ATKINS

TACTRAN WPA034 - Development of the A90 Perth Park & Ride Site

Detailed Appraisal Report

January 2010

Plan Design Enable

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Executive Summary

Atkins has been commissioned by TACTRAN (Tayside and Central Scotland Transport Partnership) to develop park and ride options that will serve the A90 transport corridor and Perth City Centre. Following the Regional Transport Strategy, a Park and Ride Strategy and Action Plan was produced which identified possible park and ride sites for further consideration; sites P4 and P5 located adjacent to the A90 east of Perth. These sites have been considered within this study.

Both sites are located in lands north of the Friarton Bridge river crossing in the vicinity of the M90 / A85 road junction (Barnhill Interchange). Site P4 is located on a greenfield site, south of Walnut Grove and adjacent to the A85 Dundee Road south/westbound carriageway. Site P5 is located on a greenfield site between the south/westbound and north/eastbound carriageway of the A85 Dundee Road. The Park & Ride Strategy and Action Plan, set region-wide strategy planning objectives against the problems and issues identified during the RTS process and appraised a long list of possible park and ride sites against these transport planning objectives. As part of this study, the study planning objectives were SMARTened in accordance with current appraisal guidance.

Following an updated consultation exercise, site P4 and P5 layouts were developed together with bus routeing options.

An appraisal of Sites P4 and P5 has been undertaken set against the study planning objectives and against the STAG criteria. Each site was scored on a 7 point scale ranging from –3 (major negative) to +3 (major positive). The analysis identified that Site P5 scores considerably lower than P4 with Site P5 scoring poorly in accessibility and safety rankings. As such, only option Site P4 was considered for a more detailed appraisal.

A range of future demand for park and ride site P4 was calculated using intercept rates measured at other similar park and ride sites in the United Kingdom and from using intercept rates of traffic passing the site. From this a low, medium and high demand was calculated which would be used for calculating the Business Case for the park and ride site during the detailed appraisal.

The park and ride facility has been appraised against the five Government transport planning objectives; environment, safety, economy, integration and accessibility and social exclusion.

A demand of 159 vehicles has been used within the detailed appraisal for both the Do Minimum and the Reference Case for two bus routeing scenarios; Scenario 1 the 'Hybrid' Service (existing bus services supplementing one new dedicated bus service) and Scenario 2 the 'Dedicated' Service (two new dedicated services using no existing bus services)..

The estimated total cost to the operator of running the Site P4 bus service is £104,117 for the 'Hybrid' Service and £175,082 using the 'Dedicated' service (2009 Q1 prices). A 'Hybrid' bus service would require a single 'Dedicated' park and ride bus for the duration of the day. A new dedicated bus service not using existing services would require a total of two dedicated buses in the AM and PM peak periods with a single bus during the interpeak period. The estimated annual fare revenue is £56,448. This is based upon 191 passengers per day using the service, 10% of which are concessionary travellers. The projected return fare is £1 per passenger.

Based upon the estimated total cost to the operator of running the Site P4 service, and the forecast annual revenue from fares, the total subsidy required from Perth and Kinross Council is estimated to be £47,668 per annum for the provision of the 'Hybrid' bus service and £118,634 using the 'Dedicated' bus service.

However, it should be noted that the adoption of the 'Hybrid' bus service will present financial complexities as any ticket revenue received as part of the park and ride would be required to be shared with all operators serving the site.

For the do something scenario: the adoption of the 'Hybrid' bus service is expected to result in a £0.274M benefit over the 60 year appraisal period, producing a BCR of 0.10. In the 'Dedicated' Service scenario, the expected benefit is £0.839M with a corresponding BCR of 0.21.

For the reference case scenario; the use of the ‘Hybrid’ service at Site P4 results in a 0.478M benefit over the 60 year appraisal period, producing a BCR of 0.17. In the ’’Dedicated’’ Service scenario, the expected benefit is £1.158M with a BCR of 0.29.

1. Introduction

1.1 Atkins has been commissioned by TACTRAN (Tayside and Central Scotland Transport Partnership) to develop park and ride options that will serve the A90 transport corridor and Perth City Centre. Following the Regional Transport Strategy, a Park and Ride Strategy and Action Plan was produced which identified possible park and ride sites for future consideration. The park and ride strategy identified two sites for further consideration; sites P4 and P5 located adjacent to the A90 east of Perth which have been considered within this study. The location of the sites is shown within Figure 1.1.

1.2 Both sites are located in lands north of the Friarton Bridge river crossing in the vicinity of the M90 / A85 road junction (Barnhill Interchange). Site P4 is located on a greenfield site, south of Walnut Grove and adjacent to the A85 Dundee Road south/westbound carriageway. Site P5 is located on a greenfield site between the south/westbound and north/eastbound carriageway of the A85 Dundee Road set within the gyratory system of the Barnhill Interchange. The A85 is a trunk road at this point.

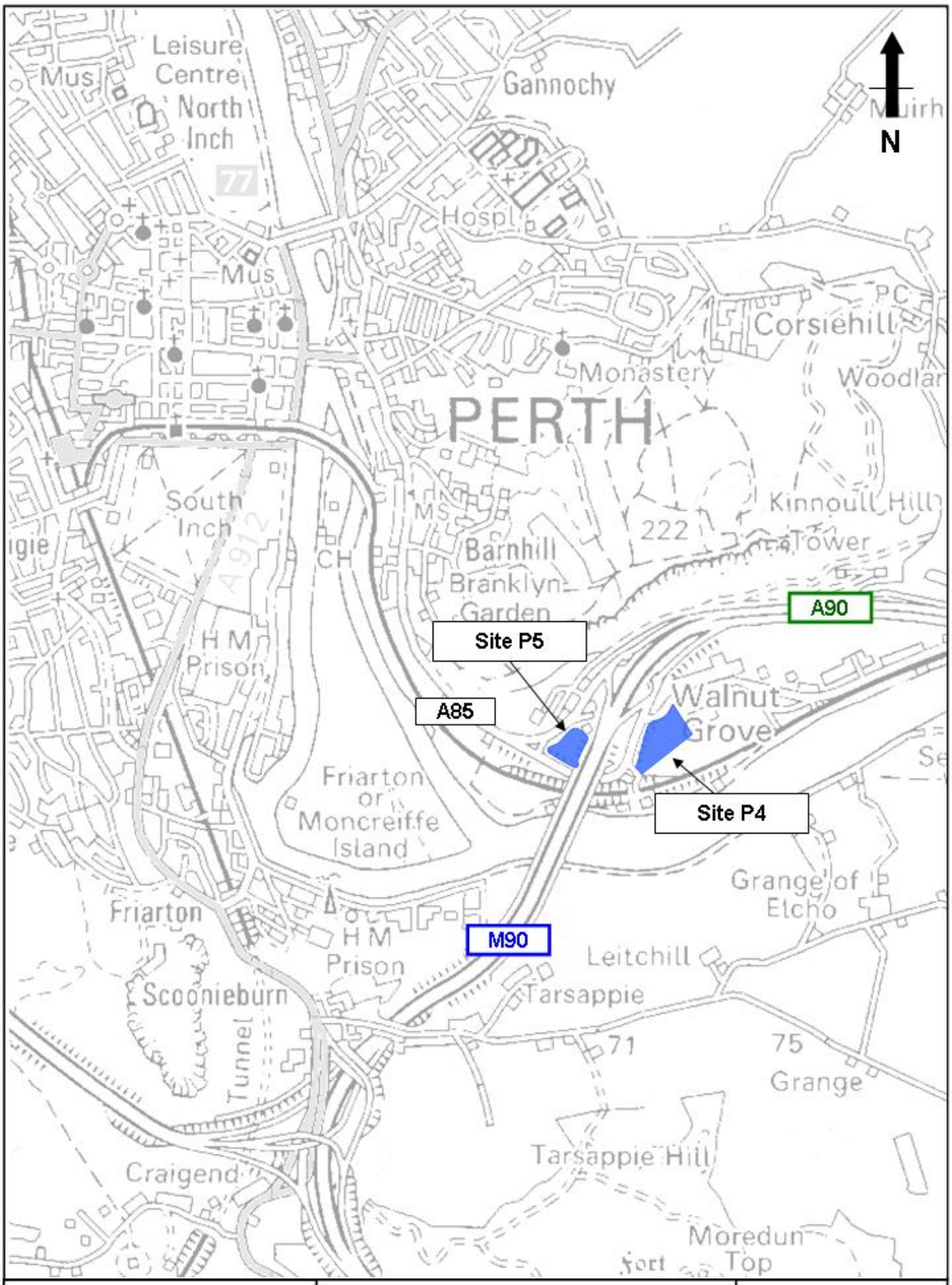
1.3 This report presents the appraisal process for the development of a park and ride facility measured against the Study Transport Planning Objectives and the five appraisal objectives as set out in the Government's appraisal guidance;

- Environment;
- Safety;
- Economy;
- Integration; and
- Accessibility and Social Exclusion.

