduce delays for users. However, the absence of development plans for these sites is an issue and due to the distance between them and potential destinations they are likely to be expensive and unattractive to users.

6.2.5 Creating a bus lane on the A90 without widening it is likely to result in extreme congestion issues and widening the A90 will be expensive, especially given that bus frequencies on this route are low.

Figure 6.1: Location of Options 1A, 1B and 1C



Options 3, 3i and 3ii

6.2.6 Site 3 (Figure 6.2) is located northwest of the Swallow roundabout and was previously identified as part of the development of the Park & Ride Strategy. Various access options make up Options 3, 3i and 3ii as follows:

- Site 3 – access from Swallow Roundabout only
- Site 3i – access from Swallow Roundabout and short slip
- Site 3ii – access from Swallow Roundabout and long slip

6.2.7 Site 3 is zoned for business development and is currently being used to raise young trees as is land for possible future slip roads. The remainder is farmland. The access from the Swallow roundabout has to negotiate a Site of Importance for Nature Conservation, Tree

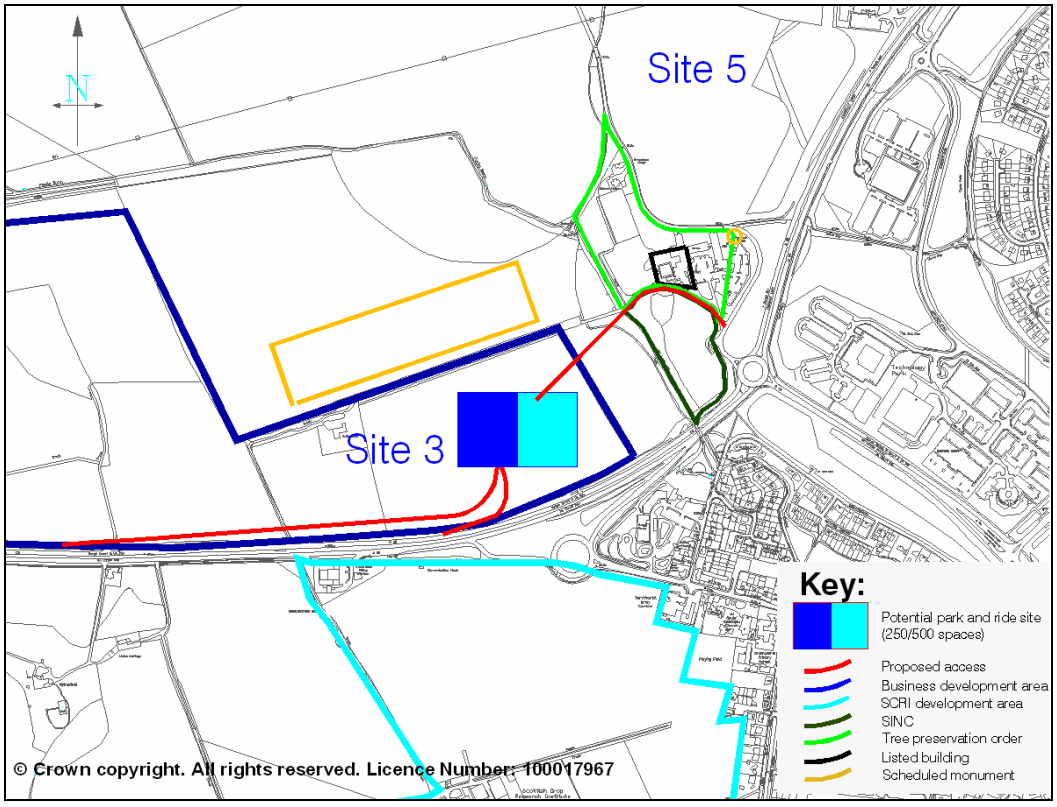
Preservation Order area and a listed building. In addition all accesses must comply with DMRB design standards.

6.2.8 Transport Scotland have indicated that they are not opposed to a slip road from the A90 to the site as long as all design standards are met and that the exit is a minimum of 1 kilometre from the Swallow Roundabout.

6.2.9 While located inside the congestion zone, Site 3 has the potential to serve a wider catchment from northwest Dundee as well as the A90 corridor. Additionally, 3i and 3ii have the potential to remove vehicles from the queue at the Swallow Roundabout as well as from the busy approaches to the city centre.

6.2.10 An appropriate internal site layout would be required to prevent unwanted rat-running.

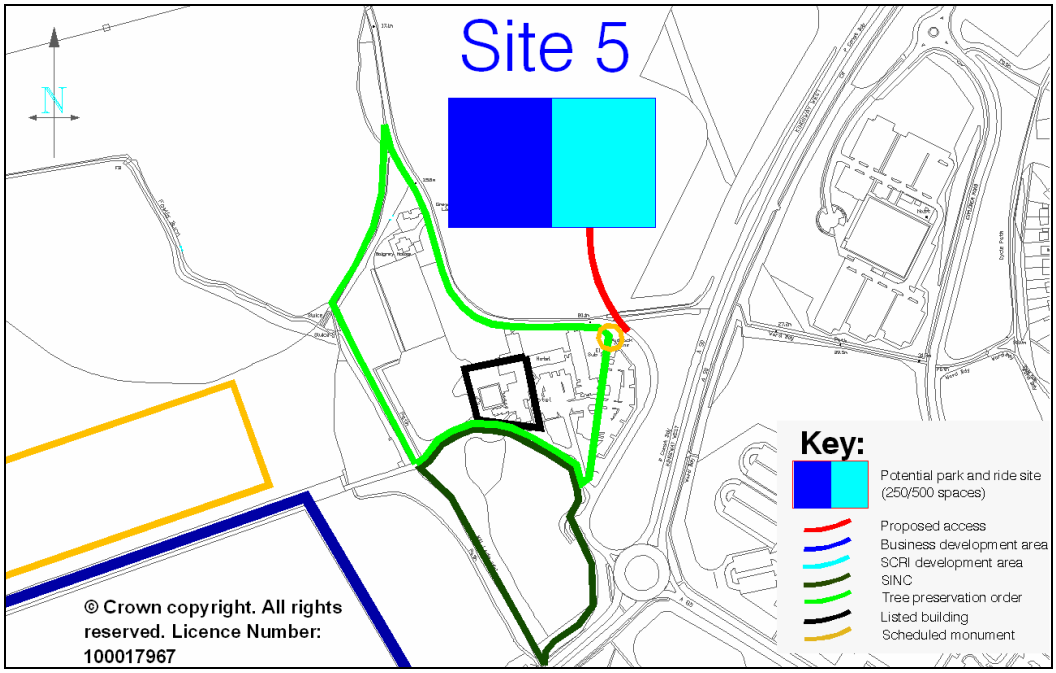
Figure 6.2: Location of Options 3, 3i, 3ii



Site 5

6.2.11 Site 5 is located on farmland northwest of the Swallow Roundabout; it is zoned for business development and can be readily accessed from the Swallow Roundabout. Though it avoids some of the complications of Options 3, 3i and 3ii it has only limited potential to reduce congestion at the Swallow Roundabout. It would, however, help reduce congestion on Riverside Avenue / Riverside Drive and on the approach to the city centre.

Figure 6.3: Site 5 location



Site 6A

6.2.12 Site 6A is north of Riverside Avenue and would be accessed from, Perth Road on land identified under Policy 24 of the Dundee local plan as "Principal Economic Development Areas". Its location close to desired destination points is likely to result in high usage figures with potential benefits for city centre congestion. In addition, it could be served by existing bus services and readily connected into local walk and cycle routes. However, land values are likely to be high and the ability to deliver the site on this high amenity space is uncertain.

6.2.13 In addition the site is close to Ninewells Hospital and likely to act as an overflow car park. While this may not be a major disadvantage in general it is outwith the aims of this study and would impact upon forecast bus fare revenues.

Site 6B

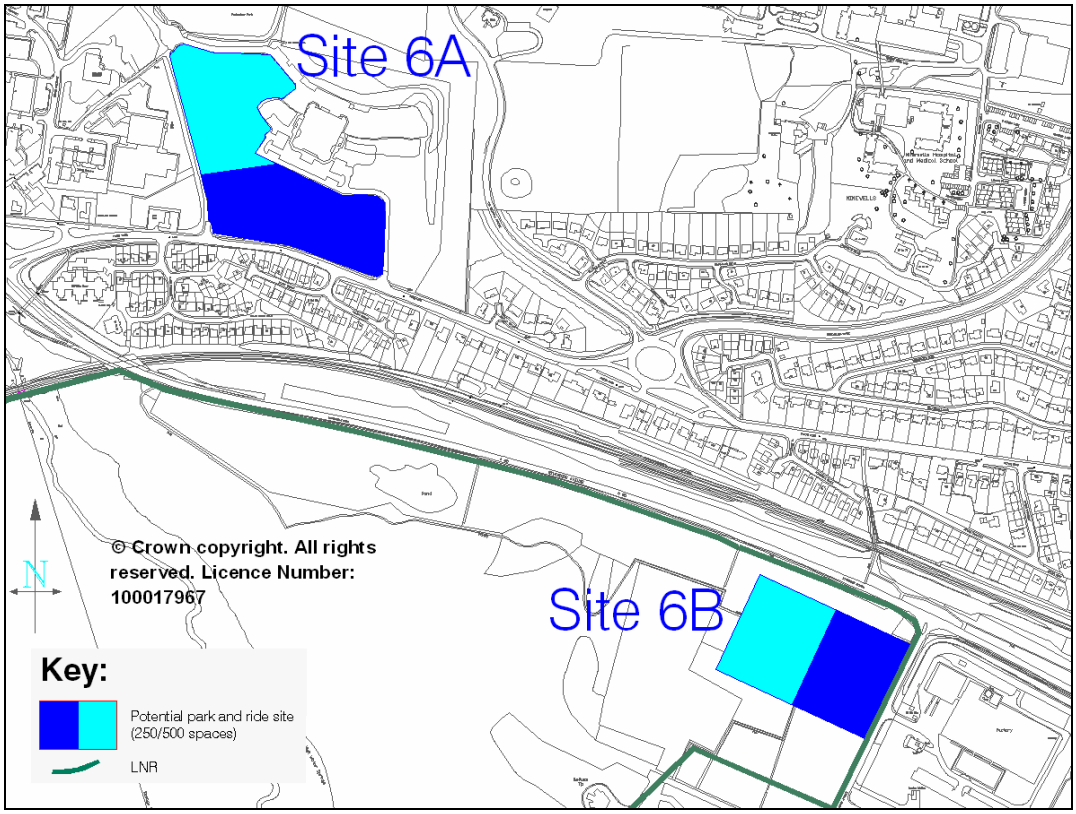
6.2.14 Site 6B would be accessed from Wright Avenue to its east. It is proposed that the junction of Wright Avenue with Riverside Avenue be upgraded to a roundabout. The site is on reclaimed land belonging to the Inner Tay Local Nature Reserve but is currently used as rough grazing. As the land is adjacent to industrial units, Dundee airport's, runway and local roads its reclaimed status is not considered to be a major issue. There are preliminary proposals for a wildlife park and the Park & Ride site could provide a dual role - providing parking for the park, particularly at the weekend, when Park & Ride demand is lower

6.2.15 The site could be partially served by existing bus services which currently run three times per hour and high frequency services on Perth Road are only a short walk away. The site could be readily connected to the walk and cycle network. Being closer to the city centre, the site has a larger catchment area. It offers shorter on-bus journey times and by attracting significant levels of patronage, it helps to reduce city centre congestion.

6.2.16 Unlike Site 6A, it has a reduced risk of acting as a Ninewells overspill car park. Should Invergowrie Station be relocated to Riverside Avenue, it has the potential to operate as a

parkway, providing Park & Ride capacity for the wider rail network in the future. A shuttle bus service could also link the Park & Ride site with the airport.

Figure 6.4: Sites 6A and 6B



6.3 Scheme costs

6.3.1 Initial scheme costs have been calculated based on an assumed Park & Ride site of 400 spaces.

Table 6.1: Cost of 400 space Park & Ride site

Item	Cost
Site clearance and grading	£160,000
Service connections	£50,000
Drainage and surfacing	£480,000
Footways, etc	£120,000
Fencing, signing lining	£240,500
Lighting and CCTV	£180,000
Miscellaneous	£55,000
Total	£1,285,500
Land costs (10% of Total)	£128,550
Contingencies (15% of Total)	£192,825
Fees (20% of Total)	£257,100
Overall total	£1,863,975

6.3.2 Fees, contingencies and land costs are estimated to add an additional £578,500 to the estimated cost of the works alone making the approximate total cost of a site £1,864,000. Site access and an allowance for optimism bias are excluded.

Additional costs

6.3.3 The cost of constructing access to each site would vary significantly; initial costing have been calculated, based on SPONS, as summarised in Table 6.2.

6.3.4 Initial bus operating costs have also been calculated based on extending an existing service from Ninewells to each site on a 10 minute frequency.

Table 6.2: Additional costs

Location	Site access roads	Eastbound bus lane	Additional operating costs
Site 1A, 1B, 1C	£95,000	£3,020,000	£300,000
Site 3	£450,000		£150,000
Site 3i	£750,000		£150,000
Site 3ii	£1,700,000		£150,000
Site 5	£350,000		£150,000
Site 6A	£86,000		
Site 6B	£300,000		

6.4 Initial demand forecasts

6.4.1 Initial demand forecasts were undertaken using CB's Park & Ride demand model PRIDE in order to identify potential demand. Forecast years for are 2012 and 2022; initial results are given in Table 6.3 below.

6.4.2 Full details of the demand forecasting methodology are given in Appendix D, a summary of PRIDE is provided in Appendix E.

6.4.3 Demand forecasts have been further refined as part of the Detailed Appraisal and the results are summarised in Chapter 7.

Table 6.3: Initial demand forecasts

Year	Period	Site 1a	Site 1b, c	*Site 1b, c with bus lane	Site 3	Site 3i	*Site 3ii	Site 5	Site 6a	Site 6b
2012	AM	56	70	70	115	124	124	115	167	142
	IP	38	46	46	72	77	77	72	102	75
	Total	94	116	116	187	201	201	187	269	217
2022	AM	75	94	125	150	160	202	150	209	179
	IP	50	59	59	88	94	94	88	126	93
	Total	125	153	184	238	254	296	238	335	272

*Bus lane / extended slip road assumed to be implemented after 2012

6.5 Appraisal against planning objectives

6.5.1 The planning objectives have been designed to encapsulate the transport problems and opportunities of the City of Dundee. Consequently, the performance of the options against the transport planning objectives is a measure of their ability to address current problems and exploit potential opportunities.

6.5.2 Full appraisal results for each option are given in the Appraisal Summary Tables in Appendix B.

6.5.3 A standard seven point scale (Table 6.4) has been used to highlight each option's score against the transport planning objectives, as indicated in Table 6.5.

Table 6.4: Standard seven point scale

Description	Score
Major benefit	✓✓✓
Moderate benefit	✓✓
Minor benefit	✓
No benefit or impact	0
Minor impact	×
Moderate impact	××
Major impact	×××

6.5.4 In total, Sites 1A, B and C score similarly with 1B and 1C performing slightly better as Site 1A scores poorly against Objective 4. All sites offer slightly enhanced public transport services in west Dundee (Objective 1) with the 'with bus lane' options scoring better as they also offer journey time savings. Similarly all of the sites offer some shift towards sustainable and healthy travel (Objective 2) and remove some traffic from the Swallow Roundabout and Dundee city centre (Objective 3). The 'with bus lanes' options typically score more highly here as they attract a greater patronage. The exception to this is the bus lane with a single traffic lane which scores very poorly against Objective 3 as queuing would be expected to increase dramatically on the approach to the Swallow Roundabout.

6.5.5 Against Objective 4, the Site 1 options score relatively poorly due to the impact on local air quality around Longforgan. This is especially the case for Site 1A as traffic would have to pass through Longforgan to reach the site and for the bus lane plus single traffic lane option which would worsen queuing and local air quality on the approach to the Swallow Roundabout. As they involve developing land not otherwise likely to be developed it is considered that even with effective mitigation measures these Options can achieve at best a neutral score for Objective 5. The exception to this is the bus lane plus two traffic lanes option which demands extensive widening of the A90.

6.5.6 Sites 3 and 5 score similarly. They offer some improvements in public transport accessibility (Objective 1) and result in some mode shift (Objective 2). Both are accessed from the Swallow Roundabout and as a result they offer no reduction in traffic congestion for longer trips passing through the west of Dundee. However, they do offer potential benefits for journeys starting or ending in Dundee. They offer some potential for improvement in local air quality in central Dundee while worsened air quality in the immediate vicinity of the sites will impact on very few residential properties. As these site are on land likely to be developed in any case with effective mitigation measures they are considered to offer a minor benefit to Objective 5.

6.5.7 Two sub-options for Site 3 have been tested; 3i assumes a short off-slip from the A90 into the site; 3ii assumes a longer slip bypassing the eastbound queue approaching the Swallow Roundabout.

Table 6.5: Assessment of options against transport planning objectives

	1. Improve the public transport accessibility to employment, health, leisure and recreational locations in the west of Dundee and city centre	2. Encourage a shift toward sustainable and healthier modes of transport	3. Reduce traffic congestion for longer distance trips in the west of Dundee	4. Contribute to national and local air quality targets and reduce the impact of climate change	5. Minimise the impacts of the scheme upon the natural and built environment	Total
1A	✓	✓	✓	××	0	+1
1B	✓	✓	✓	×	0	+2
1C	✓	✓	✓	×	0	+2
1A, B, C (with bus lane + 1 general traffic lane)	✓✓	✓✓	×××	×××	0	-2
1A, B, C (with bus lane + 2 general traffic lanes)	✓✓	✓✓	✓✓	×	××	+3
3	✓	✓✓	✓	✓	✓	+6
3i	✓	✓✓	✓✓	✓✓	✓	+8
3ii (extended slip)	✓✓	✓✓✓	✓✓✓	✓✓✓	✓	+12
5	✓	✓✓	✓	✓	✓	+6
6A	✓✓	✓✓✓	✓	✓✓	×	+7
6B	✓✓	✓✓	✓	✓✓	0	+7

6.5.8 Both options attract significant levels of Park & Ride demand as they offer some travel time saving by avoiding the queue at the Swallow Roundabout. Because of this increase patronage they will be able to support bus services more effectively, will result in more mode shift, have a greater potential benefit for congestion at the Swallow Roundabout and in central Dundee and have a greater potential impact on local air quality. As a result these options score more highly against Objectives 1 to 4 and equally well against Objective 5.

6.5.9 Options 6A and 6B are located off Riverside Avenue, east of the Swallow roundabout. Their location means that they do not reduce congestion or commuter traffic on the A90 corridor, however, they do meet other local study objectives. In particular, site 6A is well located to serve Ninewells Hospital.Both sites are easily served by existing public transport services. By helping to reinforce these, they help to meet Objective 1 – improving public transport accessibility. In the short to medium term they also help encourage mode shift to public transport; in the longer term, their effectiveness is reduced as congestion and resulting delays increase at the Swallow Roundabout.

6.5.10 These options score well against air quality targets. Although the actual reduction in car trip lengths is less than at other locations further west, they attract significant patronage and help to lower congestion and emissions in the city centre.

6.5.11 In terms of the environment, Site 6A has been given a negative score. It is located within landscaped private grounds and would have some effect on the built environment.

6.5.12 Site 6B lies on land identified by the Dundee Local Plan as belonging to a Protected Open Space (Policy 66A and 66B) and a Local Nature Reserve. In the future it is proposed to develop the site as a wildlife park. Nevertheless, it is anticipated that some parking will be required to serve the park and that a Park & Ride site at this location could serve a dual role. Discussions with planners have been positive and provided appropriate landscaping is provided, existing zoning is not considered a significant barrier to development.

6.6 Appraisal against government criteria

6.6.1 Each options has been appraised against the government criteria; Environment. Safety, Economy, Integration, Accessibility and Social Inclusion.

6.6.2 Using the standard seven point scale, the anticipated impacts of the options on the STAG criteria are shown in Table 6.6.

Table 6.6: Anticipated impact of options on the STAG criteria

Option	Environment	Safety	Economy	Integration	Accessibility and social inclusion
1A	×	0	✓	0	✓
1B	0	0	✓	0	✓
1C	0	0	✓	0	✓
1A, B, C (with bus lane + 1 general traffic lane)	××	0	×××	0	✓
1A, B, C (with bus lane + 2 general traffic lanes)	××	0	✓	0	✓
3	0	0	✓	✓	✓
3i	0	0	✓✓	✓	✓
3ii (extended slip)	0	0	✓✓	✓	✓
5	✓	0	✓	✓	✓
6A	✓	0	✓	✓✓	✓
6B	0	0	✓	✓✓	✓

Environment

6.6.3 **Noise and vibration:** Site 1A is most closely surrounded by residential properties and noise and vibration, especially at the construction stage, may be problematic. Sites 3, 3i, 3ii and 5 are close to very few residential properties and noise is not likely to be a problem. However, detailed assessment of the number of residential properties affected by increased noise will be necessary during the detailed appraisal particularly where options will affect areas which are currently very quiet.

6.6.4 **Global air quality - carbon dioxide (CO2):** as studies show that Park & Ride sites generally result in traffic redistribution rather than overall increases or decreases in vehicle miles the effects on global air quality are assumed to be neutral overall, however, this will require detailed appraisal.

6.6.5 **Local air quality - particulates (PM10) and nitrogen dioxide (NO2):** Sites 3, 3i, 3ii, 5, 6A and 6B lie within the Air Quality Management Area for Dundee City Council as does Dundee City Centre. In combination with effective parking management in the city centre Park & Ride use should reduce central traffic and so improve air quality in this sensitive area. However, there will be a worsening of local air quality in the immediate vicinity of the sites and their access roads and this will be most problematic for Site 1A as the largest number of residential properties will be affected. In the case of 1A, B, C (with bus lane and 1 general traffic lane) there will be a worsening of queuing on the approach to the Swallow Roundabout and this would be expected to have a noticeable impact on local air quality here. For the remaining options a combination of good existing air quality and few adjacent residential properties will limit the impact of worsened air quality. However, this issue will require detailed appraisal.

6.6.6 **Water quality, drainage and flood defence:** The western area of Site 3 and eastern area of Site 5 are potentially at risk of flooding but construction should be able to largely avoid the affected areas. Carefully designed drainage would be required at all sites and detailed consideration of this issue is likely to be needed for Sites 3, 3i, 3ii and 5 including how construction may influence flooding in adjacent areas.

6.6.7 **Geology:** There are no geological designations in the area of any of the sites and there are no anticipated issues with the mechanical ability of the ground to support the structures

proposed at any of the proposed sites. Groundwater vulnerability at all sites is intermediate to high but there would only be a significant impact on groundwater quality in the event of a major hydrocarbon spillage such as might follow a major road traffic accident.

6.6.8 **Biodiversity and habitats:** At all of the proposed sites a Phase 1 habitat survey will be required at the detailed appraisal stage. For Sites 3, 3i, 3ii access to the Swallow Roundabout will require building through either the Swallow Wetland Site of Importance for Nature Conservation or the Swallow Tree Preservation Order Area. Sites 6B lies within the Inner Tay Local Nature Reserve. If any of these options are ultimately progressed there will need to be considerable detailed survey and mitigation work.

6.6.9 Sites 1A, B, C (with bus lane + 2 general traffic lanes) result in the loss of more open land and several mature trees and this would be expected to have a greater impact on biodiversity and habitats.

6.6.10 **Landscape and visual amenity:** Sites 1A would have a minor impact on the landscape, although like all sites, it would be landscaped to a high standard. Widening of the A90 to provide a bus lane would also impact on visual amenity. Landscape quality would be slightly affected by Sites 3, 3i, 3ii and 5 but given that there are medium term proposals to develop the sites, there are not considered significant.

6.6.11 Site 6A is on a green space within the built up area and though the view would worsen for those overlooking the site development here would not be wholly out of character. Site 6B is adjacent to industrial units and so although the site itself would be affected, the general character of the area would not be.

6.6.12 Conversely by helping to remove traffic from central Dundee all sites have a potential impact on the attractiveness of the city centre.

6.6.13 **Agriculture and soils:** All of the options except 6A are on land currently being used for agriculture and so development of any of them will involve some loss of agricultural land but this is not considered to be significant. Sites 1A, B, C (with bus lane + 2 general traffic lanes) result in the loss of more agricultural land than with other options.

6.6.14 **Cultural heritage:** The western part of the Landmark Hotel is a listed building. The cursus and barrows southwest of Greystanes Lodge and the Paddock Standing Stone just east of the Landmark Hotel are Scheduled Monuments and there is a disused Mill Lade adjacent to Site 3. Though these sites are all in the region of either Site 3, 3i, 3ii or 5 it is considered that the effects on them will be minimal from the perspective of the area's cultural heritage.

6.6.15 **Overall environmental scores:** Each site has been scored against each of the above criteria and an overall score derived on the basis of this as shown in Table 6.7.

Safety

6.6.16 All of the options have been given neutral scores for the Safety criterion as all sites would be constructed to modern standards and in line with best practice. While car trips will be removed from the highway network and this may result is a small accident saving, the impact is not considered to be significant. Consequently, no net change in overall safety levels is anticipated.

Table 6.7: Environmental scoring

Environmental aspect	Site										
	1A	1B	1C	1A, B, C (1 bus lane, 1 traffic lane)	1A, B, C (1 bus lane, 2 traffic lanes)	3	3i	3ii	5	6A	6B
Noise and vibration	×	0	0	0	0	0	0	0	0	0	0
Global air quality - carbon dioxide (CO2)	0	0	0	0	0	0	0	0	0	0	0
Local air quality - particulates (PM10) and nitrogen dioxide (NO2)	××	×	×	×××	0	✓✓	✓✓	✓✓✓	✓✓	✓✓	✓✓
Water quality, drainage and flood defence	0	0	0	0	0	0	0	0	0	0	0
Geology	0	0	0	0	0	0	0	0	0	0	0
Biodiversity and habitats	0	0	0	0	0	×	×	××	0	0	×
Landscape and visual amenity	×	0	0	×	××	✓	✓	✓	✓	0	✓
Agriculture and soils	0	0	0	0	×	0	0	0	0	0	0
Cultural heritage	0	0	0	0	0	0	0	0	0	0	0
Overall score	×	0	0	××	××	0	0	0	✓	✓	0

Economy

6.6.17 Sites 1A, B and C attract least demand and so are considered to have least economic benefit as they will have a limited impact on travel choice and on traffic congestion both at the Swallow Roundabout and in Dundee city centre. Reallocating the nearside lane for bus only use is considered to result in major economic disbenefits. Queues on the approach to the Swallow would increase substantially and result in additional delays to national and local general traffic which are not considered acceptable. An additional bus lane, while costly, would provide bus journey time improvements to strategic as well as Park & Ride and local services. It has therefore been scored as having a slight overall benefit.

6.6.18 Sites 3 and 5 score positively, however, although they attract significant Park & Ride demand they provide no congestion relief at the Swallow Roundabout. They do, however, reduce congestion on Riverside Drive / Riverside Avenue and in the city centre, and allow for a reduction in long stay parking.

6.6.19 Sites 3i and 3ii attract higher level of Park & Ride demand than the sites above. They also remove local traffic from the trunk road network reducing congestion for strategic movements on the A90 corridor. They also potentially reduce congestion on Riverside Drive / Riverside Avenue and in the city centre, and allow for a reduction in long stay parking. Consequently, they have been scored higher than the other sites appraised.

6.6.20 Sites 6A and 6B are considered to provide a minor economic benefit. As for sites 3 and 5, they do not help remove local traffic from the trunk road network. They do, however, have high anticipated usage and the potential to reduce congestion on the approaches to the city centre and allow central long stay parking supply to be reduced.

Integration

6.6.21 For the Integration criterion two factors have been considered. The first is the possibility for increasing transport integration and the second is the degree to which the option integrates with current policies.

6.6.22 Sites 1A, 1B and C have all been given a neutral weighting. While it is anticipated that inter-urban bus services would serve the sites, opportunities for integrating the sites with local bus services from Dundee would be costly. In addition, none of the sites are currently zoned for development.

6.6.23 Sites 3 options and 5 are located within land zoned for development and could be connected to local walk and cycle networks. As a result these options score more highly.

6.6.24 Site 6A has been given a positive weighting as the potential for interchange with local bus services is high as is the potential for linkage into local walk and cycle networks; Site 6B also scores positively as the site would serve a dual purpose as a parkway for the relocated Invergowrie station.

Accessibility and social inclusion

6.6.25 All sites are considered to have a positive impact on accessibility and social inclusion. All sites have the potential to help reinforce existing bus services. Non Park & Ride users, including those without a car, may benefit from the increased level of public transport provision that Park & Ride provides.

6.7 Impacts on policy directives

6.7.1 All transport planning objectives were created in line with current policy documents and recent studies in the TACTRAN region.

6.7.2 The TACTRAN Park & Ride Strategy which was informed by the TACTRAN Regional Transport Strategy and the National Transport Strategy set a direction for Park & Ride provision across the TACTRAN region. A number of potential sites and selected priorities for development were appraised. These included a site to the south of Dundee at the southern end of the Tay Bridge (now being taken forward in a separate study) and a site to the west of Dundee which is the subject of this study.

6.7.3 The Dundee Local Plan, whilst not outlining specific proposals, does recognise that Park & Ride "could have positive benefits on Dundee's population and road congestion" and identifies a number of sites in and around west Dundee as suitable for business development. Park & Ride development does not fit explicitly into current planning proposals but there is outline support. The Plan is currently under review and it is expected that a future plan will identify potential locations, taking cognisance of local and national policies which support Park & Ride to the west of Dundee.

6.7.4 Options 3, 3i and 3ii require access through, or very close to, an area identified as a Site of Importance for Nature Conservation while Site 6B is identified in the Local Plan as being located within Protected Open Space (Policy 66A and 66B) and a Local Nature Reserve. However, business development proposals around Site 3 will ultimately require access through this same area and it is proposed to develop the area around 6B as a wildlife park as some future stage. It is anticipated that some parking will be required to serve the park and that a Park & Ride site at this location could serve a dual role.

6.7.5 The Perth & Kinross Local Plan does not discuss Park & Ride for Dundee and is opposed, at present, to developments around Longforgan.

6.8 Feasibility

6.8.1 There are two aspects of feasibility assessment; technical feasibility and operational feasibility. Technical feasibility relates to the straightforwardness of implementing the proposal. It also considers whether there are any novel / untried / leading edge technologies involved and whether there are any notable risks involved. Operational feasibility relates to the presence of factors which might adversely affect the ability to operate the proposal over its projected life without major additional cost.

6.8.2 Site 1 options are on un-zoned land which may prove a barrier to obtaining planning permission. Sites 3 and 5 lie on land zoned for business development but Dundee City Council have indicated that Park & Ride is not considered incompatible with this. Site 6A. is located within private landscaped grounds and it is extremely unlikely that a Park & Ride site would be permitted at this location.

6.8.3 There are environmental issues at Sites 3 and 6B as access to Site 3 involves either crossing or passing very close to a Site of Importance for Nature Conservation, Tree Preservation Order Area and listed building and 6B is in a Local Nature Reserve. Though these are complicating factors the presence of other development proposals around these two sites suggests that, with suitable mitigation, the environmental obstacles are not likely to prove insurmountable.

6.8.4 Overall 6A is considered unfeasible due to the difficulties associated with purchasing and developing such land. Sites 1A, 1B and 1C, 3, and 6B all have challenges associated with them but are considered feasible overall.

6.8.5 In terms of access and bus priority, reallocating one eastbound lane on the A90 as a bus lane is also not considered feasible. It would lead to increased congestion on the A90 trunk road which in term would result in increased levels of pollution and carbon emissions. This option is also at odds with a number of the study and government objectives.

6.9 Affordability

6.9.1 There are two strands to affordability:

- the cost of construction, and
- ongoing operating costs and levels of revenue support.

6.9.2 Sites 1A, 1B and 1C attract least Park & Ride patronage. In the longer term (beyond 2012), to be successful, they would require additional bus priority – most probably the provision of an eastbound bus lane. While this would serve all buses and not just Park & Ride, the cost at approximately £3,000,000, is considered prohibitive given the low bus frequency and short duration of queuing and this option has been scored accordingly.

6.9.3 These sites are also located furthest from Dundee. Extending existing services to provide the required service frequency would require a significant level of ongoing revenue support.

6.9.4 Site 3 offers a number of benefits. It's location is such that initial access could be provided from the Swallow roundabout. As eastbound queuing on the approach to the Swallow Roundabout continues to increase, a new off-slip could be constructed at a later date, providing journey time savings to public transport users. This slip could further extended in later years or the site could be integrated with Dundee Western Gateway development with access from a new development spine road.

6.9.5 In summary, the site allows the greatest number of access options and has the greatest potential for future proofing as congestion levels continue to increase. The site can be expanded and access can be improved in phased manner, limiting the initial capital cost outlay.

6.9.6 Site 3 is also well located to be served by existing public transport services. This would help to minimise operating costs, particularly in the initial years of operation.

6.9.7 Sites 5, 6A and 6B are all located close to the existing road network and so the cost of access to each site would be relatively low. Bus operating costs would be reduced; Sites 6A and 6B are already well served by public transport compared with other sites.

6.9.8 Sites 1A, 1B and 1C are located on private land which is not zoned for development and so the cost of land acquisition is likely to be low. Sites 3 and 5 lie on private land zoned for development and while the cost of acquisition may be higher, this is considered to be financially viable.

6.9.9 The proposed location of Site 6A is on "prime economic development land" - land purchase costs are considered a major barrier to its development. Site 6B is located on land, the majority of which is owned by Dundee City Council.

6.10 Public acceptability

6.10.1 During the development of TACTRAN's Regional Transport Strategy, extensive consultation was undertaken and reaction to Park & Ride was positive. Furthermore, TACTRAN's existing Park & Ride sites are well used and there is no reason to anticipate high levels of public objection to Park & Ride in general.

6.10.2 Options 1 A, B and C have been considered with a sub-option where one carriageway lane is reallocated for bus only use. This option is unlikely to be acceptable to Transport Scotland or to the public. Widening the A90 to provide a dedicated bus lane is also likely to have an environmental impact and a number of mature trees may need to be removed.

6.10.3 Access to Site 3 requires a road through, or near to, a site of Importance for Nature Conservation, Tree Preservation Order Area and listed building. Without suitable mitigation measures there is likely to be public opposition to these proposals.

6.10.4 Site 5 has no significant environmental impact and is therefore considered to have the highest level of public acceptability.

6.10.5 In terms of public acceptability, Site 6A is located within a developed area is therefore likely to meet little resistance. Site 6B is located in a Local Nature Reserve. While this would normally result in considerable public opposition the land is currently being used for rough grazing and is not of obviously high environmental quality and so, with suitable mitigation, it is likely to be possible to make this site publically acceptable.

6.11 Participation and consultation

6.11.1 The focus of the consultation stage has been to ensure that the initial proposals developed do not conflict with any pre-existing plans or policies and to seek comments on such topics as the general feasibility of the plans and any specific issues which might occur.

6.11.2 As part of the option generation stage, a programme of consultation was undertaken with the Steering Group, including TACTRAN, Transport Scotland, Dundee City Council and Perth & Kinross Council. This was undertaken to ensure that all issues are fully captured and that opportunities considered are consistent with each organisation's overall transport strategy.

6.11.3 Consultation with key stakeholders, including local public transport operators has also been undertaken to examine how each Park & Ride site might be serviced and integrated into the existing transport network.

6.12 Options selected for further consideration

6.12.1 A summary appraisal table is given in given in Table 6.8 below. The options selected for further assessment are based on the results of this and the AST tables provided in Appendix B.

6.12.2 The following options have been rejected from further consideration:

- Site 1A, B and C
- Site 6A

6.12.3 Sites 1 A, B and C have been rejected as they score poorly against the study objectives and have overall environmental impacts rather than benefits. In addition the attract the least Park & Ride demand and providing effective bus priority on the A90 to maximise the benefit of each sites location would be prohibitively costly. Operating costs would also be high as a number of local services would need to be extended from Ninewells Hospital in order to provide a sufficiently attractive service frequency. Finally, there are also at odds with development policy in this area.

Table 6.8: Summary appraisal

		Site 1A	Site 1B	Site 1C	Site 1B, C with bus lane +1 traffic lane	Site 1B, C with bus lane + 2 traffic lanes	Site 3	Site 3i	Site 3ii	Site 5	Site 6A	Site 6B
Planning objectives	Improve the public transport accessibility to employment, health, leisure and recreational locations in the west of Dundee and city centre	✓	✓	✓	✓✓	✓✓	✓	✓	✓✓	✓	✓✓	✓✓
	Encourage a shift toward sustainable and healthier modes of transport	✓	✓	✓	✓✓	✓✓	✓✓	✓✓	✓✓✓	✓✓	✓✓✓	✓✓
	Reduce traffic congestion for longer distance trips in the west of Dundee	✓	✓	✓	×××	✓✓	✓	✓✓	✓✓✓	✓	✓	✓
	Contribute to national and local air quality targets and reduce the impact of climate change	××	×	×	×××	×	✓	✓✓	✓✓✓	✓	✓✓	✓✓
	Minimise the impacts of the scheme upon the natural and built environment	0	0	0	0	××	✓	✓	✓	✓	×	0
STAG criteria	Environment	×	0	0	××	××	0	0	0	✓	✓	0
	Safety	0	0	0	0	0	0	0	0	0	0	0
	Economy	✓	✓	✓	×××	✓	✓	✓✓	✓✓	✓	✓	✓
	Integration	0	0	0	0	0	✓	✓	✓	✓	✓✓	✓✓
	Accessibility	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Feasibility		✓	✓	✓	×××	××	✓	✓	✓	✓✓✓	×××	✓
Affordability		×	×	×	×	×××	✓✓	✓	0	✓✓	✓✓✓	✓✓✓
Public acceptability		✓	✓	✓	×××	✓	✓	✓	✓	✓✓	✓	✓

✓✓✓ Major benefit
✓✓ Moderate benefit
✓ Minor benefit
0 Neutral impact

× Minor cost
×× Moderate cost
××× Major cost

6.12.4 Although it scores well against the study objectives and offers integration and minor environmental benefits, Site 6A is discounted primarily because the site lies within private grounds of a major employer. This is "prime economic development land" and the cost of purchase would be prohibitive. In addition, a significant proportion of forecast demand comes on foot from Ninewells Hospital. Consequently, the site may act as an overflow car park and, as such, does not serve the aims of this project. This proportion is likely to increase, at the expense of city centre demand, as development of the hospital site continues. No income would obtained from these users if the site operated as pay on bus.

6.12.5 As a result of this assessment of options, the following options have been selected for detailed appraisal:

- Site 3 – access via Swallow Roundabout
- Site 3i – access via short eastbound off slip and Swallow Roundabout; and,
- Site 3ii – access via longer eastbound off slip and Swallow Roundabout
- Site 5 – access via Swallow Roundabout
- Site 6B – access from Riverside Avenue

6.12.6 Although there are environmental issues with Sites 3 and 6B and Site 5 offers limited long term potential for addressing issues at the Swallow Roundabout these obstacles are not considered insurmountable at this stage.

7 Detailed appraisal

7.1 Overview

7.1.1 The Detailed Appraisal Stage requires a more detailed appraisal of options taken forward from the Initial Appraisal. Detailed appraisal includes further analysis of each option's performance against:

- Transport Planning Objectives;
- STAG Criteria;
- Cost to Government; and
- Risk and Uncertainty.

7.2 Site locations

7.2.1 Three site locations have been assessed; these are:

- Site 3 northwest of the Swallow Roundabout
- Site 5 north of the Swallow Roundabout, and
- Site 6B located off Wright Avenue to the south of Riverside Avenue.

7.2.2 Location plans for each site are shown in Figure 7.1 to Figure 7.3 and are based on the provision of 400 parking spaces.

7.3 Site access

7.3.1 Three different access scenarios are being considered for Site 3. The first of these is a direct access from the Swallow Roundabout only. The second is an access from the roundabout in combination with a short slip road leaving the A90 and the third is an access to the roundabout in combination with a longer slip road.

7.3.2 Site 5 would be accessed directly from the Swallow Roundabout; site 6B would be accessed from Riverside Avenue, via Wright Avenue.

7.3.3 Access to Sites 3 and 5, via the Swallow Roundabout, would require an additional junction with the adjacent hotel. Based on Dundee City Council's Road Hierarchy, and assuming that both links are local distributor roads, then the additional junction would require to be located a minimum of 60 metres north of the Swallow Roundabout. Figure 7.4 shows that an access to Site 3 could be located just under 70 metres from the Swallow Roundabout; access to Site 5 could be provided from a similar location.

7.4 Options

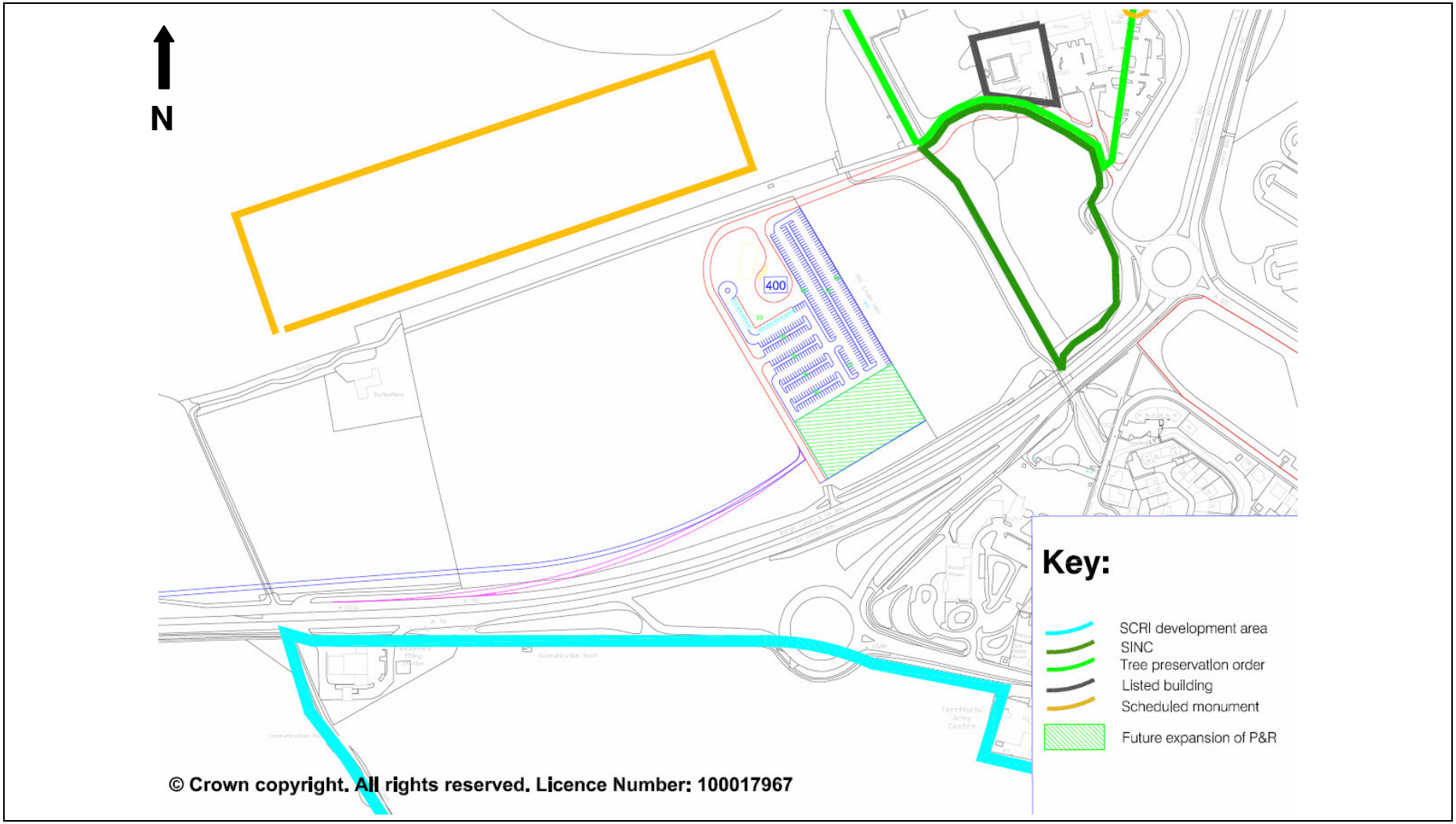
7.4.1 In summary, there are five options for appraisal:

- Option 3 – Site 3 + Swallow Roundabout access;
- Option 3i – Site 3 + Swallow Roundabout access + short slip road;
- Option 3ii – Site 3 + Swallow Roundabout access + long slip road;
- Option 5 – Site 5 + Swallow Roundabout access; and,
- Option 6B – Site 6B + access from Wright Avenue.

7.5 Bus service provision

7.5.1 In order to establish the potential patronage of each site, a number of assumptions have been made with regards to likely bus service provision, routes and stop locations.

Figure 7.1: Site 3 / 3i / 3ii location plan



The distance between the short slip exit and the Swallow roundabout is to be no less than 1km.