1.4 The history of this study is contained within a set of reports produced by Atkins which are summarised below:

- Pre-Appraisal Preliminary Report (March 2009); this report gives a summary of the pertinent work undertaken to date before Atkins was commissioned and details the work undertaken during the scoping period of the study including a brief overview of the existing traffic model.
- Outline Appraisal and Option Development Report (June 2009); this report summarises the outline appraisal process undertaken for the sites under consideration including the setting of planning objectives and discusses the option development process. The report concluded that Site P4 should go forward to the detailed appraisal stage whilst Site P5 should be disregarded mainly due to implementability reasons. and
- **Detailed Appraisal Report;** the final report develops options for car park location and construction, bus routeing options and develops a business case for the provision of a park and ride facility south east of Perth. The detailed appraisal of Site P4, considers demand against the Study Transport Planning Objectives and the five objectives as set out in the Government's appraisal guidance; Environment, Safety, Economy, Integration; and Accessibility and Social Exclusion.

Figure 1.1 – Proposed Location of Park and Ride Sites South East of Perth



ATKINS | Proposed Location of Park and Ride | Figure 1.1 | NTS

2. Study Context

Perth and Surrounding Area

2.1 Perth is located on the east coast of Scotland, approximately 23 miles south west of Dundee and is the main centre for retail, leisure and employment for the Perth and Kinross Council (PKC) area. Perth's economic importance is bolstered by its cultural and historic attractions, resulting in it also being an important tourist attraction for the area.

Population

2.2 The population of Perth City is approximately 43,500 people[1] with several satellite towns depending on Perth for their main leisure, retail and employment services. The main towns within the PKC area are Blairgowrie, Alyth, Coupar Angus, Bridge of Earn, Kinross, Crieff and Auchterarder located within the Lowland Rural Area; and Pitlochry, Aberfeldy and Dunkeld located within the Highland Rural Area. The following towns and villages which are located within the immediate catchment of the proposed park and ride sites have the following populations;

- Errol 1,070;
- Inchture 800;
- Bridge of Earn 2,330; and
- Dundee 155,000.

2.3 The Perth and Kinross Structure Plan sets a target for over 18,000 new homes across the area to be delivered by 2020 to accommodate the changing demographics of the population. This will impact both on traffic volumes, congestion and car parking demand within Perth City Centre and also impact on the objectives set out in national, regional and local transport strategies unless the growth in car use can be managed. Pertinent to this study, the increase in new homes will provide a greater number of people residing within the catchment of the proposed park and ride site and thus could result in a greater demand for a park and ride bus service.

2.4 The Regional Transport Strategy for the area recognises that traffic volumes continue to grow within Perth, with 85% of trips attributed to car use and 9% attributed to public transport trips. This pattern is similar for commuting traffic with car based commuting trips increasing from 63% to 70% and public transport commuting trips reducing from 16% to 10% between 1991 and 2001. This trend conflicts with current national transport planning policy, which supports the increasing role of sustainable transport within the UK. However, bus use at Broxden Park and Ride, which is located to the southwest of Perth City Centre adjacent to the trunk road, is increasing with the park and ride car park recently being increased from 200 to 406 spaces to accommodate an increase in demand.

2.5 The largest proportion of the Perth and Kinross working population is employed in the food and drink industries, tourism, and agriculture with the average Perth income below the Scotland and UK average which is compounded by the fact that there is also an average of 14% employment inactivity within the city.[2] However, despite this, it is recognised, within the RTS, that car ownership continues to rise and stands at 76 per cent. This is above the national average for car ownership of 67 per cent.

[1] Regional Transport Strategy 2008 - 2023

[2] Scottish Transport Projects Review

Transportation Overview

2.6 Perth City itself has excellent road links, with the A9 trunk road corridor, connecting with Stirling and Glasgow to the south-west; and with Dunkeld, Pitlochry and Inverness located to the north. The M90 motorway acts as a southern bypass and connects the city with Kinross and Edinburgh to the south. The A90 serves the Dundee conurbation and provides access to settlements along the Perth to Dundee road corridor and to the northeast of Perth City Centre.

2.7 Perth is also well served by public transport, with several local and strategic bus services connecting with Perth Bus Station in the city centre and also with Broxden Park and Ride site located in the outskirts of Perth. In addition, Perth Rail Station provides a rail connection to the major cities in Scotland and the neighbouring towns and cities located on the national rail network.

2.8 In order to maintain Perth's economic viability, it is recognised that the movement of people and freight in and around Perth should be managed to minimise congestion and delay. A number of measures are in place to manage transport volumes within the city, one of which is the provision of a series of park and ride facilities introduced to serve key road corridors. This has been successfully implemented at Broxden and with limited success at Scone where bus based park and ride facilities exist. There is also a bus based Park and Ride facility at Kinross, serving a more strategic travel market and looking towards Edinburgh in the main.

Road Network

2.9 The park and ride sites, as identified within the Park and Ride Strategy and Action Plan, are located in lands north of the Friarton Bridge river crossing in the vicinity of the M90 / A85 road junction (Barnhill Interchange). Site P4 is located on a greenfield site, south of Walnut Grove and adjacent to the A85 Dundee Road south/westbound carriageway. Site P5 is located on a greenfield site within the Barnhill Interchange gyratory between the south/westbound and north/eastbound carriageway of the A85 Dundee Road. The A85 is a trunk road and subject to the national speed limit as it passes both sites.

2.10 The Dundee to Perth trunk road route has a key role in transporting commuters to Perth during the morning peak and returning to Dundee during the evening peak. Additionally, the M90 also serves commuter traffic from Kinross and the south. The interrogation of traffic survey data shows an Annual Average Daily Traffic (AADT) of 13,800 vehicles use the A85 trunk road corridor which results in congestion, within the city centre, at the peak journey times on key routes.

2.11 The section of the A85 Dundee Road corridor, adjacent to the sites under consideration, links the M90 / A90 trunk road corridor with the city centre of Perth via either the Queens Bridge or the Perth Bridge river crossings. As such, it is a key route for both commuters and shoppers travelling to Perth from the A90 and M90 road corridors.

2.12 Outside the 40mph speed limit, the A85 is a four-lane dual carriageway and is subject to the national speed limit. The eastbound and westbound carriageways separate to form the Barnhill Interchange which forms a junction with the A90 / M90 road corridor. Within the Barnhill Interchange, the A85 forms a one way gyratory as it allows traffic to circulate between the on-slip roads and off slip roads of the A90 /M90. This section of road is set in a rural environment and is part of the trunk road network. A footway is located on the west/south verge.

2.13 Within the city boundary, the A85 Dundee Road is a two lane single carriageway with a speed limit of 40mph and the road takes a more urban role with priority junctions, footways and properties taking direct access from it.

2.14 As the A85 approaches Perth City Centre and the Queens Bridge, the speed limit reduces to 30mph, with traffic signals in place to control traffic at the road junctions located either end of the river bridge crossings. A left turn filter is present at the Queens Bridge crossing to help reduce congestion and delay. On the Queens Bridge itself the A85 comprises three lanes; with two lanes allocated to traffic leaving the city centre and one lane allocated for inbound traffic.