Figure 7.2: Site 5 location plan

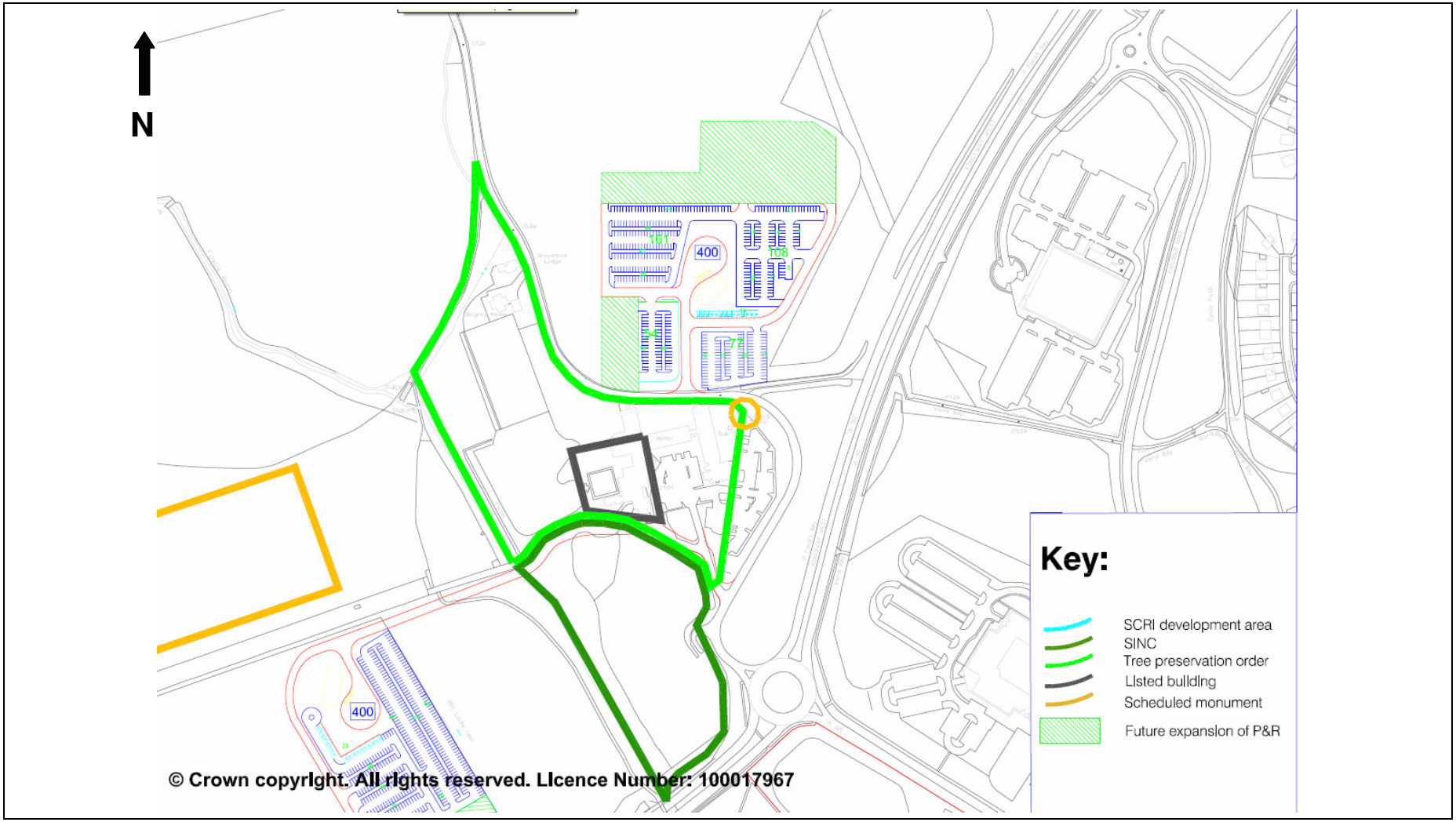


Figure 7.3: Site 6B location plan

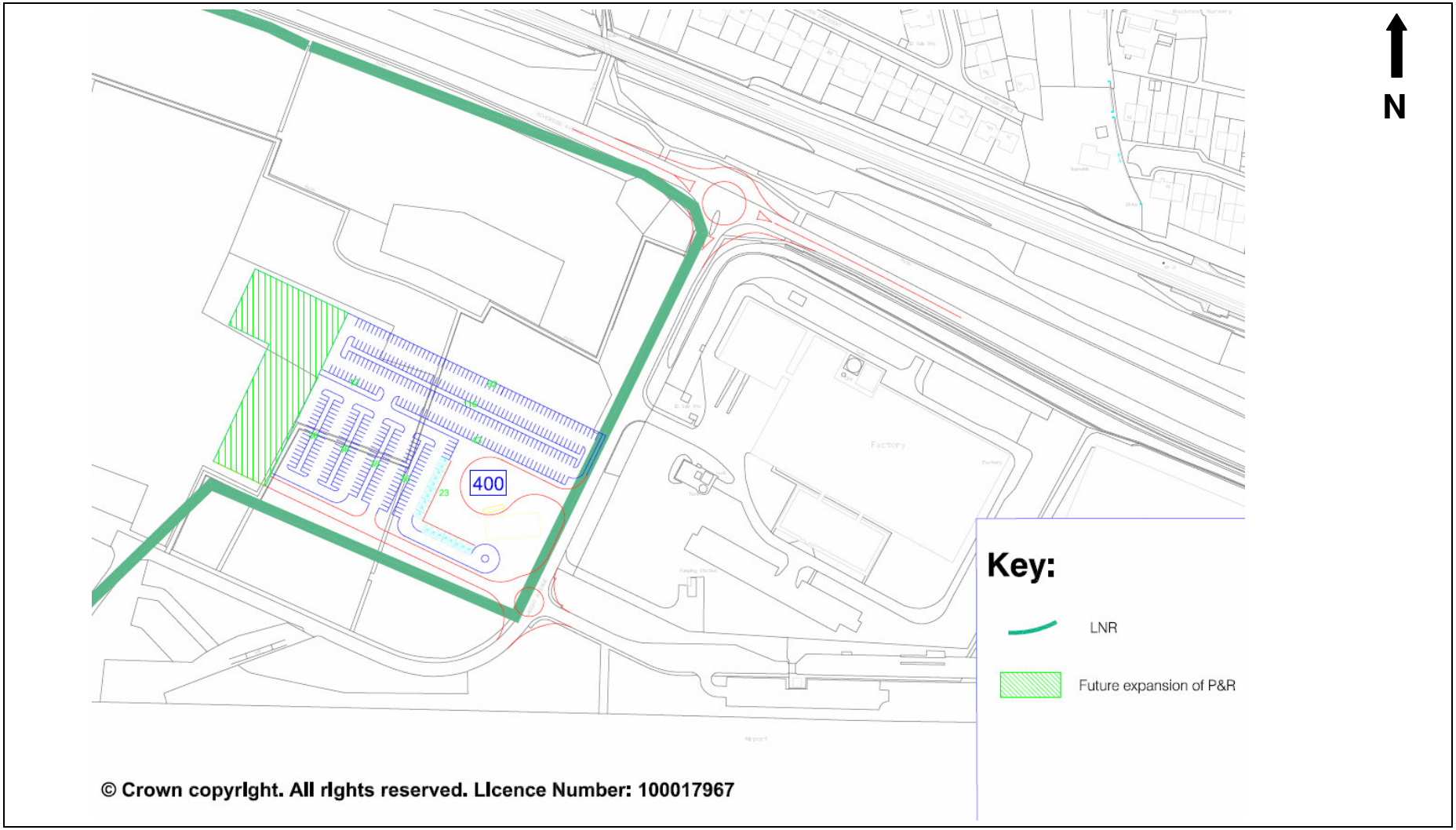
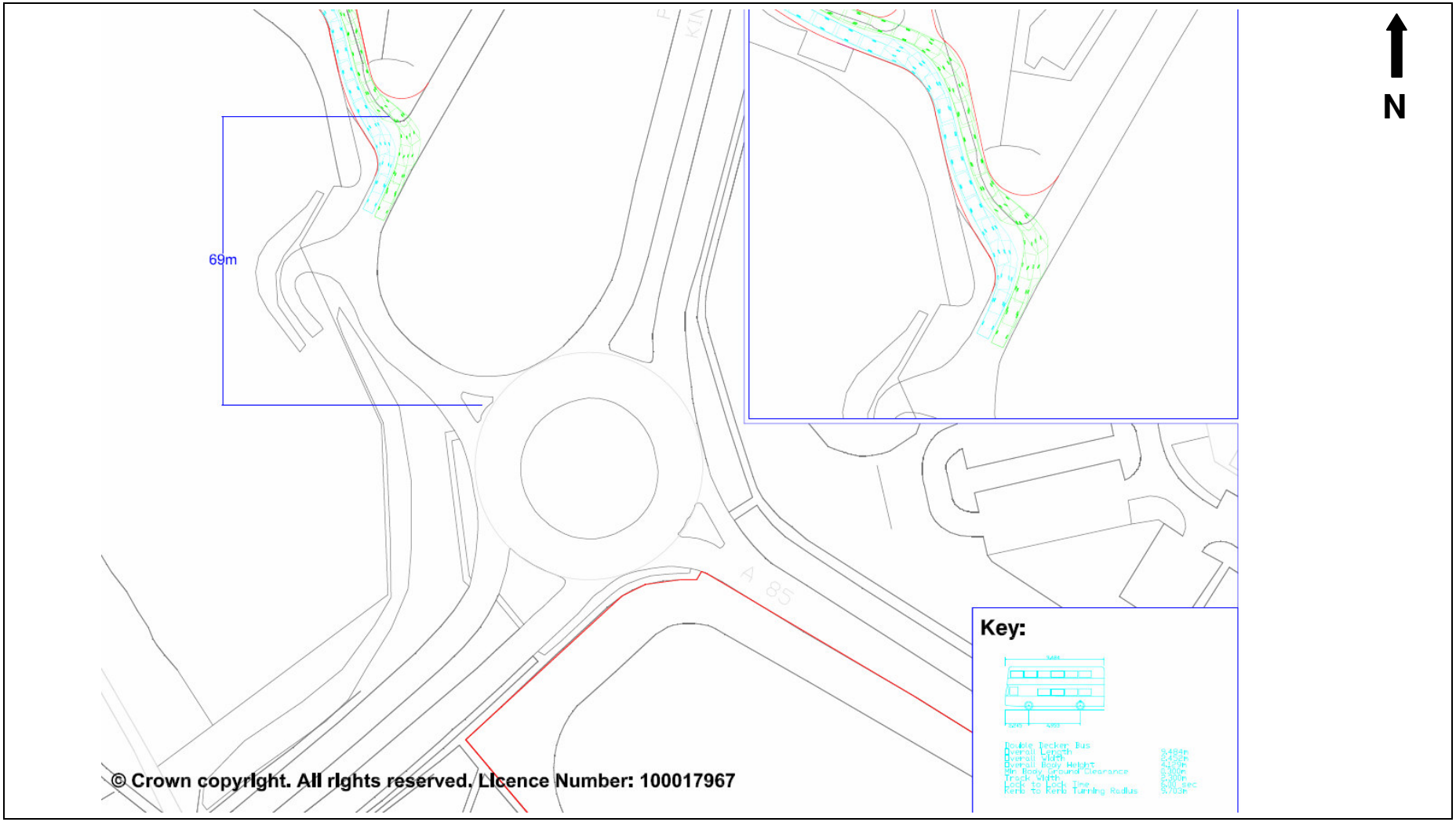


Figure 7.4: Site 3 site access from Swallow Roundabout



Dedicated, commercial and hybrid services

7.5.2 Three alternative bus service scenarios have been considered:

- Dedicated – branded buses serving the Park & Ride and a limited number of stops en route to the city centre – a grant or subsidy is paid to operate the service
- Hybrid – existing bus services are extended to serve the Park & Ride site. Additional buses may also be required to provide an adequate frequency. The cost of route extensions and additional buses is paid for by grant or subsidy with the existing sections of the service operating on a commercial basis
- Commercial – each Park & Ride site would be served by a dedicated service for the first 10 years, before becoming fully commercial. The initial cost of operating the required buses would be paid for by grant or subsidy. Services would then operate on a fully commercial basis with revenue from increasing Park & Ride use and new development at the Dundee Western Gateway. Buses would operate via the dedicated routes shown in Figures 7.5 and 7.6.

7.5.3 A 12 minute service frequency has been assumed for each scenario. Return Park & Ride bus fares at all sites are as follows:

- £1.00 to Ninewells Hospital
- £1.50 to Dundee University
- £2.00 to Dundee city centre

Bus routes and stops

7.5.4 Proposed bus routes and stops serving Site 3 / 5 and 6B are shown in Figures 7.5 and 7.6 respectively. All assumptions have been made following consultation with local bus operators.

7.5.5 It has been assumed that dedicated buses serving Site 3 / 5 would operate via Riverside Avenue and Riverside Drive. In addition, a local minibus shuttle service would operate between the site and Ninewells Hospital.

7.5.6 As an extension of existing services, a hybrid bus service would operate from the Park & Ride site via Ninewells Hospital and Perth Road to the city centre. Journey times would be extended as discussed below.

7.5.7 It has been assumed that the commercial service option, serving Site 3 / 5 would operate following the hybrid route for the first 10 years, and then via the dedicated route for the remainder of the appraisal period.

7.5.8 Site 6B would be served by buses operating via Riverside Avenue and Riverside Drive to the city centre. The route would also extend west to Ninewells Hospital via Tom McDonald Avenue. This route would be unchanged, whether operated as a dedicated, hybrid or commercial service.

Bus journey times

7.5.9 With regard to journey times it is assumed that:

- For Site 3 / 5, bus journey times are assumed to match surveyed A90 journey times until they reach Perth Rd / Riverside Ave. junction. Subsequently they follow timetabled journey times of existing services.
- For Site 6B, existing bus journey times have been used, as given in published timetables.

Figure 7.5: Park & Ride bus routes and stops – Sites 3 and 5

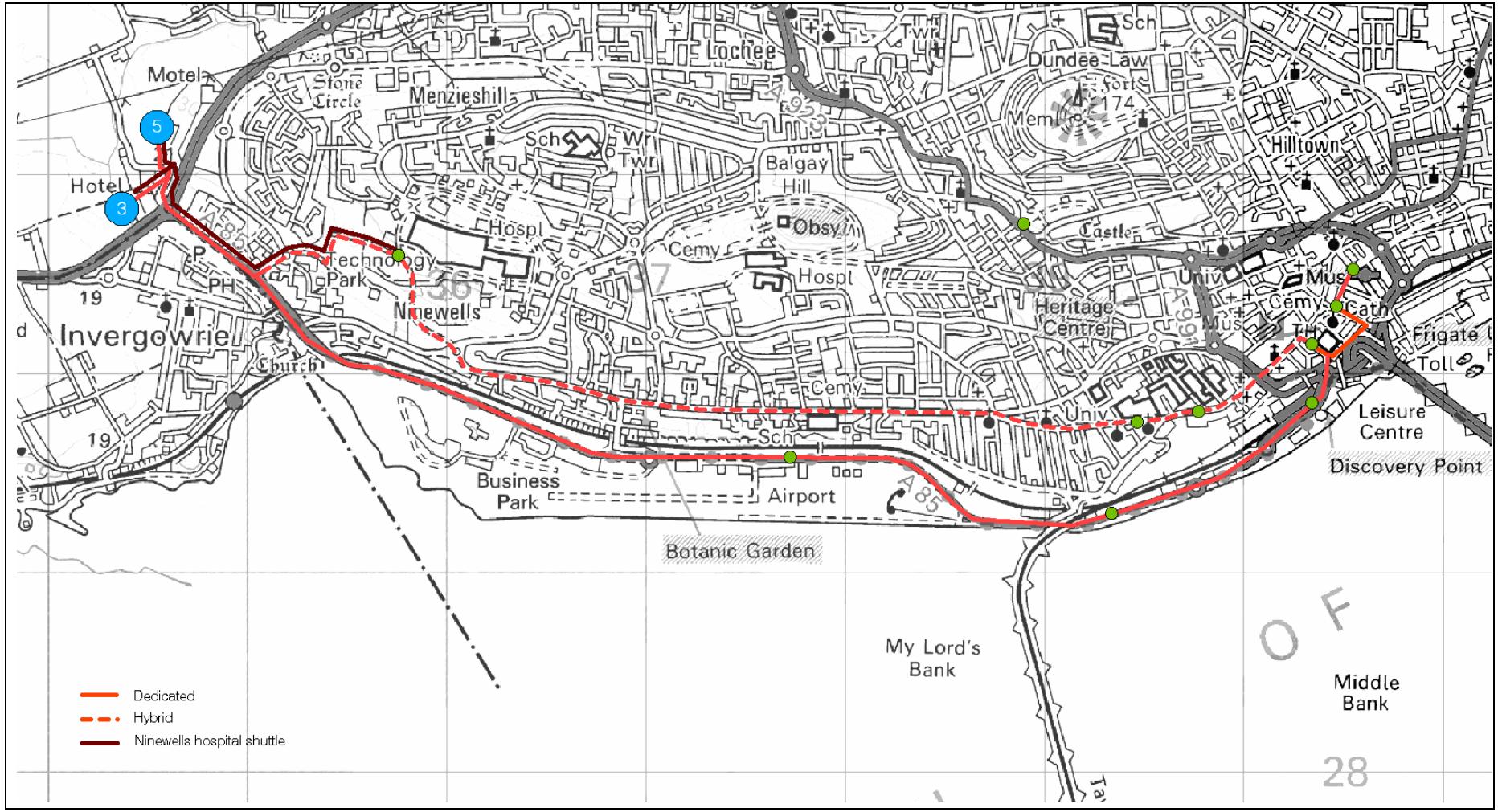
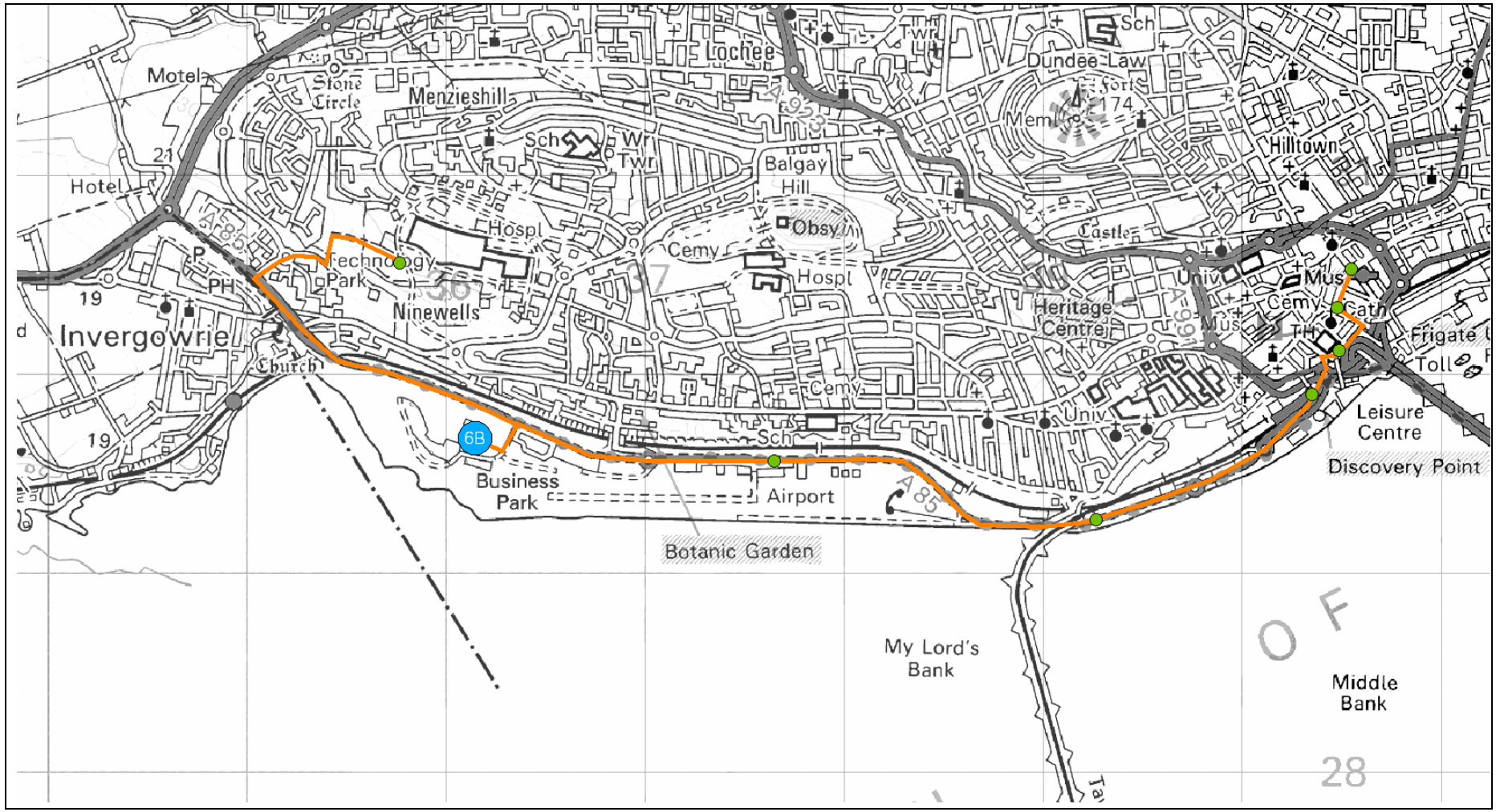


Figure 7.6: Park & Ride bus route and stops – Site 6B



7.5.10 Calculated journey times are given in Table 7.1.

Table 7.1: Journey times from Park & Ride site

	One-way	Return trip	Layover	Total journey time
Site 3/5 via Riverside Avenue / Drive	16	32	5	37
Site 3/5 via Ninewells and Perth Rd	22	44	5	49
Site 6B to city centre	11	22	5	27
Ninewells – Site 6B – city centre	16	32	5	37

Number of dedicated / hybrid buses required to serve each site

7.5.11 In order to calculate the operating costs of the dedicated and hybrid scenarios, the number of buses required to serve each site has been determined.

7.5.12 For a dedicated service, the number of buses required is the total journey time, divided by the frequency, rounded up to the nearest integer, as given Table 7.2.

Table 7.2: Number of buses – dedicated service

	Total journey time	Frequency (minutes)			
		12	15	20	30
Site 3/5 via Riverside Ave / Drive*	37	4	3	2	2
Site 3/5 via Ninewells and Perth Rd	49	5	4	3	2
Site 6B to city centre	27	3	2	2	1
Ninewells – Site 6B – city centre	37	4	3	2	2

* An additional shuttle bus would operate from the P&R site to Ninewells hospital

7.5.13 Based on the above table, four buses would be required to operate a dedicated bus service, with a 12 minute frequency, from Site 3 / 5 to the city centre via Riverside Avenue and Riverside Drive. In addition, a shuttle bus would operate to Ninewells Hospital. Four buses would also be necessary to operate between Site 6B, the city centre and Ninewells.

7.5.14 A hybrid bus service to Site 3 / 5 has been based on extending two existing services at a 30 minute frequency from Ninewells hospital. Although existing services operates with a layover at Ninewells, this is insufficient to allow an extension of the route without the provision of an additional bus on each route.

7.5.15 With four buses per hour provided by extended services, one further bus would be required per hour to provide a 12 minute frequency between the site and the city centre, operating via Ninewells and Perth Road.

7.5.16 The hybrid service to Site 6B is based upon supplementing the existing Travel Dundee 8X and Stagecoach X42 which pass the site. Together these buses operate three times per hour between the city centre and Ninewells. In order to provide a 12 minute frequency two additional buses per hour (30 minute frequency) would be required to operate past the site. From Table 7.2, this would require an additional 2 buses.

Summary

7.5.17 A summary of each service is given below.

Dedicated service - 12 minute frequency

Site 3 / 5
- P&R to city centre service operates limited stop via Riverside Avenue / Riverside Drive
- 4 buses required to serve city centre
- 1 additional bus required to serve Ninewells

Site 6B
- 4 buses required to serve Ninewells and city centre
- Service operates via Riverside Drive and Tom McDonald Avenue

Hybrid service - 12 minute frequency

Site 3 / 5
- P&R service to city centre operates via Ninewells Hospital and Perth Road - increased journey time reduces P&R demand
- Existing services extended to serve the Park & Ride site – 2 additional bus is required
- 1 further bus is required to operate a loop between the Park & Ride site and the city centre

Site 6B
- Existing 8X and X42 services are "infilled" with subsidised services
- 2 additional buses are required operating on a loop between Ninewells - P&R - city centre

Commercial service – 12 minute frequency

For Sites 3, 3i, 3ii and 5, operates as the dedicated service; for the first 10 years services are paid for by grant / subsidy, buses then run on a fully commercial basis from year 11. The service to Site 6B operates as the hybrid for the first 10 years before operating on a fully commercial basis.

7.6 Scheme costs

7.6.1 A summary of scheme costs is given in Table 7.3; annual operating costs and revenue is given in Table 7.4 . All costs are in 2010 prices. More detail on how these costs have been calculated is given in Appendix C.

7.6.2 Should the Park & Ride site be designed to provide overnight lorry parking, capital costs would be increased by approximately £450,000. The additional costs include pavement strengthening and wider internal roads to accommodate HGV movements.

Table 7.7.3: Park & Ride capital costs, 2010 prices (400 spaces)

	Infrastructure costs	Base costs (incl 20% fees)	Total base capital costs (incl 15% contingencies)	Capital cost including optimism bias (excluding land)	Land costs	Total capital cost
A90 site 3	£2,153,971	£2,584,765	£2,907,861	£4,045,158	£290,786	£4,335,944
A90 site 3i	£2,465,500	£2,958,600	£3,328,425	£4,630,210	£332,843	£4,963,052
A90 site 3ii	£3,503,929	£4,204,715	£4,730,304	£6,580,379	£473,030	£7,053,409
A90 site 5	£2,153,971	£2,584,765	£2,907,861	£4,045,158	£290,786	£4,335,944
A90 site 6B	£1,876,025	£2,251,230	£2,532,634	£3,523,175	£253,263	£3,776,438

Contingencies have been assumed to be 15%, fees 20%
44% optimism bias has been applied to the base costs as given in Chapter 11
Land costs have been assumed to be 10% of the base capital costs

Table 7.4: Park & Ride operating costs / annual revenue, 2010 prices (400 spaces)

		Annual revenue (2012)	Annual maintenance cost	Annual operating cost (P&R site)	Annual operating cost (bus)	Notes
A90 site 3	commercial	£105,000	£107,699	£43,320	£548,995	First 10 years only
	hybrid	£83,000	£107,699	£43,320	£264,946	
	dedicated	£105,000	£107,699	£43,320	£548,995	
A90 site 3i	commercial	£112,000	£123,275	£43,320	£548,995	First 10 years only
	hybrid	£88,000	£123,275	£43,320	£264,946	
	dedicated	£112,000	£123,275	£43,320	£548,995	
A90 site 3ii	commercial	£112,000	£175,196	£43,320	£548,995	First 10 years only
	hybrid	£88,000	£175,196	£43,320	£264,946	
	dedicated	£112,000	£175,196	£43,320	£548,995	
A90 site 5	commercial	£105,000	£107,699	£43,320	£548,995	First 10 years only
	hybrid	£83,000	£107,699	£43,320	£264,946	
	dedicated	£105,000	£107,699	£43,320	£548,995	
A90 site 6B	commercial	£119,000	£93,801	£43,320	£206,425	First 10 years only
	hybrid	£119,000	£93,801	£43,320	£206,425	
	dedicated	£119,000	£93,801	£43,320	£451,898	

Annual maintenance costs have been assumed to be 5% of construction costs

7.7 Demand forecasting

Methodology

7.7.2 A full Demand Forecasting Report is provided as Appendices D, E and F and only a brief summary is provided here. Demand forecasting has been undertaken in CB's PRIDE software. This is a specific Park & Ride demand forecasting model, originally developed for the 1993 Greater Manchester Park and Ride Methodology Study, jointly funded by the Association of Greater Manchester Authorities and the then Department of Transport. The main inputs to PRIDE are:

- car trip demand by origin, destination, time period and/or trip purpose;
- car journey costs – in-vehicle time, parking search times, parking charges, and walk times from the car park;
- journey costs by Park & Ride – access times to the Park & Ride site by car, walk time at the site, wait time, fare, in-vehicle time, and walk time from the bus stop at the destination;
- mode choice parameters.

7.7.3 Trip demands and existing costs were taken from the LATIS model with addition information from the DCCP model and from data collected by Ninewells Hospital and by CB.

7.7.4 The costs of Park & Ride use include the in-vehicle time which comes directly from the input matrices but also various search and walk times which have been estimated by CB and the bus journey wait time, travel time, walk time and cost which have also been estimated by CB using data where available.

7.7.5 The costs of parking in Dundee City Centre and the proportion of users paying to park was based on published information on parking charges and surveys of free private parking space undertaken as part of the DCCP model building process.

7.7.6 Mode choice parameters include the spread factor (lambda), taken to be 0.06, and the modal penalty, taken to be 20 minutes.

Central demand forecasts

7.7.7 The central demand forecasts, based on the assumptions outlined above, are shown in Table 7.5- all demands are vehicles. Further detail on the methodology used is given in the Demand Forecasting Report

Table 7.5: Central demand forecasts (vehicles)

Period	Site 3	Site 3i	Site 3ii	Site 5	Site 6B
2012 AM	129	136	136	129	138
2012 IP	61	64	64	61	68
2012 Total	190	200	200	190	206
2022 AM	187	197	227	187	200
2022 IP	99	105	105	99	114
2022 Total	286	302	332	286	314

7.7.8 Total demand in persons is given in Table 7.6.

Table 7.6: Central demand forecasts (persons)

Period	Site 3	Site 3i	Site 3ii	Site 5	Site 6B
2012 AM	162	171	171	162	174
2012 IP	78	83	83	78	88
2012 Total	240	254	254	240	262
2022 AM	234	246	282	234	250
2022 IP	127	135	135	127	147
2022 Total	361	381	417	361	397

Sensitivity tests

7.7.9 A series of sensitivity tests have been undertaken. These include an assessment of the impact of:

- reduced Park & Ride fares (bus fares reduced by 20%);
- increased parking charges (charges increased by 4% above inflation);
- increased walk times which might accrue as the result of extensions to the existing controlled parking zone areas (walk times increased by 6 minutes);
- bus priority; and,
- reduced bus frequency from 12 minutes to 15 minutes.

7.7.10 The results of these tests for each site are shown in Table 7.7 to Table 7.10..

Table 7.7: Site 3 / 5 sensitivity tests

Period	fares down	parking charges up	CPZ area up	Bus priority	Reduced bus freq
2012 AM	5%	0%	41%	3%	-10%
2012 IP	5%	0%	5%	0%	-10%
2012 Total	5%	0%	29%	2%	-10%
2022 AM	5%	13%	40%	3%	0%
2022 IP	4%	10%	3%	0%	0%
2022 Total	5%	12%	27%	2%	0%

Table 7.8: Site 3i sensitivity tests

Period	fares down	parking charges up	CPZ area up	Bus priority	Reduced bus freq
2012 AM	6%	0%	38%	3%	-10%
2012 IP	5%	0%	0%	0%	-9%
2012 Total	6%	0%	26%	2%	-10%
2022 AM	5%	13%	37%	3%	0%
2022 IP	4%	10%	0%	0%	0%
2022 Total	4%	12%	24%	2%	0%

Table 7.9: Site 3ii sensitivity tests

Period	fares down	parking charges up	CPZ area up	Bus priority	Reduced bus freq
2012 AM	6%	0%	38%	3%	-10%
2012 IP	5%	0%	0%	0%	-9%
2012 Total	6%	0%	26%	2%	-10%
2022 AM	4%	12%	35%	3%	0%
2022 IP	4%	10%	0%	0%	0%
2022 Total	4%	11%	24%	2%	0%

Table 7.10: Site 6B sensitivity tests

Period	fares down	parking charges up	CPZ area up	Bus priority	Reduced bus freq
2012 AM	5%	0%	40%	3%	-9%
2012 IP	4%	0%	0%	0%	-9%
2012 Total	5%	0%	27%	2%	-9%
2022 AM	5%	14%	39%	3%	0%
2022 IP	4%	10%	0%	0%	0%
2022 Total	4%	12%	25%	2%	0%

7.7.11 Overall:

- reducing Park & Ride bus fares by 20% increases vehicle demand by approximately 5%;
- increasing parking charges increases demand by 12%;
- increasing the size of the CPZ increases demand by around 25%;
- introducing bus priority increases demand by 2%; and,
- reducing bus frequency reduces demand by up to 10%.

7.7.12 Based on the above range of sensitivities, the maximum predicted vehicle demand for any option is 411 for Option 3ii in 2022 and the minimum is 171 for Option 3 / 5 in 2012.

7.7.13 At this stage, for the purposes of the economic assessment and further appraisal, a 400 space Park & Ride site has been assumed.

Hybrid bus service via Perth Road

7.7.14 As noted in Table 7.1, operating a hybrid bus service from Sites 3 and 5 to the city centre, via Ninewells Hospital and Perth Road, increases one-way journey times from 16 to 22 minutes. The increased journey time reduces Park & Ride demand as shown in Table 7.11.

Table 7.11: Forecast demand at Sites 3 / 5 with hybrid bus service via Perth Rd (vehicles)

Period	Site 3	Site 3i	Site 3ii	Site 5
2012 AM	102	108	108	102
2012 IP	50	53	53	50
2012 Total	152	161	161	152
2022 AM	146	155	181	146
2022 IP	79	84	84	79
2022 Total	225	239	265	225

7.8 Appraisal against study objectives

OSTs and ASTs

7.8.2 Full OSTs and ASTs are provided in Appendices G and H.

Study objectives

7.8.3 The study objectives are:

- improve the public transport accessibility to employment, health, leisure and recreational locations in the west of Dundee and city centre;
- encourage a shift toward sustainable and healthier modes of transport;
- reduce traffic congestion for longer distance trips in the west of Dundee;
- contribute to national and local air quality targets and reduce the impact of climate change; and,
- minimise the impacts of the scheme upon the natural and built environment.

7.8.4 For the Part 2 appraisal, it is essential that the objectives are SMART (Specific, Measurable, Attainable, Relevant, Timed) so that future monitoring and evaluation is possible. The objectives have been reviewed and they are all considered to be specific, attainable and relevant. In addition the impacts should be realised within no more than a year of a site becoming operational and so they are considered to be timed. Finally impacts on the objectives will also be measureable and suitable measurements are given in Table 13.1.

7.8.5 During the Part 2 appraisal the effects of Options 3, 3i, 3ii, 5 and 6B were assessed against the objectives as shown in Table 7.12. These scores are similar to those awarded during Part 1 assessment with minor changes as follows:

- To reflect the fact that Option 3ii does not have a greatly increased patronage over Option 3i its score for Objectives 2, 3 and 4 has been reduced to match Option 3i.
- Option 5 has been given a higher score against Objective 5, reflecting the reduced impact on the environmentally sensitive locations in this area.
- Option 6B has been a higher score against Objective 2 to reflect its potential for encouraging walking and cycling due to its closer location to popular destinations.
- Finally, Option 6B has been given a higher score against Objective 5 as although it lies within a local nature reserve it is considered likely that environmental effects can be minimised.

Table 7.12: Scores against planning objectives

Objective		3	3i	3ii	5	6B
1	Improve the public transport accessibility to employment, health, leisure and recreational locations in the west of Dundee and city centre	✓	✓	✓✓	✓	✓✓
2	Encourage a shift toward sustainable and healthier modes of transport	✓✓	✓✓	✓✓	✓✓	✓✓✓
3	Reduce traffic congestion for longer distance trips in the west of Dundee	✓	✓✓	✓✓	✓	✓
4	Contribute to national and local air quality targets and reduce the impact of climate change	✓	✓✓	✓✓	✓	✓✓
5	Minimise the impacts of the scheme upon the natural and built environment	✓	✓	✓	✓✓	✓
Total		+6	+8	+9	+7	+9

7.8.6 Options 3ii and 6B have higher Park & Ride patronage forecasts and are therefore scored more highly against Objective 1. They provide the highest number of users with a choice of travel options and, in terms of demand, best help to support and reinforce the existing public transport network.

7.8.7 Options 3, 3i and 5 also help support the objective but have been given a minor positive benefit due lower forecast Park & Ride demand.

7.8.8 Option 6B has been given the highest score for encouraging shifts towards more sustainable and healthier modes of transport as it is particularly well placed to encourage shifts to healthier modes (walking and cycling) as well as to more sustainable modes (bus). This is because it can easily be connected to Dundee's walk and cycle networks and it is closer to key destinations and so distance will be less of a deterrent.

7.8.9 Options 3, 5 and 6B are scored as having only minor benefits against Objective 3 as they can only address traffic congestion in central Dundee with benefits for long distance trips terminating in Dundee only. Option 3i and 3ii score more highly as they remove traffic from the Swallow Roundabout as well.

7.8.10 Park & Ride has a role to play in addressing local and national air quality issues. They offer the potential to reduce emissions in city centre areas where both population and pollution levels are highest. Pollutants such as carbon monoxide, benzene, 1-3 butadiene, lead, nitrogen dioxide, sulphur dioxide and PM_{10}s can also have a significant impact on local air quality. The entire Dundee City Council Area has been designated an Air Quality Management Area due to concerns over nitrogen dioxide levels.

7.8.11 There are particular concerns regarding the following junctions and areas:

- Victoria Road / Hilltown,
- Logie Street / Loons Road,
- Lochee Road / Dudhope Terrace,
- Lochee Road / Rankine Street, and
- Dundee City Centre (including Dock Street, Commercial Street, Seagate, Nethergate, Whitehall Street, Union Street, and St Andrew's Street).

7.8.12 Although traffic travelling to central Dundee from the A90 does not directly pass any of these junctions, it does contribute to emissions in the central area.

7.8.13 Options 3i and 3ii have been scored highly due to their potential to improve air quality both in the city centre and at the Swallow Roundabout. Option 6B has been scored highly as its strong patronage maximises benefits in the city centre where they will be felt most strongly by most people.

7.8.14 With appropriate landscaping and screening there is no reason why development at any of the proposed sites should have a detrimental impact on the overall quality of the built environment though a listed building in the vicinity of Site 3 would have to be treated carefully.

7.8.15 Site 3 is located in, or adjacent to an area already zoned for business development and is adjacent to a Site of Importance for Nature Conservation (SINC) and an area covered by a Tree Preservation Order. In order to access the site it will be necessary to pass close to the boundary of the SINC site and across the area covered by the Tree Preservation Order. Under Policy 70 of the Dundee Local Plan "development proposals must not adversely affect the nature conservation qualities of Sites of Importance for Nature Conservation or Local Nature Reserves". However as the proposals do not actually encroach on the SINC site it is considered possible to minimise the impact of any development on this sensitive area. The mitigation measures which will be required in order to permit the construction of

an access road through the area covered by the Tree Preservation Order are currently being investigated. However, it is noted that the planned business development in this area will not be feasible without an access into the Swallow Roundabout and so, on balance Options 3, 3i and 3ii have been given a minor positive score. Furthermore, it is noted that if a decision was taken to proceed at this site there would need to be "an ecological or similar assessment that details the likely impacts of the proposal on the conservation interests of the designation, along with proposed mitigation measures" as specified in the Local Plan.

7.8.16 Site 5 is located in an area zoned for business development and can be accessed from the existing northwest approach to the Swallow Roundabout without the need to cross the area protected by the Tree Preservation Order or to pass near to the SINC site. For this reason Option 5 has been given a moderately positive score.

7.8.17 Site 6B lies within an area identified in the Dundee Local Plan as Protected Open Space under Policy 66A and 66B and as a Local Nature Reserve. In addition the area between the road and railway to the north of the site is designated a wildlife corridor under Policy 70. In the normal way any proposed development on such a site would score poorly but in this case there are already proposals to develop a wildlife attraction of some sort in this area and the area itself is not of clearly high environmental quality at present and so 6B has been given an overall minor benefit score. However, it is noted that if a decision was taken to proceed at this site there would need to be "an ecological or similar assessment that details the likely impacts of the proposal on the conservation interests of the designation, along with proposed mitigation measures" as specified under Policy 70 of the Local Plan.

7.9 National and STPR objectives

7.9.1 As well as several non-location specific national objectives the projects being assessed here have potential impacts on a number of the STPR corridor and node objectives. As the study objectives were set with these in mind full assessment is not considered necessary but it is considered to be appropriate to make some comment on the effects the proposals might have. The relevant corridor objectives are:

- to promote continuing reduction in accident rates and severity rates across the strategic transport network; and
- to promote journey time reductions, particularly by public transport, between the Central Belt and Aberdeen primarily to allow business to achieve an effective working day when travelling between these centres.

7.9.2 There are potential safety gains as a result of these proposals and a minor positive impact here is probably reasonable. Due to queue reductions at the Swallow Roundabout journeys via Dundee on the A90 either by car or public transport would be expected to gain a minor positive impact following implementation of Option 3i or 3ii. Options 3, 5, and 6B which do not remove traffic from the Swallow Roundabout would be expected to have no impact here.

7.9.3 The relevant node objectives are:

- to reduce the conflict between longer distance and local traffic;
- to improve bus/rail interchange opportunities; and,
- to improve the public transport accessibility and competitiveness to Dundee West.

7.9.4 Options 3i and 3ii would be expected to reduce the conflict between through trips and trips to Dundee at the Swallow Roundabout but will not address issues further east along the Kingsway. All Options will help to reduce conflicts between traffic heading through Dundee City Centre and traffic whose destination is there as well as traffic moving on and off the Tay Road Bridge. Overall some minor benefits would be anticipated.

7.9.5 All options will enhance opportunities for car / bus interchange and may enhance opportunities for bus / bus or bus / long distance bus interchange if service patterns allow this. If the relocation of Invergowrie Station proceeds as currently proposed then Option 6B will provide a noticeable additional option for bus / rail or car / rail interchange. Similarly all options should enhance public transport accessibility and competitiveness in Dundee West as all will involve some additional and / or extended services.

7.9.6 The preferred site is intended to be one of a network of four Park & Ride locations serving major arterial routes into Dundee and forming a comprehensive Park & Ride system for the city.

7.9.7 A summary of the appraisal of each site against the STPR National Objectives is given in Table 7.13. Table 7.14 summarises the appraisal of each site against STPR Node and Corridor Objectives.

Table 7.13: Appraisal against STPR national objectives

National objective		Site 3 / 5	Site 3i / 3ii	Site 6B
1	To promote 'competitive' inter-urban journey times.	**Positive** Park & Ride at this location would reduce peak hour local and strategic traffic approaching Dundee city centre. Reduced congestion would result from a mode shift from car to public transport	**Positive** Park & Ride at this location would reduce peak hour local and strategic traffic approaching Dundee city centre. In addition, this option removes vehicles from the Swallow Roundabout, providing both east and westbound journey time savings to trunk road traffic	**Positive** Park & Ride at this location would reduce peak hour local and strategic traffic approaching Dundee city centre. Reduced congestion would result from a mode shift from car to public transport
2	To reduce inter-urban journey times on public transport.	**Positive** The development of Park-&-Ride at this location has the potential to reduce congestion on arterial routes to the city centre, reducing inter-urban journey times to Dundee	**Positive** The development of Park-&-Ride at this location has the potential to reduce congestion on arterial routes to the city centre, reducing inter-urban journey times to Dundee. As above, this option removes traffic from the Swallow roundabout, reducing journey times for through traffic on the A90	**Positive** The development of Park-&-Ride at this location has the potential to reduce congestion on arterial routes to the city centre, reducing inter-urban journey times to Dundee
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.	**Slight positive** The forecast reduction in car trips to the city centre would result in journey time savings on Riverside Avenue / Riverside Drive for vehicles approaching the city centre	**Positive** This option would improve journey time reliability for all vehicles on the A90 trunk road at peak times. As at other sites, the forecast reduction in car trips to the city centre would result in journey time savings on Riverside Avenue / Riverside Drive for vehicles approaching the city centre	**Slight positive** The forecast reduction in car trips to the city centre would result in journey time savings on Riverside Avenue / Riverside Drive for vehicles approaching the city centre
4	To promote journey time reductions between the Central Belt and Dundee/Aberdeen/Inverness primarily to allow business to achieve an effective working day between these centres.	**Slight positive** By providing Park & Ride, this intervention would be effective in removing peak hour car trips from arterial routes to the west of Dundee. Moderate journey time savings would result	**Positive** Park & Ride at this location would be effective in removing peak hour car trips from the Swallow Roundabout and arterial routes to the west of Dundee. Moderate journey time savings would result for inter-urban traffic	**Slight positive** By providing Park & Ride, this intervention would be effective in removing peak hour car trips from arterial routes to the west of Dundee. Moderate journey time savings would result
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).	**Slight positive** Peak hour journey times into Dundee would be reduced and Park & Ride would help support additional public transport provision. Consequently, the labour catchment area accessible by public transport would be increased		

National objective		Site 3 / 5	Site 3i / 3ii	Site 6B
6	Support the development and implementation of the emerging national development interventions.	**Positive** This intervention would help improve public transport accessibility to Ninewells Hospital from the west of Dundee along the A90 corridor. Public transport access to Dundee Airport would also be improved, where buses operate via Riverside Avenue / Riverside Drive		
7	Reduce CO_2 emissions per person km.	**Slight positive** Park & Ride would result in a transfer of a part of some journeys from private car to public transport. Experience from other similar schemes indicates that there is also the potential for some trips previously made wholly by public transport to shift to Park & Ride, or for diverted trips increasing overall trip length. Assuming such increases are minor, there is likely to be a decrease in CO_2e emissions in the city centre served by the Park-&-Ride scheme		
8	Stabilise total CO_2 emissions.	**Slight positive** Park & Ride would result in a transfer of a part of some journeys from private car to public transport. Experience from other similar schemes indicates that there is also the potential for some trips previously made wholly by public transport to shift to Park & Ride, or for diverted trips increasing overall trip length. Assuming such increases are minor, there is likely to be a decrease in CO_2e emissions in the city centre served by the Park-&-Ride scheme		
9	Reduce CO_2 emissions in line with expectations from the emerging climate change bill.	**Neutral** By the year 2050, the draft Climate Change Bill requires a reduction, in the total amount of CO_2e emitted, of 60 per cent in comparison with the 1990 baseline. By reducing congestion and encouraging mode shift to public transport, the intervention could potentially lead to reduced CO_2e emissions per person km. Park & Ride therefore promotes carbon efficiency; however the potential of the scheme to help meet the levels required by the Bill is extremely low		
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.	**Neutral** By encouraging mode shift to public transport, there would be a resulting minor reduction in accident savings. Nevertheless, the overall impact of the measures on accident rates and severity rates is considered to be negligible		
11	To promote seamless travel.	**Positive** Park-&-Ride sites improve transport integration, by providing seamless connections between the car and bus services. In addition to facilitating transfer between modes, this also facilitates transfer from strategic to urban networks. Overall, the intervention is expected to generate a positive impact on this objective		
12	Improve the competitiveness of public transport relative to the car.	**Positive** Park & Ride provides an attractive alternative transport mode to the car. It also helps to strengthen existing bus service provision, resulting in higher frequency services for may existing public transport users. Reduced traffic congestion helps to reduce bus journey times and may allow for increased bus priority at strategic locations		
13	To improve overall perceptions of public transport.	**Positive** This intervention envisages consistent branding and information at all Park-&-Ride site and on bus services. Vehicle branding and high quality passenger information are powerful tools in raising public perception of bus services, and these benefits could extend to the overall perception of public transport		

Table 7.14: Appraisal against STPR node and corridor objectives

National objective	Site 3 / 5	Site 3i / 3ii	Site 6B
STPR corridor objectives			
To promote continuing reduction in accident rates and severity rates across the strategic transport network; and	**Neutral** By encouraging mode shift to public transport, there would be a resulting minor reduction in accident savings. Nevertheless, the overall impact of the measures on accident rates and severity rates is considered to be negligible		
To promote journey time reductions, particularly by public transport, between the Central Belt and Aberdeen primarily to allow business to achieve an effective working day when travelling between these centres.	**Slight positive** By providing Park & Ride, this intervention would be effective in removing peak hour car trips from arterial routes to the west of Dundee. Moderate journey time savings would result	**Positive** Park & Ride at this location would be effective in removing peak hour car trips from the Swallow Roundabout and arterial routes to the west of Dundee. Moderate journey time savings would result for inter-urban traffic	**Slight positive** By providing Park & Ride, this intervention would be effective in removing peak hour car trips from arterial routes to the west of Dundee. Moderate journey time savings would result
STPR node objectives			
To reduce the conflict between longer distance and local traffic	**Positive** Park & Ride at this location would reduce peak hour local and strategic traffic approaching Dundee city centre. Reduced congestion would result from a mode shift from car to public transport	**Positive** Park & Ride at this location would reduce peak hour local and strategic traffic approaching Dundee city centre. In addition, this option removes local traffic from the Swallow Roundabout, providing both east and westbound journey time savings to trunk road flows	**Positive** Park & Ride at this location would reduce peak hour local and strategic traffic approaching Dundee city centre. Reduced congestion would result from a mode shift from car to public transport
To improve bus/rail interchange opportunities	**Positive** Park-&-Ride sites improve transport integration, by providing seamless connections between the car and bus services. In addition to facilitating transfer between modes, this also facilitates transfer from strategic to urban networks. Overall, the intervention is expected to generate a positive impact on this objective		
To improve the public transport accessibility and competitiveness to Dundee West	**Positive** Park & Ride provides an attractive alternative transport mode to the car. It also helps to strengthen existing bus service provision, resulting in higher frequency services for may existing public transport users. Reduced traffic congestion helps to reduce bus journey times and may allow for increased bus priority at strategic locations		
To promote continuing reduction in accident rates and severity rates across the strategic transport network	**Neutral** By encouraging mode shift to public transport, there would be a resulting minor reduction in accident savings. Nevertheless, the overall impact of the measures on accident rates and severity rates is considered to be negligible		
To promote journey time reductions, particularly by public transport, between Aberdeen and the Central Belt primarily to allow business to achieve an effective working day when travelling between these centres.	**Slight positive** By providing Park & Ride, this intervention would be effective in removing peak hour car trips from arterial routes to the west of Dundee. Moderate journey time savings would result	**Positive** Park & Ride at this location would remove peak hour car trips from the Swallow Roundabout and arterial routes to the west of Dundee. Moderate journey time savings would result for inter-urban traffic	**Slight positive** By providing Park & Ride, this intervention would be effective in removing peak hour car trips from arterial routes to the west of Dundee. Moderate journey time savings would result

7.10 Implementability appraisal

Introduction

7.10.2 Part 2 appraisal does not require a reassessment of the conclusions on the implementability of each option which was undertaken at Part 1 but as implementability is included in the Detailed Appraisal ASTs it is appropriate to summarise the key points here.