2.15 It can be noted that the adopted Perth and Kinross Structure Plan sets a target of an additional 10,000 new homes for the area by 2020 which together with the growth in retail and commercial

land use within Perth City Centre will increase the burden on the local road infrastructure including the A85. The high car ownership levels of the region and the future planned housing expansion for the area will increase traffic movements unless managed carefully. This will increase the overall negative impacts associated with high traffic flow such as particulate emissions, noise, vibration, congestion, delay and severance.

Pedestrian Provision

2.16 Footways are present along the section of the A85 Dundee Road within the urban form of Perth, which connect to the city centre. In addition, a pedestrian footbridge, across the River Tay, exists as part of the rail / river crossing and provides an alternative pedestrian access across the River Tay.

2.17 Outside the 40mph zone, the A85 Dundee Road benefits from a footway on its western/southern verge, this provides pedestrian access to Walnut Grove.

2.18 The A90 is part of the strategic trunk road network and as such no formal pedestrian provision is present as it passes the outskirts of Perth.

Cycle Provision

2.19 No formal cycle provision currently exists within the A85 road corridor. Cyclists currently use the existing road network to undertake their journeys. Cycling is permitted along the A90, however it is considered that only experienced cyclists would use this route.

2.20 The rail footbridge that crosses the River Tay is not suitable for cycling, due to its restricted width and presence of steps at its western extremity.

Park and Ride Serving Perth (Bus)

2.21 The park and ride site at Broxden has recently been expanded from 200 car parking spaces to a capacity of 406 spaces. Bus services include a service between the site and Perth City Centre (Smith & Sons No. 301) and more strategic bus routes to Inverness, Dundee, Stirling, Glasgow and Edinburgh (Megabus). It is understood that the facilities at Broxden will be enhanced in the near future with a waiting room, toilets and changing facilities for staff planned. The dedicated park and ride bus service between Broxden and Perth City Centre has headway of 12 minutes and has a return fare of £1.00 and has branded bus livery to increase service profile.

2.22 The park and ride facility at Scone is served by bus service No. 7, which has been re-routed to directly to serve the site. This site has no park and ride branded buses. The service runs every ten minutes throughout the day Monday to Saturday, but diverts through Scone on its way to Perth. The car park has a capacity of 50 vehicles, which rarely exceeds capacity.

2.23 The park and ride facility at Kinross has a capacity for 126 vehicles which is serviced by long distance Megabus / Citylink services that supplement the site with a half hour service and an hourly service to Aberdeen and Edinburgh. In addition, two local Stagecoach services which run two hourly also serve the site. The car park site rarely reaches capacity and the buses are not branded for the sole purpose of the park and ride.

Bus Services

2.24 Currently, five bus services pass sites P4 and P5, numbers 16, 53 and 54b, 333 and Megabus travel along the A85 both in an eastbound and westbound direction, albeit some of the eastbound services are somewhat remote from Site P4. The frequency of the bus services are contained within Table 2.1.

Table 2.1 – Bus Services Passing the Sites

Service Number / Operator / Service	Frequency
16 – Stagecoach – Dundee to Perth	Minimum 2 per hour (weekday)
53 – Stagecoach Strathtay – Coupar Angus to Perth	1 return journey (Tue / Thurs)
54b – Stagecoach in Perth – Walnut Grove to Perth	1 return journey every 2 hours (weekday)

Service Number / Operator / Service	Frequency
333 – Stagecoach / NHS Tayside – PRI to Ninewells Hospital	1 return journey per hour
Megabus – Perth to Dundee	3 return journey per hour

Car Parking Within Perth

2.25 A Controlled Parking Zone (CPZ) exists within Perth City Centre that allows visitors to park with the payment of a fee. In total, 5,260 parking spaces are available within car parks or at designated on-street parking bays. Parking charges vary; however they are set to encourage short stay parking within the centre with long stay commuters paying a higher fee at off street car parks. All day parking charges range from £3 in South Inch car park to £7 Canal Street multi storey. Season tickets are available which range from £50 per month in South Inch to £75 per month in Canal Street.

2.26 The cost and availability of car parking within Perth City Centre will have a direct impact on the use of the park and ride service as people generally travel in a way that incurs less cost to themselves, measured in time and money.

2.27 No formal off street car parking areas are present along the A85 Dundee Road, however ad hoc on-street parking is experienced. Private car parking areas are present which serve local businesses and residential homes. Anecdotal evidence points toward an increase in people parking within a gap site on Dundee Road and accessing the city centre via the rail footbridge across the River Tay.

2.28 Car park usage within Perth City Centre is high with the more popular car parks reaching capacity typically at midday[3], particularly during the shopping peak on a Saturday. However, car parking spaces are available at some of the less popular sites.

Road Traffic Accidents

2.29 Local accident data for the last five years for the local roads around the proposed site was supplied by PKC for the local road network and Transport Scotland for the trunk road network. The data provided covers reported road traffic accidents that have occurred between January 2003 and December 2007. The data has been examined to define the local accident characteristics for the relevant road network between the proposed park and ride site and Perth City Centre.

2.30 Accident data has been analysed on the A85 between the Barnhill Interchange and Perth City Centre (on the A85), and within the city centre itself. Table 2.2 presents a summary of these results.

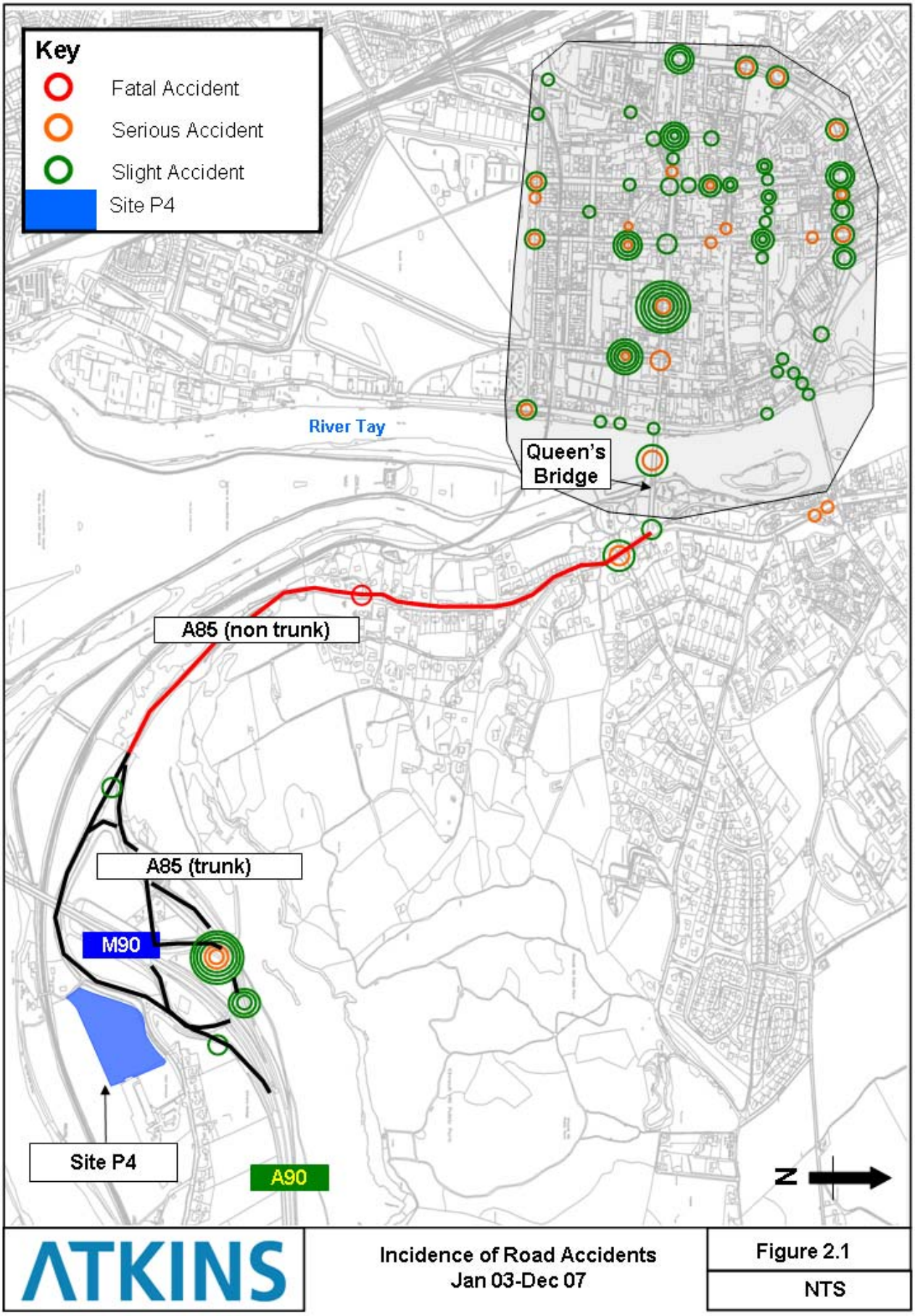
Table 2.2 - Recorded Personal Injury Accidents 2003-2008

Location	Fatal	Serious	Slight	Total
Within the city centre (west of South Street Bridge)	0	23	76	99
A85 between South Street Bridge and 60mph speed limit (non-trunk road)	1	1	4	6
A85 trunk between 40mph speed limit and M90	0	3	12	15
Total	1	27	92	**120**

[3] Perth and Kinross Council parking figures

2.31 An initial examination of the data indicates that a total of 120 personal injury accidents have been recorded within this area within the last five years. Figure 2.1 summarises the locations and severity of these recorded accidents.

Figure 2.1 – Accident Locations Figure (2003 – 2007



2.32 The following summary highlights the key points identified during the analysis;

- There was one fatal accident on the A85 within the five year period;
- In addition, 27 serious and 92 slight accidents have occurred within the study area within the five year period;
- A cluster (4 slight, 2 serious) of road traffic accidents have been reported within the Barnhill Interchange with the majority of incidents reported on the A85 eastbound carriageway at the junction with the slip roads of the A90 and M90 (western facing). One slight accident has also been reported at the southbound off slip junction with the A85 gyratory;
- There have been twenty-five slight accidents and nine serious accidents on the A989 inner ring road of Perth City Centre; and
- Two slight accidents and one serious accident were recorded on Queens Bridge.

2.33 Following discussion with BEAR Scotland, the trunk road operator, it is understood that the Barnhill Interchange has been subject to recent accident remedial works and therefore it is considered that the future accident rate at the junction will be reduced.

3. Planning and Policy Framework

Introduction

3.1 This section provides a brief summary of the key transport and planning policies and plans which exist for the Perth area and which are considered relevant to this study.

National Context

National Planning Framework for Scotland 2

3.2 The National Planning Framework (NPF2) will guide Scotland's development to 2030, setting out strategic development priorities to support the Scottish Government's central purpose; sustainable economic growth.

3.3 Pertinent to this study, the NPF2 recognises strong growth in eastern and central Scotland with Perth predicted to grow by 22%. The importance of good transport links between Perth to Glasgow, Edinburgh and Stirling to the south, Inverness to the North and Dundee to the north and east is recognised. In addition, it is recognised there is scope for developing complementary roles for Dundee and Perth as the main centres on the River Tay.

3.4 Dundee has also been allocated a proportion of £36million to address large concentrations of vacant and derelict land which may also increase travel demand along the A85 / A90 transport corridor.

3.5 Perth is recognised as a strategic point on the transport network and is also classified as a gateway point to the Highlands. Taking cognisance of this, an efficient sustainable transport network is key for Perth to ensure it maintains its position within the strategic road network. A successful park and ride strategy around Perth will strengthen its position moving towards 2030. The document also recognises the strong links along the Tay corridor between Perth and Dundee, which the delivery of a park and ride facility adjacent to the A85 will help strengthen.

Scotland's National Transport Strategy

3.6 Scotland's National Transport Strategy (NTS) was published in December 2006; its high level objectives for transport in Scotland are:

- Promoting economic growth by building, enhancing, managing and maintaining transport services, infrastructure and networks to maximise efficiency;
- Promoting social inclusion by connecting remote and disadvantaged communities and increasing their accessibility of the transport network;
- Protecting the environment and improving health by building and investing in public transport and other types of efficient and sustainable transport which minimise emissions and consumption of resources and energy;
- Improving safety of journeys by reducing accidents and enhancing the personal safety of pedestrians, drivers, passengers and staff; and
- Improving integration by making journey planning and ticketing easier and working to ensure a smoother connection between different forms of transport.

3.7 Pertinent to this study, the NTS also states that "transport interchanges must be of the highest quality" and that "regional transport partnerships will have a key role to play in promoting integration and improving key interchanges in their region".

Scottish Planning Policy 17 (Planning for Transport)

3.8 Scottish Planning Policy Note 17 supports the Scottish Government's integration objectives through the integration of land use, economic development, environmental issues and transport

planning. The document considers that the planning system is a key mechanism for integration through the support of:

- A pattern of development and redevelopment that reduces the need to travel and facilitates movement by public transport including the provision of interchange facilities between modes;
- Provision of access to high quality public transport, in order to encourage modal shift away from car use to more sustainable forms of transport, and to fully support those without access to a car; and
- Effective management of motorised travel, within a context of sustainable transport objectives.

3.9 It is recognised that the emerging Scottish Planning Policy document dated April 2009 written on behalf of the Scottish Government has been out for consultation. At the time of writing, the result of the consultation is awaited however it is considered that the document will help shape future planning guidance. However the ethos of SPP17 remains within the emerging planning policy document.

Strategic Transport Projects Review (STPR)

3.10 The STPR written on behalf of the Scottish Government has made recommendations on a number of land-based strategic transport projects, which will establish the basis for the ongoing development of Scotland's transport infrastructure to meet the demands of the 21st Century. The STPR focuses on identifying those projects that most effectively contribute towards the Government's purpose of increasing sustainable economic growth.

3.11 The STPR was undertaken using an objective led, evidence based approach to appraise potential means of addressing transport issues. This approach is compatible with Scottish Transport Appraisal Guidance (STAG) methodology.

3.12 The most notable intervention pertinent to this study is the A9 upgrade between Dunblane and Inverness which may result in the grade separation of the Broxden and Inveralmond roundabouts.

Regional Context

TACTRAN Regional Transport Strategy 2008 - 2023

3.13 In accordance with the Transport (Scotland) Act 2005, TACTRAN produced their Regional Transport Strategy (RTS) which sets out a vision and strategy for improving the region's transport infrastructure, services and other facilities, over a fifteen year period taking cognisance of the National Transport Strategy. The RTS has been prepared in partnership with four constituent Councils located within the region, namely Perth and Kinross Council, Stirling Council, Dundee City Council and Angus Council. The Scottish Ministers approved the RTS in June 2008.

3.14 In order to meet the objectives set within the RTS, the need for a number of sub-strategies was identified, one of which; the Park & Ride Strategy and Action Plan identified and prioritised possible park and ride sites within the TACTRAN area.

3.15 The sub-strategies are summarised below:

- **TACTRAN Park and Ride Strategy and Action Plan;** this study undertook a STAG Stage 1 objective led type assessment of the TACTRAN area where the need for park and ride was measured against the five government objectives; Environment, Safety, Economy, Integration, Accessibility and Social Inclusion. Six sites in and around Perth were identified within the option generation and appraisal process with sites P4 and P5 located to the east of Perth identified as having priority for implementation as they have the greatest potential for generating the largest demand with a viable bus route into Perth City centre a distinct possibility.
- **Park and Ride Demand Forecasting and Option Appraisal Report –** TACTRAN; this report summarises the forecast park and ride demand at potential Park & Ride sites across the TACTRAN area. In order to undertake this forecast, a demand forecasting model

(PRIDE) developed by Colin Buchanan was utilised. This software provides an interface that pulls together information including: access time to the park and ride site by car, walk time on site, wait time, fares, in-vehicle time, and walk time to final destination, and mode choice parameters.