Technical feasibility

7.10.3 None of the proposals includes any novel / untried / leading edge technologies and there are no notable risks involved. Therefore all of the options are technically feasible when considered on this basis. However, there are a number of environmental issues to be overcome for Options 3, 3i, 3ii and 6B. While these can be resolved and do not affect the overall feasibility of these options, there is a requirement for further work.

7.10.4 It should be noted that Site 6B lies on reclaimed land; there may be additional earth works required to stabilise the location in order to enable the construction of a Park & Ride site.

Operational feasibility

7.10.5 Provided that site usage develops broadly as anticipated there are no obvious factors which might affect the ability of any of the options to operate long term without major additional cost. Therefore all of the options are operationally feasible.

Affordability

7.10.6 Scheme costs, including land and optimism bias, range from £3.78m at Site 6B to £7.05m at Site 3ii. At this stage, land costs have been assumed to be 10% of the total base capital cost. With Options 3i and 3ii, the provision of a slip road from the A90 into the Park & Ride increases the total capital costs, although these are offset by non-user benefits resulting from reduced congestion at the Swallow Roundabout.

7.10.7 Land at Site 6B is owned by Dundee City Council and purchase costs may therefore be lower. Other sites are in private ownership and land purchase costs at these locations may be higher than estimated.

7.10.8 If the Western Gateway Development proceeds then this will require to be served by public transport, helping to contribute to the commercial operation of bus services to Sites 3 and 5. Without such development, a dedicated service would cost approximately £550,000 per annum, a hybrid service would cost £265,000 per annum. It should be noted that a hybrid service, operating via Perth Rd would be less attractive to passengers; the additional 6 minute journey time reduces total demand by approximately 25%. Operating a dedicated service to Site 6B would cost £450,000 per annum, however, a hybrid / commercial service is more viable at this location. The cost of such a service would be approximate £206,000 per annum.

Public acceptability

7.10.9 During the development of TACTRAN's Regional Transport Strategy, extensive consultation was undertaken and reaction to Park & Ride was positive. Furthermore, TACTRAN's existing Park & Ride sites are well used and there is no reason to anticipate high levels of public objection to Park & Ride in general.

7.10.10 With regard to individual sites, site 3 is located adjacent to a Site of Importance for Nature Conservation and access to it would have to cross an area covered by a Tree Preservation Order. Because of this, unless satisfactory mitigation measures can be put in place, there may be local opposition to the development of Options 3, 3i and 3ii. While Site 5 has no major environmental impacts, access would be from Swallow roundabout and it offers no benefit in reducing congestion at this busy junction. Given this, it may be perceived by the public that the site offers few material benefits and that alternative options have a greater potential to reduce congestion impacts.

7.10.11 Option 6B is located within an area of Protected Open Space and Local Nature Reserve although the actual character of the area is not considered to be of the highest quality. While there may be objections to the site being developed, it is anticipated that these can be overcome provided that satisfactory mitigation measures are incorporated into the scheme.

Implementability summary

7.10.12 A summary of the implementability of each Option is shown in Table 7.15.

Table 7.15: Implementability summary

	Site 3	Site 3i	Site 3ii	Site 5	Site 6B
Technical	✓	✓	✓	✓✓✓	✓
Operational	✓✓	✓✓	✓✓	✓✓	✓✓
Affordability	✓✓	✓	0	✓✓	✓✓✓
Public acceptability	✓	✓	✓	✓	✓
Total	+6	+5	+4	+8	+7

7.11 Appraisal against STAG criteria

OSTs and ASTs

7.11.2 Full OSTs and ASTs are provided in Appendices G and H.

7.12 Environment

Noise and vibration

7.12.2 Noise is a major issue where it affects residential properties. In this case there are no residential properties in the vicinity of any of the options and the closest residential properties are separated from the sites by the A90, Kingsway or Riverside Avenue, considerable noise generators in their own right, which will more than mask any noise deriving from the Park & Ride sites themselves.

7.12.3 The only exceptions to this are Greystane Lodge and Balgray House which lie within around 160m of the busiest areas of Option 5 and the Landmark Hotel which lies close to the access road for Options 3, 3i, 3ii and 5. At a distance of 160m it would require a traffic flow of around 1000 vehicles per hour before there was enough noise to be problematic and flows are not expected to approach these levels.

7.12.4 Between 08:00 and 09:00 there are around 200 vehicles passing the hotel on the road to Liff. Using standard procedures for the calculation of road traffic noise this corresponds to

61.5dB at the reference distance (10m from the roadside)[1]. At the nearest point the hotel is only around 3m from the roadside but is divided from it by a wall. At this distance and with a barrier noise should be sufficiently reduced inside the hotel to be below the 55dB considered the threshold for community annoyance.

7.12.5 Following development of Option 3, 3i or 3ii there may be around 250 vehicles per hour on a road around 10m from the hotel at the nearest point, a point at the opposite end of the hotel from the existing closest approach to the road. Noise at this point will be around 61.5dB, enough to annoy 16% of people. However, this is the noise level with no screening assumed while in practice screening is likely and, at a minimum, the people affected will be inside the building. This should be enough to reduce the noise level by the necessary 6.5dB under most circumstances. In addition Park & Ride noise will be at its lowest level at night when people are more likely to be affected. Overall, with sensible screening the impact of noise is considered to be negligible.

7.12.6 Following development of Option 5 an increase of around 250 vehicles per hour on the existing road outside the hotel would be anticipated. This will increase the noise level at the reference distance to 65.1dB and at the hotel to around 58.1dB, enough to annoy 11% of people. However, at a distance of only 10m from the edge of the carriageway noise levels will be back below the 55dB limit for annoyance. Almost all of the hotel is further than this from the road and Park & Ride noise will be at its lowest level at night when people are more likely to be affected. Overall, given the small proportion of the hotel affected the overall impact of noise is considered to be negligible.

7.12.7 The impacts of noise would be of greater importance if any of the options were in 'quiet areas'. Although noise maps for Dundee are not yet available it is suggested that in the case of these locations which are all close to existing main roads 'quiet areas' are unlikely.

Global air quality - carbon dioxide (CO_2)

7.12.8 There are two opposing influences on carbon dioxide emissions which follow the development of a Park & Ride. The first of these is the reduction in vehicle kilometres which results from the reduced distance driven by those who previously made the whole trip by car. The second is the increased distance driven by those who previously made the whole trip by bus or did not make the trip at all and the increased distance driven by buses serving new or extended routes.

7.12.9 In this case it is anticipated that any extension to bus routes will be minimal as sites will primarily be served by existing commercial services.

7.12.10 Overall, it is considered that the majority of those using the bus to come into Dundee do so because they do not have access to a car. These users cannot transfer to Park & Ride and so potential for bus to Park & Ride mode shift is minimal. Given this, it is not considered likely that there will be any significant increase in vehicle miles due either to a shift from bus to Park & Ride or to trip generation and therefore it is only the reduction in vehicle kilometres as vehicles shift from car to Park & Ride which need be considered.

7.12.11 TUBA now includes a monetisation of the value of savings of carbon dioxide emissions and this is shown in Table 7.16.

[1] Based on http://resource.npl.co.uk/acoustics/techguides/crtn/

Table 7.16: Carbon dioxide emission savings

Option	Saving (2002 prices discounted to 2002)
3	£89,000
3i	£93,000
3ii	£119,000
5	£89,000
6B	£106,000

Local air quality - particulates (PM_{10}) and nitrogen dioxide (NO_2);

7.12.12 Beyond 200m the contribution of vehicle emissions from the road centre to local pollution levels is not significant. Figure 7.7 shows the 200m buffer for the sites being appraised. For Options 3i and 3ii there are some buildings around Mylnefield and Star Inn Farm which lie inside the buffer zone for the exit slip. However, the vast majority of vehicles contributing to local air quality at these locations would be on the A90 if they were not on the slip road and so the change in air quality will be negligible.

7.12.13 The offices at Bullion House on Mill Road lie inside the buffer zone for Site 3. However, traffic flows in the extremities of the car parking area will be minimal and this location lies more than 200m from those parts of the Park & Ride which are likely to be busy. In addition as this building currently lies on the edge of the built up area and outside the Dundee Air Quality Management Area existing air quality is likely to be good. The relocation of a modest number of vehicles from the A90 and Riverside Avenue to the Park & Ride is not likely to affect this to any significant degree.

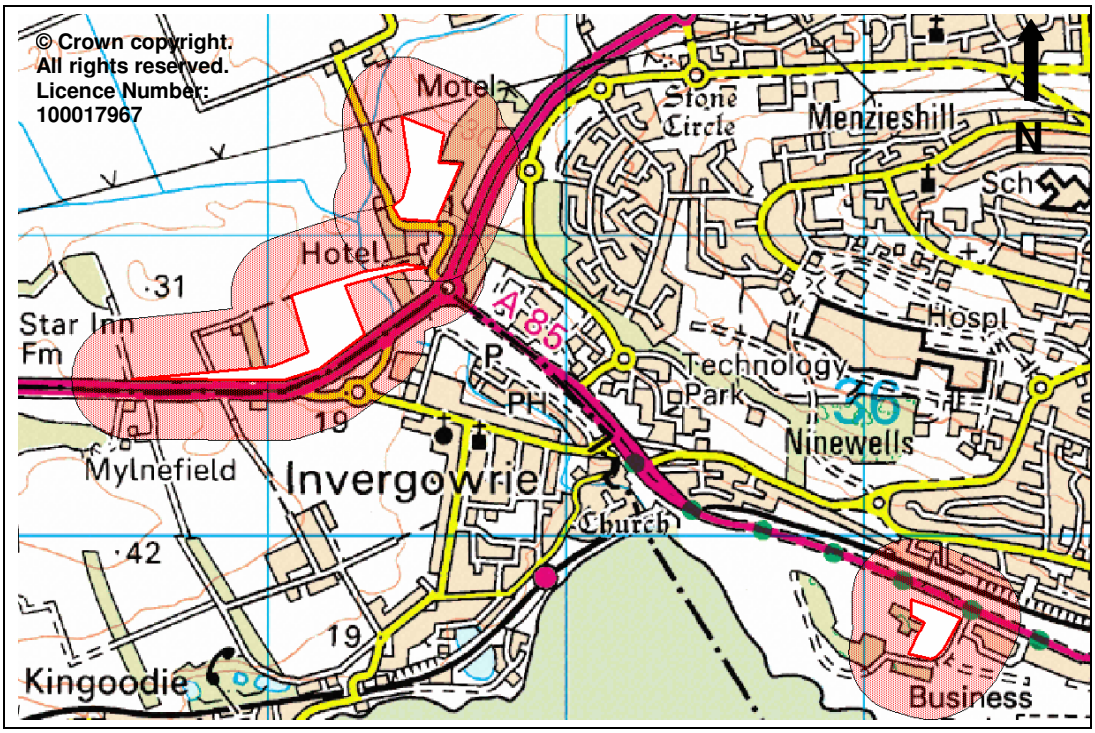
7.12.14 Greystane Lodge, Balgray House and the Landmark Hotel lie inside the 200m buffer area for Sites 3 and 5. These buildings do lie inside the Dundee Air Quality Management Area but as they are outwith the built up area current air quality is likely to be good. Using the DMRB Screening Method[2] at the worst affected building, the hotel, NO_2 might increase by up to $0.7\mu g/m^3$ and PM_{10} concentrations by to $0.07\mu g/m^3$. The contribution from the Swallow Roundabout which is much further away is similar. Under the UK Air Quality Strategy the limit for NO_2 and for PM_{10} levels is $40\mu g/m^3$ and there would appear to be very little risk of a deterioration to these levels.

7.12.15 At Site 6B a number of residential properties north of the railway line lie inside the 200m buffer. The contribution to NO_2 levels at this location from Riverside Avenue and Perth Road and from an assumed 5000 vehicles daily (30% HGVs) on Wright Avenue, respectively is $4.30\mu g/m^3$, $2.59\mu g/m^3$ and $0.47\mu g/m^3$ while the contribution from additional traffic going to the site is only $0.01\mu g/m^3$. For PM_{10} levels these figures are $0.30\mu g/m^3$, $0.20\mu g/m^3$, $0.03\mu g/m^3$ and $0.00\mu g/m^3$. Again, it would appear that there is very little risk of air quality in this area deteriorating to a level which would cause concern.

7.12.16 Overall the local air quality impacts around the sites are considered so small that they can be considered to be negligible.

[2] http://www.highways.gov.uk/business/documents/DMRB_Screening_Method_V1.03c__(12-07-07)_locked.zip

Figure 7.7: Local air quality



7.12.17 Within Dundee there may be local air quality improvements. On the assumption (outlined in Section 7.12.10) that the vast majority of site users previously made the whole trip by car and assuming additionally that there is no suppressed demand for car travel amongst those in the peripheral areas of Dundee which will be released by the Park & Ride then there should be a reduction of around 400 vehicle trips a day (in 2012) over the Do Minimum case. It has been assumed that the vast majority of these trips will reach central Dundee via Riverside Drive before heading around the Inner Ring Road in either direction.

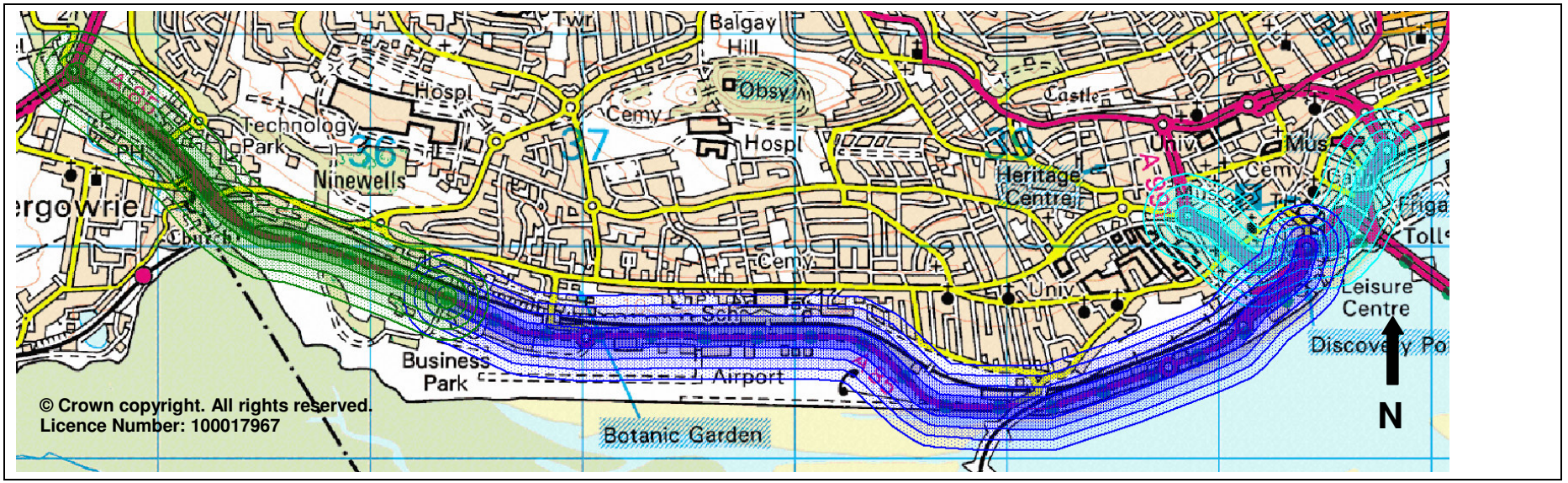
7.12.18 STAG requires that local air quality effects be assessed in successive 50m zones up to a distance of 200m. These zones are shown in Figure 7.8 and the changes in PM_{10} and nitrogen dioxide NO_2 emissions for 2012 in each of these zones is shown in Table 7.17. Changes in 2022 would be expected to be slightly larger but as there will have been more background growth and more improvements in vehicle technology by that time it is difficult to predict the overall effect on air quality.

Table 7.17: Potential change in PM_{10} and NO_2 levels within Dundee

Location	Assumed base AADT	Assumed future AADT	change in PM_{10} levels ($\mu g/m^3$)				change in NO_2 levels ($\mu g/m^3$)			
			0-50m	50-100m	100-150m	150-200m	0-50m	50-100m	100-150m	150-200m
Riverside Avenue (west of Site 6B) (7% HGVs)	16530	16130	-0.0326	-0.0124	-0.0044	-0.0023	-0.0095	-0.0028	-0.0008	-0.0004
Riverside Drive (east of Site 6B) (5% HGVs)	16922	16522	-0.0282	-0.0106	-0.0038	-0.0020	-0.0085	-0.0025	-0.0007	-0.0004
Inner Ring Road (5% HGVs)	20000*	19800	-0.0125	-0.0047	-0.0017	-0.0009	-0.0038	-0.0011	-0.0003	-0.0002

* this figure is approximate but as the calculations rely on change in traffic flow rather than absolute traffic flow this does not affect the conclusions

Figure 7.8: Local air quality zones along Riverside Avenue, Riverside Drive and in Dundee City Centre.



- Buffer zones around Riverside Avenue west of Site 6B are in green.
- Buffer zones around Riverside Drive east of site 6B are in dark blue.
- Buffer zones around the Inner Ring Road are in light blue.

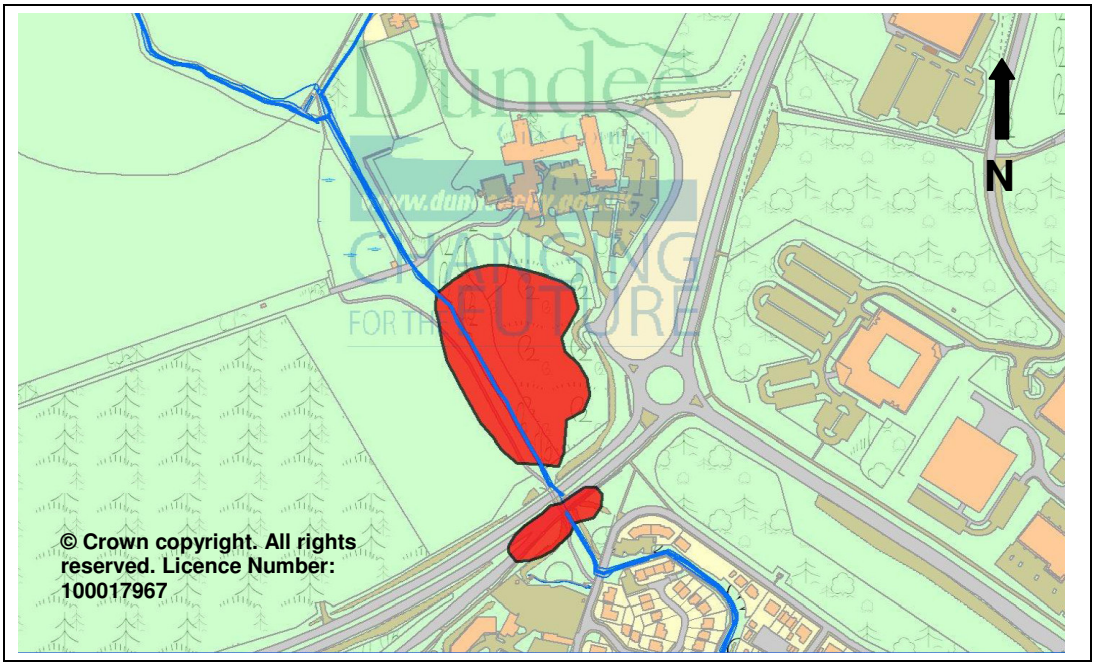
7.12.19 The UK limits for PM_{10} and NO_2 are 40 µg/m^3. The changes being predicted are, at most, 0.08% of these levels and so the likelihood of any measureable improvements in air quality are slim. However, any changes which do appear should be positive.

Water quality, drainage and flood defence

7.12.20 While there appears to be no immediate risk of flooding at Site 6B the area to the west of Site 5 and to the east of Site 3 is considered at risk of flooding by SEPA[3]. Site layouts have been designed to avoid these areas and so minimise the risk of flooding and the loss of floodplain.

7.12.21 However, with the site layout as shown Site 3 still has the highest flood risk of the three sites. The eastern boundary lies within a 1:200 year flood risk area as identified by SEPA and Dundee Council (shown in Figure 7.9). While the area acts as a natural flood plain, the trees currently growing there showed no signs of flood stress.

Figure 7.9: Swallow floodplain area



7.12.22 By creating hard surfacing across a large area of this site, the flood risk would increase and if it were to be selected for development, a more detailed flood risk assessment would be required. Overall, these constraints require careful mitigation, however they are there are not considered barriers to the development of the site.

7.12.23 Site 5 has a minor flood risk. The western edge of the site lies adjacent to a flood risk zone, again 1:200 year as identified by SEPA and Dundee Council but the site is elevated from the watercourse and is not shown on flood maps to act as a basin or significant flood plain area for waters within the catchment. Access to this site could be gained directly from the existing road without the need to pass through flood risk areas or over watercourses. However, a hydrology study would be required if this site were to be progressed in order to further define the flood risk and to determine the impact of altered drainage on the site following the increase of impermeable ground surface.

[3] http://www.multimap.com/clients/places.cgi?client=sepa

7.12.24 Site 6B is not within a flood risk zone identified by SEPA or Dundee Council and has been previously drained and reclaimed for industrial use and the construction of the airport and runways. The site lies further inland than existing features such as the airport runways and the Recycling Centre to the south of the site, both of which have gained planning permission here historically based on a low flood risk designation. Access to this site would be very direct and would not require alterations to existing watercourses as there are none within the vicinity of the site. Despite the increase in impermeable surfacing of the site, with careful design it is not anticipated that this will impact significantly on the overall drainage schemes and consequent flood risk at the site though this would need to be confirmed by a basic hydrology study were this site to be progressed.

Geology

7.12.25 There are no geological designations in the vicinity of any of the sites.

7.12.26 Sites 3 and 5 are underlain by the Lower Devonian Undivided Sandstones with overlying Raised Marine Deposits and there is no obvious reason why there should be an issue with the ability of such deposits to take the load imposed by a Park & Ride site. This is also the case at Site 6B which is underlain by the Lower Devonian Undivided Sandstones with bedrock at or near the surface and man-made deposits. This would include waste and natural earth materials deposited on the original ground surface.

7.12.27 Sites 3 and 5 overlie locally important aquifers in the Old Red Sandstone and groundwater vulnerability is intermediate to high. Site 6B overlies concealed aquifers and aquifers at depth and aquifers in Quaternary Coastal and River Alluvium at shallow levels. Again groundwater vulnerability is intermediate to high.

7.12.28 However, use of any of the sites for Park & Ride would only be likely to have a significant impact on groundwater quality in the event of a major hydrocarbon spillage such as might occur following a major vehicle collision on site. As speeds within the sites will be low and the number of heavier vehicles limited the risk of such a collision is not high.

7.12.29 Depending on previous site use, particularly at Site 6B there may be some level of land contamination present on site which could pose a risk to groundwater if disturbed. If a decision is taken to proceed at this site then a site investigation is considered a likely requirement to determine necessary mitigation measures.

7.12.30 Overall impacts on geology are considered to be negligible provided appropriate mitigation measures are put into place.

Biodiversity and habitats

7.12.31 **Introduction:** The sites were surveyed on behalf of CB by SKM (Sinclair Knight Merz) is Spring 2010 in accordance with standard Phase 1 habitat survey methodology[4]. The survey area was defined as the potential Park & Ride site and associated access roads (where identified) plus an ecological buffer zone of 200m. During the survey, terrestrial, riparian and aquatic habitats were identified. The Phase 1 survey method was extended through the additional recording of specific features indicating the presence, or likely presence, of protected species or other species of nature conservation significance.

7.12.32 The Extended Phase 1 method enables a suitably experienced ecologist to obtain sufficient understanding of the ecology of a site in order to either confirm the conservation significance of the site, and assess the potential for impacts on habitats/species likely to

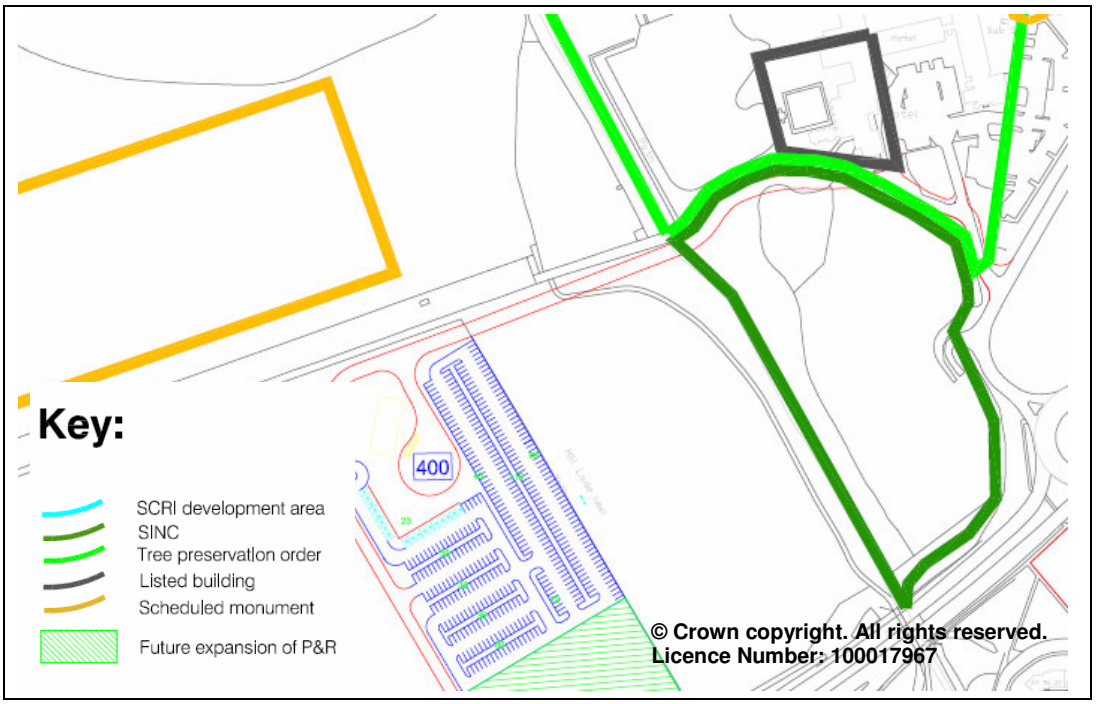
[4] Joint Nature Conservation Committee, 2003. Handbook for Phase 1 Habitat Survey: A Technique for Environmental Audit, revised reprint.

represent a material consideration in planning terms, or ascertain whether further ecological surveys will be required before such confirmation and assessment can be made.

7.12.33 It should be noted that a Phase 1 habitat survey is designed to provide a quick, transparent assessment of the habitats present in a survey area. Because of the dynamic nature of plant communities, a large number of plant species were likely to have been dormant at the time of survey.

7.12.34 A sketch map of Options 3, 3i and 3ii where there are several localised environmental constraints is shown in Figure 7.10.

Figure 7.10: Environmental constraints for Options 3, 3i and 3ii



7.12.35 **Options 3, 3i and 3ii – Habitats:** The site is situated in the western part of an area of former farmland that has been planted with trees within the last 15 years. North of the site is a public footpath set within a 25m wide section of woodland. It crosses a disused mill lade over a stone bridge and continues east to the Landmark Hotel. North of this woodland is arable farmland. East of the site is a field of improved grassland, approximately 100m wide, east of which flows the disused mill lade, which is fed by Fowlis Burn and Lochee Burn. Broadleaved woodland occurs adjacent to the mill lade. Further east is a wetland. South of the site is a narrow hedgerow, which separates the site from the A90. Scrub and amenity grassland border the road infrastructure south of the site. South of this is farmland and suburban residential and light industrial areas.

7.12.36 The plantation on site comprises pedunculate oak (*Quercus robur*), silver birch (*Betula pendula*), ash (*Fraxinus excelsior*), hazel (*Corylus avellana*), a whitebeam species (likely to be rowan, *Sorbus aucuparia*) and a species of cherry (likely to be wild cherry, *Prunus avium*). These have been planted in linear rows in discrete sections. The ground flora is generally sparse, and this is in large part due to an abundant European rabbit (*Oryctolagus cuniculus*) population. The southern one third of the site includes grass-dominated areas, comprising mainly bent grasses (*Agrostis spp*), grazed short by rabbits. The hedgerow to the south of

the site includes a section dominated by alder (*Alnus glutinosa*). A band of native shrubs has been planted north of the hedgerow.

7.12.37 The narrow woodland north of the site is dominated by the public footpath. At the time of survey, a high degree of bare ground was present. The trees are generally mature and include pedunculate oak, sycamore (*Acer pseudoplatanus*), hawthorn (*Crataegus monogyna*) and elder (*Sambucus nigra*).

7.12.38 The mill lade has stone walls to the north of the study area, but towards its southern end, before it crosses under the A90, the western bank appears to have no stone wall but slopes gently down to the water's edge. Here well-developed herbaceous vegetation occurs, but trees and shrubs have been planted along the western bank within the last 5 years. At the time of survey, the water was clear and ranged in depth from around 20cm to around 100cm. The watercourse was 3-5m wide. Little aquatic vegetation was recorded. The eastern bank comprises mature woodland habitat and includes mature alder, willows (*Salix spp*) and pedunculate oak. Common ivy (*Hedera helix*) is very abundant both on the woodland floor and on mature trees. Rhododendron (*Rhododendron ponticum*), box (*Buxus sempervirens*) and a species of lime (*Tilia sp.*) are also common and may have been planted. The ground layer includes ramsons (*Allium ursinum*) and lesser celandine (*Ranunculus ficaria*). Daffodil (*Narcissus spp*) and snowdrop (*Galanthus nivalis*) are present in large numbers and likely the results of past plantings.

7.12.39 The wetland east of the mill lade and west of the Landmark Hotel comprised a range of vegetation types, notably common reed (*Phragmites australis*) swamp, alder carr and soft-rush (*Juncus effusus*) swamp. The cover of alder appears to have expanded considerably within the last 10 years as a large number of saplings and young trees are present.

7.12.40 **Options 3, 3i and 3ii – Fauna:** No protected species were seen during the survey either on site or within the wider area. However, evidence of badger (*Meles meles*) was found in the woodland strip north of the site, where a 'snuffle hole' was observed together with a series of burrows. These burrows do not appear to be in constant use. Therefore, if the burrows constitute a badger sett, this is likely to be an outlier sett. Fox (*Vulpes vulpes*) scats were also seen in several places on and off site. A large number of birds were heard singing in the woodland areas, including several common species. A pair of mistle thrush (*Turdus viscivorus*) was seen building a nest on site.

7.12.41 **Options 3, 3i and 3ii – Evaluation:** There was no evidence of protected or notable habitats or species on Site 3 itself. However, wet woodland with abundant alder is a Tayside Biodiversity Action Plant (BAP) habitat [5] and the woodland east of the Mill Lade is likely to qualify.

7.12.42 Evidence was found of badger in the woodland strip north of the site. Badgers are offered full protection under UK law (see Appendix I) and a licence from Scottish Natural Heritage (SNH) may be to be required for any tree felling within 25 metres of a badger sett.

7.12.43 Similarly, although the proposed development site offers no opportunities for roosting bats, it is possible that bats forage along the edges of the plantation woodland. Native bats are protected under UK law (Appendix I). The Mill Lade and the associated woodland and wetland east of the site appear to offer suitable habitat for both roosting and foraging bats. Based on these findings, it is recommended that bat surveys are carried out to identify potential bat roosts and bat commuting routes near any area scheduled for development.

7.12.44 No evidence was found of water vole (*Arvicola amphibius*) on the Mill Lade. Where the banks are reinforced with stone walls, the watercourse is unlikely to be suitable for water

[5] http://www.taysidebiodiversity.co.uk/Section3_Consultation.html

voles, which require earthen banks for excavating their burrows in. No recent records of water vole are listed on the NBN Gateway[6], and it is therefore unlikely that water voles would be a constraint in the proposals. Similarly, no signs were found of otter (*Lutra lutra*) on the Mill Lade. However, the NBN Gateway lists recent records of otter in the general area, and it is possible that otters occasionally move along the Mill Lade. Otters are afforded full protection under UK law (Appendix I). If any works are scheduled for the area by the Mill Lade, it is recommended that an otter survey is carried out.

7.12.45 Breeding birds are likely to use both the proposed development site and the adjacent areas. All native breeding birds are protected under UK law (Appendix I). Any site clearance and construction works should therefore be carried out outside of the breeding season (normally between March and August, inclusive). Where this is not possible, or where nesting birds are encountered outside of this time frame, advice on mitigation should be sought from a qualified professional, and such advice should be followed.

7.12.46 In addition the access to Site 3 from the Swallow Roundabout required for Options 3, 3i and 3ii must negotiate the boundary between the Swallow Tree Preservation Order Area (TPO) and the Swallow Wetland Site of Importance for Nature Conservation (SINC). Under DLP Policy 70 (Semi-Natural Greenspaces Of Local Nature Conservation Importance) "Development proposals must not adversely affect the nature conservation qualities of Sites of Importance for Nature Conservation or Local Nature Reserves. Any development proposals affecting these sites must be accompanied by an ecological or similar assessment that details the likely impacts of the proposal on the conservation interests of the designation, along with proposed mitigation measures."

7.12.47 The Swallow Wetland site is "a diverse and complex swamp and marginal wetland with surrounding grasslands" and is among the more diverse and botanically interesting wetland sites in Dundee[7]. Its most notable features are the reed and sedge swamp both of which habitats are rare in Dundee, as well as marshy grassland. In the absence of any mitigation, there is a risk that the integrity of these habitats and their value to wildlife would be degraded as a result of the proposed development, mainly as a result of altered hydrology and hydrocarbon pollution events. Mitigation measures would need to ensure that all surface water draining from the car park into the wetland is free of pollutants, for example by filtering through a SUDS system. If this cannot be guaranteed, the car park would need to drain away from the SINC wetland. However, as this would reduce the water input to the SINC, a compensatory water input might be required.

7.12.48 Further work will be required to examine and mitigate the habitat and biodiversity impacts in this area to the standard demanded by the local plan. However, it is noted that Site 3 is land already allocated to business development. If this were to proceed there will be a requirement for access onto the A90 and options other than via the SINC are limited.

7.12.49 **Option 5 – Habitats:** The site is currently an agricultural field, and agricultural land abuts the site to the west and north. Northwest and east of the site are mixed woodland plantations, which have been planted within the last 20 years. Further east amenity grassland abuts the A90, and east of the road are light industrial and residential areas. South of the site lies the Landmark Hotel and buildings are present to the southwest too. These areas include a large number of mature ivy-clad trees.

7.12.50 The plantation northwest and east of the site comprises pedunculate oak, ash, a species of whitebeam (likely to be rowan), sycamore, beech, European larch (*Larix decidua*) and Scots pine (*Pinus sylvestris*). These have generally been planted in discrete sections. The ground

[6] http://data.nbn.org.uk/
[7] Appraisal And Evaluation Of Urban Nature Conservation Subject Local Plan 1995, Incorporating Results Of Habitats And Species Survey 2000

flora appears to be sparse or absent due to lack of light, but a power line crosses the plantation east of the site, and here rosebay willowherb (*Chamerion angustifolium*) and elder are locally dominant. A beech hedge has been planted between the plantation and the amenity grassland east of the site.

7.12.51 **Option 5 – Fauna:** No protected species were seen during the survey either on site or within the wider area. A large number of mammal burrows were encountered in the woodland east of the site and in open areas south of the woodland. However, these were all likely to be made by European rabbits, and rabbits were observed during survey. In addition, a number of fox scats were seen. A large number of birds were heard singing in the woodland areas. Skylarks (*Alauda arvensis*) were heard singing in the open farmland.

7.12.52 **Option 5 – Evaluation:** There was no evidence of protected or notable habitats or species on Site 5.

7.12.53 The site and the adjacent plantations offer no opportunities for roosting bats, but it is possible that bats forage along the edges of the plantation woodland. Habitats situated near the Landmark Hotel, south of the site, appear to offer suitable habitat to both roosting and foraging bats. Native bats are protected under UK law (Appendix I). If any tree felling is proposed for these areas as part of the development, it is recommended that bat surveys are carried out to identify potential bat roosts and bat commuting routes.

7.12.54 Similarly, because badgers are known to be present in nearby areas, they may occasionally be present on the site and could establish setts there in the future. Badgers are offered full protection under UK law (Appendix I) and a licence from Scottish Natural Heritage (SNH) may be to be required for any tree felling within 25 metres of a badger sett.

7.12.55 Breeding birds are likely to use both the proposed development site and the adjacent areas. All native breeding birds are afforded protection under UK law (Appendix I). Any site clearance and construction works should therefore be carried out outside of the breeding season (normally between March and August, inclusive). Where this is not possible, or where nesting birds are encountered outside of this time frame, advice on mitigation should be sought from a qualified professional, and such advice should be followed.

7.12.56 **Option 6B – Habitats:** The site comprises pasture, planted woodland and ephemeral vegetation on a former landfill site. At the time of survey, an area west of the site had recently been covered in mulch. Pasture grazed by Highland cattle is present northwest of the site. North of the site is the A85, a railway, and north of this are residential areas. East of the site is Wright Avenue and east of this are warehouses / light industry with landscaping consisting mainly of amenity grassland. Wright Avenue curves around the site and thus binds it to the south as well. Between the road and the airport's runway is a narrow strip of plantation woodland and bramble scrub.

7.12.57 The site comprises a number of discrete sections, which are fenced off but linked by a path system. A hawthorn hedge has been planted along the fence in several sections. Soils appear compacted and include rubble and gravel. The northern half of the site comprises woodland parcels as well as pasture, whereas the southern half of the site shows signs of recent ground disturbance and is dominated by low ephemeral vegetation or taller ruderal vegetation dominated by common nettle (*Urtica dioica*) and thistles (*Cirsium spp.*). The woodlands on site appear to be less than 30 years old and comprise a variety of species, including Scots pine, alder, hawthorn, pedunculate oak, elder, sycamore, poplar (*Populus sp.*) and willows. The ground vegetation was largely absent at the time of survey, and this may be partly due to a large population of European rabbit on site.

7.12.58 **Option 6B – Fauna:** No protected species were seen during the survey either on site or within the wider area. However, evidence of badger was found in the woodland and scrub

south of the site, near the fence to the runway, where a series of burrows was noted. Badger hairs were found at the entrances of two of these. In addition, European rabbits are abundant throughout the area and were observed during survey. A number of fox scats were also found. A large number of birds were heard singing in the woodland areas and skylarks were heard singing in the open fields.

7.12.59 **Option 6B – Evaluation:** There was no evidence of protected or notable habitats or species on the proposed development site. However, evidence was found of badger by the woodland and scrub habitat south of the site. Badgers are offered full protection under UK law (Appendix I) and a licence from Scottish Natural Heritage (SNH) may be to be required for any tree felling within 25 metres of a badger sett.

7.12.60 Breeding birds are likely to use both the proposed development site and the adjacent areas. All native breeding birds are afforded protection under UK law (Appendix I). Any site clearance and construction works should therefore be carried out outside of the breeding season (normally between March and August, inclusive). Where this is not possible, or where nesting birds are encountered outside of this time frame, advice on mitigation should be sought from a qualified professional, and such advice should be followed.

7.12.61 In addition Site 6B is within the Inner Tay Local Nature Reserve (LNR) and under DLP Policy 70 (Semi-Natural Greenspaces Of Local Nature Conservation Importance) "Development proposals must not adversely affect the nature conservation qualities of Sites of Importance for Nature Conservation or Local Nature Reserves. Any development proposals affecting these sites must be accompanied by an ecological or similar assessment that details the likely impacts of the proposal on the conservation interests of the designation, along with proposed mitigation measures." Considerable further work will be required to examine and mitigate the habitat and biodiversity impacts in this area to the standard demanded by the local plan but, given the actual nature of the site, it is likely that it will be possible to overcome the biodiversity / habitat issues.

Landscape and visual amenity

7.12.62 Site 3 is currently open space which is likely to be used for recreation by local residents on a casual basis and is adjacent to arable fields. Hard-standing across this area would impact on the view from the adjacent hotel and Greystane Lodge but screening with trees would likely be effective as a mitigating measure. The Park & Ride would lie in the view from the cursus and barrows southwest of Greystanes lodge which are a Scheduled Monument but as it would be possible to screen the site from this direction and there is already a view of the A90 it is unlikely that this would have a major impact. Views from the A90 would also include the Park & Ride when entering Dundee from the west, but due to the commercial properties and business parks proposed for this area the site would not look wholly out-of-place in the longer term. Overall impacts on landscape are considered negligible with appropriate screening.

7.12.63 Site 5 is located to the west of the A90 Kingsway, north of the Swallow Roundabout. The site is currently being used for arable farming and there is some mixed woodland to the east and south of the site. This area has been designated in the Dundee Local Plan as part of the Linlathen Economic Development Site. The existing woodland along the north side of the Kingsway would largely obscure the view from that direction with only the Landmark Hotel and associated buildings requiring specific screening in the absence of the proposed business development. If / when the proposed business development goes ahead the site will not look out of place in any case. Overall impacts on landscape are considered negligible with appropriate screening.

7.12.64 Site 6B is currently covered by derelict scrubland. There is only one immediately adjacent property with a view of the site at present; the factory east of Wright Avenue. The view is not

noticeably attractive and the site could easily be screened from this direction. Properties higher up the hill above the site will have a view of it and views from this direction will be harder to screen but given the adjacent factory it is unlikely that there will be a significant detrimental impact. Overall impacts on landscape are considered negligible with appropriate screening.

Agriculture and soils

7.12.65 The more easterly part of Site 3 and Site 6B are not currently being used for agriculture in any formal fashion. The western part of Site 3 is being used to raise young trees and Site 5 is an arable area. Sites 3 and 5 are already zoned for business development and so though there will clearly be a loss of land associated with the development of Park & Ride this would also be the case for the business development. There is no current or proposed agricultural use of Site 6B. Overall there is not likely to be any significant loss of high grade agricultural land. In addition there is no risk of severance of agricultural land. Depending on previous site use, particularly at Site 6B there may be some level of land contamination present on site and a site investigation is considered a likely requirement to determine necessary mitigation measures.

Cultural heritage

7.12.66 The western part of the Landmark Hotel is a listed building (see Figure 7.1). The cursus and barrows southwest of Greystane Lodge and the Paddock Standing Stone just east of the Landmark Hotel are Scheduled Monuments. There is a disused Mill Lade adjacent to Site 3

7.12.67 The impact on the listed part of the Landmark Hotel can be minimised through an appropriate choice of route for the access road. In addition, as the Paddock Stone is already surrounded by hotel buildings and an electricity substation it is not considered that any of the proposed sites would have any further impact. Impacts on the view from the cursus and barrows southwest of Greystanes Lodge have already been discussed in 7.12.62 and it is considered that appropriate screening could be provided were Site 3 to be developed. Development at Site 5 would be screened by the existing hotel buildings and in any case, it is likely that there are few visitors to this site as signs of the monument at ground surface level are scarce. It does not appear that the disused Mill Lade is of much cultural significance as the associated buildings (the onetime Bullionfield Paperworks) were removed to make way for the housing around Alistair Souter Crescent.

7.12.68 Overall, with appropriate screening of the view from the cursus and barrows southwest of Greystanes Lodge impacts on cultural heritage are considered to be negligible.

Environmental impact of overnight lorry parking

7.12.69 Overnight lorry parking would increase the total noise deriving from the site but given that the total number of lorries would be small and they would arrive after other vehicles had left and leave, for the most part, before other vehicles started to arrive in any number it is likely that this impact would be insignificant. In addition there might be very small increases in NO_2 and PM_{10} emissions but given the considerable distance between expected emissions and the national targets this is unlikely to result in complications. There would not be any anticipated impact on any other aspect of the environmental assessment.

7.13 Safety

7.13.1 There are two aspects of safety which must be considered in detail under STAG Part 2 appraisal. These are accidents and security.

Accidents

7.13.2 Changes in the number and / or severity of accidents are an important consideration. There are standard methodologies for calculating the number of accidents expected, their types and the severity of any casualties. These are based on the overall volume of traffic measured in vehicle kilometres.

7.13.3 On the assumption that the vast majority of site users previously made the whole trip by car and assuming additionally that there is no suppressed demand for car travel amongst those in the peripheral areas of Dundee which will be released by the Park & Ride then there should be a reduction of around 400 vehicle trips a day over the Do Minimum case.

7.13.4 For Site 3 / 5 these trips will be around 7.5km long while for Site 6B they will be around 5.2km long. This will result in a reduction in vehicle kilometres of 3000 at Sites 3/5 or 2080 at Site 6B.

7.13.5 The STAG guidance calls for the use of the methodology laid out in the NESA manual. Assuming that traffic uses Riverside Avenue and Riverside Drive the most appropriate NESA road category is number 2 (Urban – single 7.3m). On this road class in 2000 there were 0.844 personal injury accidents per million vehicle kilometres (using the rates for combined links and junctions. Applying the appropriate accident rate change coefficients and discounting over 60 years gives:

- Site 3/5
  - accidents prevented = 0.11
  - benefit (2002 prices discounted to 2002) = £2,546
- Site 6B
  - accidents prevented = 0.08
  - benefit (2002 prices discounted to 2002) = £1,765

Security

7.13.6 Security considerations are related to the personal security of travellers and their property, including pedestrians and cyclists as well as public transport and car users. Although car users are likely to feel more secure while they are in their cars than out of them the security on offer at a Park & Ride site may well be an improvement on that offered in a city centre car park or urban back street. On a well designed and laid out site pedestrians, cyclists and public transport users are all likely to experience gains in perceived security and overall it is considered that, so long as best practice is adhered to in site design there should be no measurable impact on security in comparison to the Do Minimum case for any of the five options.

7.14 Economy

Transport economic efficiency (TEE)

7.14.2 TEE analysis has been undertaken using the Department for Transport's standard software package, TUBA, using matrices output from the central patronage forecast from PRIDE.

7.14.3 There are five groups of users who may be expected to suffer costs and / or derive benefits as a result of the implementation of each option. These are:

1. users whose travel patterns do not change but who enjoy time savings and / or other benefits;
2. diverting users, who switch from other routes because of changes in relative (generalised) costs;

3. diverting users who switch mode in response to changes in relative (generalised) costs;
4. generated users, whose use was previously frustrated by, for example, traffic conditions on the option, route or service; and,
5. redistributed users who may change their origin or destination in response to transport changes (for example, finding employment elsewhere).

7.14.4 At present the appraisal process directly addresses the costs and benefits to diverting users in Group 3 provided their previous mode was car. Due to the nature of the road network, bus service and settlement pattern around Dundee it is considered that the numbers in Groups 2, 4 and 5 are negligible.

7.14.5 Costs and benefits for users in Group 1 (non-user benefits) are anticipated and these are discussed in Section 7.14.16 onwards.

Hybrid bus service

7.14.6 For the purposes of the primary TEE appraisal it has been assumed that all sites will be served using a hybrid service with the local authority subsidising additional buses to increase service frequencies.

7.14.7 The hybrid service results in increased Park & Ride bus journey times from Sites 3 and 5, as buses operate via Perth Road. For this option, forecast demands at Sites 3, 3i, 3ii and 5 are based on those Table 7.11. Demand at Site 6B is as given in Table 7.5.

7.14.8 It is assumed that 10% of those travelling in the morning peak and 25% of those travelling in the interpeak are travelling under the concessionary fares scheme and TUBA outputs for user charges and private sector grant / subsidy payments have been adjusted accordingly.

7.14.9 Central government concessionary fare costs have not been specifically allocated to this project as the national bus travel concession scheme has a capped level of funding that has been allocated nationally.

7.14.10 Due to a number of factors it is anticipate that there will be no loss of parking revenue resulting from the scheme. Several central Dundee car parks are to close for redevelopment. These include the Discovery / Olympia (200 spaces), Yeaman's Shore (120 spaces), Earl Grey Place (95 spaces) and Commercial St (110 spaces). In addition, the major Park & Ride market is commuters who park throughout the day. A key aim of the scheme is to remove this long stay parking from the city centre, providing more space for those shopping or on business in the city centre. Consequently, there are higher levels of parking turnover and revenue, in remaining city centre car parks, as a result of the project.

7.14.11 Finally it is assumed that the ratio of local authority to privately controlled parking is 63:37. The detailed derivation of scheme costs is outlined in Appendix C.

7.14.12 The results of the initial TUBA analysis are shown in Table 7.18, in 2002 prices, discounted to 2002. Benefit to cost ratios are as follows:

- Site 3/ 5 0.3
- Site 3i 1.2
- Site 3ii 1.0
- Site 6B 0.8

7.14.13 Consumer benefits, excluding non-user benefits are low because, in almost all cases, Park & Ride journeys take longer than the corresponding car journeys. Additionally, the extra

cost incurred is not enough to offset the money saved on the difference between the city centre parking charge and the bus fare.

7.14.14 However, those users who choose to use the site must, clearly, derive some personal benefit which cannot be captured by this analysis. Some examples include:

- user dislikes driving in heavy traffic;
- user dislikes parking in congested conditions;
- user has a low value of time;
- user has a high perception of walking time; or
- user is new to the area and is concerned about route finding.

Table 7.18: TEE results - hybrid bus service (2002 prices, £000s)

Item		Option			
		3 / 5	3i	3ii	6B
Consumer benefits (£000s)	travel time	-£5,018	-£4,983	-£4,961	-£4,191
	vehicle operating costs	£137	£168	£210	£337
	user charges	£4,253	£4,504	£4,677	£6,128
	non-user benefits	£187	£8,944	£8,944	-£299
	TOTAL	**-£441**	**£8,633**	**£8,870**	**£1,975**
Business benefits (£000s) **TOTAL**			**£0**	**£0**	**£0**
Private sector provider impact (£000s)	parking charges	£0	£0	£0	£0
	bus fare revenue AM	£0	£0	£0	£0
	bus fare revenue PM	£0	£0	£0	£0
	conc. fare payments	£0	£0	£0	£0
	total revenue	£0	£0	£0	£0
	bus operating costs	-£3,998	-£3,998	-£3,998	-£3,115
	investment costs	£0	£0	£0	£0
	grant / subsidy payments	£3,998	£3,998	£3,998	£3,115
	TOTAL	**£0**	**£0**	**£0**	**£0**
Developer contributions (£000s) **TOTAL**			**£0**	**£0**	**£0**
Local gov revenue (£000's)	bus fare revenue AM	£1,202	£1,273	£1,515	£1,689
	bus fare revenue PM	£1,476	£1,565	£1,508	£2,218
	concessionary fare	£626	£663	£671	£927
	TOTAL	**£3,304**	**£3,500**	**£3,693**	**£4,834**
Local / central government costs (£000s)	revenue (loss of parking revenue)	£0	£0	£0	£0
	P&R site operating costs	£2,218	£2,444	£3,198	£2,016
	investment costs	£2,794	£3,198	£4,545	£2,267
	developer contributions	£0	£0	£0	£0
	grant / subsidy payments	£3,998	£3,998	£3,998	£3,115
	indirect tax revenues	£879	£937	£1,090	£1,314
	TOTAL	**£9,889**	**£10,577**	**£12,831**	**£8,712**
Carbon benefits (£000s)		£89	£93	£119	£106
NPV costs (£000s)		**£9,889**	**£10,577**	**£12,831**	**£8,712**
NPV benefits (£000s)		**£2,952**	**£12,226**	**£12,682**	**£6,915**
Net present value (NPV) (£000s)		**-£6,937**	**£1,649**	**-£149**	**-£1,797**
Benefit to cost ratio (BCR)		**0.3**	**1.2**	**1.0**	**0.8**

7.14.15 Therefore, although the economic analysis indicates that, at an aggregate level, users should not derive a benefit from site, it must be the case that, as individuals, they do derive benefit even if this cannot be fully assessed in economic terms.

7.14.16 The removal of traffic from the Dundee urban network and / or Swallow Roundabout would reduce travel times for other vehicles on the network. These effects have been assessed using the Dundee City Centre and Swallow Roundabout Paramics models. Average time savings on key routes are:

- A90 eastbound approach to the Swallow Roundabout – 57 seconds
- A90 westbound approach to the Swallow Roundabout – 126 seconds
- Riverside Avenue / Riverside Drive approach to Dundee city centre - 5 seconds

7.14.17 The above saving have been assumed to accrue in the morning peak only.

7.14.18 The reduced delays at the Swallow Roundabout mean that the non-user benefits of Options 3i and 3ii are significantly higher than those for Options 3, 5 and 6B.

7.14.19 Non-user benefits for Option 6B are further impacted as a new roundabout would be required on Riverside Avenue to facilitate access to the site. Vehicle speeds for all vehicles on Riverside Aveneue would be reduced as a result.

Commercial / dedicated bus services

7.14.20 The results of TEE analyses for fully commercial and fully dedicated bus services are shown in Table 7.19 and Table 7.20.

7.14.21 Demand at Sites 3 and 5 is based on buses operating via Riverside Avenue / Riverside Drive, as given in Table 7.5

7.14.22 Commercial services result in BCR values of between 0.6 and 1.0 at Sites 3 / 5 and 6B, and 1.4 - 1.7 at Sites 3i and 3ii. Nevertheless, these may only be realised if additional bus services are provided for other reasons – eg. to serve developments in the Western Gateway.

Table 7.19: TEE results for a commercial bus service – Sites 3, 3i, 3ii and 5 operate as dedicated until year 10; Site 6B operates as hybrid until year 10 (2002 prices, £000s)

Item		Option			
		3 / 5	3i	3ii	6B
Consumer benefits (£000s)	travel time	-£4,655	-£4,526	-£4,373	-£4,191
	vehicle operating costs	£169	£203	£241	£337
	user charges	£5,398	£5,699	£5,909	£6,128
	non-user benefits	£187	£10,456	£10,456	-£299
	TOTAL	**£1,099**	**£11,832**	**£12,233**	**£1,975**
Business benefits (£000s) **TOTAL**			**£0**	**£0**	**£0**
Private sector provider impact (£000s)	parking charges	£0	£0	£0	£0
	bus fare revenue AM	£1,068	£1,124	£1,286	£1,162
	bus fare revenue PM	£1,322	£1,404	£1,404	£1,565
	conc. fare payments	£559	£593	£611	£651
	total revenue	£2,950	£3,121	£3,301	£3,378
	bus operating costs	-£2,709	-£2,709	-£2,709	-£1,019
	investment costs	£0	£0	£0	£0
	grant / subsidy payments	£2,709	£2,709	£2,709	£1,019
	TOTAL	**£2,950**	**£3,121**	**£3,301**	**£3,378**
Developer contributions (£000s) **TOTAL**			**£0**	**£0**	**£0**
Local gov revenue (£000's)	bus fare revenue AM	£482	£547	£551	£527
	bus fare revenue PM	£554	£557	£589	£653
	concessionary fare	£238	£247	£257	£276
	TOTAL	**£1,275**	**£1,351**	**£1,397**	**£1,455**
Local / central government costs (£000s)	revenue (loss of parking revenue)	£0	£0	£0	£0
	P&R site operating costs	£2,218	£2,444	£3,198	£2,016
	investment costs	£2,794	£3,198	£4,545	£2,267
	developer contributions	£0	£0	£0	£0
	grant / subsidy payments	£2,709	£2,709	£2,709	£1,019
	indirect tax revenue	£1,107	£1,178	£1,356	£1,314
	TOTAL	**£8,828**	**£9,529**	**£11,808**	**£6,616**
Carbon benefits (£000s)		£89	£93	£119	£106
NPV costs (£000s)		**£8,828**	**£9,529**	**£11,808**	**£6,616**
NPV benefits (£000s)		**£5,413**	**£16,397**	**£17,050**	**£6,914**
Net present value (NPV) (£000s)		**-£3,415**	**£6,868**	**£5,242**	**£298**
Benefit to cost ratio (BCR)		**0.6**	**1.7**	**1.4**	**1.0**

7.14.23 Fully dedicated services decrease BCR values as a result of increased bus operating costs. BCR's are in a range between 0.4 and 0.6 at Sites 3 / 5 and 6B, and 1.0 an 1.1 at Sites 3i and 3ii.

Table 7.20: TEE results for a fully dedicated bus service (2002 prices, £000s)

Item		Option			
		3 / 5	3i	3ii	6B
Consumer benefits (£000s)	travel time	-£4,655	-£4,526	-£4,373	-£4,191
	vehicle operating costs	£169	£203	£241	£337
	user charges	£5,398	£5,706	£5,909	£6,128
	non-user benefits	£187	£10,456	£10,456	-£299
	TOTAL	**£1,099**	**£11,839**	**£12,233**	**£1,975**
Business benefits (£000s) **TOTAL**			**£0**	**£0**	**£0**
Private sector provider impact (£000s)	parking charges	£0	£0	£0	£0
	bus fare revenue AM	£0	£0	£0	£0
	bus fare revenue PM	£0	£0	£0	£0
	conc. fare payments	£0	£0	£0	£0
	total revenue	£0	£0	£0	£0
	bus operating costs	-£8,284	-£8,284	-£8,284	-£6,819
	investment costs	£0	£0	£0	£0
	grant / subsidy payments	£8,284	£8,284	£8,284	£6,819
	TOTAL	**£0**	**£0**	**£0**	**£0**
Developer contributions (£000s) **TOTAL**			**£0**	**£0**	**£0**
Local gov revenue (£000's)	bus fare revenue AM	£1,551	£1,634	£1,837	£1,689
	bus fare revenue PM	£1,877	£1,993	£1,993	£2,218
	concessionary fare	£798	£846	£868	£927
	TOTAL	**£4,225**	**£4,472**	**£4,698**	**£4,834**
Local / central government costs (£000s)	revenue (loss of parking revenue)	£0	£0	£0	£0
	P&R site operating costs	£2,218	£2,444	£3,198	£2,016
	investment costs	£2,794	£3,198	£4,545	£2,267
	developer contributions	£0	£0	£0	£0
	grant / subsidy payments	£8,284	£8,284	£8,284	£6,819
	indirect tax revenues	£1,107	£1,178	£1,356	£1,314
	TOTAL	**£14,403**	**£15,104**	**£17,383**	**£12,416**
Carbon benefits (£000s)		£89	£93	£119	£106
NPV costs (£000s)		**£14,403**	**£15,104**	**£17,383**	**£12,416**
NPV benefits (£000s)		**£5,413**	**£16,404**	**£17,050**	**£6,915**
Net present value (NPV) (£000s)		**-£8,990**	**£1,300**	**-£333**	**-£5,501**
Benefit to cost ratio (BCR)		**0.4**	**1.1**	**1.0**	**0.6**

Public transport non-user benefits

7.14.24 Park & Ride may have both positive and negative non-user benefits depending on the circumstance. For Options 3, 3i, 3ii and 5 the buses expected to serve them will be extensions of existing routes; consequently, there would be no disbenefit to existing users. Indeed, bus passengers on the remainder of the route may gain from frequency increases. These impacts are included under Community Accessibility and are not assessed here. At Site 6B will buses enter the site at an intermediate stage on their route and so there will be some delay to individual bus journey times. The majority of those travelling past the site will be travelling between the city centre and Ninewells Hospital but, as there are more direct routes along Perth Road, total numbers are likely to be small. Even if existing users do incur some delay this should be more than balanced by any frequency increases.

Overnight lorry parking

7.14.25 If the decision is taken to allow overnight lorry parking at the site then this will increase both the construction cost for central government and the maintenance cost for local government. The additional construction costs would be approximately £450,000.

Wider economic benefits (WEBS)

7.14.26 Wider economic benefits are often important in the assessment of transport schemes and are made up from four key contributions as listed below.

- WB1 Agglomeration economies
- WB2 Increased competition as a result of better transport
- WB3 Increased output in imperfectly competitive markets
- WB4 Wider benefits arising from improved labour supply

7.14.27 WB1 – agglomeration economies describe the productivity benefits which some firms derive due to being located close to other firms either because this facilitates knowledge sharing or increases access to suppliers and labour markets. Firm's access to markets is assessed by calculating a figure called the 'effective density'.

7.14.28 In established agglomerations with mature transport infrastructures it is difficult to generate changes in the overall cost of travel significant enough to have any measurable effect on effective density. Given this and the small scale of the options being assessed here a full assessment of WB1 has not been undertaken and these effects are assumed to be negligible for all of the options being assessed.

7.14.29 The assessment of WB2 – increased competition as a result of better transport is considered by the Department for Transport to be theoretically possible but their current position is "that there is little evidence to be found on the relationship between transport and competition and on the basis of that available, the DfT does not expect that there will be significant wider benefits owing to increased competition". Transport Scotland consider that geographic factors in Scotland may mean that this is not the case, in some areas at least, and are progressing research which may allow such effects to be calculated. As this research has yet to establish a methodology for calculation of WB2 it is officially considered to be neutral.

7.14.30 WB3 – increased output in imperfectly competitive markets is assessed according to the formula below.

$$WB = (BTS + RG)V$$

where BTS = business time saving
RG = reliability gains
V = an uplift factor

7.14.31 As the options being assessed will have only a small impact on overall traffic flows and Park & Ride use in the context of business travel, excluding commuting, is rare it is not certain that there would be any significant time or reliability gains for businesses. At any rate such effects will be negligible in comparison to the directly assessed economic impacts of all of the options being assessed.

7.14.32 There are three strands to the calculation of WB4 – wider benefits arising from improved labour supply:

- WB4a: More people choosing to work as a result of commuting time savings (because one of the costs of working – commuting costs – has fallen)

- WB4b: some people choosing to work longer hours (because they spend less time commuting)
- WB4c: relocation of jobs to higher-productive areas (because better transport makes the area more attractive to firms and workers).

7.14.33 The proposals are unlikely to have any measureable impact on commuting time and so on WB4b. Park & Ride trips take longer than their private transport equivalents and, due to the need to interchange, would generally be expected to be roughly equivalent to any public transport equivalents in this case. It is therefore unlikely that there will be any significant increase in the length of the day worked by site users, let alone amongst the entire working population of Dundee. In addition the options being appraised are likely to be too small to have any measureable impact on WB4c.

7.14.34 It is conceivable that a very small number of people from the rural areas outwith Dundee will be able to seek employment when they could not previously have done so. While this will obviously benefit the individuals concerned given the overall population of Dundee and current rate of unemployment it is not likely that there will be any significant impact on businesses or the wider economy and overall impacts on WB4 are considered to be negligible for all of the options being assessed.

Economic activity and location impacts (EALI)

7.14.35 Economic activity and location impacts (EALI) assess the impact of an option on the national, regional or local economy and / or employment level.

7.14.36 At a national or regional level the options being appraised are too small to have any measureable impact. Even at the local level it would be anticipated that users will be travelling between a range of origins and destinations and so the net impact on any particular location will be immeasurably small. Around 10,000 vehicles pass through the Swallow Roundabout eastbound between 07:00 and 12:00 daily and the proportion of these attracted to Park & Ride is, at best, around 2%. While changes on the immediate approach roads associated with any of the options will be clear it is unlikely that any effects will be identifiable at any greater distance.

7.14.37 In addition the scale of the change to the overall transport system is not considered sufficient to have any significant distributional impacts and finally as the options provide an additional, rather than a replacement option, no one group stands to be disadvantaged.

7.14.38 Overall, full EALI appraisal is not considered necessary for any of the five options being appraised.

7.15 Integration

Transport integration

7.15.2 Well integrated transport aids accessibility by connecting people to opportunities and goods to markets with the minimum inconvenience. Many of the aspects of transport integration are already captured by the economic analysis and those which remain for assessment here fall into two groups.

7.15.3 **Services and ticketing:** This analysis has been conduced on the basis of bus services running every 10 to 15 minutes. Typically, users will wait between 5 and 7.5 minutes for such services resulting in more or less ‘seamless’ interchange. In addition ticket purchase procedures will be similar to those in use locally and most users will be familiar with them. Clearly those who chose to use the Park & Ride services provided do not see the

inconvenience of changing mode and buying a ticket as a significant barrier to their journey and overall impacts on services and ticketing are considered to be negligible for all of the options being assessed.

7.15.4 **Infrastructure and information:** On-site infrastructure is likely to be similar to that currently available at Perth's Broxden site which has seating, shelters, bicycle parking, and information displays. In practice Park & Ride users, for the most part, like to wait in their own cars and so do not need extensive facilities. Infrastructure and information will be provided at a good standard so that users are encouraged but overall it is not anticipated that any of the options proposed will offer significant benefits or disbenefits in comparison to the Do Minimum case.

7.15.5 **Long distance interchange:** An additional aspect of transport integration which may not have been captured by the economic analysis in this case is the potential for interchange between long distance buses and cars or local buses. In order to fully establish the demand for interchange at this site a full LATIS model run would be required and this is beyond the scope of this study. However, Citylink run Glasgow – Perth – Dundee – Aberdeen and Edinburgh – Perth – Dundee – Aberdeen services both of which pass the sites. Though these services also serve Dundee bus station those travelling to / from west Dundee might find a western interchange point more convenient.

7.15.6 There is the potential for long distance interchange at the Park & Ride site, although given the modest number of passengers involved, this aspect is not considered to require detailed assessment at this stage. Interchange could help to achieve mode shift for longer distance trips and this potential will require investigation with long distance bus operators.

7.15.7 **Park & Choose:** Though it is difficult to estimate precise numbers or benefits all of the proposed sites will offer opportunities for Park & Choose with users continuing their journeys on foot, by bicycle or in another car. From Site 3 pedestrian / cycle access to Dundee could avoid the Swallow Roundabout by using the small existing A90 underpass adjacent to the Mill Lade (possibly with some upgrading). From here there is ready access to the dedicated cycle route along Dundee Waterfront. From Site 5 a dedicated cycle / pedestrian route across the Kingsway would be required to allow users to join the Green Circular Route on Explorer Road. Site 6B is ideally placed to join the routes along Dundee Waterfront. Park & Share offers users the opportunity to reduce their parking costs or to share a vehicle for a long distance trip.

Transport land-use integration

7.15.8 As identified in the Part 1 appraisal, Site 3 lies within an area zoned for business development. This is considered to be compatible with Park & Ride. Any slip road constructed would also fall into this zoned area. Access to the Swallow Roundabout is required to allow buses and cars to enter and exit but must avoid a Site of Importance for Nature Conservation, a listed building and an area covered by a Tree Preservation Order. However, as any business development in this area would also require access to the Swallow Roundabout it is considered possible to negotiate these constraints.

7.15.9 Despite this complication this site does offer the additional possibility that any bus services reaching it could also serve proposed business developments in the Western Gateway area which will offer Dundee residents additional access to employment. In addition this will offer some potential for increased patronage in the opposite direction to the dominant tidal flow which could have a beneficial impact on the economics of the bus service operation in the longer term.

7.15.10 Site 5 also lies within an area zoned for business development and this is considered to be compatible with Park & Ride development. Bus services serving the site could also serve proposed business development in this area as was the case for Site 3.

7.15.11 Site 6B is on a site which may ultimately be adjacent to a relocated Invergowrie Station. The site is identified by the Dundee Local Plan as belonging to an area of Protected Open Space (Policy 66A and 66B) and a Local Nature Reserve which would usually preclude any development. However, there are proposals for a wildlife park at this location which would require an area of parking in any case as would the station itself. In addition increased bus services along this route would provide improve non-car access to the proposed wildlife park, station and, potentially, to the Apollo Way area and Ninewells Hospital, two major employers. In the event of relocation of the station this site could also offer increased opportunities for bus / rail interchange; it could also be used to provide overspill parking for Dundee Airport.

Policy integration

7.15.12 Proposals at both sites are in line with local planning and transport policy, the TACTRAN Park & Ride Strategy, the TACTRAN Regional Transport Strategy, the National Transport Strategy and the Strategic Transport Projects Review.

7.15.13 By definition Park & Ride use requires interchange which may be impractical for some disabled users. However as these users retain the option not to use the Park & Ride they do not incur any disbenefit. For those users whose disability does not prevent the use of Park & Ride sites there may be a degree of benefit as well designed and laid out sites with designated disabled parking and modern accessible buses increase the options open to these users. Therefore development at any of the proposed sites is compatible with government policy in this area.

7.15.14 Provided noise pollution or local air quality issues are minimised, Park & Ride sites offer positive health benefits. In addition, users who take up the opportunity to Park & Walk or Park & Cycle are likely to gain health benefits. Overall development at any of the proposed sites would be entirely compatible with government health policies.

7.15.15 It is also government policy to encourage sustainable development and increase liveability in rural areas, such as the area between Perth and Dundee. An important aspect of this is access to employment and services which may not be available in these areas. These proposals increase the options open to those living in these areas and so are in line with government policy on rural affairs.

7.15.16 The proposals increase the opportunities available to some members of socially excluded groups providing a low cost option for travel into Dundee for those outwith the city and increased bus service frequencies for some of those within the city.

7.15.17 Overall, all of the options proposed are compatible with government policy.

7.16 Accessibility and social inclusion

7.16.1 Accessibility is a concept which seeks to encapsulate the access people and businesses have to goods, services, people and opportunities. The bulk of these effects are captured by the economic analysis as, by definition, those who use the service are using it for access. However, there are two additional aspects of accessibility which must be considered and these are discussed below.

Community accessibility

7.16.2 Changes in community accessibility derive from changes in public transport network coverage and from changes in local accessibility – the opportunities to walk or cycle to services.

7.16.3 Development at all three sites is anticipated to increase the use of existing bus services and is expected to slightly increase service frequencies. This will benefit all existing users of these routes and this will increase accessibility.

7.16.4 In addition, any increased use of the existing walk and cycle network could help to encourage both its use by local people (who are often reluctant to try cycling for a number of reasons) and further investment in high quality walk and cycle links. This offers potential benefits for Dundee residents, particularly those in the western part of the city.

Comparative accessibility

7.16.5 Comparative accessibility considers the distribution of impacts by people group (gender, age, mobility impairment, income group, car ownership and so on) and the distribution of impacts by geographical area (Community Planning Partnership Areas, Development Areas, Rural Areas, Peri-Urban Areas, Urban Areas, etc).

7.16.6 None of the proposed sites are anticipated to result in discrimination against those of different genders, ages or faiths and provided the sites are constructed to modern standards and the vehicles serving them meet modern requirements there should be no disbenefit to the mobility impaired who will still have the option of making the whole journey by car if this is their preferred option.

7.16.7 A major driver in the use of Park & Ride is the cost of parking and so Park & Ride can provide a lower cost option for those on low incomes. Existing bus users travelling from outside Dundee might lose out if there was a significant shift from longer distance bus to Park & Ride, however, this is considered unlikely. Generally, Park & Ride can be expected to reinforce public transport provision, particularly on major arterial routes to the city centre, improving mobility for those without access to a car.

7.16.8 From the perspective of impacts by area the three proposed sites themselves are not immediately adjacent to significant areas of housing and are unlikely to have any significant immediate impact. There are four Social Inclusion Partnership areas in Dundee, Ardler, Hilltown, Kirkton, Mid Craigie / Linlathen but none is close enough to the proposed sites to be affected. Sites 3 and 5 could have an impact on the Peri-Urban area surrounding Dundee but no more so than the business development which is proposed in the same areas.

Equality impact assessment

7.16.9 None of the proposed sites are expected to have any impact on groups defined on the basis of race, disability, gender, age, sexual orientation and faith and a full equality impact assessment is not required.

7.17 STAG criteria appraisal summary

7.17.1 A summary of the appraisal against STAG criteria for each site is given in Table 7.21.

Table 7.21: Appraisal against STAG criteria

Criteria	Site 3	Site 3i	Site 3ii	Site 5	Site 6B
Environment	✓	✓	✓	✓✓	✓
Safety	✓	✓	✓	✓	✓
Economy	✓	✓✓	✓✓	✓	✓
Integration	✓	✓	✓	✓	✓✓
Accessibility and social inclusion	✓	✓	✓	✓	✓
Total	+5	+6	+6	+6	+6

8 Overall appraisal summary

8.1 Comparison of options

8.1.1 Table 8.1summarises the performance of all of the options against the Study Objectives and STAG and Implementability criteria.

Table 8.1: Overall appraisal summary

Group	Details	3	3i	3ii	5	6B
Study objectives	Improve the public transport accessibility to employment, health, leisure and recreational locations in the west of Dundee and city centre	✓	✓	✓✓	✓	✓✓
	Encourage a shift toward sustainable and healthier modes of transport	✓✓	✓✓	✓✓	✓✓	✓✓✓
	Reduce traffic congestion for longer distance trips in the west of Dundee	✓	✓✓	✓✓	✓	✓
	Contribute to national and local air quality targets and reduce the impact of climate change	✓	✓✓	✓✓	✓	✓✓
	Minimise the impacts of the scheme upon the natural and built environment	✓	✓	✓	✓✓	✓
STAG criteria	Environment	✓	✓	✓	✓✓	✓
	Safety	✓	✓	✓	✓	✓
	Economy	✓	✓✓	✓✓	✓	✓
	Integration	✓	✓	✓	✓	✓✓
	Accessibility and social inclusion	✓	✓	✓	✓	✓
Implementability criteria	Technical feasibility	✓	✓	✓	✓✓✓	✓
	Operation feasibility	✓✓	✓✓	✓✓	✓✓	✓✓
	Affordability	✓✓	✓	0	✓✓	✓✓✓
	Public acceptability	✓	✓	✓	✓	✓

9 Participation and consultation

9.1 RTS consultation

9.1.1 During the creation of the TACTRAN regional transport strategy consultations were undertaken with Local Authorities, wider key stakeholders, Health Boards, the Scottish Government, an expert panel and the wider public.

9.1.2 There was support for Park & Ride from Angus Council, Dundee City Council, Perth & Kinross Council, Stirling Council and HITRANS. Numerous comments were made on the subject of Park & Ride across the various groups and there was strong demonstrated support for the strategy as a whole.

9.2 Stakeholders

9.2.1 Regular meetings have been undertaken with the Steering Group, which includes TACTRAN, Transport Scotland, Dundee City Council and Perth & Kinross Council. These were undertaken to ensure that all issues are fully captured and that the opportunities considered are consistent with each organisation's overall transport strategy and current planning policy. At this stage consultation has focussed on specific issues relating to the three chosen sites and the accesses to them.

9.3 Bus Operators

9.3.1 Local bus operators Travel Dundee and Stagecoach were consulted as to the practicalities involved in serving the various sites.

9.3.2 Travel Dundee felt that site 6B was well served by existing services and that buses to the new Asda site would pass through the Swallow Roundabout and could serve a site in this area. They could envisage a demand for trips to Ninewells Hospital but thought that for trips to central Dundee a Park & Ride scheme would have difficulty in competing with unofficial Park & Ride from supermarket car parks and with free parking within walking distance of the centre. Services serving both a western site and the site at the southern end of the Tay Bridge were not considered feasible.

9.3.3 Stagecoach felt that their service 16 could serve Site 3 or 5 but that limited slack time in this service would mean that high patronages would be required for them to undertake this without subsidy. They could see potential for serving Ninewells and for running services through to the southern Tay bridgehead site. However, they saw bus priority and easy access as key to making sites work.

9.3.4 Overall, both operators were prepared to serve a new site if it was cost effective for them.

9.4 Wider public

9.4.1 Public consultation on the specific sites discussed in this appraisal has not been undertaken, primarily due to the risk of increasing project costs by affecting land prices prematurely. However, public consultation exercises undertaken as part of previous studies, including the development of the TACTRAN Park & Ride Strategy, were supportive of Park & Ride in general.

9.5 Environmental consultation

9.5.1 As part of the Environmental Assessment, consultation was undertaken with Dundee City Council.

10 Cost to government

10.1 Scheme costs

10.1.1 A detailed breakdown of scheme costs is given in Appendix F.

10.2 Investment costs

10.2.1 Investment costs cover the expenditure which will be necessary to construct a site and open it for business. Typically these include four main streams:

- Preparation and administration costs
- Land and property costs
- Construction costs
- Traffic related maintenance costs

10.2.2 In this case there are no property costs but there will be a requirement to purchase land. Land costs vary considerably as markets fluctuate and also with any zoning or development plans which come forward. It is therefore difficult to estimate land costs with any degree of accuracy and, in this case they have been taken as 10% of the calculated capital cost. Capital costs based on the construction of un-manned 400 space sites and are made up from:

- Site clearance (including any necessary regrading works and landscaping);
- Site access and power supply works;
- Car park construction including drainage, surfacing, lining and kerbing;
- Footway and footpath construction including drainage and surfacing;
- Fencing, lighting and CCTV;
- Bus shelters, signage, information displays and lighting;
- Miscellaneous items and contingencies; and,
- Preparation, administration, fees and design costs.

10.2.3 Traffic related management costs have been assumed to be negligible as no option would require significant closure of road space. The exception to this is the planned roundabout required for access to Site 6B.

10.2.4 In 2010 prices the investment required to bring each option to the point of opening (including land and 44% optimism bias) are:

- Option 3 £4,335,944
- Option 3i £4,963,052
- Option 3ii £7,053,409
- Option 5 £4,335,944
- Option 6B £3,776,438

10.3 Operating costs

10.3.1 Site operating costs are £43,320 per annum; the annual cost of maintenance of each site, based on 5% of infrastructure costs, and in 2010 prices, is:

- Option 3 £107,699
- Option 3i £123,275
- Option 3ii £175,196
- Option 5 £107,699
- Option 6B £93,801

10.4 Grants and subsidy payments

10.4.1 Any Park & Ride buses which cannot operate commercially are likely to run as supported services requiring the payment of subsidies. Three patterns of bus service operation have been considered as follows:

- Hybrid service - services run on a mainly commercial basis for Park & Ride and other users with additional buses paid for by the local authority in order to boost service frequencies.
- Commercial service – after the first 10 years services run on a wholly commercial basis for Park & Ride and other users by private operators with no cost to local government.
- Dedicated service – buses are subsidised entirely by the local authority and serve Park & Ride users only.

Table 10.1: Park & Ride operating costs / annual revenue, 2010 prices (400 spaces)

Site	Service	Annual operating cost (bus)	Notes
A90 site 3	commercial	£548,995	First 10 years only
	hybrid	£264,946	
	dedicated	£548,995	
A90 site 3i	commercial	£548,995	First 10 years only
	hybrid	£264,946	
	dedicated	£548,995	
A90 site 3ii	commercial	£548,995	First 10 years only
	hybrid	£264,946	
	dedicated	£548,995	
A90 site 5	commercial	£548,995	First 10 years only
	hybrid	£264,946	
	dedicated	£548,995	
A90 site 6B	commercial	£206,425	First 10 years only
	hybrid	£206,425	
	dedicated	£451,898	

10.4.2 Central government concessionary fare costs have not been specifically allocated to this project as the national bus travel concession scheme has a capped level of funding that has been allocated nationally.

10.5 Total costs

10.5.1 The total costs to government of the various options over the 60 year appraisal period are shown in Table 10.2.

Table 10.2: Total site costs, 2002 prices (all figures are in £000s)

		Option 3	Option 3i	Option 3ii	Option 5	Option 6B
Commercial service	investment	2,794	3,198	4,545	2,794	2,267
	operating	2,218	2,444	3,198	2,218	2,016
	subsidy	2,709	2,709	2,709	2,709	1,019
	TOTAL	**7,721**	**8,351**	**10,452**	**7,721**	**5,302**
Hybrid service	investment	2,794	3,198	4,545	2,794	2,267
	operating	2,218	2,444	3,198	2,218	2,016
	subsidy	3,998	3,998	3,998	3,998	3,115
	TOTAL	**9,010**	**9,640**	**11,741**	**9,010**	**7,398**
Dedicated service	investment	2,794	3,198	4,545	2,794	2,267
	operating	2,218	2,444	3,198	2,218	2,016
	subsidy	8,284	8,284	8,284	8,284	6,819
	TOTAL	**13,296**	**13,926**	**16,027**	**13,296**	**11,102**

10.6 Indirect taxation impacts

10.6.1 Options which substantially promote public transport can lead to reductions in HM Revenue and Customs' indirect tax receipts by shifting expenditure from cars and car fuel, which are heavily taxed, to public transport services on which the indirect tax rate is relatively low. Indirect taxation impacts, over the 60 year period (in 2002 prices) are given below:

- Option 3 £1,087,000
- Option 3i £1,457,000
- Option 3ii £1,677,000
- Option 5 £1,369,000
- Option 6B £1,625,000

10.7 Overnight lorry parking

10.7.1 If the decision is taken to allow and encourage overnight lorry parking at any chosen site this will increase both the investment and site maintenance costs. The anticipated additional investment cost would be approximately £450,000.

11 Risk and uncertainty

11.1.1 STAG requires that all risks and uncertainties associated with an option need to be fully identified and accounted for in the appraisal process. As stated in the HM Treasury Green Book (2003), in appraisals it is always likely there is some difference between what is expected and what actually happens. This is the consequence of biases unwittingly inherent in the appraisal process, and risks and uncertainties that materialise. As a result, it is important to identify and mitigate risks, and make allowances for Optimism Bias.

11.1.2 The aim of taking account of risks, uncertainties, and optimism bias is to obtain the best possible estimates of the costs and benefits of each option.

11.2 Methodology risks

11.2.1 There are a series of risks associated with methodology used in this study in appraising the costs and benefits of each Park & Ride sites and their associated transport interventions. Key risks are as follows:

- There is uncertainty over the emerging Dundee Local Plan. While there is support for Park & Ride to the west of Dundee, no preferred site is currently allocated
- Traffic generation estimates are based on CB's PRIDE software. While values of lambda have been derived from others sites in the TACTRAN area, demand is sensitive to this value
- Demand matrices are based on Transport Scotland's LATIS model. LATIS has derived growth assumptions based on data supplied by local Authorities in 2007 which could over estimate growth and the resulting number of passengers attracted in future development years
- Demand is also sensitive to parking charges in Dundee city centre and available capacity. Future changes to Dundee's parking policy could reduce total demand. Conversely, policies which raise charges or which increase the Controlled Parking Zone area would help support Park & Ride demand
- Values of land are based on 10% of construction costs. The actual cost of land purchase could differ significantly depending on existing and future zoning for development
- While an Environmental Assessment has been undertaken at a strategic level, this does not include a detailed quantification of potential impacts. The cost of the required mitigation measures to enable development at Site 3 may also be significant. Potential flood prevention measures required to limit contaminated runoff from the car park would cost approximately £300,000
- External factors may also impact on Park and Ride demand, including: external economic factors, changes to inflation, fuel prices and changes to the public transport network

11.3 Risk register

11.3.1 It is important at this stage to develop a comprehensive risk register, detailing any identified risks that are likely to affect the delivery and operation of the transport option and present this in the business case. Key risks and the status of each risk are summarised as follows:

Table 11.1: Risk assessment

Risk		Comment
Policy risk	Legislative risk	Changes in legislation increase costs. These may involve changes in procurement options, taxation and concessionary travel schemes
	Policy risk	The risk of policy changes not involving legislation. A key risk is a change in parking policy in Dundee city centre. Lower parking charges or increased supply may impact on Park & Ride demand
Risk on delivery	Construction risk	The risk that the site is not completed on time, to budget or specification. There is a risk of inflation of construction costs and complications / unexpected additional costs during the design process. For these reasons an optimism bias of 44% has been assumed
	Planning risk	The risk that planning permission cannot be obtained or that land costs are greater than anticipated. Risks are mitigated by taking two sites forward for further study – 3i / 3ii and 6B
	Residual value risk	The risk that the residual value of the site is lower than anticipated. No specific residual value has been assumed within costings or the economic appraisal
Risk on operation	Operational risk	Operating costs are higher than forecast or that a service cannot be provided. Site operating costs are conservative and bus operating costs have been benchmarked against other Park & Ride sites in the TACTRAN area. Dedicated, hybrid and commercial services have been appraised providing a range of alternative service scenarios. Site 6B carries a lower risk than other sites appraised. Were bus subsidies to be reduced or withdrawn then the site could still operate, albeit with lower levels of demand. Other sites require a higher level of ongoing subsidy for them to remain operational
	Inflation risk	The risk that actual inflation varies from assumed rates. A value of 2.5% has been assumed in accordance with the Treasury Green Book
	Maintenance risk	The risk that maintenance costs vary from those budgeted. Maintenance costs have been assumed to be 5% of construction costs per annum
Risks on demand and revenue	Demand risk	Actual demand is lower than forecast. Measures may be taken to increase demand, including marketing and promotions. As part of a parking strategy, policies which discourage commuter parking in Dundee city centre, including increased charges and length of stay restrictions, will also encourage increased Park & Ride demand. Site 6B has a lower risk than for other sites. The location has the potential to serve a multi-purpose role. It Ihas the potential to provide car parking for a proposed new wildlife park adjacent to the site, overspill parking for Ninewells Hospital, additional airport parking and parking for a relocated Invergowrie Rail station
	Design risk	The design cannot deliver a service to the required standard. As an example, traffic congestion may reduce the attractiveness of the Park & Ride bus service. Monitoring of the service and agreed quality standards will be required as part of the service provision
	Availability risk	The level of service is lower than forecast, due to budget constraints or service issues. Monitoring of bus operator performance will be required. Again Site 6B has a lower

Risk		Comment
		level of risk. Were bus subsidies to be reduced or withdrawn then the site could still operate, albeit with lower levels of demand. Other sites require a higher level of ongoing subsidy for them to remain operational
	Volume risk	Actual Park & Ride usage is significantly lower than forecast. Demand is most sensitive to charges at the site and in the city centre and to bus frequency and journey time. An appropriate level of bus service provision will encourage demand. Parking policies with Dundee city centre should also discourage commuter parking
	Technology risk	Changes in technology mean that services use sub-optimal technology. Buses will be low floor, and the latest lighting and CCTV features will be installed at the site

11.4 Optimism bias

11.4.1 As a full risk assessment has not been undertaken, higher values of optimism bias have been selected and this gives the adjusted investment costs (in 2010 prices) shown in Table 11.2.

Table 11.2: Optimism bias

	Base cost	recommended optimism bias	Capital cost including optimism bias (excluding land)
Option 3	£2,584,765	44%	£4,045,158
Option 3i	£2,958,600	44%	£4,630,210
Option 3ii	£4,204,715	44%	£6,580,379
Option 5	£2,584,765	44%	£4,045,158
Option 6B	£2,251,230	44%	£3,523,175

12 Option summary tables

12.1 Option summary tables

12.1.1 STAG requires that Option Summary Tables be prepared for each option appraised at Part 2 appraisal. The Option Summary Tables for Options 3, 3i, 3ii, 5 and 6B are given in Appendix G.

13 Monitoring and evaluation plans

13.1 Monitoring plan

Introduction

13.1.2 Ongoing monitoring of the project once it is implemented is needed to assess the eventual success of the project at meeting the study objectives. It is important to outline a proposed monitoring scheme at this early stage so that any necessary baseline data can be collected in advance of implementation. Given the small scale of the scheme it is unlikely that there will be significant funds available for monitoring and so this plan attempts to make use of data which is already being collected or which can be collected in a low cost fashion.

Proposed monitoring plan

13.1.3 In order to provide a baseline for monitoring it will be necessary to collect some data before this project is implemented. Given the likely low level of resources available for further monitoring it is suggested that a practical and cost effective approach is likely to be to monitor the usage of the site as much of the progress towards meeting the objectives is linked to the level of usage of the site. It should be possible to build up a sufficiently detailed picture of site usage from feedback from the bus operator(s) and / or spot checks. It is proposed that more detailed investigations covering those aspects of site performance not directly linked to usage be undertaken soon, 2 years, 5 years and 15 years after opening.

Key performance indicators

13.1.4 The study objectives, suggested key performance indicators, information required and some possible sources of baseline and future information are given in Table 13.1.

13.2 Evaluation plan

Introduction

13.2.2 The Scottish Government and Transport Scotland require evaluation of any option for which it provides funding or approval. Evaluation is a detailed, one-off objective driven review / audit of a project's performance.

Evaluation plan

13.2.3 The first stage of evaluation is the creation of an evaluation plan and a proposed format is laid out in this chapter.

Process / formative evaluation

13.2.4 It is anticipated that this would be conducted soon after the implementation of an option in combination with the monitoring suggested at this stage. It is intended as an assessment of how well the proposal has been implemented.

Table 13.1: Key performance indicators and data sources

Objective	Key performance indicator	Baseline information	Future information
Improve the public transport accessibility to employment, health, leisure and recreational locations in the west of Dundee and city centre	Bus service frequency and network coverage in west Dundee	Publically available timetable information	
Encourage a shift toward sustainable and healthier modes of transport	Park & Ride usage	N/A	Car park counts / feedback from bus operators
	Bus service, frequency, network coverage and requirements for Local Authority support in the area between Perth and Dundee	Publically available timetable information and Local Authority information on supported services.	
	Walking and cycling	N/A	Observed users leaving / arriving at sites on foot or by bicycle
Reduce traffic congestion for longer distance trips in the west of Dundee.	Journey time from Longforgan to Dundee City Centre	Journey time surveys / surveys at known problem junctions	
Contribute to national and local air quality targets and reduce the impact of climate change	Air quality adjacent to site	Air quality data is collected by Dundee City Council's Pollution Control Section. There are several fixed monitoring sites including one at Dundee Airport.	
	Air quality along bus route		
	Air quality in Dundee City Centre		
Minimise the impacts of the scheme upon the natural and built environment	Environmental quality in undeveloped land 100m from site perimeter compared to pre-construction quality	Pre-development biodiversity assessment	Biodiversity assessment
	Traffic passing / buildings overlooking site from an angle that most people rate as unattractive	N/A	Count locations which are subject to an unattractive view

13.2.5 Though it would not be anticipated that there would be much progress to the report at this stage this evaluation should establish and report quantitative information on project performance against the key performance indicators. In addition there should be a qualitative review of the factors underlying performance which will be likely to include a consideration of:

- Site access / egress – can traffic and buses enter and leave the site readily;
- Site characteristics – has the site been constructed to a high standard and are all the anticipated facilities in place including public transport facilities such as shelters;
- Site screening – have the necessary steps been taken to screen the site from any sensitive directions;
- Bus service operations – are buses operating as planned and are the vehicles in use of the anticipated standard;
- Quality of management;
- Information provision; and,
- Any important geographic / political factors.

13.2.6 Finally there should be an interpretation of the quantitative and qualitative information which comments on the project implementation to date, its on-going implementation and any lessons which are relevant to future operations / other similar projects.

Project / outcome evaluation

13.2.7 It is suggested that project / outcome evaluation be undertaken in tandem with the more detailed monitoring stage suggested for a time five years after the opening of the site. Having established what the baseline situation was, what the aims and objectives were and what the overall scope of the project was there should then be a focus on clear and measurable project outcomes. The most important of these will be measures of the successful operation of the site such as:

- The number of users
- Revenue from ticket sales
- Additional use of bus services by non Park & Ride users

13.2.8 In addition there should be a consideration of the performance against the key performance indicators (which will allow its performance against the study objectives to be assessed) and an assessment of the cost of building the site and of any ongoing support it has been found to require. Comparison should also be made to other similar sites such as:

- Broxden, Perth
- Springkerse and Castleview, Stirling

13.2.9 It will then be possible to assess the value for money represented by the outcome.

13.2.10 The outcome evaluation report should detail:

- key performance indicator scores;
- the extent to which project objectives have been achieved;
- if there have been any failures, why these were and what the consequences have been;
- what the project cost;
- whether there have been any unanticipated outcomes; and,
- an assessment of the project's economy, efficiency, effectiveness and equity.

13.2.11 STAG guidance requires that Evaluation conclusions are summarised using Evaluation Summary Tables.

14 Conclusions

14.1 Introduction

14.1.1 Five alternative options Park & Ride options, for a site to the West of Dundee, have been appraised against Transport Planning Objectives, STAG and Implementability criteria, Cost to Government and Risk and Uncertainty.

14.1.2 Based on this analysis, a summary of the key benefits and risks of each site is given below.

14.2 Site 3

14.2.1 Total Park & Ride demand at Site 3 is approximately 190 vehicles in 2012, increasing to 286 in 2022. As no off-slip road from the A90 is proposed, this option does not reduce traffic volumes at the Swallow Roundabout - non user benefits are therefore low. The site offers flexibility, however, and a slip road could be constructed to create Option 3i/3ii at a later date.

14.2.2 Of the options assessed, this option scores lowest against the Planning Objectives although it scores averagely well in terms of implementability and against STAG objectives.

14.2.3 In terms of risk, the site would required to be served either by extending existing bus services or by providing a dedicated service at a high cost. Operating hybrid services via Perth Road extends journey times and this impacts on the attractiveness of the site and total demand. Consequently, the site would require a significant level of operating subsidy, and this would need to be maintained, even if the site performed below expectations. Only when development of the Western Gateway commences will bus service subsidies reduce or permit operation on a commercial basis.

14.2.4 Although capital costs are lower than for Site 3i and 3ii, the land is currently in private ownership. At this stage land costs have been assumed to be 10% of the total capital cost however, there is a risk that these may be significantly higher.

14.2.5 An environmental assessment has highlighted the sensitivity of this location. An access to Site 3 from the Swallow Roundabout must negotiate the boundary between the Swallow Tree Preservation Order Area (TPO) and the Swallow Wetland Site of Importance for Nature Conservation (SINC). Under Dundee Local Plan Policy 70 (Semi-Natural Greenspaces Of Local Nature Conservation Importance) “Development proposals must not adversely affect the nature conservation qualities of Sites of Importance for Nature Conservation or Local Nature Reserves. Any development proposals affecting these sites must be accompanied by an ecological or similar assessment that details the likely impacts of the proposal on the conservation interests of the designation, along with proposed mitigation measures.”

14.2.6 Very careful design would be required to mitigate potential environmental impacts however it is considered that these could be overcome, albeit at a cost. Detailed consultation would be required, however, with Dundee City Council, the adjacent hotel and local land owners in order to deliver the site.

14.2.7 Given the relatively low BCR of this scheme compared with the alternative Options 3i and 3ii, it is not recommended take this scheme forward for further development.

14.3 Site 3i / 3ii

14.3.1 Sites 3i and 3ii are as Site 3 but include a short and longer off-slip from the A90. This allows vehicles using the Park & Ride site to leave the A90 in advance of the Swallow Roundabout.

Improved access increases forecast demand – 200 vehicles in 2012 increasing, by 2022, to 302 vehicles with 3i and 332 with Site 3ii.

14.3.2 Traffic congestion at the Swallow Roundabout is reduced, providing significant non-user benefits and which increase the overall Benefit Cost Ratio of the scheme. It also helps these options meet key Planning Objectives; to reduce traffic congestion for longer distance trips in the west of Dundee and, to contribute to national and local air quality targets and reduce the impact of climate change. These options also better meet a number of STPR Objectives, including to:

- promote competitive inter-urban journey times
- reduce inter-urban journey times on public transport
- promote journey time reductions between the Central Belt and Dundee / Aberdeen / Inverness primarily to allow business to achieve an effective working day between these centres

14.3.3 Each site also scores well against the STAG objectives, however, they score less well in terms of implementability, primarily as a result of the high cost of construction.

14.3.4 Many of the risks associated with Site 3 also apply to Options 3i and 3ii. The site is environmentally sensitive and, although impacts can be mitigated, this may result in additional costs.

14.3.5 Bus services would be provided either by extending existing bus services or by providing a dedicated service at a high cost. Operating hybrid services via Perth Road extends journey times and this impacts on the attractiveness of the site and total demand. Given the high capital outlay, it considered most likely that a dedicated service would need to be provided requiring a significant level of subsidy.

14.3.6 Land earmarked for the site is in private ownership and purchase costs may be significantly higher than the 10% of capital costs that have been assumed in this study.

14.3.7 Sites 3i and 3ii have the highest BCR of the options tested. Given this, and the fact that they best meet the STPR objectives, it is recommended that these sites are taken forward for further development.

14.4 Site 5

14.4.1 Access to Site 5 is from the Swallow Roundabout only, as with Site 3 and, consequently, demand is forecast to be the same.

14.4.2 Like Site 3, no off-slip road from the A90 is provided and so this option does not reduce traffic volumes at the Swallow Roundabout. As a result, this option scores relatively poorly against planning objectives which seek to reduce congestion and which contribute to national and local air quality targets.