- **TACTRAN Park and Ride Strategy –** Audit of Existing Provision; this document provides an audit of existing park and ride provision within the urban centres of Perth, Dundee and Stirling. Existing bus based park and ride serving urban centres both local and strategic and rail based park and ride at all stations with likely demand are discussed within this report. Within the extents of Perth it is recognised that there is a concentration of employers, retail, leisure and community land use sufficient to generate demand and require a controlled parking zone to be in place to control levels of traffic visiting the City. In total, 5,260 parking spaces are available within the central area and surrounding streets. Their attractiveness in both location and price will help determine the expected demand at existing / future park and ride facilities and will impact on the viability of each future site under consideration. The existing park and ride sites at nearby Broxden, Scone and Kinross are described with bus service frequency, prices and operators provided. Similarly a description of parking charges implemented within Perth is provided within the report for comparison. All information is accurate as of March 2008 and Broxden and Scone details are summarised in Tables 3.1 and Table 3.2.

Table 3.1 - Broxden Park and Ride Site

Broxden Park and Ride	
Capacity	406 spaces
Operator and Frequency	Smith & Sons (301) Every 10mins 07:00 to 09:00 and 16:30 to 19:00 Every 15mins 09:00 to 16:30
Cost	Free parking £1 return fare for adults
Additional Information	Site also used by long distance Megabus / Citylink services which accounts for approximately one third of park and ride users.

Table 3.2 – Scone Park and Ride Site

Scone Park and Ride	
Capacity	50 spaces
Operator and Frequency	Stagecoach (7) Every 10mins 07:30 to 18:30
Cost	Free parking £1.50 return fare for adults
Additional Information	Site is rarely used. Not a dedicated Park and Ride bus service.

- **TACTRAN Bus and Community / Demand Responsive Transport Strategy;** this sets out the principles and short, medium and long term actions to help maintain and improve the bus, community and demand responsive transport network across the TACTRAN region. The document was prepared in accordance with STAG by developing a set of SMART (Specific, Measurable, Attainable, Relevant and Timed) objectives and appraising alternatives against these objectives and against the five STAG criteria. A detailed audit and review of the bus, community and demand responsive transport network across the TACTRAN region was undertaken, key issues and opportunities for the region were identified and to assist in setting relevant objectives through extensive consultation. The report highlighted a number of gaps in service provision across the region. These are primarily in rural areas, where frequencies are often low and during off peak periods where urban areas experience infrequent services.
- **Strategic Environmental Assessment of the Bus Strategy and Community and Demand Responsive Transport Action**; this report provides environmental information on the Bus Strategy and Community and Demand Responsive Transport Action Plan and the Park and Ride Strategy and Action Plan. The report identifies and evaluates the likely significant environmental effects of the strategy and provides an early and effective opportunity for the Consultation Authorities and the public to offer views on any aspect of this Environmental Report;
- **Equality Impact Assessment of the Bus and CT&DRT Strategy;** This report sets out the principles and short, medium and long term actions by which the region's bus, community and demand responsive transport network will be maintained and improved. It is considered that the introduction of a park and ride facility will have a slight positive impact on equal opportunities in Perth. Areas within walking and cycling distance of the park and ride site will benefit in this regard. It is considered that the introduction of a park and ride facility will have a slight positive impact on equal opportunities in Perth. Areas within walking and cycling distance of the park and ride site will benefit in this regard.
- **Regional Travel Information Strategy**; This document addresses the key issues, gaps and opportunities in travel information that exists across the TACTRAN region. Seven sub objectives based on the five key objectives were identified. It is important that any new park and ride facility considers this strategy fully and helps close the travel information gaps that exist across the TACTRAN region.
- **Walking and Cycling Strategy;** This strategy sets out the principles to improve the walking and cycling network across the region and promote sustainable modes of transport. It is recognised that the park and ride sites under consideration can help increase walking and cycling in the area as it can be accessed by residents of Walnut Grove on foot or cycle. Similarly, the park and ride sites can also be used as a park and choose with commuters given the opportunity to park their car and continue the final leg of their journey on foot or cycle. In order to do this it is vital that future park and ride sites are fully accessible by walking and cycling modes as well as car and public transport.
- **Overnight Lorry Parking in the TACTRAN Region;** This study was written to establish the extent of overnight lorry parking on the public road network in the TACTRAN region. It also established whether further provision of off-road lorry parking may be justified and identified actions for improving provision and raising operator/driver awareness of existing / proposed facilities. This document recognises that lorry parking, particularly overnight has been identified as a major issue, as such, Castleview Park and Ride and future park and ride sites within the Stirling Council area have been identified as possible future sites for lorry and coach parking. Similarly, Broxden Park and Ride situated on the edge of Perth is being currently being used as an informal lorry park.
- **TACTRAN Park and Ride Strategy Best Practice Review**; The best practice review helped shape the emerging park and ride design for sites P4 and P5 with many of the recommendations adopted for this study. The salient points of the document that informed the design of the facility are summarised below:

- Park and ride can only be successful as part of an overall parking strategy.
- There are a number of ways in which the demand for park and ride can be estimated but as a general rule, on average, a well located and well designed site is able to attract as much as 20% of the traffic travelling into a town / city centre. As much as 30% of the traffic is attracted by the most successful large scale schemes.
- The location of a park and ride site is key; it should be located convenient to a radial approach route, safe and easy to access and well signed;
- The land available should be large enough to allow for expansion. Typically 400 spaces is a minimum for a viable service.
- It is generally more economic to charge for the use of the bus and to allow free parking as VAT is charged to parking fees.
- Frequent, reliable, modern, accessible and well maintained buses help to identify a high quality public transport mode.
- In general, a ten minute service frequency is considered the optimum frequency, however up to a 15 minute frequency can work within the TACTRAN area.
- Depending on the circumstances, minibuses, midi-buses, single-decker or double-decker vehicles may be appropriate.
- Bus priority measures are very important in decreasing journey times over the car and raising profile.
- A strong brand image can assist greatly in promoting and selling park and ride.
- There should be easy access and free circulation within the site with clearly marked parking bays. Bus stops must be conveniently located and users must have easy access to them. There should be convenient links to local footpaths and cycle routes. If there is land available for extension the site should be designed with a future larger parking area in mind.
- Both disabled and able bodied users will find the site easier to use if there are no excessive gradients and dropped kerbs and handrails are supplied as appropriate.
- Appropriate construction materials and pavement depths should be used given the requirement for facilitating bus use.
- High levels of site activity and a permanent staff presence are the easiest way to achieve both security and the perception of security.
- Lighting, fencing, CCTV and an appropriate layout will all help to increase both security and perceived security.
- All sites should be provided with litter bins, travel information and shelters.
- Landscaping is highly beneficial, enhancing the quality of the site and can be used to mitigate the visual and noise impacts. However landscaping should be designed so as not to reduce personal or vehicle safety, and
- Local authorities should ensure that the requirements of the bus service are clearly set out and that there are penalties in place to encourage correction when the service falls below standard.

- **Paramics Model** A micro-simulation Paramics model is available for Perth City The model considers typical weekday AM / PM peak hours in the base year of 2003 and the future year of 2018 with future design models for the Perth Area Transport Study which is under consideration by Perth and Kinross Council. It is understood from discussion with officers of PKC, that the Paramics model has been used in an area wide study of Perth which is a study that is under review by Transport Scotland and considered fit for use within that study. The Paramics model will provide an input to the appraisal process. Further details are considered

within Appendix A of this report. Future demand matrices incorporate future Structure Plan aspirations and traffic growth contained within the Traffic Model for Scotland (TMfS).

Perth and Kinross Structure Plan

3.16 The Perth and Kinross Structure Plan gives a broad, strategic land use planning guide for the years between 2007 and 2027. This plan provides for change in population, employment, and environmental conditions. The structure plan gives an indication of aspirational development proposed for the area. The Structure Plan sets a target of an additional 18,000 new homes for the area by 2020 and informs the Local Plan process.

3.17 The success of the park and ride largely depends on the demand for travel by bus. Whilst it is recognised that a current demand exists, the delivery of future development, within the Perth central core and along the eastern A85 road corridor together with the A90 corridor will help shape future demand.

3.18 The housing allocations proposed for Perth and Kinross within the updated Structure Plan are contained within Table 3.3:

Table 3.3 - Future Housing Requirement 2008 – 2020

Local Area	Housing Requirement 2008 – 2020
Perth Core Perth Lowland	5,390
Kinross & Milnathort Landward	460
Auchterarder Crieff Landward	875
Pitlochry Aberfeldy Landward	210
Blairgowrie Coupar Angus Alyth Landward	735
Perth & Kinross	7,670

Perth and Kinross Single Outcome Agreement

3.19 The Perth and Kinross Single Outcome Agreement (SOA), is an agreement between the Community Planning Partnership (CPP) and the Scottish Government that sets out the outcomes they are collectively committed to achieving between 2009 and 2011. These outcomes are based on both local priorities and needs, and have been adapted to reflect new challenges that have emerged as a result of international economic pressures.

3.20 The priorities within the SOA that are pertinent to this study include:

- To sustain and increase business investment;
- To support the economic recovery of the area through assistance to businesses and individuals;
- To close the inequalities gap, particularly in relation to poverty, educational opportunity, health and housing;
- To reduce violent crime, the number of fires, and the number of people killed or seriously injured in road accidents; and
- To reduce the total carbon footprint for Perth and Kinross.

Local Strategies and Plans

Local Plans

3.21 Local Plans take the broad Structure Plan guidance and convert it into more detailed land use policies and proposals. There are six Local Plans covering the Perth and Kinross area:

- Eastern Area;
- Highland Area;
- Kinross Area;
- Perth Central Area;
- Perth Area; and
- Strathearn Area.

3.22 The park and ride site is located within the Perth Area Local Plan which is summarised below in terms of traffic and transportation.

Perth Area Local Plan

3.23 The aim of the Perth Area Local Plan, in relation to traffic, is to adjust the balance between private motor vehicles and other transport modes in favour of pedestrians, public transport, and cycling. The Local Plan has the following objectives which are relevant to the Park and Ride proposal;

- To seek to limit vehicular penetration within the inner ring road; and
- To seek to discourage long-term parking within the town centre apart from parking for residents, and to seek alternatives such as peripheral car parking and park and ride schemes.

3.24 In addition, the Perth Area Local Plan recognises that the demand for city centre parking is near capacity during peak periods and states a desire that commuter long stay city centre parking should be removed for short stay high turnover of spaces. Furthermore it is also recognised that the need for a park and ride site located to the east of the city may be required to meet future demand.

3.25 Site P4 is zoned as Employment use / park and ride site within the Local Plan which will require a high standard of design and drainage improvement.

Strategic Transport Network Issues (Perth Area Transport Study)

3.26 This report commissioned by Perth and Kinross Council outlines the findings of a major review of transport issues in and around Perth City Centre. The report in particular highlights the requirement for significant improvements in transport infrastructure, including a major new Cross Tay Link, in order to accommodate the future development of the city.

3.27 One of the key objectives of this report is to increase the proportion of short trips by more sustainable modes by allowing the development of pedestrian, cyclist and public transport infrastructure to progress by the removal of general road traffic. Within the report there has been an assumption that three park and ride sites in and around Perth will be provided; at Walnut Grove (site P4 or P5), Bertha Park and the third possibility being the long term aspiration of Bridge of Earn rail station. It has been estimated that the introduction of park and ride, together with improved pedestrian and cycle infrastructure, will reduce the number of trips in the city centre by the order of 5%.

3.28 The report concludes that the provision of a new Cross Tay Link, together with the delivery of park and ride and improvements to the walk and cycle network is required to accommodate future trips associated with aspirational and planned development in and around Perth and Kinross area.

4. Study Transport Planning Objectives

4.1 This Chapter details the transport planning objectives adopted as part of the Park & Ride Strategy and Action Plan and refines these objectives to make them Specific, Measurable, Attainable, Relevant and Timed (SMART).

Appraisal Against Regional Objectives

4.2 As previously stated, the Park & Ride Strategy and Action Plan, set region-wide strategy planning objectives against the problems and issues identified during the RTS process and appraised a long list of possible park and ride sites against these transport planning objectives.

4.3 The transport planning objectives set within the RTS and the sub objectives contained within the Park & Ride Strategy are contained within Table 4.1.

Table 4.1 – Transport Planning Objectives – Park and Ride Strategy

RTS Objectives	Park and Ride Strategy Objectives
Economy: To ensure transport helps to deliver regional prosperity.	To ensure that Park & Ride 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
Accessibility; Equity and Social Inclusion: To improve accessibility for all, particularly for those suffering from social exclusion.	To improve access to health, leisure and retail facilities by Park & Ride
	To improve the physical accessibility of the transport system through the provision of increased Park & Ride
Environmental; To ensure that the transport system contributes to safeguarding the environment and promotes opportunities for improvement.	To respect the built environment through reducing the need to build new town and city centre car parks
Health and Well-Being: To promote the health and well-being of communities	To help limit / manage travel by private car in urban areas to help meet statutory air quality requirements in the TACTRAN area
Safety & Security: To improve the real and perceived safety and security of the transport network.	To provide the highest levels of safety and security of passengers and vehicles when using Park & Ride.
Integration: To improve integration, both within transport and between transport and other policy areas.	To ensure Park & Ride facilitates integration and is accessible by all modes of transport
	To ensure integration between land-use planning and provision of public transport

Refining the Transport Planning Objectives

4.4 The RTS process has been strongly objective led in line with RTS guidance. This involved a comprehensive analysis of trends and issues in the TACTRAN area and has been subject to extensive consultation. A key consideration was that the RTS objectives should closely reflect the Government's five NTS objectives. Similarly the objectives set within the Park and Ride and Action Plan Strategy were developed taking cognisance of the objectives contained within the RTS and NTS.

4.5 It is accepted that the sub objectives set within the Park and Ride Strategy and Action Plan are appropriate for an area wide assessment, however they require to be refined to be corridor

specific as the transport planning objectives for the study have been developed to address the issues and problems identified within the RTS.

4.6 Accordingly, a series of study transport planning objectives have been developed for adoption for this study that meets the above criteria and maintains a relationship with the strategy objectives developed from the problems and issues recognised within the RTS. These refined transport planning objectives have been used within this detailed appraisal of the proposed park and ride sites and used to develop the two park and ride site designs identified within the Park and Ride Strategy and Action Plan. The study transport planning objectives are shown in Table 4.2 and their fitness for purpose scored accordingly within Table 4.3.

Table 4.2 - Study Transport Planning Objectives – Park and Ride Strategy

Ref	Study Transport Planning Objectives
AO1	To reduce car traffic flows on the A85 between the M90 and the centre of Perth.
AO2	To increase levels of accessibility for all by sustainable modes from the A90 catchment to the centre of Perth and to specific employment, health, leisure and retail locations in Perth.
AO3	To achieve high user satisfaction for users of park and ride associated with personal and vehicle security and safety.
AO4	To increase the amount of interchange of travel between the A90 catchment area and services located in Perth centre

Table 4.3 – Refined Study Transport Planning Objectives

Corridor Specific Planning Objectives / Park and Ride Strategy Planning Objectives	AO1 To reduce car traffic flows on the A85 between the M90 and the centre of Perth.	AO2 To increase levels of accessibility for all by sustainable modes from the A90 catchment to the centre of Perth and to specific employment, health, leisure and retail locations in Perth	AO3 To achieve high user satisfaction for users of park and ride associated with personal and vehicle security and safety.	AO4 To increase the amount of interchange of travel between the A90 catchment area and services located in Perth centre
To ensure Park & Ride improves access to town/city centres and areas of employment, helping to support 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 Park & Ride		√√		√
To improve the physical accessibility of the transport system through the provision of increased Park & Ride.		√√	√	√
To respect the built environment through reducing the need 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 Park & Ride.			√	√
To ensure Park & Ride facilitates integration and is accessible by all modes of transport.		√	√	√
To ensure integration between land-use planning and provision of public transport.		√	√	√

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5. Consultation

Updating the Stakeholder Consultation

5.1 The production of the TACTRAN RTS and corresponding TACTRAN Park and Ride Strategy and Action Plan involved extensive consultation with stakeholders across the TACTRAN region. Key stakeholders were initially contacted directly and, where appropriate, met in person to discuss the various problems and issues associated with the delivery of park and ride across the region, gauge the reaction to emerging proposals and incorporate ideas in future proposals.