14.4.3 It scores satisfactorily in terms of STAG criteria. In particular, the environmental impacts of the site are lower than with any of the Site 3 options. This, together with lower capital costs, mean that the site is considered to be most easily implemented of any of the sites appraised. Nevertheless, there may be a question mark over the public acceptability of the site. It would be accessed from one of the busiest junctions on the approach to Dundee, while providing no decongestion and non-user benefits. Consequently, the potential benefits of the site may not be recognised. Land costs may also be higher than anticipated, as the site is currently in private ownership.

14.4.4 As with all Site 3 options, the bus would be served either by extending existing bus services or by providing a dedicated service at a high cost. A significant level of bus subsidy would be required to serve the site. If actual Park & Ride was significantly lower than forecast, a

subsidised service would still require to provided while fare revenue would be lower than anticipated.

14.4.5 Although the environmental impacts of Site 5 are lower than for other sites, it along with Site 3 has the lowest level of demand and BCR of the schemes assessed. It also scores relatively poorly against the Planning Objective for the study, and the STPR objectives. For these reasons it is recommended that this site is not considered further.

14.5 Site 6B

14.5.1 Site 6B is accessed via a new roundabout on Riverside Avenue. As the site is closer to Dundee city centre, it has a larger catchment area and so attracts a high level of demand. Forecast demand is 206 vehicles in 2012, increasing to 314 vehicles in 2022.

14.5.2 While the site has a lower Benefit to Cost Ratio than Sites 3i and 3ii, it is higher than for Sites 3 and 5. Benefits are reduced as the site does not reduce congestion and delay at the Swallow Roundabout. It does, however, help reduce congestion on the approach to Dundee City Centre and so scores well against other STPR objectives.

14.5.3 The site best meets the study Planning Objectives, having the highest ranking along with Site 3ii. It also scores well against STAG objectives and in terms of implementability.

14.5.4 Capital costs in constructing the site would be lower than for all other sites. In addition, the proposed location is owned by Dundee City Council so there may be no or only nominal land purchase costs.

14.5.5 In terms of environmental impact, the site lies within the Inner Tay Local Nature Reserve (LNR), however, potential impacts could be mitigated by careful screening. The site could serve a multi-purpose role, providing car parking for a proposed new wildlife park adjacent to the site, overspill parking for Ninewells Hospital, additional airport parking and parking for a relocated Invergowrie Rail station. It is also located adjacent to Dundee's Green Circular Cycle Route.

14.5.6 A final important advantage of Site 6B is that bus operating costs are the lowest of all the options assessed. Existing services X8 and X42 would be infilled with subsidised services to provide a 12 minute frequency. In the event that observed Park & Ride demand was lower than forecast, a reduced frequency bus service to the site could still be maintained with a much lower level of operating subsidy. As a result the risks in operating the site are significantly lower than with other options.

14.5.7 Although the BCR for Site 6B is lower than for Sites 3i and 3ii, it is higher than for Sites 3 / 5. The site attracts a high level of demand and may serve a multipurpose role. Therefore, it is recommended that this site is taken forward for further assessment.

14.6 Summary

14.6.1 It is recommended that the following options are taken forward for further development:

- Site 3i / 3ii, and
- Site 6B

14.6.2 Sites 3i and 3ii have the highest Benefit to Cost Ratio and also best meet the STPR objectives. In particular they help reduce congestion at the Swallow Roundabout. Nevertheless, they also have the highest capital costs, and potentially the highest environmental impact. They also carry a high level of risk – even if demand is lower than forecast it will be necessary to subsidise an appropriate level of bus service provision at a significant ongoing cost.

14.6.3 In contrast Site 6B, provides lower benefits but also a lower level of risk. While the BCR is lower than for Sites 3i and 3ii, this is primarily a result of lower non-user benefits – the site still attracts significant levels of demand (higher than for Site 3i). While this option does not help reduce congestion at the Swallow roundabout, it does help reduce congestion on the approach to Dundee City Centre and so contributes towards the STPR objectives. While there are potential environmental impacts, these can be more readily mitigated than at Site 3i / 3ii. Bus services can be provided to the site at a lower cost, and a service to the site could still be maintained even it the proposed subsidy was reduced or withdrawn. Finally, the site has the potential to serve a multi-purpose role. It has the potential to provide car parking for a proposed new wildlife park adjacent to the site, overspill parking for Ninewells Hospital, additional airport parking and parking for a relocated Invergowrie Rail station.

Appendix A

Pre-appraisal site locations

Potential Park & Ride sites and access arrangements

Figure A.1: Potential sites

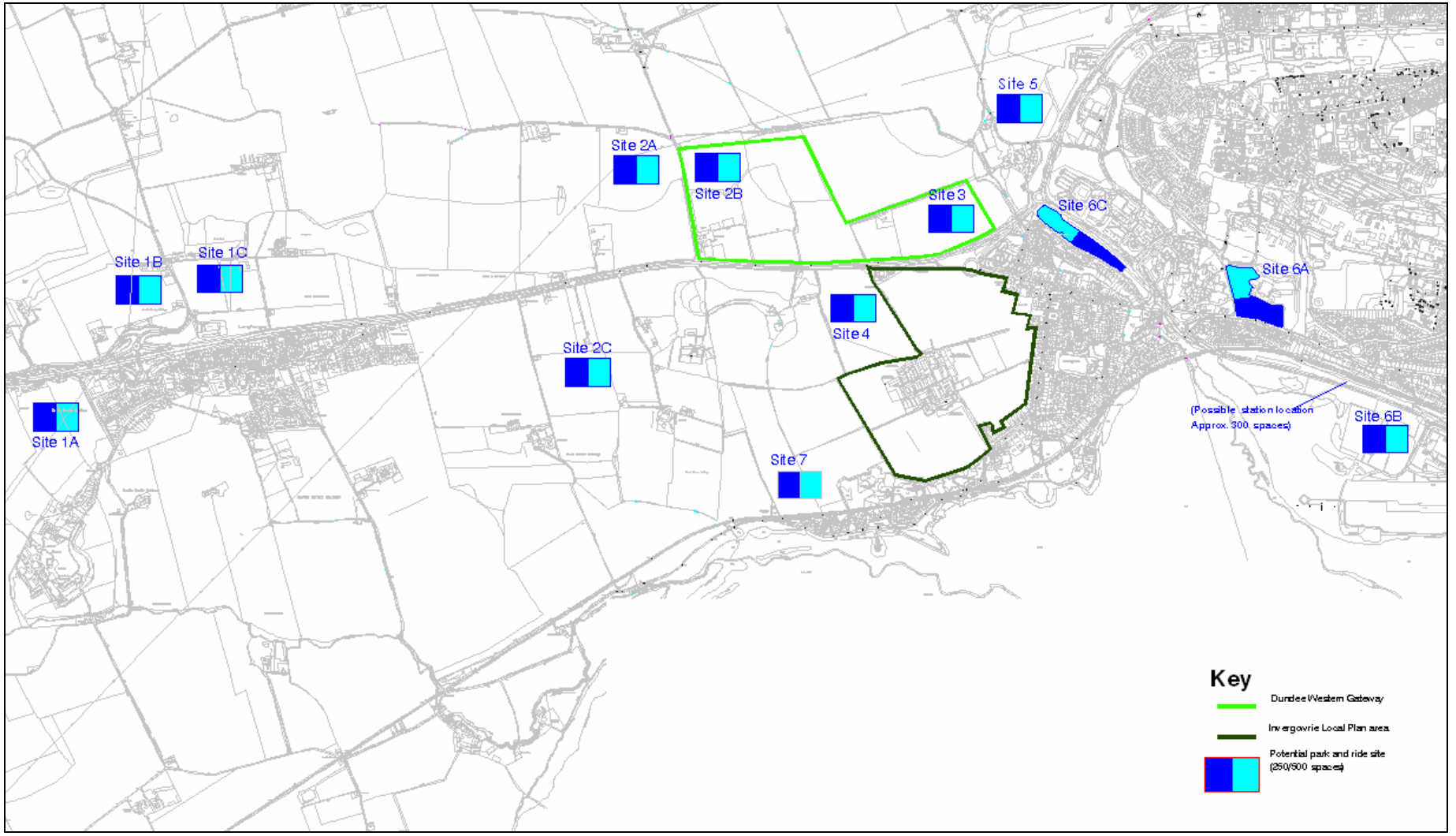


Figure A.2: Potential sites and access options

Appendix B

Initial appraisal summary tables

Proposal details			
Name and address of authority or organisation promoting the proposal: (Also provide name of any subsidiary organisations also involved in promoting the proposal)	TACTRAN, 2 High Street, Perth, PH1 5PH STAG assessment by: Colin Buchanan, 4 St Colme Street, Edinburgh, EH3 6AA		
Proposal Name:	Option 1A	Name of Planner:	
Proposal Description:	Park and Ride site located southwest of the Longforgan interchange on the A90 west of Dundee	Estimated Total Public Sector Funding Requirement:	capital cost = £1,736,400 annual revenue support = £300,000 Present Value of Cost to Govt = N/A at this stage
Funding Sought From: (if applicable)	Not applicable at this stage	Amount of Application:	Not applicable at this stage
Background information			
Geographic Context:	Dundee is Scotland's 4th largest city and the largest urban area in the TACTRAN region. It is an important employment, educational and regional centre; approximately 300,000 people live within a 30 minute drive of the city. Maintaining and improving accessibility to Dundee is therefore important to the continuing economic health of the region.		
Social Context:	The TACTRAN region has a population of approximately 475,000 people, with almost two thirds living in towns or cities. In Dundee, 17.7% of the resident population are aged between 0-15 years, 64.6% aged 16-64 years and 17.7% aged 65+ years. Approximately 31% of TACTRAN households do not have access to a car; this figure rises to approximately 46% for Dundee City. Access to healthcare facilities for those without access to a car is a key issue for the region, particularly following centralisation of services.		
Economic Context:	Maintaining and improving internal and external regional connectivity is central to ensuring that the economy of the TACTRAN region continues to prosper. Furthermore, it is essential that those who living in TACTRAN's rural communities, as well as larger towns and cities, are well-connected to essential employment, education, health and other key locations. The A90 corridor is an important part of the national trunk network. It provides a strategic function linking the central belt with Dundee and Aberdeen. It also serves an important commuter route to Dundee during peak periods. With a large number of competing movements, congestion occurs at peak periods. This has implications in terms of the local and national economy, and on the environment of the people who live and work in Dundee. While the population of Dundee is forecast to reduce slightly, total employment is expected to increase. This is anticipated to lead further increases in the level of commuting to the city from across the region.		

Transport planning objectives		
Objective:	Performance against transport planning objective:	
Improve the public transport accessibility to employment, health, leisure and recreational locations in the west of Dundee and the city centre.	✓	By providing additional bus services into the city centre there will be minor benefits in the public transport accessibility to locations in the west of Dundee and city centre.
Encourage a shift toward sustainable and healthier modes of transport.	✓	The scheme would provide a more sustainable, option of travel to the city centre this scheme would produce minor benefits in encouraging a shift towards sustainable and healthier modes of transport.
Reduce traffic congestion for longer distance trips in the west of Dundee.	✓	This option would produce minor benefits with regards to traffic congestion by removing a proportion of the traffic from the A90 and Swallow Roundabout area during peak periods.
Contribute to national and local air quality targets and reduce the impact of climate change.	✖✖	This option would slightly worsen local air quality in Longforgan. Relatively low patronage means that only minor benefits would accrue in the city centre.
Minimise the impacts of the scheme upon the natural and built environment.	0	Any potential benefits to the natural or built environment would be offset by having bus services running through the town of Longforgan and developing on Greenfield land which would otherwise not be built on.
Rationale for Selection or Rejection of Proposal:	Due to the low score of this option against the study objectives it has been rejected from further consideration.	

Implementability appraisal	
Technical:	There are no significant technical issues associated with the implementation of this proposal.
Operational:	There are no significant operational issues associated with the implementation of this proposal.
Financial:	Running local bus services to this site would increase operational costs substantially.
Public acceptability:	This proposal has not been made public but there are unlikely to be public acceptability issues.

STAG criteria		
Criterion	**Assessment summary**	**Supporting information**
Environment:	✖	This option would worsen local air quality in Longforgan and result in minor noise and vibration impacts. Although landscaped, there would also be minor landscape and visual amenity impacts.
Safety:	0	Significant safety gains are not anticipated, however, there should be no decrease in levels of safety / security.
Economy:	✓	Increased public transport provision is expected to result in slight journey time benefits during peak hours and slight economic growth. Public transport users will benefit from an increased service to the west of Dundee and city centre. Park and ride development may also facilitate the growth of new business development along the A90 corridor.
Integration:	0	Increased bus service provision will have have limited benefits with regards to the number of possibilities for integrated trips to a range of destinations around the west of Dundee and city centre.
Accessibility and Social Inclusion:	✓	Accessibility to the city centre and to the west of Dundee will improve, however the scheme would offer only minor social inclusion benefits.

Proposal details			
Name and address of authority or organisation promoting the proposal: (Also provide name of any subsidiary organisations also involved in promoting the proposal)	TACTRAN, 2 High Street, Perth, PH1 5PH STAG assessment by: Colin Buchanan, 4 St Colme Street, Edinburgh, EH3 6AA		
Proposal Name:	Option 1B	Name of Planner:	
Proposal Description:	Park and Ride site located north of the Longforgan interchange on the A90 west of Dundee	Estimated Total Public Sector Funding Requirement:	capital cost = £1,736,400 annual revenue support = £300,000 Present Value of Cost to Govt = N/A at this stage
Funding Sought From: (if applicable)	Not applicable at this stage	Amount of Application:	Not applicable at this stage
Background Information			
Geographic Context:	Dundee is Scotland's 4th largest city and the largest urban area in the TACTRAN region. It is an important employment, educational and regional centre; approximately 300,000 people live within a 30 minute drive of the city. Maintaining and improving accessibility to Dundee is therefore important to the continuing economic health of the region.		
Social Context:	The TACTRAN region has a population of approximately 475,000 people, with almost two thirds living in towns or cities. In Dundee, 17.7% of the resident population are aged between 0-15 years, 64.6% aged 16-64 years and 17.7% aged 65+ years. Approximately 31% of TACTRAN households do not have access to a car; this figure rises to approximately 46% for Dundee City. Access to healthcare facilities for those without access to a car is a key issue for the region, particularly following centralisation of services.		
Economic Context:	Maintaining and improving internal and external regional connectivity is central to ensuring that the economy of the TACTRAN region continues to prosper. Furthermore, it is essential that those who living in TACTRAN's rural communities, as well as larger towns and cities, are well-connected to essential employment, education, health and other key locations. The A90 corridor is an important part of the national trunk network. It provides a strategic function linking the central belt with Dundee and Aberdeen. It also serves an important commuter route to Dundee during peak periods. With a large number of competing movements, congestion occurs at peak periods. This has implications in terms of the local and national economy, and on the environment of the people who live and work in Dundee. While the population of Dundee is forecast to reduce slightly, total employment is expected to increase. This is anticipated to lead further increases in the level of commuting to the city from across the region.		

Transport planning objectives		
Objective:	Performance against transport planning objective:	
Improve the public transport accessibility to employment, health, leisure and recreational locations in the west of Dundee and the city centre.	✓	By providing additional bus services into the city centre there will be minor benefits in the public transport accessibility to locations in the west of Dundee and city centre.
Encourage a shift toward sustainable and healthier modes of transport.	✓	By offering another, more sustainable, option of travel, and given its reasonably attractive location, this scheme would produce moderate benefits in encouraging a shift towards sustainable and healthier modes of transport.
Reduce traffic congestion for longer distance trips in the west of Dundee.	✓	This option would produce moderate benefits with regards to traffic congestion by removing a proportion of the traffic from the A90 and Swallow Roundabout area during peak periods.
Contribute to national and local air quality targets and reduce the impact of climate change.	✖	This option will marginally worsen air quality for the residential properties north of the A90. Relatively low patronage means that only minor benefits will accrue in the city centre.
Minimise the impacts of the scheme upon the natural and built environment.	0	The site is not currently zoned for development, however, its impact could be mitigated by appropriate landscaping. Traffic generated does not significantly impact upon Longforgan.
Rationale for Selection or Rejection of Proposal:	This option scores moderately well against the objectives and STAG criteria and is feasible and publicly acceptable. Providing a sufficiently frequent bus service to the site would be costly and forecast demand is relatively low therefore this site is not being taken forward for further consideration.	

Implementability appraisal	
Technical:	There are no significant technical issues associated with the implementation of this proposal.
Operational:	There are no significant operational issues associated with the implementation of this proposal.
Financial:	Running local bus services to this site would increase operational costs substantially.
Public acceptability:	This proposal has not been made public but there are unlikely to be public acceptability issues.

STAG criteria		
Criterion	**Assessment summary**	**Supporting information**
Environment:	0	Overall, the scheme would have a neutral benefit on the environment as local impacts would be minimised by high quality landscaping.
Safety:	0	Significant safety gains are not anticipated, however, there should be no decrease in levels of safety / security.
Economy:	✓	Increased public transport provision is expected to result in slight journey time benefits during peak hours. Public transport users will benefit from an increased service to the west of Dundee and city centre. Park and ride development may also facilitate the growth of new business development along the A90 corridor.
Integration:	0	Increased bus service provision will have limited benefits with regards to the number of possibilities for integrated trips to a range of destinations around the west of Dundee and city centre.
Accessibility and Social Inclusion:	✓	Accessibility to the city centre and to the west of Dundee will improve, however the scheme would offer only minor social inclusion benefits.

Proposal details			
Name and address of authority or organisation promoting the proposal: (Also provide name of any subsidiary organisations also involved in promoting the proposal)	TACTRAN, 2 High Street, Perth, PH1 5PH STAG assessment by: Colin Buchanan, 4 St Colme Street, Edinburgh, EH3 6AA		
Proposal Name:	Option 1C	Name of Planner:	
Proposal Description:	Park and Ride site located north of the Longforgan interchange on the A90 west of Dundee	Estimated Total Public Sector Funding Requirement:	capital cost = £1,736,400 annual revenue support = £300,000 Present Value of Cost to Govt = N/A at this stage
Funding Sought From: (if applicable)	Not applicable at this stage	Amount of Application:	Not applicable at this stage

Background information	
Geographic Context:	Dundee is Scotland's 4th largest city and the largest urban area in the TACTRAN region. It is an important employment, educational and regional centre; approximately 300,000 people live within a 30 minute drive of the city. Maintaining and improving accessibility to Dundee is therefore important to the continuing economic health of the region.
Social Context:	The TACTRAN region has a population of approximately 475,000 people, with almost two thirds living in towns or cities. In Dundee, 17.7% of the resident population are aged between 0-15 years, 64.6% aged 16-64 years and 17.7% aged 65+ years. Approximately 31% of TACTRAN households do not have access to a car; this figure rises to approximately 46% for Dundee City. Access to healthcare facilities for those without access to a car is a key issue for the region, particularly following centralisation of services.
Economic Context:	Maintaining and improving internal and external regional connectivity is central to ensuring that the economy of the TACTRAN region continues to prosper. Furthermore, it is essential that those who living in TACTRAN's rural communities, as well as larger towns and cities, are well-connected to essential employment, education, health and other key locations. The A90 corridor is an important part of the national trunk network. It provides a strategic function linking the central belt with Dundee and Aberdeen. It also serves an important commuter route to Dundee during peak periods. With a large number of competing movements, congestion occurs at peak periods. This has implications in terms of the local and national economy, and on the environment of the people who live and work in Dundee. While the population of Dundee is forecast to reduce slightly, total employment is expected to increase. This is anticipated to lead further increases in the level of commuting to the city from across the region.

Transport planning objectives		
Objective:	Performance against transport planning objective:	
Improve the public transport accessibility to employment, health, leisure and recreational locations in the west of Dundee and the city centre.	✓	This site would be able to make use of the grade separated junction already in place at Longforgan and as a result would produce minor benefits to public transport accessibility to locations in the west of Dundee and the city centre.
Encourage a shift toward sustainable and healthier modes of transport.	✓	By offering another, more sustainable, option of travel, and given its reasonably attractive location, this scheme would produce moderate benefits in encouraging a shift towards sustainable and healthier modes of transport.
Reduce traffic congestion for longer distance trips in the west of Dundee.	✓	This option would produce moderate benefits with regards to traffic congestion by removing a sizeable proportion of the traffic from the A90 and Swallow Roundabout area during peak periods.
Contribute to national and local air quality targets and reduce the impact of climate change.	✖	This option will marginally worsen air quality for the residential properties north of the A90. Relatively low patronage means that only minor benefits will accrue in the city centre.
Minimise the impacts of the scheme upon the natural and built environment.	0	The site is not currently zoned for development, however, its impact could be mitigated by appropriate landscaping. Traffic generated does not significantly impact upon Longforgan.
Rationale for Selection or Rejection of Proposal:	This option scores moderately well against the objectives and STAG criteria and is feasible and publicly acceptable. Providing a sufficiently frequent bus service to the site would be costly and forecast demand is relatively low therefore this site is not being taken forward for further consideration.	

Implementability appraisal	
Technical:	There are no significant technical issues associated with the implementation of this proposal.
Operational:	There are no significant operational issues associated with the implementation of this proposal.
Financial:	Running local bus services to this site would increase operational costs substantially.
Public acceptability:	This proposal has not been made public but there are unlikely to be public acceptability issues.

STAG criteria		
Criterion	**Assessment summary**	**Supporting information**
Environment:	0	Overall, the scheme would have a neutral benefit on the environment as local impacts would be minimised by high quality landscaping.
Safety:	0	Significant safety gains are not anticipated, however, there should be no decrease in levels of safety / security.
Economy:	✓	Increased public transport provision is expected to result in slight journey time benefits during peak hours. Public transport users will benefit from an increased service to the west of Dundee and city centre. Park and ride development may also facilitate the growth of new business development along the A90 corridor.
Integration:	0	Increased bus service provision will have limited benefits with regards to the number of possibilities for integrated trips to a range of destinations around the west of Dundee and city centre.
Accessibility and Social Inclusion:	✓	Accessibility to the city centre and to the west of Dundee will improve, however the scheme would offer only minor social inclusion benefits.

Proposal details			
Name and address of authority or organisation promoting the proposal: (Also provide name of any subsidiary organisations also involved in promoting the proposal)	TACTRAN, 2 High Street, Perth, PH1 5PH STAG assessment by: Colin Buchanan, 4 St Colme Street, Edinburgh, EH3 6AA		
Proposal Name:	Option 1A, B and C with bus lane + 1 general traffic lane	Name of Planner:	
Proposal Description:	Park and Ride site located southwest of the Longforgan interchange on the A90 west of Dundee widening on the A90 and the introduction of a dedicated bus lane.	Estimated Total Public Sector Funding Requirement:	capital cost = £1,736,400 annual revenue support = £300,000 Present Value of Cost to Govt = N/A at this stage
Funding Sought From: (if applicable)	Not applicable at this stage	Amount of Application:	Not applicable at this stage
Background information			
Geographic Context:	Dundee is Scotland's 4th largest city and the largest urban area in the TACTRAN region. It is an important employment, educational and regional centre; approximately 300,000 people live within a 30 minute drive of the city. Maintaining and improving accessibility to Dundee is therefore important to the continuing economic health of the region.		
Social Context:	The TACTRAN region has a population of approximately 475,000 people, with almost two thirds living in towns or cities. In Dundee, 17.7% of the resident population are aged between 0-15 years, 64.6% aged 16-64 years and 17.7% aged 65+ years. Approximately 31% of TACTRAN households do not have access to a car; this figure rises to approximately 46% for Dundee City. Access to healthcare facilities for those without access to a car is a key issue for the region, particularly following centralisation of services.		
Economic Context:	Maintaining and improving internal and external regional connectivity is central to ensuring that the economy of the TACTRAN region continues to prosper. Furthermore, it is essential that those who living in TACTRAN's rural communities, as well as larger towns and cities, are well-connected to essential employment, education, health and other key locations. The A90 corridor is an important part of the national trunk network. It provides a strategic function linking the central belt with Dundee and Aberdeen. It also serves an important commuter route to Dundee during peak periods. With a large number of competing movements, congestion occurs at peak periods. This has implications in terms of the local and national economy, and on the environment of the people who live and work in Dundee. While the population of Dundee is forecast to reduce		

	slightly, total employment is expected to increase. This is anticipated to lead further increases in the level of commuting to the city from across the region.	
Transport planning objectives		
Objective:	Performance against transport planning objective:	
Improve the public transport accessibility to employment, health, leisure and recreational locations in the west of Dundee and the city centre.	✓✓	Park and Ride development with the construction of a bus lane on the A90 would improve public transport accessibility to locations in the west of Dundee and city centre by allowing public transport priority to avoid any lengthy delays on the A90 and Swallow Roundabout.
Encourage a shift toward sustainable and healthier modes of transport.	✓✓	By offering another, more sustainable, option of travel to the city centre, coupled with attractive bus priority measures this scheme would produce moderate benefits in encouraging a shift towards sustainable and healthier modes of transport.
Reduce traffic congestion for longer distance trips in the west of Dundee.	✖✖✖	The reallocation of one traffic lane as a bus lane would result in increased levels of queuing and delay on the A90.
Contribute to national and local air quality targets and reduce the impact of climate change.	✖✖✖	Increased general traffic congestion on the approach to the Swallow Roundabout would result in increased carbon emissions and would lower local air quality.
Minimise the impacts of the scheme upon the natural and built environment.	0	Other than air quality above, the scheme would have no significant impact on the environment. The site would be landscaped to minimise visual intrusion.
Rationale for Selection or Rejection of Proposal:	Due to the low score of this option against the study objectives it has been rejected from further consideration.	
Implementability appraisal		
Technical:	There are no significant technical issues associated with the implementation of this proposal.	
Operational:	The reallocation of one eastbound lane on the A90 as a bus lane would result in increased congestion on the A90 impacting on both local and long distance trips on the trunk road.	
Financial:	Running local bus services to this site would increase operational costs substantially.	
Public acceptability:	This proposal has not been made public, however, it is considered that the increased congestion which would result is unlikely to be publically acceptable.	

STAG criteria		
Criterion	**Assessment summary**	**Supporting information**
Environment:	✖✖	The increased levels of congestion would impact on the environment in terms of air quality and emissions. The physical impacts of the scheme are minor and the site would be landscaped to minimise visual intrusion.
Safety:	0	Significant safety gains are not anticipated, however, there should be no decrease in levels of safety / security.
Economy:	✖✖✖	This option would result in significant economic disbenefits. It would increase delays for both local and strategic traffic with national economic implications.
Integration:	0	Increased bus service provision will have limited benefits with regards to the number of possibilities for integrated trips to a range of destinations around the west of Dundee and city centre.
Accessibility and Social Inclusion:	✓	Accessibility to the city centre and to the west of Dundee will improve, however the scheme would offer only minor social inclusion benefits.

Proposal details			
Name and address of authority or organisation promoting the proposal: (Also provide name of any subsidiary organisations also involved in promoting the proposal)	TACTRAN, 2 High Street, Perth, PH1 5PH STAG assessment by: Colin Buchanan, 4 St Colme Street, Edinburgh, EH3 6AA		
Proposal Name:	Option 1A, B and C with bus lane + 2 general traffic lanes	Name of Planner:	
Proposal Description:	Park and Ride site located southwest of the Longforgan interchange on the A90 west of Dundee widening on the A90 and the introduction of a dedicated bus lane.	Estimated Total Public Sector Funding Requirement:	capital cost = £4,756,400 annual revenue support = £300,000 Present Value of Cost to Govt = N/A at this stage
Funding Sought From: (if applicable)	Not applicable at this stage	Amount of Application:	Not applicable at this stage
Background information			
Geographic Context:	Dundee is Scotland's 4th largest city and the largest urban area in the TACTRAN region. It is an important employment, educational and regional centre; approximately 300,000 people live within a 30 minute drive of the city. Maintaining and improving accessibility to Dundee is therefore important to the continuing economic health of the region.		
Social Context:	The TACTRAN region has a population of approximately 475,000 people, with almost two thirds living in towns or cities. In Dundee, 17.7% of the resident population are aged between 0-15 years, 64.6% aged 16-64 years and 17.7% aged 65+ years. Approximately 31% of TACTRAN households do not have access to a car; this figure rises to approximately 46% for Dundee City. Access to healthcare facilities for those without access to a car is a key issue for the region, particularly following centralisation of services.		
Economic Context:	Maintaining and improving internal and external regional connectivity is central to ensuring that the economy of the TACTRAN region continues to prosper. Furthermore, it is essential that those who living in TACTRAN's rural communities, as well as larger towns and cities, are well-connected to essential employment, education, health and other key locations. The A90 corridor is an important part of the national trunk network. It provides a strategic function linking the central belt with Dundee and Aberdeen. It also serves an important commuter route to Dundee during peak periods. With a large number of competing movements, congestion occurs at peak periods. This has implications in terms of the local and national economy, and on the environment of the people who live and work in Dundee. While the population of Dundee is forecast to reduce		

	slightly, total employment is expected to increase. This is anticipated to lead further increases in the level of commuting to the city from across the region.

Transport planning objectives		
Objective:	Performance against transport planning objective:	
Improve the public transport accessibility to employment, health, leisure and recreational locations in the west of Dundee and the city centre.	✓✓	Park and Ride development with the construction of a bus lane on the A90 would substantially improve public transport accessibility to locations in the west of Dundee and city centre by allowing public transport priority to avoid any lengthy delays on the A90 and Swallow Roundabout.
Encourage a shift toward sustainable and healthier modes of transport.	✓✓	By offering another, more sustainable, option of travel to the city centre, coupled with attractive bus priority measures this scheme would produce moderate benefits in encouraging a shift towards sustainable and healthier modes of transport.
Reduce traffic congestion for longer distance trips in the west of Dundee.	✓✓	The addition of a dedicated bus lane on the A90 would act as an incentive for commuters to use the Park & Ride site and would have moderate benefits with regards to reducing traffic congestion on the A90.
Contribute to national and local air quality targets and reduce the impact of climate change.	✖	This option will worsen air quality for the residential properties in Longforgan or north of the A90 while offering only minor air quality improvements in the city centre.
Minimise the impacts of the scheme upon the natural and built environment.	✖✖	For the A90 to be widened, natural vegetation would have to be removed having a moderate negative impacts on the natural environment.
Rationale for Selection or Rejection of Proposal:	Due to the low score of this option against the study objectives it has been rejected from further consideration.	

Implementability appraisal	
Technical:	There are no significant technical issues associated with the implementation of this proposal.
Operational:	There are no significant operational issues associated with the implementation of this proposal.
Financial:	Running local bus services to this site would increase operational costs substantially.
Public acceptability:	This proposal has not been made public but there are unlikely to be public acceptability issues.

STAG criteria		
Criterion	**Assessment summary**	**Supporting information**
Environment:	✖✖	This scheme would have a moderate impact on the built environment adjacent to the eastbound carriageway of the A90. Vegetation and some mature trees may need to be removed.
Safety:	0	Significant safety gains are not anticipated, however, there should be no decrease in levels of safety / security.
Economy:	✓	The bus priority measures proposed make this a more attractive option for potential Park & Ride users than would otherwise be the case. Constructions costs would, however, be high.
Integration:	0	Increased bus service provision will have limited benefits with regards to the number of possibilities for integrated trips to a range of destinations around the west of Dundee and city centre.
Accessibility and Social Inclusion:	✓	Accessibility to the city centre and to the west of Dundee will improve, however the scheme would offer only minor social inclusion benefits.

Proposal details			
Name and address of authority or organisation promoting the proposal: (Also provide name of any subsidiary organisations also involved in promoting the proposal)	TACTRAN, 2 High Street, Perth, PH1 5PH STAG assessment by: Colin Buchanan, 4 St Colme Street, Edinburgh, EH3 6AA		
Proposal Name:	Option 3	Name of Planner:	
Proposal Description:	Park and Ride site located north of A90 west of Dundee.	Estimated Total Public Sector Funding Requirement:	capital cost = £2,091,400 annual revenue support = £150,000 Present Value of Cost to Govt = N/A at this stage
Funding Sought From: (if applicable)	Not applicable at this stage	Amount of Application:	Not applicable at this stage
Background information			
Geographic Context:	Dundee is Scotland's 4th largest city and the largest urban area in the TACTRAN region. It is an important employment, educational and regional centre; approximately 300,000 people live within a 30 minute drive of the city. Maintaining and improving accessibility to Dundee is therefore important to the continuing economic health of the region.		
Social Context:	The TACTRAN region has a population of approximately 475,000 people, with almost two thirds living in towns or cities. In Dundee, 17.7% of the resident population are aged between 0-15 years, 64.6% aged 16-64 years and 17.7% aged 65+ years. Approximately 31% of TACTRAN households do not have access to a car; this figure rises to approximately 46% for Dundee City. Access to healthcare facilities for those without access to a car is a key issue for the region, particularly following centralisation of services.		
Economic Context:	Maintaining and improving internal and external regional connectivity is central to ensuring that the economy of the TACTRAN region continues to prosper. Furthermore, it is essential that those who living in TACTRAN's rural communities, as well as larger towns and cities, are well-connected to essential employment, education, health and other key locations. The A90 corridor is an important part of the national trunk network. It provides a strategic function linking the central belt with Dundee and Aberdeen. It also serves an important commuter route to Dundee during peak periods. With a large number of competing movements, congestion occurs at peak periods. This has implications in terms of the local and national economy, and on the environment of the people who live and work in Dundee. While the population of Dundee is forecast to reduce slightly, total employment is expected to increase. This is anticipated to lead further increases in the level of commuting to the city from across the region.		

Transport planning objectives		
Objective:	Performance against transport planning objective:	
Improve the public transport accessibility to employment, health, leisure and recreational locations in the west of Dundee and the city centre.	✓	This site would produce minor benefits to the public transport accessibility; it offers an additional options for commuters who are entering locations to the west of Dundee or city centre.
Encourage a shift toward sustainable and healthier modes of transport.	✓✓	By offering another, more sustainable, option of travel to the city centre this scheme would produce moderate benefits in encouraging a shift towards sustainable and healthier modes of transport.
Reduce traffic congestion for longer distance trips in the west of Dundee.	✓	This site is accessed from the Swallow Roundabout and provides no reduction in local traffic on the trunk road. Conflicts between local and long distance trips would be mitigated on Riverside Avenue and the approach to central Dundee.
Contribute to national and local air quality targets and reduce the impact of climate change.	✓	By removing some traffic from the local road network, this option would also produce subsequent benefits in the contribution to national and local air quality targets.
Minimise the impacts of the scheme upon the natural and built environment.	0	The site is already zoned for development. Environmental impacts could be limited by appropriate landscaping. Site access from the Swallow Roundabout would require careful design to minimise any impact on the SINC and trees covered by a TPO.
Rationale for Selection or Rejection of Proposal:	This option scores moderately well against the objectives and STAG criteria and is feasible, affordable and publicly acceptable and is being taken forward for further consideration.	

Implementability appraisal	
Technical:	There are no significant technical issues associated with the implementation of this proposal.
Operational:	There are no significant operational issues associated with the implementation of this proposal.
Financial:	There are no significant financial issues associated with the implementation of this proposal.
Public acceptability:	This proposal has not been made public but there are unlikely to be public acceptability issues.

STAG criteria		
Criterion	**Assessment summary**	**Supporting information**
Environment:	0	While the site would result in air quality impacts in the city centre, site access from the Swallow Roundabout would need to be carefully designed to minimise the impact on the SINC and trees covered by a preservation order.
Safety:	0	Significant safety gains are not anticipated, however, there should be no decrease in levels of safety / security.
Economy:	✓	Increased public transport provision is expected to result in slight journey time benefits during peak hours and slight economic growth. Public transport users will benefit from an increased service to the west of Dundee and city centre. Park and ride development may also facilitate the growth of new business development along the A90 corridor.
Integration:	✓	The site has the potential to act as a transport node within the Dundee Western Gateway site. Bus services will be able to serve both the Park & Ride site and new development.
Accessibility and Social Inclusion:	✓	Accessibility to the city centre and to the west of Dundee will improve, however the scheme would offer only minor social inclusion benefits.

Proposal details			
Name and address of authority or organisation promoting the proposal: (Also provide name of any subsidiary organisations also involved in promoting the proposal)	TACTRAN, 2 High Street, Perth, PH1 5PH STAG assessment by: Colin Buchanan, 4 St Colme Street, Edinburgh, EH3 6AA		
Proposal Name:	Option 3i	Name of Planner:	
Proposal Description:	Park and Ride site located north of A90 west of Dundee.	Estimated Total Public Sector Funding Requirement:	capital cost = £2,391,400 annual revenue support = £150,000 Present Value of Cost to Govt = N/A at this stage
Funding Sought From: (if applicable)	Not applicable at this stage	Amount of Application:	Not applicable at this stage
Background information			
Geographic Context:	Dundee is Scotland's 4th largest city and the largest urban area in the TACTRAN region. It is an important employment, educational and regional centre; approximately 300,000 people live within a 30 minute drive of the city. Maintaining and improving accessibility to Dundee is therefore important to the continuing economic health of the region.		
Social Context:	The TACTRAN region has a population of approximately 475,000 people, with almost two thirds living in towns or cities. In Dundee, 17.7% of the resident population are aged between 0-15 years, 64.6% aged 16-64 years and 17.7% aged 65+ years. Approximately 31% of TACTRAN households do not have access to a car; this figure rises to approximately 46% for Dundee City. Access to healthcare facilities for those without access to a car is a key issue for the region, particularly following centralisation of services.		
Economic Context:	Maintaining and improving internal and external regional connectivity is central to ensuring that the economy of the TACTRAN region continues to prosper. Furthermore, it is essential that those who living in TACTRAN's rural communities, as well as larger towns and cities, are well-connected to essential employment, education, health and other key locations. The A90 corridor is an important part of the national trunk network. It provides a strategic function linking the central belt with Dundee and Aberdeen. It also serves an important commuter route to Dundee during peak periods. With a large number of competing movements, congestion occurs at peak periods. This has implications in terms of the local and national economy, and on the environment of the people who live and work in Dundee. While the population of Dundee is forecast to reduce slightly, total employment is expected to increase. This is anticipated to lead further increases in the level of commuting to the city from across the region.		

Transport planning objectives	
Objective:	Performance against transport planning objective:
Improve the public transport accessibility to employment, health, leisure and recreational locations in the west of Dundee and the city centre.	✓ This site would produce minor benefits to the public transport accessibility; it offers an additional options for commuters who are entering locations to the west of Dundee or city centre.
Encourage a shift toward sustainable and healthier modes of transport.	✓✓ By offering another, more sustainable, option of travel to the city centre this scheme would produce moderate benefits in encouraging a shift towards sustainable and healthier modes of transport.
Reduce traffic congestion for longer distance trips in the west of Dundee.	✓✓ This option would produce moderate benefits with regards to traffic congestion by removing a sizeable proportion of the traffic from the A90 and Swallow Roundabout area during peak periods.
Contribute to national and local air quality targets and reduce the impact of climate change.	✓✓ By producing a moderate benefits with the reduction of traffic congestion, this option would also produce subsequent moderate benefits in the contribution to national and local air quality targets.
Minimise the impacts of the scheme upon the natural and built environment.	✓ The site is already zoned for development. Environmental impacts could be limited by appropriate landscaping. Site access from the Swallow Roundabout would require careful design to minimise any impact on the SINC and trees covered by a TPO.
Rationale for Selection or Rejection of Proposal:	This option scores moderately well against the objectives and STAG criteria and is feasible, affordable and publicly acceptable and is being taken forward for further consideration.

Implementability appraisal	
Technical:	There are no significant technical issues associated with the implementation of this proposal.
Operational:	There are no significant operational issues associated with the implementation of this proposal.
Financial:	There are no significant financial issues associated with the implementation of this proposal.
Public acceptability:	This proposal has not been made public but there are unlikely to be public acceptability issues.

STAG criteria		
Criterion	**Assessment summary**	**Supporting information**
Environment:	0	While the site would result in air quality impacts in the city centre, site access from the Swallow Roundabout would need to be carefully designed to minimise the impact on the SINC and trees covered by a preservation order.
Safety:	0	Significant safety gains are not anticipated, however, there should be no decrease in levels of safety / security.
Economy:	✓✓	This option removes some local traffic from the Swallow Roundabout, reducing congestion for longer distance trips. Public transport users will benefit from an increased service to the west of Dundee and city centre. Park and ride development may also facilitate the growth of new business development along the A90 corridor.
Integration:	✓	The site has the potential to act as a transport node within the Dundee Western Gateway site. Bus services will be able to serve both the Park & Ride site and new development.
Accessibility and Social Inclusion:	✓	Accessibility to the city centre and to the west of Dundee will improve, however the scheme would offer only minor social inclusion benefits.

Proposal details			
Name and address of authority or organisation promoting the proposal: (Also provide name of any subsidiary organisations also involved in promoting the proposal)	TACTRAN, 2 High Street, Perth, PH1 5PH STAG assessment by: Colin Buchanan, 4 St Colme Street, Edinburgh, EH3 6AA		
Proposal Name:	Option 3ii	Name of Planner:	
Proposal Description:	Park and Ride site located north of A90 west of Dundee, with extended slip road	Estimated Total Public Sector Funding Requirement:	capital cost = £3,341,400 annual revenue support = £150,000 Present Value of Cost to Govt = N/A at this stage
Funding Sought From: (if applicable)	Not applicable at this stage	Amount of Application:	Not applicable at this stage
Background information			
Geographic Context:	Dundee is Scotland's 4th largest city and the largest urban area in the TACTRAN region. It is an important employment, educational and regional centre; approximately 300,000 people live within a 30 minute drive of the city. Maintaining and improving accessibility to Dundee is therefore important to the continuing economic health of the region.		
Social Context:	The TACTRAN region has a population of approximately 475,000 people, with almost two thirds living in towns or cities. In Dundee, 17.7% of the resident population are aged between 0-15 years, 64.6% aged 16-64 years and 17.7% aged 65+ years. Approximately 31% of TACTRAN households do not have access to a car; this figure rises to approximately 46% for Dundee City. Access to healthcare facilities for those without access to a car is a key issue for the region, particularly following centralisation of services.		
Economic Context:	Maintaining and improving internal and external regional connectivity is central to ensuring that the economy of the TACTRAN region continues to prosper. Furthermore, it is essential that those who living in TACTRAN's rural communities, as well as larger towns and cities, are well-connected to essential employment, education, health and other key locations. The A90 corridor is an important part of the national trunk network. It provides a strategic function linking the central belt with Dundee and Aberdeen. It also serves an important commuter route to Dundee during peak periods. With a large number of competing movements, congestion occurs at peak periods. This has implications in terms of the local and national economy, and on the environment of the people who live and work in Dundee. While the population of Dundee is forecast to reduce slightly, total employment is expected to increase. This is anticipated to lead further increases in the level of commuting to the city from across the region.		

Transport planning objectives	
Objective:	Performance against transport planning objective:
Improve the public transport accessibility to employment, health, leisure and recreational locations in the west of Dundee and the city centre.	✓✓ This site would produce moderate benefits to the public transport accessibility; it offers an additional options for commuters who are entering locations to the west of Dundee or city centre.
Encourage a shift toward sustainable and healthier modes of transport.	✓✓✓ By offering another, more sustainable, option of travel to the city centre this scheme would produce major benefits in encouraging a shift towards sustainable and healthier modes of transport.
Reduce traffic congestion for longer distance trips in the west of Dundee.	✓✓✓ This option would produce major benefits with regards to traffic congestion by removing a proportion of the traffic from the A90 and Swallow Roundabout area during peak periods.
Contribute to national and local air quality targets and reduce the impact of climate change.	✓✓✓ By reducing traffic congestion on the approach to the A90 roundabout carbon emissions will be reduced, helping to contribute towards national and local air quality targets.
Minimise the impacts of the scheme upon the natural and built environment.	✓ The site is already zoned for development. Environmental impacts could be limited by appropriate landscaping. Site access from the Swallow Roundabout would require careful design to minimise any impact on the SINC and trees covered by a TPO.
Rationale for Selection or Rejection of Proposal:	This option scores well against the objectives and STAG criteria and is feasible, affordable and publicly acceptable and is being taken forward for further consideration.

Implementability appraisal	
Technical:	There are no significant technical issues associated with the implementation of this proposal.
Operational:	There are no significant operational issues associated with the implementation of this proposal.
Financial:	Construction of extended slip road, eastbound would be expensive. This may open up the area to potential development in the future so may not be as expensive as initial costs would seem.
Public acceptability:	This proposal has not been made public but there are unlikely to be public acceptability issues.

STAG Criteria		
Criterion	**Assessment summary**	**Supporting information**
Environment:	0	While the site would result in air quality impacts in the city centre, site access from the Swallow Roundabout would need to be carefully designed to minimise the impact on the SINC and trees covered by a preservation order.
Safety:	0	Significant safety gains are not anticipated, however, there should be no decrease in levels of safety / security.
Economy:	✓✓	This option removes some local traffic from the Swallow Roundabout, reducing congestion for longer distance trips. Public transport users will benefit from an increased service to the west of Dundee and city centre. Park and ride development may also facilitate the growth of new business development along the A90 corridor.
Integration:	✓	The site has the potential to act as a transport node within the Dundee Western Gateway site. Bus services will be able to serve both the Park & Ride site and new development.
Accessibility and Social Inclusion:	✓	Accessibility to the city centre and to the west of Dundee will improve, however the scheme would offer only minor social inclusion benefits.

Proposal details			
Name and address of authority or organisation promoting the proposal: (Also provide name of any subsidiary organisations also involved in promoting the proposal)		TACTRAN, 2 High Street, Perth, PH1 5PH STAG assessment by: Colin Buchanan, 4 St Colme Street, Edinburgh, EH3 6AA	
Proposal Name:	Option 5	Name of Planner:	
Proposal Description:	Park and Ride site located north of the Swallow Roundabout	Estimated Total Public Sector Funding Requirement:	capital cost = £1,991,400 annual revenue support = £150,000 Present Value of Cost to Govt = N/A at this stage
Funding Sought From: (if applicable)	Not applicable at this stage	Amount of Application:	Not applicable at this stage
Background information			
Geographic Context:	Dundee is Scotland's 4th largest city and the largest urban area in the TACTRAN region. It is an important employment, educational and regional centre; approximately 300,000 people live within a 30 minute drive of the city. Maintaining and improving accessibility to Dundee is therefore important to the continuing economic health of the region.		
Social Context:	The TACTRAN region has a population of approximately 475,000 people, with almost two thirds living in towns or cities. In Dundee, 17.7% of the resident population are aged between 0-15 years, 64.6% aged 16-64 years and 17.7% aged 65+ years. Approximately 31% of TACTRAN households do not have access to a car; this figure rises to approximately 46% for Dundee City. Access to healthcare facilities for those without access to a car is a key issue for the region, particularly following centralisation of services.		
Economic Context:	Maintaining and improving internal and external regional connectivity is central to ensuring that the economy of the TACTRAN region continues to prosper. Furthermore, it is essential that those who living in TACTRAN's rural communities, as well as larger towns and cities, are well-connected to essential employment, education, health and other key locations. The A90 corridor is an important part of the national trunk network. It provides a strategic function linking the central belt with Dundee and Aberdeen. It also serves an important commuter route to Dundee during peak periods. With a large number of competing movements, congestion occurs at peak periods. This has implications in terms of the local and national economy, and on the environment of the people who live and work in Dundee. While the population of Dundee is forecast to reduce slightly, total employment is expected to increase. This is anticipated to lead further increases in the level of commuting to the city from across the region.		

Transport planning objectives		
Objective:	Performance against transport planning objective:	
Improve the public transport accessibility to employment, health, leisure and recreational locations in the west of Dundee and the city centre.	✓	This site would produce minor benefits to the public transport accessibility; it offers an additional options for commuters who are entering locations to the west of Dundee or city centre.
Encourage a shift toward sustainable and healthier modes of transport.	✓✓	By offering another, more sustainable, option of travel to the city centre this scheme would produce moderate benefits in encouraging a shift towards sustainable and healthier modes of transport.
Reduce traffic congestion for longer distance trips in the west of Dundee.	✓	This site is accessed from the Swallow Roundabout and provides no significant reduction in local traffic on the trunk road. Existing conflicts between local and long distance trips between the central belt and Dundee would be mitigated on Riverside Avenue and the approaches to the city centre.
Contribute to national and local air quality targets and reduce the impact of climate change.	✓	By removing some traffic from the local road network, this option would also produce subsequent minor benefits in the contribution to national and local air quality targets.
Minimise the impacts of the scheme upon the natural and built environment.	✓	The site is already zoned for development. Environmental impacts could be limited by appropriate landscaping.
Rationale for Selection or Rejection of Proposal:	Due to the relatively low score of this option against the study objectives it has been rejected from further consideration.	