5.2 As part of this study, further stakeholder consultation has been undertaken to determine if views on the short listed P4 / P5 park and ride sites had changed since the initial consultation exercise. This consultation exercise was undertaken to:

- Establish the likelihood of the viability of a park and ride facility that serves the A90 road corridor / A85 Dundee Road;
- Investigate the likely interest for providing a park and ride service and establish future bus routes, frequency, and catchment of such a service;
- Establish existing parking problems within Perth City Centre and identify possible future trends;
- Understand what problems exist at the Broxden and Scone Park and Ride Sites;
- Explore future access points for each site and understand the constraints related with each site; and
- Investigate possible planning constraints or issues.

The organisations consulted as part of this study are summarised within Table 5.1.

Table 5.1 - List of Consultees

Group	Organisation	Individual Contact Details
Public Bodies	Perth and Kinross Council – Roads and Transportation	Alex Deans
	Perth and Kinross Council – Planning	Ron Moody
	Perth and Kinross Council – Public Transport Cycle Officer	Andrew Warrington Persephone Beer
	Transport Scotland	Malcolm Forsyth Veronica Allen
	JMP Consulting (TS Term Consultants)	Jason Gillespie
	TACTRAN	Niall Gardiner
	Stirling Council	Brian Roberts
	Scottish Environmental Protection Agency (SEPA)	Richard Hamilton (hydrologist) Debbie Crichton (Environmental Protection Officer)
NHS	NHS Tayside	Michael Cambridge

Group	Organisation	Individual Contact Details
Trust		
Public Transport Operators	Stagecoach (Perth)	Steve Walker
	Smith and Sons	Haldane Leaver
	Scottish Citylink	Mike Dean
	Parks of Hamilton	Michael Andrews Coach.trafficmanager@parks.uk.com
Business Organisations	Perth City Centre Management	Gillian Coyne
	Federation of Small Business (Northeast Scotland Region, Perth & Kinross Branch)	Branch Chairman Gillian MacEwan
	Perthshire Chamber of Commerce	

Consultation Output

5.3 As part of the consultation exercise, the organisations contained within Table 5.1 were contacted for their views on the emerging proposals and to help formulate the corridor specific transport planning objectives.

General Car Park Considerations

5.4 Following consultation with the above, the following design criteria for the park and ride sites have been incorporated within the proposal.

- The buses will access the bus stop area via a bus only access road, which will segregate bus movements from general park and ride users thus reducing delay and conflict. The bus stop area will be approximately 5m wide which is large enough to provide a high quality waiting area including shelters, notice boards, seating, cycle parking etc.
- Disabled parking for a minimum of 4% of car park capacity will be provided within close proximity to the passenger waiting area to provide access to the bus stop without crossing any roads. In addition, pedestrian footways / routes will be provided which allow access to the bus stop area in a clear and easy manner by people on foot.
- The car park will be able to accommodate, as a minimum, the predicted demand plus an additional 20% and will have bus shelters in place for the comfort of waiting passengers. No buildings / toilets for bus staff / general public or attendants have been planned at this point, however depending on the popularity of the site these facilities could be introduced at a later date and be placed within close proximity to the bus stop. The design of the roads can accommodate this within the outline design. It can be noted that each site is capable of expansion if future demand requires it.
- CCTV and lighting will be provided to allay safety and security fears for people using the park and ride facility, particularly during times of nightfall.
- Several areas of strategic planting will be incorporated within the design of the park and ride to mitigate its visual impact. The content of the planting areas will be finalised during the detailed design stage.

5.5 It can be noted that, the layout of the car park will be planned in such a way, that it can accommodate the Heavy Goods Vehicles (HGVs) turning within the car park without mounting kerbs and landscaped areas. It is recommended that the car park construction costs are increased if it is expected that the car park will also be used as an official HGV parking area.

5.6 A summary of the key feedback from the additional consultation undertaken as part of this study is described below.

Consideration of the Bus Routeing

5.7 The PKC public transport officer confirmed that the bus service for the existing park and ride facility at Broxden is subsidised by Perth and Kinross Council. He also confirmed that he did not think it was feasible for the existing Broxden Park and Ride service to be extended to serve the proposed P4/P5 park and ride site due to concerns regarding convoluted routing, the ability of the service to serve the existing stops at the rail station, Mill Street and the leisure centre and concerns regarding journey time reliability.

5.8 It was suggested that the park and ride service could act as the local bus link between Walnut Grove and Perth City Centre which could possibly be integrated with the existing service (number 54b) that serves this community. This would be more feasible during off peak periods when journey times between Perth City Centre and the site are reduced. It was also suggested that one of the existing Council funded Perth City midibus routes could be used within the formulation of any new bus route and that it could also provide a link around the city centre car parks, the bus/rail station and the main retail areas in Perth City Centre.

5.9 It was confirmed that the signalised junctions within Perth City Centre are fitted with loops to facilitate bus priority on approach to the junction. Therefore it would be beneficial to bus users if all Walnut Grove park and ride buses are fitted with transponders to gain maximum benefit from the Perth City bus priority measures.

5.10 Representatives of Stagecoach and Smith & Sons were contacted in order to understand their thoughts regarding the provision of a park and ride bus service. Stagecoach is willing to consider routeing the number 16 (Dundee – Perth) bus service into the proposed park and ride in both directions. This would generally give a 30 minute headway each way which would provide a supplement to providing a new dedicated park and ride bus service. However it was recognised that gaps may exist in the service particularly during the AM and PM peak periods. If a new service was diverted along Walnut Grove following its existing timetable, PKC may be able to take off service 54B (Walnut Grove outbound shuttle), which would provide a cost saving to PKC in terms of the removal of the existing subsidy.

5.11 Smith and Sons, the bus operator that currently provides the local service at Broxden Park and Ride, also expressed an interest. Smith and Sons have no issues with the existing park and ride service currently serving the Broxden site.

Planning Considerations and Constraints (PKC Planning)

5.12 Site P4 lies within an area identified as site Bi1 in the adopted Perth Area Local Plan and is zoned for an office development, a park and ride site or for a site for a single high amenity user. Part of site Bi1 has been utilised to form an office development, which takes access directly from Walnut Grove. Consequently when the Draft Local Plan was published for comment, this area was identified for further development, which would create a high quality entrance to the city and a park and ride site was one of the appropriate uses considered. A suitable landscape framework and a high standard of design were amongst the requirements for any development of the site.

5.13 Site P5 lies within an undeveloped site located within the Barnhill Interchange. The site is undesignated within the Draft Local Plan for Perth.

5.14 It was also confirmed that a development of this nature would not normally require an Environmental Impact Assessment but an appropriate assessment may be required due to the proximity of the River Tay SAC.

Walking and Cycling

5.15 It was confirmed that there is no formal provision for cyclists in the local area of the proposed park and ride sites. However, pedestrians can use an existing footway that is located on the southern verge of the Dundee Road (A85) between Walnut Grove and Perth City Centre, which provides direct access to the P4 Site and links to Perth's street network and beyond to the city centre. It is

unlikely that people will walk to / from the city centre from either site as it is considered too far for the typical city visitor to walk, however both Sites P4 and P5 are within walking distance of Walnut Grove.