Implementability appraisal	
Technical:	There are no significant technical issues associated with the implementation of this proposal.
Operational:	There are no significant operational issues associated with the implementation of this proposal.
Financial:	There are no significant financial issues associated with the implementation of this proposal.
Public acceptability:	This proposal has not been made public but there are unlikely to be public acceptability issues.

STAG criteria		
Criterion	**Assessment summary**	**Supporting information**
Environment:	✓	Benefits in air quality would be achieved with the reduction of congestion levels along Riverside Avenue / Riverside Drive. The scheme would be landscaped to minimise its impact on the landscape.
Safety:	0	Significant safety gains are not anticipated, however, there should be no decrease in levels of safety / security.
Economy:	✓	Increased public transport provision is expected to result in slight journey time benefits during peak hours and slight economic growth. Public transport users will benefit from an increased service to the west of Dundee and city centre. Park and ride development may also facilitate the growth of new business development along the A90 corridor.
Integration:	✓	This site would offer integration with the planned western villages to the north west of Dundee; it is also located close to local pedestrian and cycle rotues
Accessibility and Social Inclusion:	✓	Accessibility to the city centre and to the west of Dundee will improve, however the scheme would offer only minor social inclusion benefits.

Proposal details			
Name and address of authority or organisation promoting the proposal: (Also provide name of any subsidiary organisations also involved in promoting the proposal)		TACTRAN, 2 High Street, Perth, PH1 5PH STAG assessment by: Colin Buchanan, 4 St Colme Street, Edinburgh, EH3 6AA	
Proposal Name:	Option 6A	Name of Planner:	
Proposal Description:	Park and Ride site located north of Perth Road	Estimated Total Public Sector Funding Requirement:	capital cost = £1,727,400 annual revenue support = £0 Present Value of Cost to Govt = N/A at this stage
Funding Sought From: (if applicable)	Not applicable at this stage	Amount of Application:	Not applicable at this stage
Background information			
Geographic Context:	Dundee is Scotland's 4th largest city and the largest urban area in the TACTRAN region. It is an important employment, educational and regional centre; approximately 300,000 people live within a 30 minute drive of the city. Maintaining and improving accessibility to Dundee is therefore important to the continuing economic health of the region.		
Social Context:	The TACTRAN region has a population of approximately 475,000 people, with almost two thirds living in towns or cities. In Dundee, 17.7% of the resident population are aged between 0-15 years, 64.6% aged 16-64 years and 17.7% aged 65+ years. Approximately 31% of TACTRAN households do not have access to a car; this figure rises to approximately 46% for Dundee City. Access to healthcare facilities for those without access to a car is a key issue for the region, particularly following centralisation of services.		
Economic Context:	Maintaining and improving internal and external regional connectivity is central to ensuring that the economy of the TACTRAN region continues to prosper. Furthermore, it is essential that those who living in TACTRAN's rural communities, as well as larger towns and cities, are well-connected to essential employment, education, health and other key locations. The A90 corridor is an important part of the national trunk network. It provides a strategic function linking the central belt with Dundee and Aberdeen. It also serves an important commuter route to Dundee during peak periods. With a large number of competing movements, congestion occurs at peak periods. This has implications in terms of the local and national economy, and on the environment of the people who live and work in Dundee. While the population of Dundee is forecast to reduce slightly, total employment is expected to increase. This is anticipated to lead further increases in the level of commuting to the city from across the region.		

Transport planning objectives		
Objective:	Performance against transport planning objective:	
Improve the public transport accessibility to employment, health, leisure and recreational locations in the west of Dundee and the city centre.	✓✓	This site attracts significant levels of demand in early years and provides additional parking for Ninewells Hospital. In future years, demand increases at a lower level due to congestion impacts at the Swallow Roundabout
Encourage a shift toward sustainable and healthier modes of transport.	✓✓✓	By offering another, more sustainable, option of travel to the city centre this scheme would produce moderate benefits in encouraging a shift towards sustainable and healthier modes of transport.
Reduce traffic congestion for longer distance trips in the west of Dundee.	✓	This site is accessed from Riverside Aveneue and provides no reduction in local traffic on the trunk road. Existing conflicts between local and long distance trips are mitigated to Dundee city centre.
Contribute to national and local air quality targets and reduce the impact of climate change.	✓✓	This site would provide benefits in meeting national and local air quality targets in Dundee city centre. Although Park & Ride demand is high, it provides no congestion relief on the A90 and so has only a minor impact in reducing emissions at this location.
Minimise the impacts of the scheme upon the natural and built environment.	✖	This site is located on high amenity land and its development would have a local impact on the environment
Rationale for Selection or Rejection of Proposal:	Due to the low score of this option against the study objectives it has been rejected from further consideration.	

Implementability appraisal	
Technical:	The site is in private ownership. Construction of a Park & Ride site would result in a significant loss of amenity in the existing campus development.
Operational:	There are no significant operational issues associated with the implementation of this proposal.
Financial:	There are no significant financial issues associated with the implementation of this proposal.
Public acceptability:	This proposal has not been made public; the site is located on private grounds and discussions would be required with the site owners as to the acceptability of this proposal.

STAG criteria		
Criterion	**Assessment summary**	**Supporting information**
Environment:	✓	Benefits in air quality would be achieved with the reduction of congestion levels along Riverside Avenue / Riverside Drive, however, the site has a high amenity value, being located within private landscaped grounds.
Safety:	0	Significant safety gains are not anticipated, however, there should be no decrease in levels of safety / security.
Economy:	✓	Increased public transport provision is expected to result in slight journey time benefits during peak hours and slight economic growth. Public transport users will benefit from an increased service to the west of Dundee and city centre. Park and ride development may also facilitate the growth of new business development along the A90 corridor.
Integration:	✓✓	This site could well itegrated with existing walking and cycling links and local bus services.
Accessibility and Social Inclusion:	✓	Accessibility to the city centre and to the west of Dundee will improve, however the scheme would offer only minor social inclusion benefits.

Proposal details			
Name and address of authority or organisation promoting the proposal: (Also provide name of any subsidiary organisations also involved in promoting the proposal)	TACTRAN, 2 High Street, Perth, PH1 5PH STAG assessment by: Colin Buchanan, 4 St Colme Street, Edinburgh, EH3 6AA		
Proposal Name:	Option 6B	Name of Planner:	
Proposal Description:	Park and Ride site adjacent to the new Dundee west train station	Estimated Total Public Sector Funding Requirement:	capital cost = £1,641,400 annual revenue support = £0 Present Value of Cost to Govt = N/A at this stage
Funding Sought From: (if applicable)	Not applicable at this stage	Amount of Application:	Not applicable at this stage
Background information			
Geographic Context:	Dundee is Scotland's 4th largest city and the largest urban area in the TACTRAN region. It is an important employment, educational and regional centre; approximately 300,000 people live within a 30 minute drive of the city. Maintaining and improving accessibility to Dundee is therefore important to the continuing economic health of the region.		
Social Context:	The TACTRAN region has a population of approximately 475,000 people, with almost two thirds living in towns or cities. In Dundee, 17.7% of the resident population are aged between 0-15 years, 64.6% aged 16-64 years and 17.7% aged 65+ years. Approximately 31% of TACTRAN households do not have access to a car; this figure rises to approximately 46% for Dundee City. Access to healthcare facilities for those without access to a car is a key issue for the region, particularly following centralisation of services.		
Economic Context:	Maintaining and improving internal and external regional connectivity is central to ensuring that the economy of the TACTRAN region continues to prosper. Furthermore, it is essential that those who living in TACTRAN's rural communities, as well as larger towns and cities, are well-connected to essential employment, education, health and other key locations. The A90 corridor is an important part of the national trunk network. It provides a strategic function linking the central belt with Dundee and Aberdeen. It also serves an important commuter route to Dundee during peak periods. With a large number of competing movements, congestion occurs at peak periods. This has implications in terms of the local and national economy, and on the environment of the people who live and work in Dundee. While the population of Dundee is forecast to reduce slightly, total employment is expected to increase. This is anticipated to lead further increases in the level of commuting to the city from across the region.		

Transport planning objectives		
Objective:	Performance against transport planning objective:	
Improve the public transport accessibility to employment, health, leisure and recreational locations in the west of Dundee and the city centre.	✓✓	This site attracts significant levels of demand in early years and provides additional parking for Ninewells Hospital. In future years, demand increases at a lower level due to congestion impacts at the Swallow Roundabout
Encourage a shift toward sustainable and healthier modes of transport.	✓✓	By offering another, more sustainable, option of travel to the city centre this scheme would produce minor benefits in encouraging a shift towards sustainable and healthier modes of transport.
Reduce traffic congestion for longer distance trips in the west of Dundee.	✓	This option would provide minor benefits with regards to traffic congestion as it is located well within the congestion boundary.
Contribute to national and local air quality targets and reduce the impact of climate change.	✓✓	the site would attract significant patronage and would help reduce congestion and improve air quality in Dundee city centre.
Minimise the impacts of the scheme upon the natural and built environment.	0	There will be a neutral effect on the natural and built environment; development of the site would not cause a greatly negative impact but the site is unlikely to achieve the necessary demand to produce a positive impact.
Rationale for Selection or Rejection of Proposal:	This option scores well against the objectives and STAG criteria and is feasible, affordable and publicly acceptable and is being taken forward for further consideration.	

Implementability appraisal	
Technical:	There are no significant technical issues associated with the implementation of this proposal.
Operational:	There are no significant operational issues associated with the implementation of this proposal.
Financial:	There are no significant financial issues associated with the implementation of this proposal.
Public acceptability:	This proposal has not been made public but there are unlikely to be public acceptability issues.

STAG criteria		
Criterion	**Assessment summary**	**Supporting information**
Environment:	0	The site attracts a high level of patronage and would help improve local air quality on Riverside Avenue and the city centre. Careful landscaping would be required to minimise the impact of the site on the proposed wildife park.
Safety:	0	Significant safety gains are not anticipated, however, there should be no decrease in levels of safety / security.
Economy:	✓	Increased public transport provision is expected to result in slight journey time benefits during peak hours and slight economic growth. Public transport users will benefit from an increased service to the west of Dundee and city centre. Park and ride development may also facilitate the growth of new business development along the A90 corridor.
Integration:	✓✓	This site is adjacent to the proposed relocated Invergowrie rail station. As such, it could serve a dual function as both a Park & Ride site for the City Centre and a parkway for the station. It is also adjacent to local walking and cycling routes.
Accessibility and Social Inclusion:	✓	Accessibility to the city centre and to the west of Dundee will improve, however the scheme would offer only minor social inclusion benefits.

Appendix C

Scheme costs (2010 prices)

Capital costs (400 spaces excluding site access)

Item	Quantity	Unit	Rate	Total cost
Site clearance		allow		£5,000
Earthworks	8750	m3	£1.10	£9,625
Surplus materials off site	7000	m3	£19.70	£137,900
Car park drainage	17500	m2	£14.50	£253,750
Sub-base / base course	17500	m2	£13.20	£231,000
Binder course / surface course	17500	m2	£17.80	£311,500
Car park kerbing	1500	m	£25.00	£37,500
Car park markings		allow		£10,000
Footways and footpaths	17500	m2	£5.00	£87,500
Topsoil		allow		£10,000
Perimeter fence	550	m	£100.00	£55,000
Landscaping		allow		£60,000
Electricity supply		allow		£20,000
Utilities ducting		allow		£35,000
Car park lighting	17500	m2	£5.00	£87,500
Terminal building / shelter		allow		£75,000
Signs, fixed information displays		allow		£10,000
CCTV cameras		allow		£100,000
Miscellaneous works		allow		£39,750
Total				£1,576,025

Site access costs, Sites 3 / 5

Item	Quantity	Unit	Rate	Total cost
Site clearance		allow		£50,000
Earthworks	6136	m3	£1.10	£6,750
Surplus materials off site	4548	m3	£19.70	£89,598
Drainage	7219	m2	£14.50	£104,678
Sub-base / base course	7219	m2	£13.20	£95,293
Binder course / surface course	7219	m2	£17.80	£128,502
Footways and footpaths	1500	m2	£5.00	£7,500
Road markings / signage		allow		£10,000
Electricity supply		allow		£10,000
Utilities ducting		allow		£15,000
Car park lighting	7125	m2	£5.00	£35,625
Landscaping		allow		£50,000
Miscellaneous works		allow		£25,000
Total				£577,946

Short slip, Site 3i

Item	Quantity	Unit	Rate	Total cost
Site clearance		allow		£30,000
Earthworks	2280	m3	£1.10	£2,508
Surplus materials off site	2264	m3	£19.70	£44,602
Drainage	2850	m2	£14.50	£41,323
Sub-base / base course	2850	m2	£13.20	£37,618
Binder course / surface course	2850	m2	£17.80	£50,728
Footways and footpaths	1500	m2	£5.00	£7,500
Road markings / signage		allow		£8,000
Electricity supply		allow		£10,000
Utilities ducting		allow		£15,000
Car park lighting	2850	m2	£5.00	£14,249
Landscaping		allow		£30,000
Miscellaneous works		allow		£50,000
Total				£311,529

Long slip, Site 3ii

Item	Quantity	Unit	Rate	Total cost
Site clearance		allow		£120,000
Earthworks	15000	m3	£1.10	£16,500
Surplus materials off site	12293	m3	£19.70	£242,175
Drainage	13659	m2	£14.50	£198,056
Sub-base / base course	13659	m2	£13.20	£180,300
Binder course / surface course	13659	m2	£17.80	£243,131
Footways and footpaths	4500	m2	£5.00	£22,500
Road markings / signage		allow		£24,000
Electricity supply		allow		£20,000
Utilities ducting		allow		£45,000
Car park lighting	13659	m2	£5.00	£68,295
Landscaping		allow		£90,000
Miscellaneous works		allow		£200,000
Total				£1,349,958

Total site access costs

Location		Site access roads
Site 3	New access from Swallow roundabout	£557,946
Site 3i	As Site 3 with additional short slip from A90	£889,475
Site 3ii	As Site 3 with additional long slip from A90	£1,927,904
Site 5	New access from Swallow roundabout	£577,946
Site 6B	New roundabout from Riverside Ave*	£300,000

Approximate cost calculated from SPONS

Park & Ride operating costs (400 spaces)

Item	Unit	Cost
Cleaning and maintenance	£10.00/person/hour	£8,320
Marketing and publicity	SUM	£6,000
Business rates	SUM	£10,000
Utilities	SUM	£9,000
CCTV maintenance contract	SUM	£10,000
Total		£43,320

Bus operating costs (per bus), hybrid service

Location	Additional bus via Perth Rd from P&R site to city centre	Extension of existing service from Ninewells to P&R site
Bus running costs		
Route length (km)	15.60	3.80
No of return journeys	12	24
Fuel cost/km (£)	0.20	0.20
Vehicle maintenance cost/km (£)	0.32	0.32
Other cost/km (£)	0.12	0.12
Total cost/km (£)	0.64	0.64
Total variable costs	£36,694.34	£17,876.73
Leasing costs		
Finance Charges %	0.10	0.10
Lease Period	10.00	10.00
Annual Payment/Vehicle	£10,558.21	£10,558.21
Insurance Cost/Annum/Vehicle (£):	1,800.00	1,800.00
Road Tax Cost/Annum/Vehicle (£):	400.00	400.00
Total fixed operating costs	£12,758.21	£12,758.21
Labour costs		
Working hours	8.00	8.00
Driver costs (£/Hour)	10.50	10.50
Crew shifts	2.00	2.00
Total labour costs	£51,408.00	£51,408.00
Total annual operating cost	£100,860.55	£82,042.94

Total Park & Ride costs input to TUBA (400 spaces)

Site	Site cost	Access cost	Total cost	Total including fess and contingencies	Total including optimism bias	Land costs	Car park operating costs	Annual maintenance costs	Car park operating cots (60 years)	Maintenance costs (59 years)
Site 3	£1,576,025	£557,946	£2,153,971	£2,907,860	£4,045,158	£290,786	£43,320	£107,699	£2,599,200	£6,354,214
Site 3i	£1,576,025	£889,475	£2,465,500	£3,328,424	£4,630,210	£332,843	£43,320	£123,275	£2,599,200	£7,273,224
Site 3ii	£1,576,025	£1,927,904	£3,503,929	£4,730,305	£6,580,379	£473,030	£43,320	£175,196	£2,599,200	£10,336,591
Site 5	£1,576,025	£557,946	£2,153,971	£2,907,860	£4,045,158	£290,786	£43,320	£107,699	£2,599,200	£6,354,214
Site 6B	£1,576,025	£300,000	£1,876,025	£2,532,634	£3,523,175	£253,263	£43,320	£93,801	£2,599,200	£5,534,274

Values highlighted are input to TUBA

Land costs have been assumed to be 10% of construction costs

Maintenance costs are assumed to be 5% of the construction cost per annum

Total bus operating costs input to TUBA (400 spaces) – hybrid example

Site		No of buses	Bus service (Cost p.a) Additional bus operating between P%R site and city centre	No of buses	Bus service (Cost p.a Additional bus operating between P&R site and Ninewells hospital	Annual bus operating costs	Years of operating grant	Total bus operating costs (60 years)
Site 3	commercial	4	£110,034	1	£108,858	£548,995	10	£5,489,946
	hybrid	1	£100,861	2	£82,043	£264,946	60	£15,896,785
	dedicated	4	£110,034	1	£108,858	£548,995	60	£32,939,674
Site 3i	commercial	4	£110,034	1	£108,858	£548,995	10	£5,489,946
	hybrid	1	£100,861	2	£82,043	£264,946	60	£15,896,785
	dedicated	4	£110,034	1	£108,858	£548,995	60	£32,939,674
Site 3ii	commercial	4	£110,034	1	£108,858	£548,995	10	£5,489,946
	hybrid	1	£100,861	2	£82,043	£264,946	60	£15,896,785
	dedicated	4	£110,034	1	£108,858	£548,995	60	£32,939,674
Site 5	commercial	4	£110,034	1	£108,858	£548,995	10	£5,489,946
	hybrid	1	£100,861	2	£82,043	£264,946	60	£15,896,785
	dedicated	4	£110,034	1	£108,858	£548,995	60	£32,939,674
Site 6B	commercial	2	£103,213			£206,425	10	£2,064,255
	hybrid	2	£103,213			£206,425	60	£12,385,530
	dedicated	4	£112,974			£451,898	60	£27,113,852

Appendix D

Demand forecasting

D Demand forecasting

D.1 Introduction

D.1.1 This appendix summarises the detailed forecasting undertaken for each Park & Ride selected for Initial Appraisal. The forecasting methodology is summarised below, including details of the development of input PRIDE matrices and background assumptions.

D.2 Forecasting methodology

D.2.1 The forecasting tool used for the study is PRIDE. PRIDE is a demand forecasting model developed by CB specifically for the assessment of Park and Ride schemes. It was developed initially for the 1993 Greater Manchester Park and Ride Methodology Study, jointly funded by the Association of Greater Manchester Authorities and the then Department of Transport. The main inputs to PRIDE are:

- car trip demand by origin, destination, time period and/or trip purpose;
- car journey costs – in-vehicle time, parking search times, parking charges, and walk times from the car park;
- journey costs by Park and Ride – access times to the Park and Ride site by car, walk time at the site, wait time, fare, in-vehicle time, and walk time from the bus stop at the destination;
- mode choice parameters.

D.2.2 A full summary of the PRIDE software and inputs is given in Appendix E.

Assessment years

PRIDE forecasts Park & Ride patronage by origin, destination and time period for each given site. For this study, the assessment years are 2012 and 2022 in accordance with LATIS forecast years.

Trip demand and costs

D.2.3 Morning and interpeak demand, journey time and distance matrices were skimmed from the Land-use And Transport Integration in Scotland (LATIS) model, for 2007, 2012 and 2022 model years.

D.2.4 In addition, Dundee City Council supplied the Dundee City Centre Paramics (DCCP) model. Skims of demand, time and distance were taken from the 2007 “Test 2” scenario.

D.2.5 PRIDE input matrices have been created from a combination of both data sets. LATIS provides information on all O-D movements across Scotland and to Dundee in particular. It is however, too aggregate within Dundee City Centre to fully reflect car parking availability and charges with a sufficient degree of accuracy for this study. By contrast the DCCP model is extremely detailed within the city centre but provides no information on trip origins or destinations beyond its model limits.

D.2.6 By combining both data sets it has been possible to create robust matrices which provide sufficient detail with regard to origin – destination, travel time and distance at both a national and local level.

D.2.7 Additional data used in the creation of input matrices includes:

- origin – destination data from the Ninewells Hospital travel plan
- recent journey time surveys undertaken by Colin Buchanan along the A90 / Riverside Avenue / Riverside Drive corridor

Matrix building

Zone system

D.2.8 The zone system for PRIDE combines the LATIS zone and the DCCP model zone systems.

D.2.9 Figure D.1 shows the LATIS zone system is the vicinity of Dundee. Zones 552 and 555 are covered in full by the extent of the DCCP model while zones 548, 551, 556 and 559 have some overlap with the DCCP zone system. The extent of the DCCP is shown in Figure D.2.

Figure D.1: LATIS zones in vicinity of Dundee

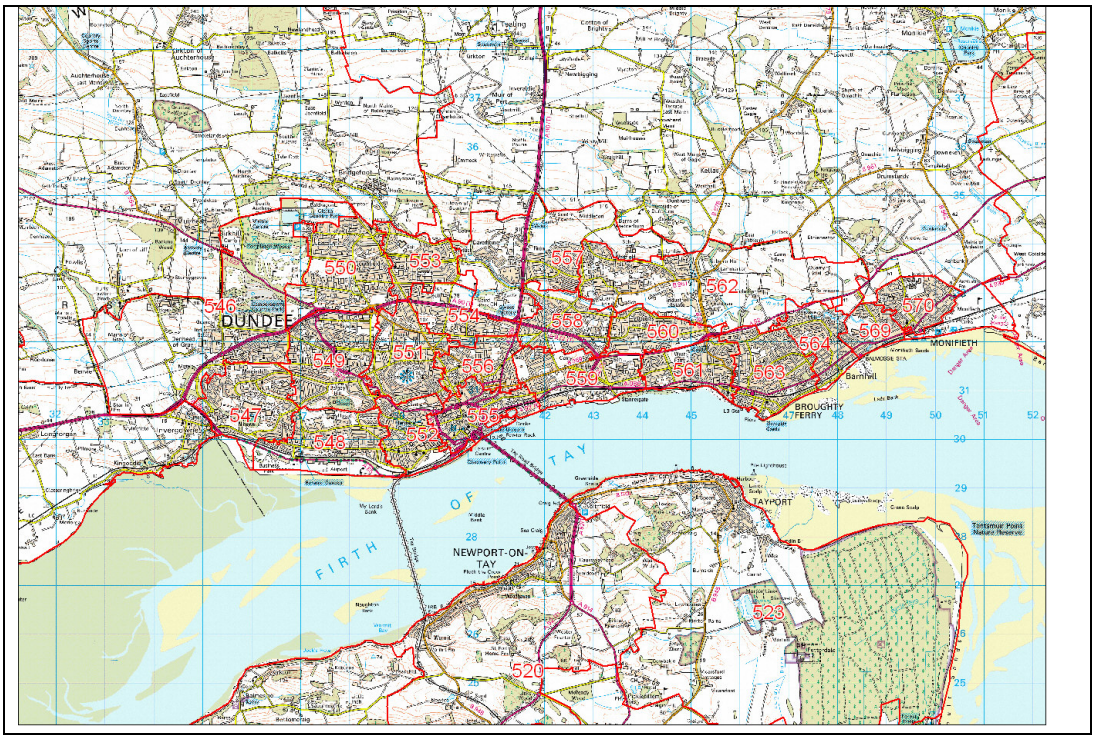
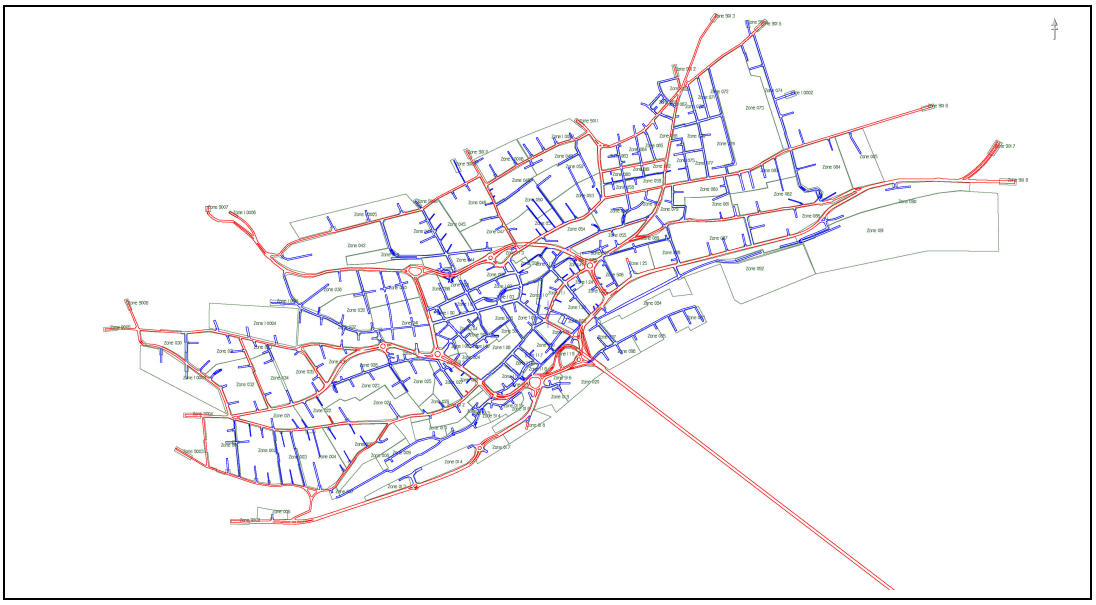


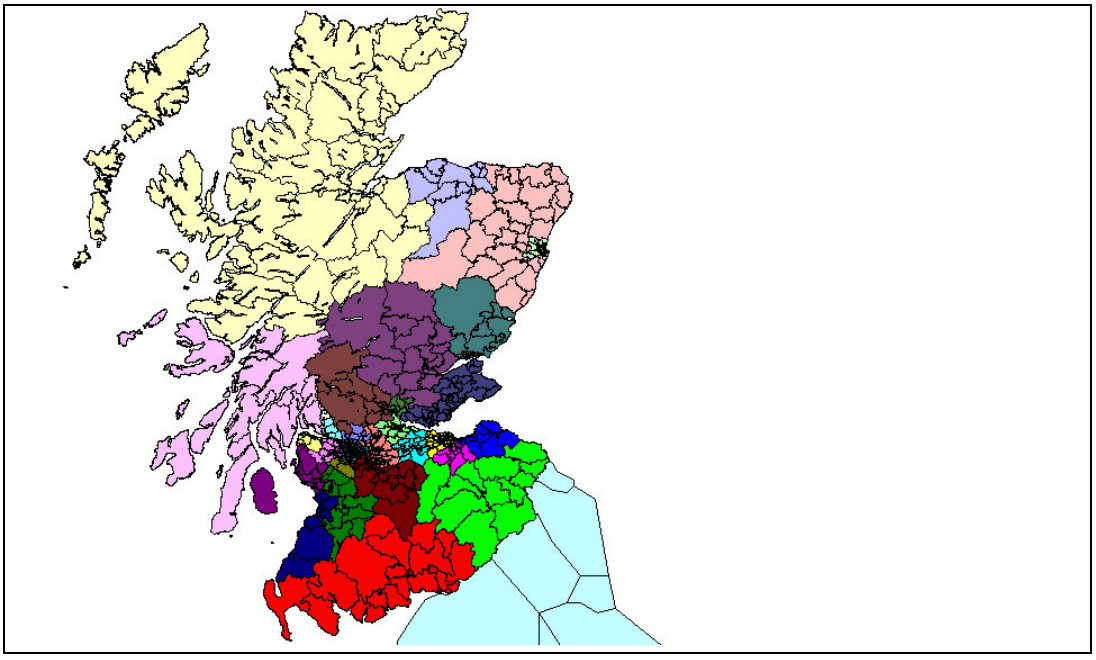
Figure D.2: DCCP model extents and zone plan



D.2.10 LATIS zones have been aggregated by Local Authority area, as shown in Figure D.3, with the exception of those in Dundee City, Fife, Perth & Kinross and Angus. The zones in these areas are treated as follows:

- Dundee City – LATIS zones 552 & 555: replace with DCCP zoning system.
- Dundee City –LATIS zones other than 552 & 555: use LATIS zones with no aggregation.
- Fife – aggregate LATIS zones into 5 districts.
- Perth & Kinross – use LATIS zones with no aggregation.
- Angus – use LATIS zones with no aggregation.

Figure D.3: LATIS Local Authority areas



D.2.11 The DCCP model contains 166 zones of which 141 are internal. LATIS zone 552 is replaced with 35 DCCP zones and LATIS zone 555 is replaced with 69 DCCP zones. Demand from the remaining DCCP zones is replaced by that of the equivalent LATIS zones.

D.2.12 Ninewells Hospital is disaggregated from its LATIS zone for destination trips only (process described below).

Development of trip matrices

D.2.13 The process to combine DCCP and LATIS demand data has been undertaken in two stages:

1. Aggregate LATIS demand using zone system
2. Combine DCCP and aggregated LATIS (a-LATIS) demand

Table D.14.1: Trip generation methodology

		To	
		Dundee City Centre	Rest of Scotland
From	Dundee City Centre	Use DCCP demand	Use DCCP with trips to external zones disaggregated to a-LATIS zones
	Rest of Scotland	Use DCCP with trips from external zones disaggregated to a-LATIS zones	Use a-LATIS demand

D.2.14 To avoid the potential double counting of trips, any DCCP zones which fall outside of LATIS zones 552 and 555 haven been treated as external. Therefore trips to those zones from other DCCP zones have been treated as “Dundee City Centre” to “Rest of Scotland” trips.

D.2.15 An exception to the above methodology has been made for Ninewells Hospital. Morning and interpeak trips to Ninewells Hospital are instead calculated and distributed using the following method:

- A general trip rate for “General Hospital with Casualty” has been extracted from the TRICS database
- From this trip rate the proportion of trips arriving in both the peak morning hour and the average interpeak hour has calculated
- From the Ninewells Travel Plan the total number of employees has been identified along with the proportion of employees working full time and arriving by car
- The approximate number of trips arriving in each peak hour and average interpeak hour has thus been calculated
- From the travel plan, the distribution of employee residences by postcode has been extracted and converted to a distribution by aLATIS zones
- This distribution is then applied to the number of trips calculated for each model period
- For a-LATIS zones 58 and 61 (Dundee city centre) these trips have been further distributed by DCCP zone
- In order to be able to accurately identify Ninewells demand, the hospital has been given its own zone within the PRIDE matrices and trips to a-LATIS zone 53 (previously containing Ninewells) have been factored to ensure that the total number of trips to the area is unchanged.

D.2.16 Although the DCCP model does not include a full interpeak scenario the following data is available:

- AM and PM DCCP "Test 2" skims (2007)
- AM and IP LATIS skims

D.2.17 A combination of "Test 2" morning and evening peak demands have been used to give an approximate interpeak demand matrix.

The following procedure has been used:

- 1) sum morning and interpeak demands
- 2) factor these combined demands back to the morning peak matrix total
- 3) calculate morning to interpeak factors from the available LATIS skims
- 4) factor the combined demand matrix created in step 2 to an interpeak matrix using the LATIS factor in step 3.

D.2.18 The methodology is considered sufficiently robust for the purposes of this study. In particular, the advantage of the use of detailed Paramics zoning is maintained and this more than offsets any small error in the interpeak matrix demands.

Growth from 2012 to 2022

D.2.19 Traffic growth has been determined from the increase in destination trips to Dundee city centre from the LATIS models. Growth has been calculated from a-LATIS Zones 58 and 61 (Dundee City centre). The following factors result:

- LATIS (destination trip) growth 2007 to 2012 AM = 1.130
- LATIS (destination trip) growth 2007 to 2012 IP = 1.264
- LATIS (destination trip) growth 2007 to 2022 AM = 1.563
- LATIS (destination trip) growth 2007 to 2022 IP = 1.987

D.2.20 These are the factors used to obtain 2012 and 2022 trip matrices from the 2007 DCCP matrices.

Travel time and travel distance methodology

D.2.21 Travel time matrices have been calculated based on the following methodology:

- LATIS matrices have been aggregated (giving a-LATIS matrices) using the zone system described above with travel times averaged over constituent LATIS zones
- "interface" zones have been identified in the DCCP model. These are DCCP zones which lie on the edge of LATIS zones 552 & 555 close to, or on, major routes into the city centre
- two "central" DCCP zones have been identified as close to the centroids of LATIS zones 552 & 555
- next, all a-LATIS zones have been associated with one of 4-5 sectors depending on how traffic from these zones would approach Dundee, eg. north Fife traffic approaches via the Tay Bridge, Perth traffic accesses Dundee via the A90, etc
- the journey times between the "interface" and "central" DCCP zones have then been calculated. These "adjustment" values are used to calculate travel time from a-LATIS zones to the edge of the DCCP model area
- surveyed travel times between potential Park & Ride sites and the edge of the DCCP model have been used directly instead of a-LATIS data to ensure accuracy for these trips which are most important in terms of potential Park & Ride demand

D.2.22 Figure D.4 and Table D.14.2 summarise how the travel times for the various types of trips are calculated.

Figure D.4: Travel time and distance adjustment

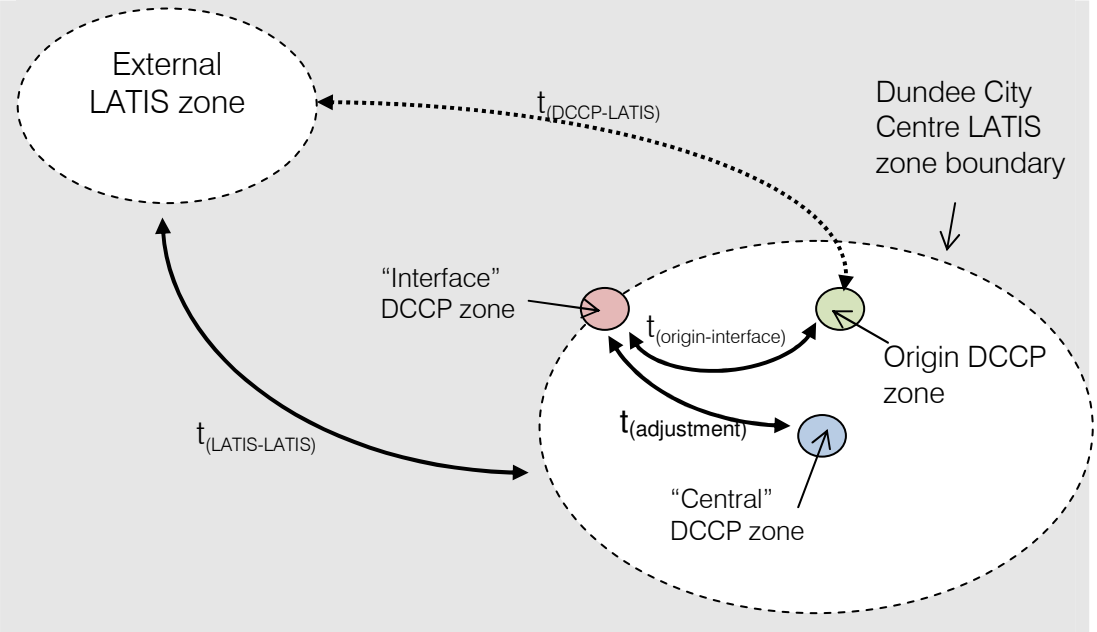


Table D.14.2: Travel time methodology

		To		
		Dundee City Centre	LATIS zones containing potential P&R sites	Rest of Scotland
From	Dundee City Centre	Use DCCP travel time	[DCCP time from origin zone to "interface" zone] + [Surveyed travel time from "interface" DCCP zone to P&R site]	[DCCP time from origin zone to relevant "interface" zone] - ["adjustment" time from DCCP "interface" zone to "central" zone] + [Averaged LATIS times from Dundee zones]
	LATIS zones containing potential P&R sites	[Surveyed travel time from P&R site to "interface" DCCP zone] + [DCCP time from "interface" zone to destination zone]	Use averaged LATIS travel times	Use averaged LATIS travel times
	Rest of Scotland	[Averaged LATIS times to Dundee zones] - ["adjustment" time from DCCP "interface" zone to "central" zone] + [DCCP time from relevant "interface" zone to destination zone]	Use averaged LATIS travel times	Use averaged LATIS travel times

D.2.23 Travel distances have been calculated following the same methodology as that for travel time above.

Free parking and parking search and walk times

D.2.24 The availability of free parking is a major constraint on the Park and Ride market. Car trip demand has been disaggregated by those who pay for parking and those who enjoy free parking.

D.2.25 Parking search times are related to the ease of parking, which itself is a function of the balance between demand and supply. We have used the following search times in our model.

- On-street parking and small car parks – 2 to 3 minutes
- Larger car parks – 4 minutes
- Ninewells Hospital – 7 minutes (partly representing the difficulty in finding a space and in entering / exiting major car parks at peak periods)

D.2.26 Walk times from the car parks to destination zones have been estimated from maps and average walking speeds.

Costs by Park & Ride

D.2.27 Many of the costs of making a journey by Park & Ride will be a function of the service design – routes, stop locations, frequency and fares. The scope for serving intermediate destinations en route and allowing boarding at intermediate stops has been considered for each site.

D.2.28 Patronage sensitivity tests have been undertaken based on increased city centre parking charges, increased walk times as a result of possible extensions to the controlled parking zone (CPZ) and bus priority measures. The impact of the provision of a reduced bus service frequency and alternative Park & Ride fares have also been considered.

Mode choice parameters

D.2.29 Model parameters (modal penalty and spread factor) represent people's attitude to mode shift.

D.2.30 The mode penalty represents the immeasurable negative parts of a public transport journey such as reliability, convenience and image. A car journey is given zero mode penalty while public transport is given a positive mode penalty in the form of additional journey time.

D.2.31 For Park & Ride, the spread factor (lambda) can lie anywhere between 0.04 and 0.08. Colin Buchanan are presently undertaking all the transport modelling in relation to Edinburgh Tram and as part of this work, values of lambda have been determined. In the Edinburgh Transport Model (which includes Park & Ride), lambda has been calculated to be 0.06.

D.2.32 A modal penalty of 20 minutes has been assumed, which is typical for park and ride schemes. This penalty represents the overall perceived additional cost to Park & Ride users, including peoples resistance to switching mode from the car, and the perceived cost of interchange.

Scheme parameters

D.2.33 This section summarises the key inputs and assumptions which relate to the central demand forecasts for each site. Based on these, summary results for each site are given in Section D.3 below.

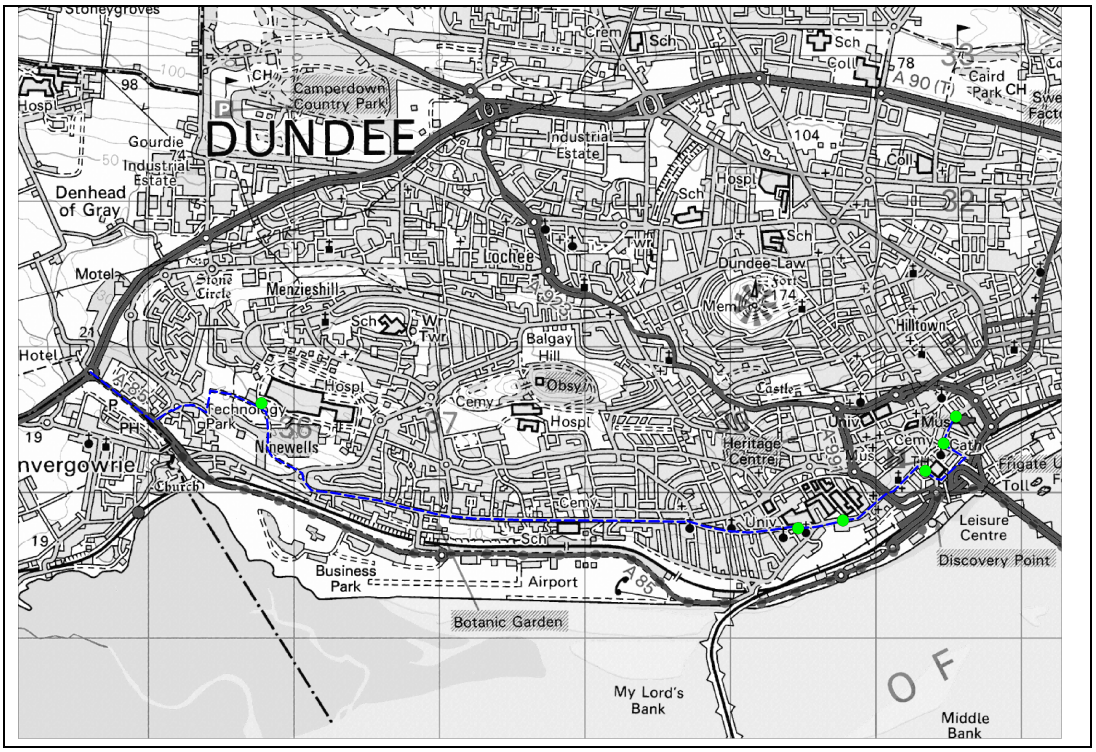
Service provision

D.2.34 In order to establish the potential patronage of each site, a number of assumptions have been made as likely bus route and stop locations and these are shown in Figure D.5. All assumptions have been made in consultation with local bus operators.

D.2.35 With regard to journey times it is assumed that:

- For Park & Ride sites west of the Swallow Roundabout, bus journey times are assumed to match surveyed A90 journey times until they reach Perth Rd / Riverside Ave. junction. Subsequently they follow timetabled journey times of existing services.
- For Park & Ride sites east of the Swallow Roundabout, existing bus journey times have been used, as given in published timetables.

Figure D.5: Park & Ride bus route and stop (excluding Site 6B)



D.2.36 Site 6A is within walking distance of Ninewells Hospital. No bus link is proposed between the sites; instead, a walk time of 5 minutes has been assumed.

D.2.37 Buses serving Site 6B are assumed to operative via Riverside Avenue and Riverside Drive to the city centre. As such they do not directly serve the University. It has been assumed, however, that the service would be extended westwards to serve Ninewells Hospital.

D.2.38 It has been assumed that the service frequency from all Park & Ride sites is 12 minutes in 2012 and 10 minutes in 2022 (in both morning and evening periods). This represents a commercially viable service.

D.2.39 A hybrid option has been considered as part of the economic appraisal where the additional buses required to provide the above frequency would be operated with a subsidy.

D.2.40 An alternative scenario with bus frequencies of 15 minutes in 2012 and 10 minutes in 2022 is presented as a sensitivity test .This represents dedicated buses for each site: 2 buses serving Sites 6A, 3 buses serving sites 3, 5 and 6B (with an extension to Ninewells Hospital).

D.2.41 Table D.3 indicates the number of buses required to serve each site at 10, 13 and 15 minute frequencies. Table D.4 indicates the number of subsidised buses required to operate a hybrid service.

Table D.14.3: Number of buses required to serve each site

	10 minute frequency	12 minute frequency	15 minute frequency
Site 1A	5	4	4
Site 1B	5	4	3
Site 5-3	4	4	3
Site 3i	4	4	3
Site 3ii	4	4	3
Site 6A	3	3	2
Site 6B (extended to Ninewells)	4	4	3

Table D.14.4: Number of subsided buses required to operate a 12 minute frequency hybrid service

	Existing frequency	Number of subsided buses required
Site 1A	30 min	3
Site 1B	30 min	3
Site 5-3	30 min	2
Site 3i	30 min	2
Site 3ii	30 min	2
Site 6A	greater than 12 min	0
Site 6B (extended to Ninewells)	20 min	2

Bus priority

D.2.42 Tests 1B/C and 3ii with “bus priority” represent the provision of a bus lane on the A90, eastbound on the approach to the Swallow Roundabout. Journey times to the Park & Ride site have been reduced by 5 minutes for all LATIS zones west of Dundee in the 2022 morning peak only.

Parking charges

D.2.43 Table D.14.5 shows the assumed parking charges in the city centre, around Dundee University and at Ninewells. The charge for Ninewells Hospital has been based on the maximum visitor charge of £1.70 with a reduction to account for the lower daily cost of a staff permit. The charge for Dundee University is based on the current £270 yearly staff permit fee (assuming 230 days worked per year).

D.2.44 Charges for car parks and on street parking in the morning parks are based on “all day” rates; interpeak charges are based on “3-4 hour” rates.

Table D.14.5: Parking charges

Parking type	2012 AM	2012 IP	2022 AM	2022 IP
All Car Parks (except Greenmarket)	£6.70	£3.40	£7.40	£3.75
On-Street	£8.04	£4.08	£8.88	£4.50
Greenmarket Car Park	£5.60	£3.40	£6.18	£3.75
Ninewells Hospital	£1.60	£1.60	£1.76	£1.76
Dundee University	£1.20	£1.20	£1.32	£1.32

D.2.45 For the purposes of this assessment, 2012 charges have been assumed to remain at current 2010 levels while growth of RPI + 1% per annum is assumed for 2022 charges.

D.2.46 Appendix F provides more details of assumed parking charges in the city centre and how they relate to the DCCP zone system.

Bus fares

D.2.47 Return Park & Ride bus fares at all sites are as follows:

- £1.00 to Ninewells Hospital
- £1.50 to Dundee University
- £2.00 to Dundee city centre

D.2.48 Fares are assumed to remain constant in real terms (as RPI at 2.5%).

PRIDE parameters

D.2.49 Key PRIDE parameters are summarised below. As noted previously, the value of lambda has been derived to be 0.06 with a mode penalty for Park & Ride of 20 minutes.

D.2.50 The following weights on walking on walk, wait and in vehicle time have been applied:

- walk time x 2
- wait time x 2
- in-vehicle time x 1

D.2.51 All PRIDE matrices are one hour matrices. The following factors have been applied to expand the matrices to the full day period:

- AM = PRIDE AM hour x 2
- Interpeak = PRIDE IP hour x 5

D.2.52 A general assumption is that Park & Ride demand tails off in the afternoon, hence, the factor on the interpeak period is 5 hours rather than 7. Similarly, it is assumed that there is no inbound demand for Park & Ride in the evening period.

D.3 Forecast demand

D.3.1 A summary of central patronage forecasts is given in Table D.14.6 below.

Table D.14.6: Demand forecast results (vehicles)

Period	Site 1A	Site 1B/C	Site 1B/C (bus priority)	Site 3/5	Site 3i	Site 3ii (bus priority)	Site 6A	Site 6B
2012 AM	69	83	83	129	136	136	173	138
2012 IP	33	38	38	61	64	64	104	68
2012 Total	102	121	121	190	200	200	277	206
2022 AM	100	121	139	187	197	227	234	200
2022 IP	55	64	64	99	105	105	148	114
2022 Total	155	185	203	286	302	332	382	314

D.3.2 Sites 1B and C perform better than 1A with 20-30 more cars using the site in both 2012 and 2022. When bus priority measures on the A90 are included with site 1B, in 2022, a further increase of 18 cars is forecast in the morning peak.

D.3.3 Sites 3 and 5 perform well with 190 cars using the site in 2012 and 286 in 2022. Providing a short off slip from the A90 into the Park & Ride site, and bypassing the Swallow Roundabout, increases Park & Ride demand by only 16 vehicles in 2012.

D.3.4 An extended off-slip provides greater priority and reduces journey times for Park & Ride users and an additional 50 vehicles use the site in 2022.

D.3.5 Sites 6A and 6B have the highest demand of all sites without bus priority. Forecast demand at Site 6A is 277 vehicles in 2012 and 382 in 2022, although a proportion of this is for Ninewells Hospital.

D.3.6 It should be noted that Site 6A's location is such that it would be possible to walk from the site to the hospital. Consequently, there is the potential for the site to act as an overflow car park rather than its intended purpose as a Park & Ride site.

D.3.7 Site 6B is predicted to attract approximately 206 trips in 2012; although lower than for Site 6A, a similar number of trips have a final destination in the city centre.

D.3.8 Table D.14.7 shows the number of vehicles using the P&R sites that have Ninewells Hospital as destination.

Table D.14.7: Ninewells demand forecast results (vehicles)

Period	Site 1A	Site 1B/C	Site 1B/C (bus priority)	Site 3/5	Site 3i	Site 3ii (bus priority)	Site 6A	Site 6B
2012 AM	14	17	17	27	29	29	54	24
2012 IP	15	18	18	29	31	31	63	29
2012 Total	29	35	35	56	60	60	117	53
2022 AM	16	19	22	31	33	36	53	27
2022 IP	18	21	21	32	34	34	62	32
2022 Total	34	40	43	63	67	70	115	59

D.3.9 Between 29-60 vehicles using P&R have Ninewells as a destination. This is approximately 30% of the total demand for each site. The exception is site 6A where 117 vehicles have Ninewells as a destination. This represents 42% of the total trips to this site.

Vehicle occupancy

D.3.10 All demands given above are in vehicles; the vehicle occupancies given in Table D.8 below have been assumed to covert from vehicle to person trips:

Table D.14.8: Vehicle occupancy

	AM peak	Interpeak
Free parking (Private non residential)	1.1	1.1
Paid Parking	1.1	1.3

Sensitivity testing

D.3.11 A series of sensitivity tests have been undertaken. These include an assessment of the impact of:

- reduced Park & Ride fares
- increased parking charges, and
- increased walk times which might accrue as the result of extensions to the existing controlled park zone areas.
- providing additional bus priority on the approach to the city centre
- reduced bus frequency from 12 minutes to 15 minutes in 2012

Bus fares reduced by 20% sensitivity test

D.3.12 By lowering all Park & Ride bus fares by 20% and rerunning the analysis it is possible to identify the sensitivity of demand to changes in bus fares. Table D.14.9 shows the results of this sensitivity test. Table D.14.10 shows a comparison of this test with the original results presented in Table D.6.

Table D.14.9: "Bus fares -20%" sensitivity test results (vehicles)

Period	Site 1A	Site 1B/C	Site 1B/C (bus priority)	Site 3/5	Site 3i	Site 3ii (bus priority)	Site 6A	Site 6B
2012 AM	73	89	89	136	144	144	180	145
2012 IP	34	40	40	64	67	67	107	71
2012 Total	107	129	129	200	211	211	287	216
2022 AM	105	128	146	196	206	237	243	209
2022 IP	58	67	67	103	109	109	152	118
2022 Total	163	195	213	299	315	346	395	327

Table D.14.10: "Bus fares -20%" Percentage change from standard scenario forecast

Period	Site 1A	Site 1B/C	Site 1B/C (bus priority)	Site 3/5	Site 3i	Site 3ii (bus priority)	Site 6A	Site 6B
2012 AM	6%	7%	7%	5%	6%	6%	4%	5%
2012 IP	3%	5%	5%	5%	5%	5%	3%	4%
2012 Total	5%	7%	7%	5%	6%	6%	4%	5%
2022 AM	5%	6%	5%	5%	5%	4%	4%	5%
2022 IP	5%	5%	5%	4%	4%	4%	3%	4%
2022 Total	5%	5%	5%	5%	4%	4%	4%	4%

D.3.13 By lowering bus fares by 20% there is an approximate 5% increase in patronage. By 2022, the percentage increase is lower, partly because of the higher general travel costs. Sites further from Dundee show a slightly larger percentage increase than those closer to the city but they also start from a lower level of patronage.

Parking charges RPI +4% sensitivity test

D.3.14 To assess the impact of increased parking charges on Park & Ride demand, charges have been increased by RPI +4% per annum from 2012 levels. The results of this test are summarised in Table D.14.11. Table D.14.12 highlights the percentage increase in demand compared with the original results given in Table D.6.

Table D.14.11: "2022 Parking charges RPI +4%" sensitivity test results (vehicles)

Period	Site 1A	Site 1B/C	Site 1B/C (bus priority)	Site 3/5	Site 3i	Site 3ii (bus priority)	Site 6A	Site 6B
2012 AM	69	83	83	129	136	136	173	138
2012 IP	33	38	38	61	64	64	104	68
2012 Total	102	121	121	190	200	200	277	206
2022 AM	117	141	159	212	223	254	263	227
2022 IP	61	71	71	109	115	115	160	125
2022 Total	178	212	230	321	338	369	423	352

Table D.14.12: "2022 Parking charges RPI +4%" Percentage change from standard scenario forecast

Period	Site 1A	Site 1B/C	Site 1B/C (bus priority)	Site 3/5	Site 3i	Site 3ii (bus priority)	Site 6A	Site 6B
2012 AM	0%	0%	0%	0%	0%	0%	0%	0%
2012 IP	0%	0%	0%	0%	0%	0%	0%	0%
2012 Total	0%	0%	0%	0%	0%	0%	0%	0%
2022 AM	17%	17%	14%	13%	13%	12%	12%	14%
2022 IP	11%	11%	11%	10%	10%	10%	8%	10%
2022 Total	15%	15%	13%	12%	12%	11%	11%	12%

Increasing parking charges has more effect on patronage at the sites further from the city than those closer in. Specifically, there is an increase of 15% at sites 1A and 1B compared to an increase of 11-13% at the remaining sites. This is because these sites are relatively unattractive and so any change in parking charges will have a proportionately greater effect.

Expanded CPZ sensitivity test

D.3.15 The impact of an expanded Dundee Controlled Parking Zone (CPZ) was modelled by increasing the average walk time for "cars with paid parking" to their final destination. The expansion of the CPZ will potentially cover the following areas:

- Dundee West End
- Dudhope, Hilltown
- Princes St
- Invergowrie Drive

D.3.16 These expansion areas are roughly between 0.1 and 1.0km from the current CPZ and so we have assumed an average distance of 0.4km. We also assumed a walk speed of 4km/h and therefore assumed an additional 6 minutes walk time.

D.3.17 Walk times have only been increased in the morning peak – we assume that only commuters would have previously parked in the expanded CPZ area. For this reason, interpeak results are identical to the original results. Table D.14.13 summarises the results of this test and Table D.14.14 shows a comparison of this test with the original results presented in Table D.6.

Table D.14.13: "Expanded CPZ" sensitivity test results (vehicles)

Period	Site 1A	Site 1B/C	Site 1B/C (bus priority)	Site 3/5	Site 3i	Site 3ii (bus priority)	Site 6A	Site 6B
2012 AM	105	123	123	182	188	188	229	193
2012 IP	33	38	38	64	64	64	104	68
2012 Total	138	161	161	246	252	252	333	261
2022 AM	150	176	197	262	270	306	314	278
2022 IP	55	64	64	102	105	105	148	114
2022 Total	205	240	261	364	375	411	462	392

Table D.14.14: "Expanded CPZ" Percentage change from standard scenario forecast

Period	Site 1A	Site 1B/C	Site 1B/C (bus priority)	Site 3/5	Site 3i	Site 3ii (bus priority)	Site 6A	Site 6B
2012 AM	52%	48%	48%	41%	38%	38%	32%	40%
2012 IP	0%	0%	0%	5%	0%	0%	0%	0%
2012 Total	35%	33%	33%	29%	26%	26%	20%	27%
2022 AM	50%	45%	42%	40%	37%	35%	34%	39%
2022 IP	0%	0%	0%	3%	0%	0%	0%	0%
2022 Total	32%	30%	29%	27%	24%	24%	21%	25%

D.3.18 Similarly to the parking charges sensitivity test sites further from the city show a larger percentage increase in patronage than those closer to the city centre. Increasing the size of the CPZ has a large effect on Park & Ride patronage with up to 79 additional cars using Site 3ii.

Bus priority test

D.3.19 Bus priority measures on the approach to central Dundee would reduce journey times, increasing Park & Ride demand. Potential measures are limited by a lack of available road space and so a nominal one minute average journey time saving has been assumed in the morning peak only. The results of the test are given in Table D.15.

Table D.14.15: "Bus priority" sensitivity test results (vehicles)

Period	Site 1A	Site 1B/C	Site 1B/C (bus priority)	Site 3/5	Site 3i	Site 3ii (bus priority)	Site 6A	Site 6B
2012 AM	71	86	86	133	140	140	177	142
2012 IP	33	38	38	61	64	64	104	68
2012 Total	104	124	124	194	204	204	281	210
2022 AM	103	125	143	192	202	233	241	206
2022 IP	55	64	64	99	105	105	148	114
2022 Total	158	189	207	291	307	338	389	320

Table D.14.16: "Bus priority" Percentage change from standard scenario forecast

Period	Site 1A	Site 1B/C	Site 1B/C (bus priority)	Site 3/5	Site 3i	Site 3ii (bus priority)	Site 6A	Site 6B
2012 AM	3%	4%	4%	3%	3%	3%	2%	3%
2012 IP	0%	0%	0%	0%	0%	0%	0%	0%
2012 Total	2%	2%	2%	2%	2%	2%	1%	2%
2022 AM	3%	3%	3%	3%	3%	3%	3%	3%
2022 IP	0%	0%	0%	0%	0%	0%	0%	0%
2022 Total	2%	2%	2%	2%	2%	2%	2%	2%

D.3.20 Comparing the results with base demand (Table D.16) shows only modest increases in demand, 2-4% across each site, in each time period and year. It is likely, however, that if more significant time savings could be identified, demand would increase by much higher levels.

Reduced bus frequency sensitivity test

D.3.21 The impact of providing a 15 minute, rather than 12 minute, bus service to each site has been undertaken. Providing a dedicated bus service or subsidising more frequent or extended routes is expensive so this test represents a scenario to minimise initial operating costs.

D.3.22 The reduced service frequency has the effect of increasing passenger waiting time at the Park & Ride stop from 6 to 7 minutes in 2012 only. Frequency in 2022 is assumed to be 10 minutes as in the standard scenario.

D.3.23 The results from this sensitivity test are shown in Table D.14.17 below while Table D.14.18 shows a comparison of this test with the original results presented in Table D.6.

Table D.14.17: "Reduced bus frequency" test results

Period	Site 1A	Site 1B/C	Site 1B/C (bus priority)	Site 3/5	Site 3i	Site 3ii (bus priority)	Site 6A	Site 6B
2012 AM	61	74	74	116	123	123	162	125
2012 IP	29	34	34	55	58	58	101	62
2012 Total	90	108	108	171	181	181	263	187
2022 AM	100	121	139	187	197	227	234	200
2022 IP	55	64	64	99	105	105	148	114
2022 Total	155	185	203	286	302	332	382	314

Table D.14.18: "Reduced bus frequency" Percentage change from standard scenario forecast

Period	Site 1A	Site 1B/C	Site 1B/C (bus priority)	Site 3/5	Site 3i	Site 3ii (bus priority)	Site 6A	Site 6B
2012 AM	-12%	-11%	-11%	-10%	-10%	-10%	-6%	-9%
2012 IP	-12%	-11%	-11%	-10%	-9%	-9%	-3%	-9%
2012 Total	-12%	-11%	-11%	-10%	-10%	-10%	-5%	-9%
2022 AM	0%	0%	0%	0%	0%	0%	0%	0%
2022 IP	0%	0%	0%	0%	0%	0%	0%	0%
2022 Total	0%	0%	0%	0%	0%	0%	0%	0%

D.3.24 Reducing bus frequency has the effect of reducing patronage by up to 12%. Sites 1A and 1B are affected slightly more than sites closer to the city as they already struggle for demand. Any change that will effectively increase journey times will make an already unattractive option more so.

D.3.25 Site 6A is less affected by the reduction in bus frequency as it is within walking distance of Ninewells Hospital. Therefore, the patronage for Ninewells is unaffected by this measure.

D.4 Summary

D.4.1 This report summarises the methodology used to develop demand, time and distance input matrices to PRIDE in order to assess the potential demand for a new Park & Ride site to the west of Dundee. Several sources of data were used including:

- LATIS
- Dundee City Centre Paramics model, and
- the Ninewells Hospital Travel Plan

D.4.2 PRIDE has been used to assess several Park & Ride sites, providing patronage forecasts for 2012 and 2022 morning and interpeak periods. Sensitivity tests have also been undertaken, varying parameters including:

- Park & Ride bus fares
- bus frequencies, and
- parking charges

D.4.3 Sites 1A, B and C perform poorly in comparison with other sites. Sites 1B and C have patronage of 121 cars in 2012. Adding bus priority measures to site 1B increases patronage to 203 cars (from 185 with no bus priority) in 2022.

D.4.4 Sites 3 and 5 perform well with 190 cars using the site in 2012 and more than 280 in 2022. When easier access is added there is an increase of only 10-15 vehicles in both tested years. Adding bus priority measures has a bigger impact: patronage is predicted to increase by almost 50 cars.

D.4.5 Sites 6A and 6B have the highest demand of all sites without bus priority. Site 6A has a demand of 277 in 2012 and over 380 in 2022. Site 6B is predicted to have about 70 less trips than 6A in both modelled years.

Sensitivity testing

D.4.6 The effect of varying several different parameters on the predicted patronage has been tested. Reducing Park & Ride bus fares by 20% had the effect of increasing patronage by approximately 5% for all sites.

D.4.7 Increasing parking charges for the 2022 test had the effect of increasing patronage by 11-15%. Specifically, there was an increase of 13-15% at sites 1A and 1B compared to an increase of 11-13% at the remaining sites.

D.4.8 Increasing the size of Dundee's CPZ has the effect of increasing Park & Ride patronage. Similarly to the parking charge sensitivity test, sites further from the city show a larger percentage increase in patronage than those closer to the city centre. Increasing the size of the CPZ however has a much larger effect on Park & Ride patronage with up to 80 additional cars.

D.4.9 Reducing P&R bus journey times by 1 minute to simulate modest bus priority measures gives an increase of 2% in patronage figures across all sites.

D.4.10 Reducing bus frequency has the effect of reducing patronage by up to 12%. Site 6A is relatively unaffected by this option as it is within walking distance of Ninewells Hospital.

Appendix E

PRIDE

PRIDE

The forecasting tool for the study is PRIDE. PRIDE is a demand forecasting model developed by CB specifically for the assessment of Park & Ride schemes. It was developed initially for the 1993 Greater Manchester Park & Ride Methodology Study, jointly funded by the Association of Greater Manchester Authorities and the then Department of Transport. It has been modified and enhanced since, and has been used extensively by CB in a range of studies across the UK.

The main inputs to PRIDE are:

- car trip demand by origin, destination, time period and/or trip purpose;
- car journey costs – in-vehicle time, parking search times, parking charges, and walk times from the car park;
- journey costs by Park & Ride – access times to the Park & Ride site by car, walk time at the site, wait time, fare, in-vehicle time, and walk time from the bus stop at the destination;
- mode choice parameters.

Figure E.1 illustrates the overall approach to forecasting Park & Ride patronage, revenues and costs.

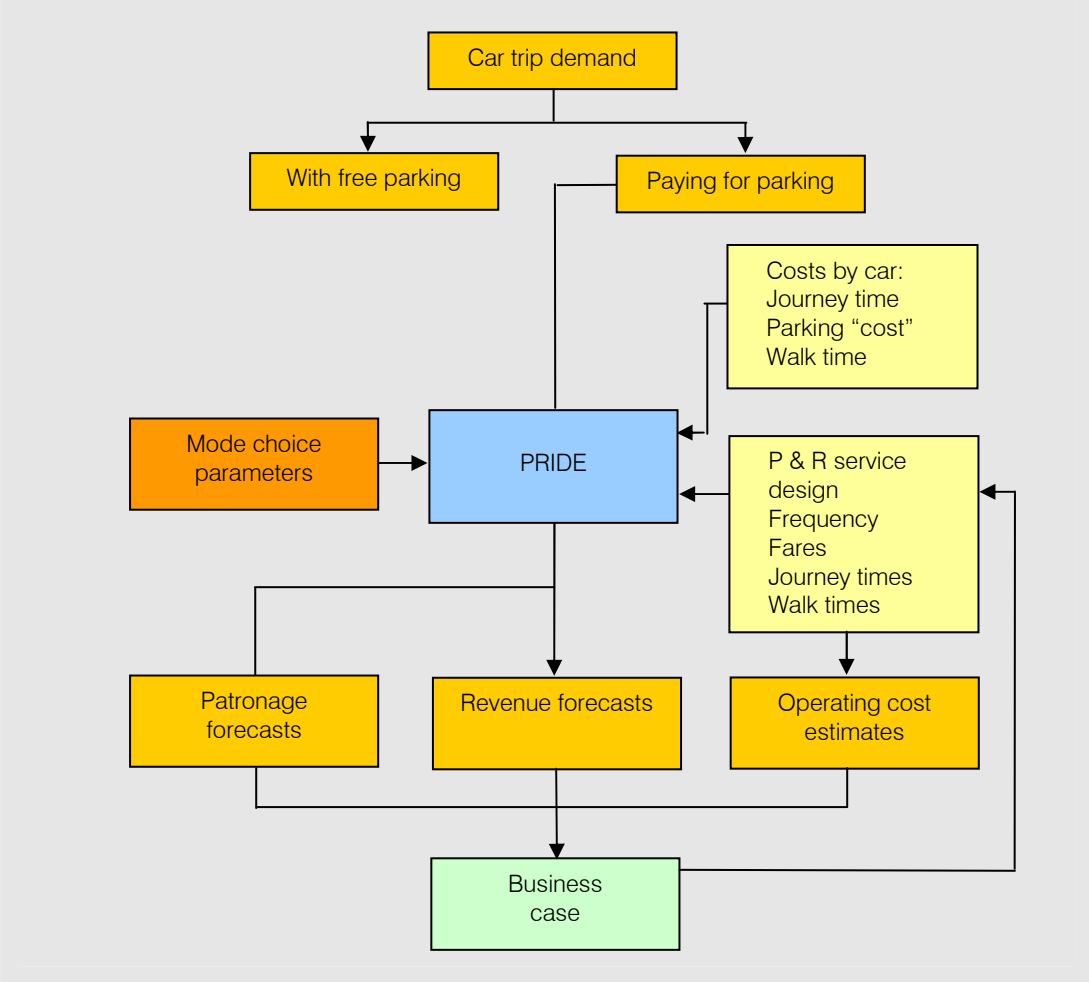


Figure E.1: Patronage / revenue costs

Trip demand

Trip demand is generally obtained from an appropriate highway model – either macro or microsimulation. Demand data is then adjusted to an appropriate assessment year based on appropriate growth factors.

It should be noted that PRIDE was originally designed to interface with highway assignment models, such as TMfS for its cost and demand data and to model all Park & Ride markets. However, where information from a model is not available these data have been derived from other available data sources or from bespoke surveys and input directly to the PRIDE model. Once set up with cost and demand information PRIDE is a fast and flexible tool for assessing patronage for different Park & Ride options (sites and service designs) and for testing the sensitivity of forecasts. Thus PRIDE was developed for specifically for this type of feasibility study.

Trip costs

Cost data can also be derived from time and distance skims from the model. If data from the model is deemed not to be appropriate then journey times by car will be estimated from journey time survey data.

The availability of free parking is a major constraint on the Park & Ride market. CB's normal practice is to split the car trip demand into those who pay for parking and those who enjoy free parking. If no reliable direct survey information on the availability of free parking is available, we make a broad estimate based on the estimated amount of Private Non-residential Parking (PNR).

In the absence of direct survey information parking search times are related to the ease of parking, which itself will be a function of the balance between demand and supply. Walk times from the car parks to destination zones are estimated from maps and average walking speeds.

Costs by Park & Ride

Many of the costs of making a journey by Park & Ride will be a function of the service design – routes, stop locations, frequency and fares. The sensitivity of patronage, revenues and costs to alternative designs (particularly with regard to fares and frequency) can be explored with PRIDE.

The scope for serving intermediate destinations en route and allowing boarding at intermediate stops (taking into account potential abstraction form existing services) can be considered for each corridor.

In-vehicle times are based on surveyed bus speeds if available, or estimated from car speed with due allowance for existing and potential bus priority and for the scope for further bus priority.

Sensitivity tests for costs and revenues can also be carried out for 'external factors' such as variations in demand growth rates, variations in parking charges or availability, the impact of bus priorities on journey times (car and bus) and even road pricing or workplace parking charges.

Mode choice parameters

Model parameters (model penalty and spread factor) represent peoples attitude to mode shift. These vary by area and will be derived from local research if available and / or from research on Park & Ride elsewhere in the UK. CB has a library of such information that we have used to derive model parameters for other studies.

Patronage and revenues

PRIDE forecasts Park & Ride patronage (by origin, destination, time period) and revenues for given sites/locations, demand scenarios and Park & Ride service design. Estimates of revenues abstracted from town centre car parks are also directly calculated from the patronage forecasts by destination and the parking charge data.

Annualisation of revenues are based on local data on car trip demand through the year. This data is derived either from permanent traffic count sites on routes to the town centre or, preferably, from car park loop data.

Costs

The costing of Park & Ride services is based on local operating cost data if provided by the operator, or on CB's database of operating costs from other areas of the UK. Capital costs are based on local unit rates or published unit rates. Allowance can be made for any

'abnormal' costs likely to be associated with specific locations, for example if access works are likely to be particularly costly.

Land acquisition costs are usually based on local land values, as advised by the Local Authorities' estates officers.

Appendix F

Parking charges

Figure F.1 shows a plan of the DCCP zones with a-LATIS zones 58 and 61. Within this zone system there are several car parks.

Figure F.1: DCCP zone system

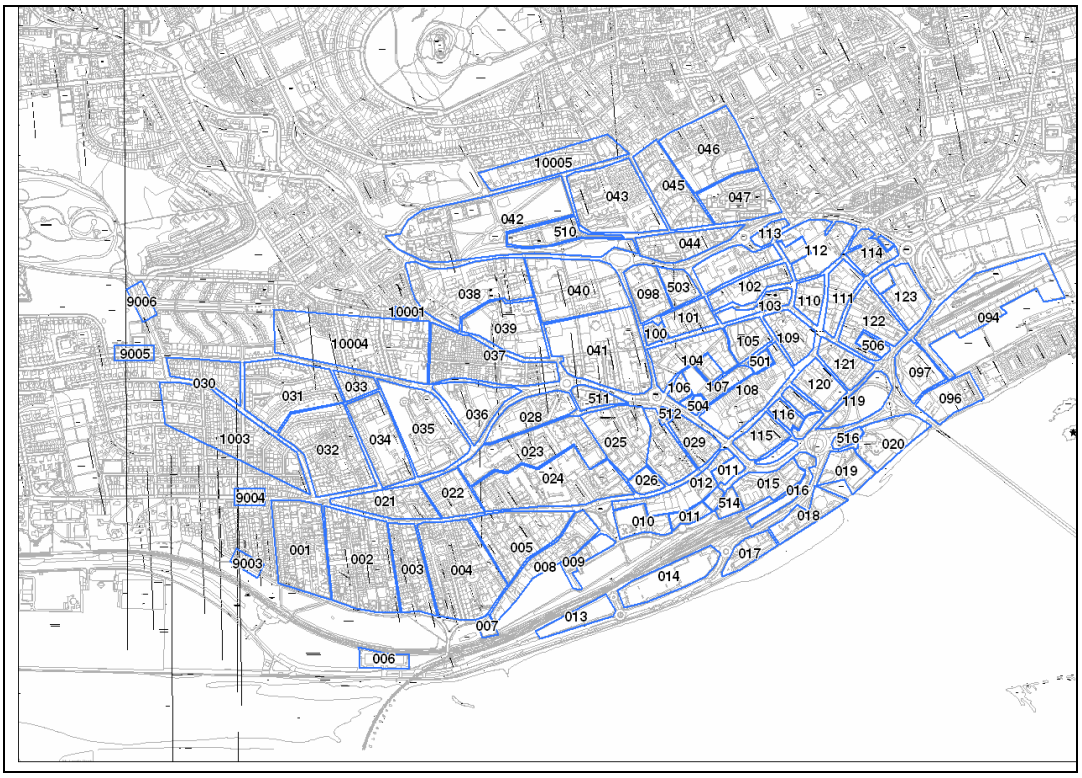


Table F.1 shows the parking charges assumed for each zone containing paid-for parking. Table F.2 shows the percentage of cars which have free parking in each of the zones with associated charges.

The Discovery / Olympia and Yeaman's shore car parks are anticipated to close shortly. In both 2012 and 2022, vehicles from these sites are assumed to be parked at the Greenmarket car park; walk times to the city centre have been adjusted accordingly.

Table F.1: Parking charges within DCCP (also including Ninewells Hospital)

DCCP zone number	Description	2012 AM parking charge (p)	2012 IP parking charge (p)	2022 AM parking charge (p)	2022 IP parking charge (p)
11	Science Centre W (Var stay)	670	340	740	375
16	Dundee Station	670	340	740	375
18	Abercraig (Long stay)	560	340	618	375
19	Discovery / Olympia (Var stay)	670	340	740	375
23	Dundee Uni.	120	120	132	132
24	Dundee Uni.	120	120	132	132
25	Dundee Uni.	120	120	132	132
26	Dundee Uni.	120	120	132	132
27	Dundee Uni.	120	120	132	132
103	City Centre on-street	804	408	888	450
105	City Centre on-street	804	408	888	450
108	Overgate Centre	804	408	888	450
115	Nethergate (Var Stay)	670	340	740	375
116	City Centre on-street	804	408	888	450
117	City Centre on-street	804	408	888	450
118	City Centre on-street	804	408	888	450
119	Dock St	670	340	740	375
120	Shore Terrace (Var stay)	670	340	740	375
[500]	Ninewells Hospital [not within DCCP]	160	160	176	176
501	Overgate (Var Stay)	670	340	740	375
502	Wellgate (Var stay)	670	340	740	375
504	West Marketgait (Var Stay)	670	340	740	375
505	Lindsay St (Var Stay)	670	340	740	375
506	Gellatly St (Var Stay)	670	340	740	375
507	East Port (Var Stay)	670	340	740	375
508	East Whale Lane (Long Stay)	560	340	618	375
509	Queen St (Var Stay)	670	340	740	375
512	South Tay St (Var Stay)	670	340	740	375
513	Science Centre E (Var Stay)	670	340	740	375
514	Greenmarket (special price)	560	340	618	375
515	Yeaman's Shore (Var Stay)	670	340	740	375

Table F.2: Percentage of cars with free parking within DCCP (also including Ninewells Hospital)

DCCP zone number	Description	2012 AM (%)	2012 IP (%)	2022 AM (%)	2022 IP (%)
11	Science Centre W (Var stay)	7	3	7	3
16	Dundee Station	0	0	0	0
18	Abercraig (Long stay)	77	63	77	63
19	Discovery / Olympia (Var stay)	10	5	10	5
23	Dundee Uni.	12	12	12	12
24	Dundee Uni.	12	12	12	12
25	Dundee Uni.	12	12	12	12
26	Dundee Uni.	12	12	12	12
27	Dundee Uni.	12	12	12	12
103	City Centre on-street	0	0	0	0
105	City Centre on-street	0	0	0	0
108	Overgate Centre	0	0	0	0
115	Nethergate (Var Stay)	76	62	76	62
116	City Centre on-street	0	0	0	0
117	City Centre on-street	0	0	0	0
118	City Centre on-street	0	0	0	0
119	Dock St	32	19	32	19
120	Shore Terrace (Var stay)	79	66	79	66
[500]	Ninewells Hospital [not within DCCP]	0	0	0	0
501	Overgate (Var Stay)	1	0	1	0
502	Wellgate (Var stay)	0	0	0	0
504	West Marketgait (Var Stay)	1	1	1	1
505	Lindsay St (Var Stay)	9	4	9	4
506	Gellatly St (Var Stay)	0	0	0	0
507	East Port (Var Stay)	0	0	0	0
508	East Whale Lane (Long Stay)	0	0	0	0
509	Queen St (Var Stay)	0	0	0	0
512	South Tay St (Var Stay)	0	0	0	0
513	Science Centre E (Var Stay)	0	0	0	0
514	Greenmarket (special price)	0	0	0	0
515	Yeaman's Shore (Var Stay)	0	0	0	0

Appendix G

Option summary tables

OST: A90 West of Dundee Park & Ride Study — Option 3

Option description: Park & Ride site situated northwest of the Swallow Roundabout and accessed from it.

Capital Costs/grant (2002 Prices)	£3,506,165
Annual Revenue Support (2002 Prices)	£336,361
Present Value of Cost to Government (inc tax loss.)	£9,889,000

Summary of impact on the five STAG criteria

Impacts (Monetary and Non-Monetary)	- - -	- -	-	0	+	++	+++	Monetary only (£m)	Monetary impact ratio (if relevant)
Accessibility and Social Inclusion					X			£0.000	n/a
Environment					X			£0.089	0.0090
Integration					X			£0.000	n/a
Safety					X			£0.003	0.0003
Economy					X			£2.863	0.2892
							NPV:	£2.954	BCR: 0.2985
Including Wider Economic Benefits							NPV:	£2.954	BCR: 0.2985

Assessment against Transport Planning Objectives

	- - -	- -	-	0	+	++	+++
TPO Target 1:					X		
`TPO Target 2:						X	
TPO Target 3:					X		
TPO Target 4:					X		
TPO Target 5:					X		

Contribution toward the Government Purpose: Contributes towards STPR national and node and corridor objectives. It encourages a shift from car to public transport reducing peak hour congestion on the approach to Dundee City Centre. It also improves the competitiveness of public transport and helps to promote integration and seamless travel.

STAG Criteria		Implementability Appraisal	
Criterion:	Supporting Information	Criterion:	Supporting Information
Accessibility & Social Inclusion	positive effect	Technical	feasible although environmental issues would require careful mitigation
Safety	minor positive impact	Operational	feasible
Economy	benefits to users and the private sector	Financial	affordable
Integration	minor positive impact	Public Acceptability	acceptable if environmental issues can be overcome
Environment	*This section identifies key impacts and tensions across the sub-criteria*		
	There are potential impacts relating to the site itself and to the access to the Swallow Roundabout which must skirt the Swallow Wetland SINC and Swallow Hotel TPO area. With suitable mitigation the impacts can be minimised and access through here will be required for planned business developments to go ahead.		

Transport Planning Objectives			
Obj.	Description of Objective	Obj.	Description of Objective
TPO 1:	Improve the public transport accessibility to employment, health, leisure and recreational locations in the west of Dundee and city centre	TPO 4:	Contribute to national and local air quality targets and reduce the impact of climate change
TPO 2:	Encourage a shift toward sustainable and healthier modes of transport	TPO 5:	Minimise the impacts of the scheme upon the natural and built environment
TPO 3:	Reduce traffic congestion for longer distance trips in the west of Dundee		

OST: A90 West of Dundee Park & Ride Study — Option 3i

Option description: Park & Ride site situated northwest of the Swallow Roundabout and accessed from it and from a short slip off the A90.

Capital Costs/grant (2002 Prices)	£4,013,262
Annual Revenue Support (2002 Prices)	£348,956
Present Value of Cost to Government (inc tax loss.)	£10,577,000

Summary of impact on the five STAG criteria

Impacts (Monetary and Non-Monetary)	- - -	- -	-	0	+	++	+++	Monetary only (£m)	Monetary impact ratio (if relevant)
Accessibility and Social Inclusion					X			£0.000	n/a
Environment					X			£0.093	0.0088
Integration					X			£0.000	n/a
Safety					X			£0.003	0.0002
Economy						X		£12.133	1.1469
								NPV: £12.228	BCR: 1.1559
Including Wider Economic Benefits								NPV: £12.228	BCR: 1.1559

Assessment against Transport Planning Objectives

	- - -	- -	-	0	+	++	+++
TPO Target 1:					X		
`TPO Target 2:						X	
TPO Target 3:						X	
TPO Target 4:						X	
TPO Target 5:					X		

Contribution toward the Government Purpose: Contributes towards STPR national and node and corridor objectives. It encourages a shift from car to public transport reducing peak hour congestion on the approach to Dundee City Centre. In addition, this option removes vehicles from the Swallow Roundabout, providing both east and westbound journey times savings to trunk road traffic. This option also improves the competitiveness of public transport and helps to promote integration and seamless travel.

STAG Criteria		Implementability Appraisal	
Criterion:	Supporting Information	Criterion:	Supporting Information
Accessibility & Social Inclusion	positive effect	Technical	feasible although environmental issues would require careful mitigation
Safety	minor positive impact	Operational	feasible
Economy	benefits to users and the private sector	Financial	affordable
Integration	minor positive impact	Public Acceptability	acceptable if environmental issues can be overcome
Environment	*This section identifies key impacts and tensions across the sub-criteria*		
	There are potential impacts relating to the site itself and to the access to the Swallow Roundabout which must skirt the Swallow Wetland SINC and Swallow Hotel TPO area. With suitable mitigation the impacts can be minimised and access through here will be required for planned business developments to go ahead.		

Transport Planning Objectives			
Obj.	Description of Objective	Obj.	Description of Objective
TPO 1:	Improve the public transport accessibility to employment, health, leisure and recreational locations in the west of Dundee and city centre	TPO 4:	Contribute to national and local air quality targets and reduce the impact of climate change
TPO 2:	Encourage a shift toward sustainable and healthier modes of transport	TPO 5:	Minimise the impacts of the scheme upon the natural and built environment
TPO 3:	Reduce traffic congestion for longer distance trips in the west of Dundee		

OST: A90 West of Dundee Park & Ride Study — Option 3ii

Option description: Park & Ride site situated northwest of the Swallow Roundabout and accessed from it and from a long slip off the A90.

Capital Costs/grant (2002 Prices)	£5,703,583
Annual Revenue Support (2002 Prices)	£390,942
Present Value of Cost to Government (inc tax loss.)	£12,831,000

Summary of impact on the five STAG criteria

Impacts (Monetary and Non-Monetary)	- - -	- -	-	0	+	++	+++	Monetary only (£m)	Monetary impact ratio (if relevant)
Accessibility and Social Inclusion					X			£0.000	n/a
Environment					X			£0.119	0.0093
Integration					X			£0.000	n/a
Safety					X			£0.003	0.0002
Economy						X		£12.563	0.9789
								NPV: £12.684	BCR: 0.9884
Including Wider Economic Benefits								NPV: £12.684	BCR: 0..9884

Assessment against Transport Planning Objectives

	- - -	- -	-	0	+	++	+++
TPO Target 1:						X	
`TPO Target 2:						X	
TPO Target 3:						X	
TPO Target 4:						X	
TPO Target 5:					X		

Contribution toward the Government Purpose: Contributes towards STPR national and node and corridor objectives. It encourages a shift from car to public transport reducing peak hour congestion on the approach to Dundee City Centre. In addition, this option removes vehicles from the Swallow Roundabout, providing both east and westbound journey times savings to trunk road traffic. This option also improves the competitiveness of public transport and helps to promote integration and seamless travel.

STAG Criteria		Implementability Appraisal	
Criterion:	Supporting Information	Criterion:	Supporting Information
Accessibility & Social Inclusion	positive effect	Technical	feasible although environmental issues would require careful mitigation
Safety	minor positive impact	Operational	feasible
Economy	benefits to users and the private sector	Financial	affordable
Integration	minor positive impact	Public Acceptability	acceptable if environmental issues can be overcome
Environment	*This section identifies key impacts and tensions across the sub-criteria*		
	There are potential impacts relating to the site itself and to the access to the Swallow Roundabout which must skirt the Swallow Wetland SINC and Swallow Hotel TPO area. With suitable mitigation the impacts can be minimised and access through here will be required for planned business developments to go ahead.		

Transport Planning Objectives			
Obj.	Description of Objective	Obj.	Description of Objective
TPO 1:	Improve the public transport accessibility to employment, health, leisure and recreational locations in the west of Dundee and city centre	TPO 4:	Contribute to national and local air quality targets and reduce the impact of climate change
TPO 2:	Encourage a shift toward sustainable and healthier modes of transport	TPO 5:	Minimise the impacts of the scheme upon the natural and built environment
TPO 3:	Reduce traffic congestion for longer distance trips in the west of Dundee		

OST: A90 West of Dundee Park & Ride Study — Option 5

Option description: Park & Ride site situated northwest of the Swallow Roundabout and accessed from the existing northwest approach.

Capital Costs/grant (2002 Prices)	£3,506,165
Annual Revenue Support (2002 Prices)	£336,361
Present Value of Cost to Government (inc tax loss.)	£9,889,000

Summary of impact on the five STAG criteria

Impacts (Monetary and Non-Monetary)	- - -	- -	-	0	+	++	+++	Monetary only (£m)	Monetary impact ratio (if relevant)
Accessibility and Social Inclusion					X			£0.000	n/a
Environment						X		£0.089	0.0090
Integration					X			£0.000	n/a
Safety					X			£0.003	0.0003
Economy					X			£2.863	0.2892
								NPV: £2.954	BCR: 0.2895
Including Wider Economic Benefits								NPV: £2.954	BCR: 0.2895

Assessment against Transport Planning Objectives

	- - -	- -	-	0	+	++	+++
TPO Target 1:					X		
`TPO Target 2:						X	
TPO Target 3:					X		
TPO Target 4:					X		
TPO Target 5:						X	

Contribution toward the Government Purpose: Contributes towards STPR national and node and corridor objectives. It encourages a shift from car to public transport reducing peak hour congestion on the approach to Dundee City Centre. It also improves the competitiveness of public transport and helps to promote integration and seamless travel.

STAG Criteria		Implementability Appraisal	
Criterion:	Supporting Information	Criterion:	Supporting Information
Accessibility & Social Inclusion	positive effect	Technical	feasible
Safety	minor positive impact	Operational	feasible
Economy	benefits to users and the private sector	Financial	affordable
Integration	effects positive if any	Public Acceptability	acceptable
Environment	*This section identifies key impacts and tensions across the sub-criteria*		
	The site is a green field site but there are no other environmental issues of note.		

Transport Planning Objectives			
Obj.	Description of Objective	Obj.	Description of Objective
TPO 1:	Improve the public transport accessibility to employment, health, leisure and recreational locations in the west of Dundee and city centre	TPO 4:	Contribute to national and local air quality targets and reduce the impact of climate change
TPO 2:	Encourage a shift toward sustainable and healthier modes of transport	TPO 5:	Minimise the impacts of the scheme upon the natural and built environment
TPO 3:	Reduce traffic congestion for longer distance trips in the west of Dundee		

OST: A90 West of Dundee Park & Ride Study — Option 6B

Option description: Park & Ride site west of Wright Avenue

Capital Costs/grant (2002 Prices)	£3,053,733
Annual Revenue Support (2002 Prices)	£277,801
Present Value of Cost to Government (inc tax loss.)	£8,712,000

Summary of impact on the five STAG criteria

Impacts (Monetary and Non-Monetary)	- - -	- -	-	0	+	++	+++	Monetary only (£m)	Monetary impact ratio (if relevant)
Accessibility and Social Inclusion					X			£0.000	n/a
Environment					X			£0.106	0.0122
Integration						X		£0.000	n/a
Safety					X			£0.002	0.0002
Economy					X			£6.809	0.7814
								NPV: £6.917	BCR: 0.7937
Including Wider Economic Benefits								NPV: £6.917	BCR: 0.7937

Assessment against Transport Planning Objectives

	- - -	- -	-	0	+	++	+++
TPO Target 1:						X	
`TPO Target 2:							X
TPO Target 3:					X		
TPO Target 4:						X	
TPO Target 5:					X		

Contribution toward the Government Purpose: Contributes towards STPR national and node and corridor objectives. It encourages a shift from car to public transport reducing peak hour congestion on the approach to Dundee City Centre. It also improves the competitiveness of public transport and helps to promote integration and seamless travel.

STAG Criteria		Implementability Appraisal	
Criterion:	Supporting Information	Criterion:	Supporting Information
Accessibility & Social Inclusion	positive effect	Technical	feasible
Safety	minor positive impact	Operational	feasible
Economy	benefits to users and the private sector	Financial	affordable
Integration	effects positive if any	Public Acceptability	acceptable if environmental issues can be overcome
Environment	*This section identifies key impacts and tensions across the sub-criteria*		
	There are potential impacts relating to the site which lies within the Inner Tay LNR. However, despite its location the site is not of significant habitat value and with suitable measures any issues are likely to be overcome.		

Transport Planning Objectives			
Obj.	Description of Objective	Obj.	Description of Objective
TPO 1:	Improve the public transport accessibility to employment, health, leisure and recreational locations in the west of Dundee and city centre	TPO 4:	Contribute to national and local air quality targets and reduce the impact of climate change
TPO 2:	Encourage a shift toward sustainable and healthier modes of transport	TPO 5:	Minimise the impacts of the scheme upon the natural and built environment
TPO 3:	Reduce traffic congestion for longer distance trips in the west of Dundee		

Appendix H

Detailed appraisal summary tables

Proposal Details			
Name and address of authority or organisation promoting the proposal: (Also provide name of any subsidiary organisations also involved in promoting the proposal)		TACTRAN, Bordeaux House, 31 Kinnoull Street, Perth, PH1 5EN STAG assessment by: Colin Buchanan, 4 St Colme Street, Edinburgh, EH3 6AA	
Proposal Name:	Option 3	Name of Planner:	
Proposal Description:	Park & Ride site situated northwest of the Swallow Roundabout and accessed from it.	Total Public Sector Funding Requirement (2002 prices):	Undiscounted capital costs: £3,506,165 Annual Revenue support: £336,361 PVC to government: £9,889,000
Funding Sought From: (if applicable)	N/A at this stage	Amount of Application:	N/A at this stage
Background Information			
Geographic Context:	Dundee is Scotland's 4th largest city and the largest urban area in the TACTRAN region. It is an important employment, educational and regional centre; approximately 300,000 people live within a 30 minute drive of the city. Maintaining and improving accessibility to Dundee is therefore important to the continuing economic health of the region.		
Social Context:	The TACTRAN region has a population of approximately 475,000 people, with almost two thirds living in towns or cities. In Dundee, 17.7% of the resident population are aged between 0-15 years, 64.6% aged 16-64 years and 17.7% aged 65+ years. Approximately 31% of TACTRAN households do not have access to a car; this figure rises to approximately 46% for Dundee City. Access to healthcare facilities for those without access to a car is a key issue for the region, particularly following centralisation of services.		
Economic Context:	Maintaining and improving internal and external regional connectivity is central to ensuring that the economy of the TACTRAN region continues to prosper. Furthermore, it is essential that those who living in TACTRAN's rural communities, as well as larger towns and cities, are well-connected to essential employment, education, health and other key locations. The A90 corridor is an important part of the national trunk network. It provides a strategic function linking the central belt with Dundee and Aberdeen. It also serves an important commuter route to Dundee during peak periods. With a large number of competing movements, congestion occurs at peak periods. This has implications in terms of the local and national economy, and on the environment of the people who live and work in Dundee. While the population of Dundee is forecast to reduce slightly, total employment is expected to increase. This is anticipated to lead further increases in the level of commuting to the city from across the region.		

Planning Objectives	
Objective:	Performance against planning objective:
Improve the public transport accessibility to employment, health, leisure and recreational locations in the west of Dundee and city centre	✓ More network coverage and destinations served in and from West Dundee.
Encourage a shift toward sustainable and healthier modes of transport	✓✓ Increased use of buses in Dundee.
Reduce traffic congestion for longer distance trips in the west of Dundee	✓ Potential reductions in traffic in central Dundee benefit long distance trips starting / ending in Dundee.
Contribute to national and local air quality targets and reduce the impact of climate change	✓ Potential air quality gains in central Dundee.
Minimise the impacts of the scheme upon the natural and built environment	✓ Scheme may impact environmentally sensitive areas but effects can be minimised
Rationale for Selection or Rejection of Proposal:	Selected - Significant potential benefits if environmental issues can be overcome

Implementability Appraisal	
Technical:	The proposal involves no novel / untried / leading edge technologies and there are no notable risks involved. Provided the environmental issues can be addressed this option is technically feasible.
Operational:	Provided patronage develops broadly as anticipated the proposal is operationally feasible.
Financial:	Investment costs are relatively low but ongoing subsidy of the bus service is likely to be required. However, provided suitable sources of funding can be identified the proposal is financially feasible.
Public acceptability:	Provided impacts on the Swallow Hotel Wetland SINC and TPO can be mitigated this proposal should be publically acceptable.

Environment			
Mitigation Options Included: (Costs & Benefits)	Due to the Swallow Wetland and Swallow Hotel TPO area extensive mitigation will be required.		
Sub-criterion	**Qualitative Information**	**Quantitative Information**	**Significance of Impact**
Noise and Vibration	Due to the small number of sensitive receptors and currently low level of noise, noise and vibration impacts are negligible.	negligible	negligible
Global Air Quality – CO_2	Vehicle kilometres reduce due to the shift to Park & Ride.	£89,000	minor
Local Air Quality – PM_{10} and NO_2	Due to the small number of sensitive receptors, small impact of the proposals and currently good air quality overall impacts are considered negligible. Minor air quality improvements within Dundee are possible.	People / properties with potential improvements greatly exceeds those with potential impacts.	minor
Water Quality, Drainage and Flood Defence	The site is not considered to be at risk of flooding. There is a some risk of flooding and changes in flood plain operation relating to the access to the Swallow Roundabout but, given the other development proposals for this area it is considered likely that it will be possible to mitigate there effects.	site is waterlogged and acts as a floodplain. Access road must cross floodplain.	negligible with mitigation
Geology	No geological designations. There is a low risk to groundwater in the event of a major hydrocarbon spillage but this can be mitigated.	negligible	negligible
Biodiversity	There are potential impacts relating to the site itself and to the access to the Swallow Roundabout which must skirt the Swallow Wetland SINC and Swallow Hotel TPO area. With suitable mitigation the impacts can be minimised and access through here will be required for planned business developments to go ahead.	minor impact on Swallow Wetland SINC	minor with mitigation
Visual Amenity	Impacts on visual amenity are small and can be screened.	negligible	negligible
Agriculture and Soils	Only a small area will be lost and this will likely be lost to business development in the longer term in any case.	negligible	negligible
Cultural Heritage	Impacts on cultural heritage are not anticipated.	negligible	negligible
Landscape	Impacts on landscape are small and can be screened.	negligible	negligible
Physical fitness	A small number of users may take up the opportunity to Park & Walk or Park & Cycle	negligible	negligible
Monetised summary			**£89,000**
Monetary Impact Ratio			**0.0090**

Safety			
Sub-criterion	**Item**	**Qualitative Information**	**Quantitative Information**
Accidents	Change in Annual Personal Injury Accidents	Accidents reduce slightly as traffic falls in Dundee	0.11 PIAs prevented
	Change in Balance of Severity	No change anticipated	n/a
	Total Discounted Savings	due to reduction in accidents	£2,546
Security		Overall impacts on security are considered to be negligible	~ £0
Monetised summary			**£2546**
Monetary Impact Ratio			**0.0003**

Economy (Transport Economic Efficiency)			
Sub-criterion	**Item**	**Qualitative Information**	**Quantitative Information**
User Benefits	Travel Time	As Park & Ride involves interchange travel times increase.	-£5,018,000
	User Charges	Users save city centre parking charges which are greater than the bus fares incurred.	£4,262,600
	Vehicle Operating Costs	Reductions in vehicle mileage reduce operating costs	£137,000
	Quality / Reliability Benefits	negligible	£0
Non-user benefits	Travel Time	Travel times for non-users decrease	£187,000
Private Sector Operator Impacts	Investment Costs	Private sector investment is not required.	£0
	Operating & Maintenance Costs	Cost of running additional buses.	-£3,998,000
	Revenues	Loss of parking income.	£0
		Bus fare income	£3,304,000
	Grant/Subsidy payments	Payments cover the use of concessionary fare passes and the cost of running new buses	£3,998,000
Monetised summary			**£2,951,600**
Monetary Impact Ratio			**0.2982**

Economy (Wider Economic Benefits)			
Sub-criterion	**Item**	**Qualitative information**	**Quantitative information**
Wider Economic Benefits	Agglomeration economies (WB1)	In established agglomerations with mature transport infrastructures it is difficult to generate changes in the overall cost of travel significant enough to have any measurable effect on effective density. Given this and the small scale of this option WB1 is assumed to be negligible.	negligible
	Increased output in perfectly competitive markets (WB3)	There will have only be a small impact on overall traffic flows and Park & Ride use in the context of business travel, excluding commuting, is rare and so it is not certain that there would be any significant time or reliability gains for businesses. At any rate such effects will be negligible in comparison to the directly assessed economic impacts of all of the options being assessed.	negligible
	Wider benefits arising from improved labour supply (WB4)	There is unlikely to be any measurable impact on commuting time or on business locations. A few individuals may be able to access employment when they could not previously but overall impacts are considered to be negligible.	negligible
Monetised summary			**~£0.00**
Monetary Impact Ratio			**0**

Economy (Economic Activity and Location Impacts)			
Sub-criterion	**Item**	**Qualitative Information**	**Quantitative Information**
Economic Activity and Location Impacts	Local Economic Impacts	The scheme is too small to have significant local impacts at the expense of other localities.	N/A
	National Economic Impacts	The scheme is too small to have significant national impacts.	N/A
	Distributional Impacts	The scheme is too small to have significant distributional impacts.	N/A

Integration			
Sub-criterion	**Item**	**Qualitative Information**	**Quantitative Information**
Transport Interchanges	Services & Ticketing	Users will have to interchange and they will have to buy tickets but this will not be a source of significant benefit or disbenefit.	negligible
	Infrastructure & Information	Infrastructure and information provision will be as good as is financially feasible and will not be a source of significant benefit or disbenefit.	negligible
Land-use Transport Integration		This proposal is in line with national and local planning policy.	N/A
Policy Integration		This proposal is in line with government policy on transport, disability, health and rural affairs.	N/A

Accessibility & Social Inclusion			
Sub-criterion	**Item**	**Qualitative Information**	**Quantitative Information**
Community Accessibility	Public Transport Network Coverage	Network extended into the Western Gateway area. Service frequencies may improve.	Small benefit to households on existing routes
	Access to Other Local Services	No impact anticipated	Negligible
Comparative Accessibility	Distribution/Spatial Impacts by Social Group	Slight risk of minor impacts on bus services into Dundee from Perth and the adjoining rural areas.	Negligible
	Distribution/Spatial Impacts by Area	No significant impacts	Negligible

Strategic Environmental Assessment (SEA)	
Summary of SEA outcome where appropriate	Not required

Cost to Public Sector		
Item	Qualitative information	Quantitative information
Public Sector Investment Costs	Site and access construction	£2,794,000
Public Sector Operating & Maintenance Costs	Site maintenance and operating costs	£2,218,000
Grant/Subsidy Payments	bus operation subsidy	£3,998,000
Revenues	losses in pay parking revenue assumed to be zero	£0
Taxation impacts	losses for indirect taxation (primarily petrol)	£879,000

Monetised Summary	
Present Value of Transport Benefits	£2,954,146
Present Value of Cost to Government	£9,889,000
Net Present Value	-£6,934,854
Benefit-Cost to Government Ratio	0.2987
Benefit-Cost to Government Ratio (including WEBs)	0.2987
Benefit-Cost to Funding Agency Ratio	N/A at this stage

Proposal Details			
Name and address of authority or organisation promoting the proposal: (Also provide name of any subsidiary organisations also involved in promoting the proposal)		TACTRAN, Bordeaux House, 31 Kinnoull Street, Perth, PH1 5EN STAG assessment by: Colin Buchanan, 4 St Colme Street, Edinburgh, EH3 6AA	
Proposal Name:	Option 3i	Name of Planner:	
Proposal Description:	Park & Ride site situated northwest of the Swallow Roundabout and accessed from it and from a short slip off the A90.	Total Public Sector Funding Requirement (2002 prices):	Undiscounted capital costs: £4,013,262 Annual Revenue support: £348,956 PVC to government: £10,577,000
Funding Sought From: (if applicable)	N/A at this stage	Amount of Application:	N/A at this stage

Background Information	
Geographic Context:	Dundee is Scotland's 4th largest city and the largest urban area in the TACTRAN region. It is an important employment, educational and regional centre; approximately 300,000 people live within a 30 minute drive of the city. Maintaining and improving accessibility to Dundee is therefore important to the continuing economic health of the region.
Social Context:	The TACTRAN region has a population of approximately 475,000 people, with almost two thirds living in towns or cities. In Dundee, 17.7% of the resident population are aged between 0-15 years, 64.6% aged 16-64 years and 17.7% aged 65+ years. Approximately 31% of TACTRAN households do not have access to a car; this figure rises to approximately 46% for Dundee City. Access to healthcare facilities for those without access to a car is a key issue for the region, particularly following centralisation of services.
Economic Context:	Maintaining and improving internal and external regional connectivity is central to ensuring that the economy of the TACTRAN region continues to prosper. Furthermore, it is essential that those who living in TACTRAN's rural communities, as well as larger towns and cities, are well-connected to essential employment, education, health and other key locations. The A90 corridor is an important part of the national trunk network. It provides a strategic function linking the central belt with Dundee and Aberdeen. It also serves an important commuter route to Dundee during peak periods. With a large number of competing movements, congestion occurs at peak periods. This has implications in terms of the local and national economy, and on the environment of the people who live and work in Dundee. While the population of Dundee is forecast to reduce slightly, total employment is expected to increase. This is anticipated to lead further increases in the level of commuting to the city from across the region.

Planning Objectives	
Objective:	Performance against planning objective:
Improve the public transport accessibility to employment, health, leisure and recreational locations in the west of Dundee and city centre	✓ More network coverage and destinations served in and from West Dundee.
Encourage a shift toward sustainable and healthier modes of transport	✓✓ Increased use of buses in Dundee.
Reduce traffic congestion for longer distance trips in the west of Dundee	✓✓ Potential reductions in traffic at the Swallow Roundabout and in central Dundee benefitting both through trips and long distance trips starting / ending in Dundee.
Contribute to national and local air quality targets and reduce the impact of climate change	✓✓ Potential air quality gains in central Dundee and at the Swallow Roundabout
Minimise the impacts of the scheme upon the natural and built environment	✓ Scheme may impact environmentally sensitive areas but effects can be minimised
Rationale for Selection or Rejection of Proposal:	Selected - Significant potential benefits if environmental issues can be overcome

Implementability Appraisal	
Technical:	The proposal involves no novel / untried / leading edge technologies and there are no notable risks involved. Provided the environmental issues can be addressed this option is technically feasible.
Operational:	Provided patronage develops broadly as anticipated the proposal is operationally feasible.
Financial:	Investment costs are relatively high and ongoing subsidy of the bus service is likely to be required. However, provided suitable sources of funding can be identified the proposal is financially feasible.
Public acceptability:	Provided impacts on the Swallow Hotel Wetland SINC and TPO can be mitigated this proposal should be publically acceptable.

Environment			
Mitigation Options Included: (Costs & Benefits)	Due to the Swallow Wetland and Swallow Hotel TPO area extensive mitigation will be required.		
Sub-criterion	**Qualitative Information**	**Quantitative Information**	**Significance of Impact**
Noise and Vibration	Due to the small number of sensitive receptors and currently low level of noise, noise and vibration impacts are negligible.	negligible	negligible
Global Air Quality – CO_2	Vehicle kilometres reduce due to the shift to Park & Ride.	£93,000	minor
Local Air Quality – PM_{10} and NO_2	Due to the small number of sensitive receptors, small impact of the proposals and currently good air quality overall impacts are considered negligible. Minor air quality improvements within Dundee are possible.	People / properties with potential improvements greatly exceeds those with potential impacts.	minor
Water Quality, Drainage and Flood Defence	The site is not considered to be at risk of flooding. There is a some risk of flooding and changes in flood plain operation relating to the access to the Swallow Roundabout but, given the other development proposals for this area it is considered likely that it will be possible to mitigate there effects.	site is waterlogged and acts as a floodplain. Access road must cross floodplain.	negligible with mitigation
Geology	No geological designations. There is a low risk to groundwater in the event of a major hydrocarbon spillage but this can be mitigated.	negligible	negligible
Biodiversity	There are potential impacts relating to the site itself and to the access to the Swallow Roundabout which must skirt the Swallow Wetland SINC and Swallow Hotel TPO area. With suitable mitigation the impacts can be minimised and access through here will be required for planned business developments to go ahead.	minor impact on Swallow Wetland SINC	minor with mitigation
Visual Amenity	Impacts on visual amenity are small and can be screened.	negligible	negligible
Agriculture and Soils	Only a small area will be lost and this will likely be lost to business development in the longer term in any case.	negligible	negligible
Cultural Heritage	Impacts on cultural heritage are not anticipated.	negligible	negligible
Landscape	Impacts on landscape are small and can be screened.	negligible	negligible
Physical fitness	A small number of users may take up the opportunity to Park & Walk or Park & Cycle	negligible	negligible
Monetised summary			**£93,000**
Monetary Impact Ratio			**0.0088**

Safety			
Sub-criterion	**Item**	**Qualitative Information**	**Quantitative Information**
Accidents	Change in Annual Personal Injury Accidents	Accidents reduce slightly as traffic falls in Dundee	0.11 PIAs prevented
	Change in Balance of Severity	No change anticipated	n/a
	Total Discounted Savings	due to reduction in accidents	£2,546
Security		Overall impacts on security are considered to be negligible	~ £0
Monetised summary			**£2546**
Monetary Impact Ratio			**0.0002**

Economy (Transport Economic Efficiency)			
Sub-criterion	**Item**	**Qualitative Information**	**Quantitative Information**
User Benefits	Travel Time	As Park & Ride involves interchange travel times increase.	-£4,983,000
	User Charges	Users save city centre parking charges which are greater than the bus fares incurred.	£4,503,900
	Vehicle Operating Costs	Reductions in vehicle mileage reduce operating costs	£168,000
	Quality / Reliability Benefits	negligible	£0
Non-user benefits	Travel Time	Travel times for non-users decrease	£8,944,000
Private Sector Operator Impacts	Investment Costs	Private sector investment is not required.	£0
	Operating & Maintenance Costs	Cost of running additional buses.	-£3,998,000
	Revenues	Loss of parking income.	£0
		Bus fare income	£3,500,000
	Grant/Subsidy payments	Payments cover the use of concessionary fare passes and the cost of running new buses	£3,998,000
Monetised summary			**£12,132,900**
Monetary Impact Ratio			**1.2259**

Economy (Wider Economic Benefits)			
Sub-criterion	**Item**	**Qualitative information**	**Quantitative information**
Wider Economic Benefits	Agglomeration economies (WB1)	In established agglomerations with mature transport infrastructures it is difficult to generate changes in the overall cost of travel significant enough to have any measurable effect on effective density. Given this and the small scale of this option WB1 is assumed to be negligible.	negligible
	Increased output in perfectly competitive markets (WB3)	There will have only be a small impact on overall traffic flows and Park & Ride use in the context of business travel, excluding commuting, is rare and so it is not certain that there would be any significant time or reliability gains for businesses. At any rate such effects will be negligible in comparison to the directly assessed economic impacts of all of the options being assessed.	negligible
	Wider benefits arising from improved labour supply (WB4)	There is unlikely to be any measurable impact on commuting time or on business locations. A few individuals may be able to access employment when they could not previously but overall impacts are considered to be negligible.	negligible
Monetised summary			**~£0.00**
Monetary Impact Ratio			**0**

Economy (Economic Activity and Location Impacts)			
Sub-criterion	**Item**	**Qualitative Information**	**Quantitative Information**
Economic Activity and Location Impacts	Local Economic Impacts	The scheme is too small to have significant local impacts at the expense of other localities.	N/A
	National Economic Impacts	The scheme is too small to have significant national impacts.	N/A
	Distributional Impacts	The scheme is too small to have significant distributional impacts.	N/A

Integration			
Sub-criterion	**Item**	**Qualitative Information**	**Quantitative Information**
Transport Interchanges	Services & Ticketing	Users will have to interchange and they will have to buy tickets but this will not be a source of significant benefit or disbenefit.	negligible
	Infrastructure & Information	Infrastructure and information provision will be as good as is financially feasible and will not be a source of significant benefit or disbenefit.	negligible
Land-use Transport Integration		This proposal is in line with national and local planning policy.	N/A
Policy Integration		This proposal is in line with government policy on transport, disability, health and rural affairs.	N/A

Accessibility & Social Inclusion			
Sub-criterion	**Item**	**Qualitative Information**	**Quantitative Information**
Community Accessibility	Public Transport Network Coverage	Network extended into the Western Gateway area. Service frequencies may improve.	Small benefit to households on existing routes
	Access to Other Local Services	No impact anticipated	Negligible
Comparative Accessibility	Distribution/Spatial Impacts by Social Group	Slight risk of minor impacts on bus services into Dundee from Perth and the adjoining rural areas.	Negligible
	Distribution/Spatial Impacts by Area	No significant impacts	Negligible

Strategic Environmental Assessment (SEA)	
Summary of SEA outcome where appropriate	Not required

Cost to Public Sector		
Item	Qualitative information	Quantitative information
Public Sector Investment Costs	Site and access construction	£3,198,000
Public Sector Operating & Maintenance Costs	Site maintenance and operating costs	£2,444,000
Grant/Subsidy Payments	bus operation subsidy	£3,998,000
Revenues	losses in pay parking revenue	£0
Taxation impacts	losses for indirect taxation (primarily petrol)	£,937,000

Monetised Summary	
Present Value of Transport Benefits	£12,135,446
Present Value of Cost to Government	£10,577,000
Net Present Value	£1,558,446
Benefit-Cost to Government Ratio	1.1473
Benefit-Cost to Government Ratio (including WEBs)	1.1473
Benefit-Cost to Funding Agency Ratio	N/A at this stage

Proposal Details			
Name and address of authority or organisation promoting the proposal: (Also provide name of any subsidiary organisations also involved in promoting the proposal)		TACTRAN, Bordeaux House, 31 Kinnoull Street, Perth, PH1 5EN STAG assessment by: Colin Buchanan, 4 St Colme Street, Edinburgh, EH3 6AA	
Proposal Name:	Option 3ii	Name of Planner:	
Proposal Description:	Park & Ride site situated northwest of the Swallow Roundabout and accessed from it and from a long slip off the A90.	Total Public Sector Funding Requirement (2002 prices):	Undiscounted capital costs: £5,703,583 Annual Revenue support: £390,942 PVC to government: £12,831,000
Funding Sought From: (if applicable)	N/A at this stage	Amount of Application:	N/A at this stage

Background Information	
Geographic Context:	Dundee is Scotland's 4th largest city and the largest urban area in the TACTRAN region. It is an important employment, educational and regional centre; approximately 300,000 people live within a 30 minute drive of the city. Maintaining and improving accessibility to Dundee is therefore important to the continuing economic health of the region.
Social Context:	The TACTRAN region has a population of approximately 475,000 people, with almost two thirds living in towns or cities. In Dundee, 17.7% of the resident population are aged between 0-15 years, 64.6% aged 16-64 years and 17.7% aged 65+ years. Approximately 31% of TACTRAN households do not have access to a car; this figure rises to approximately 46% for Dundee City. Access to healthcare facilities for those without access to a car is a key issue for the region, particularly following centralisation of services.
Economic Context:	Maintaining and improving internal and external regional connectivity is central to ensuring that the economy of the TACTRAN region continues to prosper. Furthermore, it is essential that those who living in TACTRAN's rural communities, as well as larger towns and cities, are well-connected to essential employment, education, health and other key locations. The A90 corridor is an important part of the national trunk network. It provides a strategic function linking the central belt with Dundee and Aberdeen. It also serves an important commuter route to Dundee during peak periods. With a large number of competing movements, congestion occurs at peak periods. This has implications in terms of the local and national economy, and on the environment of the people who live and work in Dundee. While the population of Dundee is forecast to reduce slightly, total employment is expected to increase. This is anticipated to lead further increases in the level of commuting to the city from across the region.

Planning Objectives	
Objective:	Performance against planning objective:
Improve the public transport accessibility to employment, health, leisure and recreational locations in the west of Dundee and city centre	✓✓ Increased patronage supports more network coverage and destinations served in and from West Dundee.
Encourage a shift toward sustainable and healthier modes of transport	✓✓ Increased use of buses in Dundee.
Reduce traffic congestion for longer distance trips in the west of Dundee	✓✓ Potential reductions in traffic at the Swallow Roundabout and in central Dundee benefitting both through trips and long distance trips starting / ending in Dundee.
Contribute to national and local air quality targets and reduce the impact of climate change	✓✓ Potential air quality gains in central Dundee and at the Swallow Roundabout
Minimise the impacts of the scheme upon the natural and built environment	✓ Scheme may impact environmentally sensitive areas but effects can be minimised
Rationale for Selection or Rejection of Proposal:	Selected - Significant potential benefits if environmental issues can be overcome

Implementability Appraisal	
Technical:	The proposal involves no novel / untried / leading edge technologies and there are no notable risks involved. Provided the environmental issues can be addressed this option is technically feasible.
Operational:	Provided patronage develops broadly as anticipated the proposal is operationally feasible.
Financial:	Investment costs are relatively high and ongoing subsidy of the bus service is likely to be required. However, provided suitable sources of funding can be identified the proposal is financially feasible.
Public acceptability:	Provided impacts on the Swallow Hotel Wetland SINC and TPO can be mitigated this proposal should be publically acceptable.

Environment			
Mitigation Options Included: (Costs & Benefits)	Due to the Swallow Wetland and Swallow Hotel TPO area extensive mitigation will be required.		
Sub-criterion	**Qualitative Information**	**Quantitative Information**	**Significance of Impact**
Noise and Vibration	Due to the small number of sensitive receptors and currently low level of noise, noise and vibration impacts are negligible.	negligible	negligible
Global Air Quality – CO_2	Vehicle kilometres reduce due to the shift to Park & Ride.	£119,000	minor
Local Air Quality – PM_{10} and NO_2	Due to the small number of sensitive receptors, small impact of the proposals and currently good air quality overall impacts are considered negligible. Minor air quality improvements within Dundee are possible.	People / properties with potential improvements greatly exceeds those with potential impacts.	minor
Water Quality, Drainage and Flood Defence	The site is not considered to be at risk of flooding. There is a some risk of flooding and changes in flood plain operation relating to the access to the Swallow Roundabout but, given the other development proposals for this area it is considered likely that it will be possible to mitigate there effects.	site is waterlogged and acts as a floodplain. Access road must cross floodplain.	negligible with mitigation
Geology	No geological designations. There is a low risk to groundwater in the event of a major hydrocarbon spillage but this can be mitigated.	negligible	negligible
Biodiversity	There are potential impacts relating to the site itself and to the access to the Swallow Roundabout which must skirt the Swallow Wetland SINC and Swallow Hotel TPO area. With suitable mitigation the impacts can be minimised and access through here will be required for planned business developments to go ahead.	minor impact on Swallow Wetland SINC	minor with mitigation
Visual Amenity	Impacts on visual amenity are small and can be screened.	negligible	negligible
Agriculture and Soils	Only a small area will be lost and this will likely be lost to business development in the longer term in any case.	negligible	negligible
Cultural Heritage	Impacts on cultural heritage are not anticipated.	negligible	negligible
Landscape	Impacts on landscape are small and can be screened.	negligible	negligible
Physical fitness	A small number of users may take up the opportunity to Park & Walk or Park & Cycle	negligible	negligible
Monetised summary			**£119,000**
Monetary Impact Ratio			**0.0093**

Safety			
Sub-criterion	**Item**	**Qualitative Information**	**Quantitative Information**
Accidents	Change in Annual Personal Injury Accidents	Accidents reduce slightly as traffic falls in Dundee	0.11 PIAs prevented
	Change in Balance of Severity	No change anticipated	n/a
	Total Discounted Savings	due to reduction in accidents	£2,546
Security		Overall impacts on security are considered to be negligible	~ £0
Monetised summary			**£2546**
Monetary Impact Ratio			**0.0002**

Economy (Transport Economic Efficiency)			
Sub-criterion	**Item**	**Qualitative Information**	**Quantitative Information**
User Benefits	Travel Time	As Park & Ride involves interchange travel times increase.	-£4,961,000
	User Charges	Users save city centre parking charges which are greater than the bus fares incurred.	£4,676,800
	Vehicle Operating Costs	Reductions in vehicle mileage reduce operating costs	£210,000
	Quality / Reliability Benefits	negligible	£0
Non-user benefits	Travel Time	Travel times for non-users decrease	£8,944,000
Private Sector Operator Impacts	Investment Costs	Private sector investment is not required.	£0
	Operating & Maintenance Costs	Cost of running additional buses.	-£3,998,000
	Revenues	Loss of parking income.	£0
		Bus fare income	£3,693,000
	Grant/Subsidy payments	Payments cover the use of concessionary fare passes and the cost of running new buses	£3,998,000
Monetised summary			**£12,562,800**
Monetary Impact Ratio			**1.2693**

Economy (Wider Economic Benefits)			
Sub-criterion	**Item**	**Qualitative information**	**Quantitative information**
Wider Economic Benefits	Agglomeration economies (WB1)	In established agglomerations with mature transport infrastructures it is difficult to generate changes in the overall cost of travel significant enough to have any measurable effect on effective density. Given this and the small scale of this option WB1 is assumed to be negligible.	negligible
	Increased output in perfectly competitive markets (WB3)	There will have only be a small impact on overall traffic flows and Park & Ride use in the context of business travel, excluding commuting, is rare and so it is not certain that there would be any significant time or reliability gains for businesses. At any rate such effects will be negligible in comparison to the directly assessed economic impacts of all of the options being assessed.	negligible
	Wider benefits arising from improved labour supply (WB4)	There is unlikely to be any measurable impact on commuting time or on business locations. A few individuals may be able to access employment when they could not previously but overall impacts are considered to be negligible.	negligible
Monetised summary			**~£0.00**
Monetary Impact Ratio			**0**

Economy (Economic Activity and Location Impacts)			
Sub-criterion	**Item**	**Qualitative Information**	**Quantitative Information**
Economic Activity and Location Impacts	Local Economic Impacts	The scheme is too small to have significant local impacts at the expense of other localities.	N/A
	National Economic Impacts	The scheme is too small to have significant national impacts.	N/A
	Distributional Impacts	The scheme is too small to have significant distributional impacts.	N/A

Integration			
Sub-criterion	**Item**	**Qualitative Information**	**Quantitative Information**
Transport Interchanges	Services & Ticketing	Users will have to interchange and they will have to buy tickets but this will not be a source of significant benefit or disbenefit.	negligible
	Infrastructure & Information	Infrastructure and information provision will be as good as is financially feasible and will not be a source of significant benefit or disbenefit.	negligible
Land-use Transport Integration		This proposal is in line with national and local planning policy.	N/A
Policy Integration		This proposal is in line with government policy on transport, disability, health and rural affairs.	N/A

Accessibility & Social Inclusion			
Sub-criterion	**Item**	**Qualitative Information**	**Quantitative Information**
Community Accessibility	Public Transport Network Coverage	Network extended into the Western Gateway area. Service frequencies may improve.	Small benefit to households on existing routes
	Access to Other Local Services	No impact anticipated	Negligible
Comparative Accessibility	Distribution/Spatial Impacts by Social Group	Slight risk of minor impacts on bus services into Dundee from Perth and the adjoining rural areas.	Negligible
	Distribution/Spatial Impacts by Area	No significant impacts	Negligible

Strategic Environmental Assessment (SEA)	
Summary of SEA outcome where appropriate	Not required

Cost to Public Sector		
Item	**Qualitative information**	**Quantitative information**
Public Sector Investment Costs	Site and access construction	£4,545,000
Public Sector Operating & Maintenance Costs	Site maintenance and operating costs	£3,198,000
Grant/Subsidy Payments	bus operation subsidy	£3,998,000
Revenues	losses in pay parking revenue	£0
Taxation impacts	losses for indirect taxation (primarily petrol)	£1,090,000

Monetised Summary	
Present Value of Transport Benefits	£12,565,346
Present Value of Cost to Government	£12,831,000
Net Present Value	-£265,654
Benefit-Cost to Government Ratio	0.9793
Benefit-Cost to Government Ratio (including WEBs)	0.9793
Benefit-Cost to Funding Agency Ratio	N/A at this stage

Proposal Details			
Name and address of authority or organisation promoting the proposal: (Also provide name of any subsidiary organisations also involved in promoting the proposal)		TACTRAN, Bordeaux House, 31 Kinnoull Street, Perth, PH1 5EN STAG assessment by: Colin Buchanan, 4 St Colme Street, Edinburgh, EH3 6AA	
Proposal Name:	Option 5	Name of Planner:	
Proposal Description:	Park & Ride site situated northwest of the Swallow Roundabout and accessed from the existing northwest approach.	Total Public Sector Funding Requirement (2002 prices):	Undiscounted capital costs: £3,506,165 Annual Revenue support: £336,361 PVC to government: £9,889,000
Funding Sought From: (if applicable)	N/A at this stage	Amount of Application:	N/A at this stage

Background Information	
Geographic Context:	Dundee is Scotland's 4th largest city and the largest urban area in the TACTRAN region. It is an important employment, educational and regional centre; approximately 300,000 people live within a 30 minute drive of the city. Maintaining and improving accessibility to Dundee is therefore important to the continuing economic health of the region.
Social Context:	The TACTRAN region has a population of approximately 475,000 people, with almost two thirds living in towns or cities. In Dundee, 17.7% of the resident population are aged between 0-15 years, 64.6% aged 16-64 years and 17.7% aged 65+ years. Approximately 31% of TACTRAN households do not have access to a car; this figure rises to approximately 46% for Dundee City. Access to healthcare facilities for those without access to a car is a key issue for the region, particularly following centralisation of services.
Economic Context:	Maintaining and improving internal and external regional connectivity is central to ensuring that the economy of the TACTRAN region continues to prosper. Furthermore, it is essential that those who living in TACTRAN's rural communities, as well as larger towns and cities, are well-connected to essential employment, education, health and other key locations. The A90 corridor is an important part of the national trunk network. It provides a strategic function linking the central belt with Dundee and Aberdeen. It also serves an important commuter route to Dundee during peak periods. With a large number of competing movements, congestion occurs at peak periods. This has implications in terms of the local and national economy, and on the environment of the people who live and work in Dundee. While the population of Dundee is forecast to reduce slightly, total employment is expected to increase. This is anticipated to lead further increases in the level of commuting to the city from across the region.

Planning Objectives	
Objective:	Performance against planning objective:
Improve the public transport accessibility to employment, health, leisure and recreational locations in the west of Dundee and city centre	✓ More network coverage and destinations served in and from West Dundee.
Encourage a shift toward sustainable and healthier modes of transport	✓✓ Increased use of buses in Dundee.
Reduce traffic congestion for longer distance trips in the west of Dundee	✓ Potential reductions in traffic in central Dundee benefit long distance trips starting / ending in Dundee.
Contribute to national and local air quality targets and reduce the impact of climate change	✓ Potential air quality gains in central Dundee.
Minimise the impacts of the scheme upon the natural and built environment	✓✓ Environmentally sensitive areas are avoided and environmental effects can be minimised
Rationale for Selection or Rejection of Proposal:	Selected – some potential benefits and reduced environmental constraints

Implementability Appraisal	
Technical:	The proposal involves no novel / untried / leading edge technologies and there are no notable risks involved. Provided the environmental issues can be addressed this option is technically feasible.
Operational:	Provided patronage develops broadly as anticipated the proposal is operationally feasible.
Financial:	Investment costs are relatively low but ongoing subsidy of the bus service is likely to be required. However, provided suitable sources of funding can be identified the proposal is financially feasible.
Public acceptability:	There is no particular reason why this proposal should not be publically acceptable.

Environment			
Mitigation Options Included: (Costs & Benefits)	Only standard mitigation measures should be required.		
Sub-criterion	**Qualitative Information**	**Quantitative Information**	**Significance of Impact**
Noise and Vibration	Due to the small number of sensitive receptors and currently low level of noise, noise and vibration impacts are negligible.	negligible	negligible
Global Air Quality – CO_2	Vehicle kilometres reduce due to the shift to Park & Ride.	£89,000	minor
Local Air Quality – PM_{10} and NO_2	Due to the small number of sensitive receptors, small impact of the proposals and currently good air quality overall impacts are considered negligible. Minor air quality improvements within Dundee are possible.	People / properties with potential improvements greatly exceeds those with potential impacts.	minor
Water Quality, Drainage and Flood Defence	The site is not considered to be at significant risk of flooding.	negligible	negligible
Geology	No geological designations. There is a low risk to groundwater in the event of a major hydrocarbon spillage but this can be mitigated.	negligible	negligible
Biodiversity	The site is currently in arable use and impacts on biodiversity should be minimal.	negligible	negligible
Visual Amenity	Impacts on visual amenity are small and can be screened.	negligible	negligible
Agriculture and Soils	Only a small area will be lost and this will likely be lost to business development in the longer term in any case.	negligible	negligible
Cultural Heritage	Impacts on cultural heritage are not anticipated.	negligible	negligible
Landscape	Impacts on landscape are small and can be screened.	negligible	negligible
Physical fitness	A small number of users may take up the opportunity to Park & Walk or Park & Cycle	negligible	negligible
Monetised summary			**£89,000**
Monetary Impact Ratio			**0.0090**

Safety			
Sub-criterion	**Item**	**Qualitative Information**	**Quantitative Information**
Accidents	Change in Annual Personal Injury Accidents	Accidents reduce slightly as traffic falls in Dundee	0.11 PIAs prevented
	Change in Balance of Severity	No change anticipated	n/a
	Total Discounted Savings	due to reduction in accidents	£2,546
Security		Overall impacts on security are considered to be negligible	~ £0
Monetised summary			**£2546**
Monetary Impact Ratio			**0.0003**

Economy (Transport Economic Efficiency)			
Sub-criterion	**Item**	**Qualitative Information**	**Quantitative Information**
User Benefits	Travel Time	As Park & Ride involves interchange travel times increase.	-£5,018,000
	User Charges	Users save city centre parking charges which are greater than the bus fares incurred.	£4,252,600
	Vehicle Operating Costs	Reductions in vehicle mileage reduce operating costs	£137,000
	Quality / Reliability Benefits	Negligible	£0
Non-user benefits	Travel Time	Travel times for non-users decrease	£187,000
Private Sector Operator Impacts	Investment Costs	Private sector investment is not required.	£0
	Operating & Maintenance Costs	Cost of running additional buses.	-£3,998,000
	Revenues	Loss of parking income.	£0
		Bus fare income	£3,304,000
	Grant/Subsidy payments	Payments cover the use of concessionary fare passes and the cost of running new buses	£3,998,000
Monetised summary			**£2,951,000**
Monetary Impact Ratio			**0.2982**

Economy (Wider Economic Benefits)			
Sub-criterion	**Item**	**Qualitative information**	**Quantitative information**
Wider Economic Benefits	Agglomeration economies (WB1)	In established agglomerations with mature transport infrastructures it is difficult to generate changes in the overall cost of travel significant enough to have any measurable effect on effective density. Given this and the small scale of this option WB1 is assumed to be negligible.	negligible
	Increased output in perfectly competitive markets (WB3)	There will have only be a small impact on overall traffic flows and Park & Ride use in the context of business travel, excluding commuting, is rare and so it is not certain that there would be any significant time or reliability gains for businesses. At any rate such effects will be negligible in comparison to the directly assessed economic impacts of all of the options being assessed.	negligible
	Wider benefits arising from improved labour supply (WB4)	There is unlikely to be any measurable impact on commuting time or on business locations. A few individuals may be able to access employment when they could not previously but overall impacts are considered to be negligible.	negligible
Monetised summary			**~£0.00**
Monetary Impact Ratio			**0**

Economy (Economic Activity and Location Impacts)			
Sub-criterion	**Item**	**Qualitative Information**	**Quantitative Information**
Economic Activity and Location Impacts	Local Economic Impacts	The scheme is too small to have significant local impacts at the expense of other localities.	N/A
	National Economic Impacts	The scheme is too small to have significant national impacts.	N/A
	Distributional Impacts	The scheme is too small to have significant distributional impacts.	N/A

Integration			
Sub-criterion	**Item**	**Qualitative Information**	**Quantitative Information**
Transport Interchanges	Services & Ticketing	Users will have to interchange and they will have to buy tickets but this will not be a source of significant benefit or disbenefit.	negligible
	Infrastructure & Information	Infrastructure and information provision will be as good as is financially feasible and will not be a source of significant benefit or disbenefit.	negligible
Land-use Transport Integration		This proposal is in line with national and local planning policy.	N/A
Policy Integration		This proposal is in line with government policy on transport, disability, health and rural affairs.	N/A

Accessibility & Social Inclusion			
Sub-criterion	**Item**	**Qualitative Information**	**Quantitative Information**
Community Accessibility	Public Transport Network Coverage	Network extended into area northwest of the Kingsway. Service frequencies may improve.	Small benefit to households on existing routes
	Access to Other Local Services	No impact anticipated	Negligible
Comparative Accessibility	Distribution/Spatial Impacts by Social Group	Slight risk of minor impacts on bus services into Dundee from Perth and the adjoining rural areas.	Negligible
	Distribution/Spatial Impacts by Area	No significant impacts	Negligible

Strategic Environmental Assessment (SEA)	
Summary of SEA outcome where appropriate	Not required

Cost to Public Sector		
Item	Qualitative information	Quantitative information
Public Sector Investment Costs	Site and access construction	£2,794,000
Public Sector Operating & Maintenance Costs	Site maintenance and operating costs	£2,218,000
Grant/Subsidy Payments	bus operation subsidy	£3,998,000
Revenues	losses in pay parking revenue	£0
Taxation impacts	losses for indirect taxation (primarily petrol)	£879,000

Monetised Summary	
Present Value of Transport Benefits	£2,954,146
Present Value of Cost to Government	£9,889,000
Net Present Value	-£6,934,854
Benefit-Cost to Government Ratio	0.2987
Benefit-Cost to Government Ratio (including WEBs)	0.2987
Benefit-Cost to Funding Agency Ratio	N/A at this stage

Proposal Details			
Name and address of authority or organisation promoting the proposal: (Also provide name of any subsidiary organisations also involved in promoting the proposal)	TACTRAN, Bordeaux House, 31 Kinnoull Street, Perth, PH1 5EN STAG assessment by: Colin Buchanan, 4 St Colme Street, Edinburgh, EH3 6AA		
Proposal Name:	**Option 6B**	Name of Planner:	
Proposal Description:	Park & Ride site west of Wright Avenue	Total Public Sector Funding Requirement (2002 prices):	Undiscounted capital costs: £3,053,733 Annual Revenue support: £277,801 PVC to government: £8,712,000
Funding Sought From: (if applicable)	N/A at this stage	Amount of Application:	N/A at this stage
Background Information			
Geographic Context:	Dundee is Scotland's 4th largest city and the largest urban area in the TACTRAN region. It is an important employment, educational and regional centre; approximately 300,000 people live within a 30 minute drive of the city. Maintaining and improving accessibility to Dundee is therefore important to the continuing economic health of the region.		
Social Context:	The TACTRAN region has a population of approximately 475,000 people, with almost two thirds living in towns or cities. In Dundee, 17.7% of the resident population are aged between 0-15 years, 64.6% aged 16-64 years and 17.7% aged 65+ years. Approximately 31% of TACTRAN households do not have access to a car; this figure rises to approximately 46% for Dundee City. Access to healthcare facilities for those without access to a car is a key issue for the region, particularly following centralisation of services.		
Economic Context:	Maintaining and improving internal and external regional connectivity is central to ensuring that the economy of the TACTRAN region continues to prosper. Furthermore, it is essential that those who living in TACTRAN's rural communities, as well as larger towns and cities, are well-connected to essential employment, education, health and other key locations. The A90 corridor is an important part of the national trunk network. It provides a strategic function linking the central belt with Dundee and Aberdeen. It also serves an important commuter route to Dundee during peak periods. With a large number of competing movements, congestion occurs at peak periods. This has implications in terms of the local and national economy, and on the environment of the people who live and work in Dundee. While the population of Dundee is forecast to reduce slightly, total employment is expected to increase. This is anticipated to lead further increases in the level of commuting to the city from across the region.		

Planning Objectives		
Objective:	Performance against planning objective:	
Improve the public transport accessibility to employment, health, leisure and recreational locations in the west of Dundee and city centre	✓✓	Increased patronage provides support for greater network coverage and destinations served in and around West Dundee.
Encourage a shift toward sustainable and healthier modes of transport	✓✓✓	Increased use of buses in Dundee. Potential for increases in walking and cycling
Reduce traffic congestion for longer distance trips in the west of Dundee	✓	Potential reductions in traffic in central Dundee benefit long distance trips starting / ending in Dundee.
Contribute to national and local air quality targets and reduce the impact of climate change	✓✓	Potentially significant air quality gains in central Dundee.
Minimise the impacts of the scheme upon the natural and built environment	✓	Scheme may impact environmentally sensitive areas but effects can be minimised
Rationale for Selection or Rejection of Proposal:	Selected - Significant potential benefits if environmental issues can be overcome	

Implementability Appraisal	
Technical:	The proposal involves no novel / untried / leading edge technologies and there are no notable risks involved. Provided the environmental issues can be addressed this option is technically feasible.
Operational:	Provided patronage develops broadly as anticipated the proposal is operationally feasible.
Financial:	Investment costs are relatively low but ongoing subsidy of the bus service is likely to be required. However, provided suitable sources of funding can be identified the proposal is financially feasible.
Public acceptability:	Provided impacts on the Inner Tay LNR can be mitigated this proposal should be publically acceptable.

Environment			
Mitigation Options Included: (Costs & Benefits)	Due to site's location within the Inner Tay LNR extensive mitigation will be required.		
Sub-criterion	**Qualitative Information**	**Quantitative Information**	**Significance of Impact**
Noise and Vibration	Due to the presence of the railway line and Riverside Drive between the site and any sensitive receptors noise and vibration impacts are considered to be negligible.	negligible	negligible
Global Air Quality – CO_2	Vehicle kilometres reduce due to the shift to Park & Ride.	£106,000	minor
Local Air Quality – PM_{10} and NO_2	Due to the small number of sensitive receptors, small impact of the proposals and currently good air quality overall impacts are considered negligible. Minor air quality improvements within Dundee are possible.	People / properties with potential improvements greatly exceeds those with potential impacts.	minor
Water Quality, Drainage and Flood Defence	The site is not considered to be at significant risk of flooding.	negligible	negligible
Geology	No geological designations. There is a low risk to groundwater in the event of a major hydrocarbon spillage but this can be mitigated.	negligible	negligible
Biodiversity	There are potential impacts relating to the site which lies within the Inner Tay LNR. However, despite its location the site is not of significant habitat value.	minor impact on Inner Tay LNR	minor with mitigation
Visual Amenity	Impacts on visual amenity are small and can be screened.	negligible	negligible
Agriculture and Soils	Only a small area will be lost and this is not currently used for agriculture.	negligible	negligible
Cultural Heritage	Impacts on cultural heritage are not anticipated.	negligible	negligible
Landscape	Impacts on landscape are small and can be screened.	negligible	negligible
Physical fitness	A small number of users may take up the opportunity to Park & Walk or Park & Cycle	negligible	negligible
Monetised summary			**£106,000**
Monetary Impact Ratio			**0.0122**

Safety			
Sub-criterion	**Item**	**Qualitative Information**	**Quantitative Information**
Accidents	Change in Annual Personal Injury Accidents	Accidents reduce slightly as traffic falls in Dundee	0.08 PIAs prevented
	Change in Balance of Severity	No change anticipated	n/a
	Total Discounted Savings	due to reduction in accidents	£1765
Security		Overall impacts on security are considered to be negligible	~ £0.00
Monetised summary			**£1765**
Monetary Impact Ratio			**0.0002**

Economy (Transport Economic Efficiency)			
Sub-criterion	**Item**	**Qualitative Information**	**Quantitative Information**
User Benefits	Travel Time	As Park & Ride involves interchange travel times increase.	-£4,191,000
	User Charges	Users save city centre parking charges which are greater than the bus fares incurred.	£6,127,950
	Vehicle Operating Costs	Reductions in vehicle mileage reduce operating costs	£337,000
	Quality / Reliability Benefits	negligible	£0
Non-user benefits	Travel Time	Travel times for non-users increase overall due to introduction of new roundabout	-£299,000
Private Sector Operator Impacts	Investment Costs	Private sector investment is not required.	£0
	Operating & Maintenance Costs	Cost of running additional buses.	-£3,115,000
	Revenues	Loss of parking income.	£0
		Bus fare income	£4,834,000
	Grant/Subsidy payments	Payments cover the use of concessionary fare passes and the cost of running new buses	£3,115,000
Monetised summary			**£6,808,950**
Monetary Impact Ratio			**0.6879**

Economy (Wider Economic Benefits)			
Sub-criterion	**Item**	**Qualitative information**	**Quantitative information**
Wider Economic Benefits	Agglomeration economies (WB1)	In established agglomerations with mature transport infrastructures it is difficult to generate changes in the overall cost of travel significant enough to have any measurable effect on effective density. Given this and the small scale of this option WB1 is assumed to be negligible.	negligible
	Increased output in perfectly competitive markets (WB3)	There will have only be a small impact on overall traffic flows and Park & Ride use in the context of business travel, excluding commuting, is rare and so it is not certain that there would be any significant time or reliability gains for businesses. At any rate such effects will be negligible in comparison to the directly assessed economic impacts of all of the options being assessed.	negligible
	Wider benefits arising from improved labour supply (WB4)	There is unlikely to be any measurable impact on commuting time or on business locations. A few individuals may be able to access employment when they could not previously but overall impacts are considered to be negligible.	negligible
Monetised summary			**~£0.00**
Monetary Impact Ratio			**0**

Economy (Economic Activity and Location Impacts)			
Sub-criterion	**Item**	**Qualitative Information**	**Quantitative Information**
Economic Activity and Location Impacts	Local Economic Impacts	The scheme is too small to have significant local impacts at the expense of other localities.	N/A
	National Economic Impacts	The scheme is too small to have significant national impacts.	N/A
	Distributional Impacts	The scheme is too small to have significant distributional impacts.	N/A

Integration			
Sub-criterion	**Item**	**Qualitative Information**	**Quantitative Information**
Transport Interchanges	Services & Ticketing	Users will have to interchange and they will have to buy tickets but this will not be a source of significant benefit or disbenefit.	negligible
	Infrastructure & Information	Infrastructure and information provision will be as good as is financially feasible and will not be a source of significant benefit or disbenefit.	negligible
Land-use Transport Integration		This proposal is in line with national and local planning policy.	N/A
Policy Integration		This proposal is in line with government policy on transport, disability, health and rural affairs.	N/A

Accessibility & Social Inclusion			
Sub-criterion	**Item**	**Qualitative Information**	**Quantitative Information**
Community Accessibility	Public Transport Network Coverage	Service frequencies may improve.	Small benefit to households on existing routes
	Access to Other Local Services	No impact anticipated	Negligible
Comparative Accessibility	Distribution/Spatial Impacts by Social Group	Slight risk of minor impacts on bus services into Dundee from Perth and the adjoining rural areas.	Negligible
	Distribution/Spatial Impacts by Area	No significant impacts	Negligible

Strategic Environmental Assessment (SEA)	
Summary of SEA outcome where appropriate	Not required

Cost to Public Sector		
Item	Qualitative information	Quantitative information
Public Sector Investment Costs	Site and access construction	£2,267,000
Public Sector Operating & Maintenance Costs	Site maintenance and operating costs	£2,016,000
Grant/Subsidy Payments	bus operation subsidy	£3,115,000
Revenues	losses in pay parking revenue	£0
Taxation impacts	losses for indirect taxation (primarily petrol)	£1,314,000

Monetised Summary	
Present Value of Transport Benefits	£6,810,715
Present Value of Cost to Government	£8,712,000
Net Present Value	-£1,901,285
Benefit-Cost to Government Ratio	0.7818
Benefit-Cost to Government Ratio (including WEBs)	0.7818
Benefit-Cost to Funding Agency Ratio	N/A at this stage

Appendix I

Relevant environmental legislation

Badgers

Badgers are protected by the Protection of Badgers Act 1992, as amended by the Nature Conservation (Scotland) Acts 2004. They are also listed on Schedule 6 of the Wildlife and Countryside Act 1981. With certain exceptions it is unlawful to:

- Wilfully kill, injure, take or possess a badger;
- Attempt to kill, injure or take a badger;
- Cruelly ill-treat a badger; and
- Interfere with a badger sett.

A badger sett is defined in the legislation as 'any structure or place, which displays signs indicating current use by a badger'. Legislation is largely aimed at protecting badgers from deliberate persecution and harm. It does not directly protect the habitat and foraging grounds of badgers. 'Current use' does not simply mean 'current occupation' and for licensing purposes it is defined as 'any sett within an occupied badger territory regardless of when it may have last been used'. A sett therefore, in an occupied territory, is classified as in current use even if it is only used seasonally or occasionally by badgers, and is afforded the same protection in law.

Badger is also included on the Scottish Biodiversity List, which is a list of flora, fauna and habitats considered by the Scottish Ministers to be of principal importance for biodiversity conservation.

Otter

Otters are protected through the Wildlife and Countryside Act 1981 (WCA), as amended by the Nature Conservation (Scotland) Act 2004, and Schedule 2 of the Conservation (Natural Habitats &c) Amendment (Scotland) Regulations 2007 that define European protected species.

The Amendment Regulations state that it is an offence to:

- deliberately capture, injure or kill any wild animal of a European protected species;
- deliberately disturb wild animals of any such species in such a way as to be likely significantly to affect the ability of any significant group of animals of that species to survive, breed, or rear or nurture their young or the local distribution or abundance of such an animal; or
- damage or destroy a breeding site or resting place of such an animal.

Under these Regulations it is an offence to damage or destroy a breeding site or resting place, whether the animal is in occupation or not, and protection extends to all life stages of the animal in question. There are additional offences relating to possession, control and sale of a live or dead otter or part of such an animal.

Otter is also included on the Scottish Biodiversity List.

Bats

All native bats are protected through the Wildlife and Countryside Act 1981 (WCA), as amended by the Nature Conservation (Scotland) Act 2004, and Schedule 2 of the Conservation (Natural Habitats &c) Amendment (Scotland) Regulations 2007 that define European Protected Species.

The Amendment Regulations state that it is an offence to:

- deliberately capture, injure or kill any wild animal of a European protected species;
- deliberately disturb wild animals of any such species in such a way as to be likely significantly to affect the ability of any significant group of animals of that species to survive, breed, or rear or nurture their young or the local distribution or abundance of such an animal; or

- damage or destroy a breeding site or resting place of such an animal.

Under these Regulations it is an offence to damage or destroy a breeding site or resting place, whether the animal is in occupation or not, and protection extends to all life stages of the animal in question. There are additional offences relating to possession, control and sale of a live or dead bat or part of such an animal.

Bats are also included on the Scottish Biodiversity List.

Birds

The Wildlife and Countryside Act 1981, as amended by the Nature Conservation (Scotland) Act 2004, states that it is an offence to:

- kill, injure or take any wild bird;
- take, damage or destroy the nest of any wild bird while that nest is in use or being built;
- take or destroy an egg of any wild bird;
- have in one's possession or control any wild bird (dead or alive) or any part of a wild bird which has been taken in contravention of the Act or the Protection of Birds Act 1954;
- have in one's possession or control any egg or part of an egg which has been taken in contravention to the Act. This includes items taken or killed before the passing of the Act;
- have in one's possession or control any live bird of prey of any species in the world (with the exception of vultures and condors) unless it is registered and ringed in;
- have in one's possession or control any bird of a species occurring on Schedule 4 of the Act unless registered (and in some cases ringed) in accordance with the Secretary of State's regulations; and
- disturb any wild bird listed on Schedule 1 while it is nest building, or at a nest containing eggs or young, or disturb the dependent young of such a bird.

In addition, a large number of bird species are included on the Scottish Biodiversity List.

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