5.16 Access to Site P5 is difficult for pedestrians and cyclists as it is located within the Barnhill Interchange gyratory system and therefore requires the A85 to be crossed, which is a high-speed link.

5.17 As part of the park and ride proposals, the PKC cycling officer stressed the importance of improving links for cyclists to the east, as well as to the west. Scope to formalise cycling provision in the vicinity of the park and ride could be looked at although the close proximity to the A85 dual carriageway could reduce the attractiveness of the route.

5.18 Previously, Sustrans undertook a study looking at the possibility of a riverside path from Perth to Walnut Grove and beyond which was never taken forward. Whilst a pedestrian bridge across the River Tay exists as part of the railway over river crossing, south of Queens Bridge, it is understood that it is not suitable for cycle use, as it has an approximate width of 2m. Anecdotal evidence suggests that people who park on the east bank of the River Tay and walk to Perth City Centre use this bridge.

National Health Service (NHS)

5.19 TACTRAN has undertaken informal preliminary discussion with NHS regarding the principle of the possible use of the 333 service to serve the park and ride sites under consideration.

Perth City Management

5.20 A survey of Perth City Centre shoppers was undertaken over the period Thursday 27th November to Thursday 11th December 2008 to better understand the issues of shopping within Perth during the Christmas period. The points, pertinent to this study are discussed below:

- Travel to Perth for shopping by car is in the decline (65% of respondents in 2005 to 39% in 2008) and travel by bus is increasing (22% in 2005) to 39% in 2008, slight increases in train use and walking was also recorded. Of those respondents that travelled by car in 2008, 14% used park and ride (up from 5% in 2007).
- In general, most drivers using a car park found a parking space easily (71%) with 17% experience modest difficulty and 13% finding some difficulty or very difficult. This trend was similar between 2005 and 2008.
- The majority of respondents stayed between 2- 4 hours (44%) with 15% staying over four hours. The latter is the proportion of visitors more likely to use the park and ride facility when visiting Perth.

Transport Scotland

5.21 Officers from Transport Scotland Development Control and their advisors, (JMP Consulting) were contacted as it was recognised that access to the park and ride site would require a connection with the trunk road network. Whilst it was recognised that there is a presumption against new accesses with the trunk road, it was confirmed that a connection that introduces an opportunity to increase sustainable travel would be looked on favourably. Any new junction would be required to be designed to Design Manual for Roads and Bridges standards and BEAR and the Strategic Road Safety Section should be contacted for background information. Access difficulties for site P5 were identified as a junction to/from the trunk road from the offside lane would be required which could prove problematic.

5.22 Transport Scotland has indicated that they will favourably consider the proposed car park access junctions. The proposed access junction will be designed in compliance with the guidance provided in the DMRB and sited at a location that can safely provide access by visitors of all modes.

5.23 BEAR Scotland was also contacted regarding the junction proposals. It was confirmed that their Client Transport Scotland advised that JMP would represent Transport Scotland's view at this stage.

5.24 Officers from Transport Scotland's STAG advisors were also contacted. It was advised that the park and ride study team should be aware of the Perth Area Transport Study being undertaken on behalf of Perth and Kinross Council and that any formal STAG report should not consider a mode specific solution to identified problems and issues.

5.25 The supplementary information collated as part of the RTS and Park and Ride Strategy and Action Plan was formally submitted to Transport Scotland for comment by TACTRAN. TACTRAN will take this matter forward in discussion with Transport Scotland.

Stirling Council

5.26 It is recognised that the park and ride sites located within the Stirling Council area, at Castleview and Springkerse, are considered to be a good example of a successful park and ride, therefore officers from Stirling Council were contacted for advice on operational issues and costs.

5.27 Castleview Park and Ride, located on the edge of Stirling cost £1.9M to build including land acquisition. The site has a waiting room and toilets etc. for users. The building cost approximately £230,000 with £75,000 of energy efficient materials incorporated into the design. The car park has a capacity of 200 vehicles. The subsidy required for the bus service (based on two buses with a 12 minute frequency) is approximately £120,000 per annum with an annual maintenance of £125,000 per annum.

5.28 Two attendants are on site who act as ambassadors for Stirling Council who liaise with tourists, visitors etc. The cost for employing the attendants is additional to the above costs. The car park is a 'Park Mark' to provide added comfort to users.

5.29 Springkerse Park and Ride also located on the edge of Stirling requires a subsidy of £60,000 per annum and the car park has a capacity for 215 spaces.

5.30 The consultation exercise did not identify any insurmountable issues concerning the park and ride development proposal. However all views, comments and opinions were considered when forming the study transport planning objectives and thereafter for the appraisal of potential solutions.

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6. Option Design

Site P4 Layout Design

6.1 Site P4 is located on a greenfield site on land adjacent to the A85 trunk road (westbound carriageway), south of Walnut Grove to the south east of Perth's urban form. The site is designed for approximately 240 parking spaces with space for future expansion to approximately 500 spaces.

6.2 The site is relatively flat and is bounded by the Perth to Dundee railway line to the south, the A85 Dundee Road westbound carriageway to the west and Walnut Grove to the north and east. Beyond the railway line to the south is the River Tay.

6.3 In the vicinity of the site, the A85 and Walnut Grove is in embankment, thus a degree of earthworks will be required for the access road, the need for earthworks will be reduced if the existing farm access is used which is located to the south west of the site. This will also help serve visibility requirements.

6.4 Whilst the site is relatively remote from existing development, it can be noted that one farmhouse and one office block overlook the site. Residents living to the west of Walnut Grove may also be able to see the car park once completed.

6.5 Following discussions with officers of Perth and Kinross Council (Roads and Planning) and TACTRAN, the need for a high quality car park design is desired with an appropriate landscape framework in place to satisfy planning requirements. Whilst a full Environmental Impact Assessment is not required, a suitable environmental study will be needed appropriate to the site's size and use before planning consent is granted. Similarly, a Transport Statement / Assessment is likely to be required before planning consent is granted.

6.6 Vehicular access to the car park will be gained via an upgraded farm access junction, which currently provides access to an existing farm, to the sailing club and a further farm house located south of the railway line. Currently this access road is a single track but can adequately accommodate the existing movements of vehicles turning in and out the site within its bellmouth. The upgraded access junction will be a left in and left out arrangement with a splitter island, which accommodates pedestrian movements crossing the road. The junction has been designed in accordance with DMRB and will be able to accommodate the turning movements of buses / HGVs accessing the site.

6.7 The upgraded priority junction is located approximately 160m south of the junction of the A85 and Walnut Grove which is appropriate for a road with a design speed of 85kph. Currently the national speed limit applies. Transport Scotland has confirmed that the appropriate design speed will be determined from speed surveys taken on approach to the junction from the north. Given the presence of the A90 / M90 / Walnut Grove junction with the A85, the design speed of 85kph appears appropriate. An area wide plan is provided for context, which is contained within Figure 6.1 and a preliminary site design of car park P4 is contained within Figure 6.2. A preliminary design of the park and ride was developed and forwarded to Transport Scotland and their advisors JMP Consulting and BEAR Scotland the maintenance operator. The following points were made:

6.8 In principle the junction's form and location are acceptable to Transport Scotland TRNM. A number of observations were added:-

- The reconfiguration of the existing farm access to provide a formal left in / out arrangement appears satisfactory. The proposed visibility splay is appropriate for an 85kph design speed. If the 85th%ile speed indicates an 85kph design speed (or if the speed limit is 50mph or less) then the proposed visibility would be acceptable;

- Whilst the traffic associated with the park and ride appears low and given the predicted flows, it is not anticipated that the park and ride would result in any additional operational problems on the interchange;
- The principle of bus priority on the trunk road is acceptable; however it is not entirely clear where this is to be located. When available, detailed proposals should be submitted for approval; and
- It is advisable to contact BEAR Scotland regarding approval of detailed modifications to the trunk road.

Figure 6.1 – Park and Ride Site Context

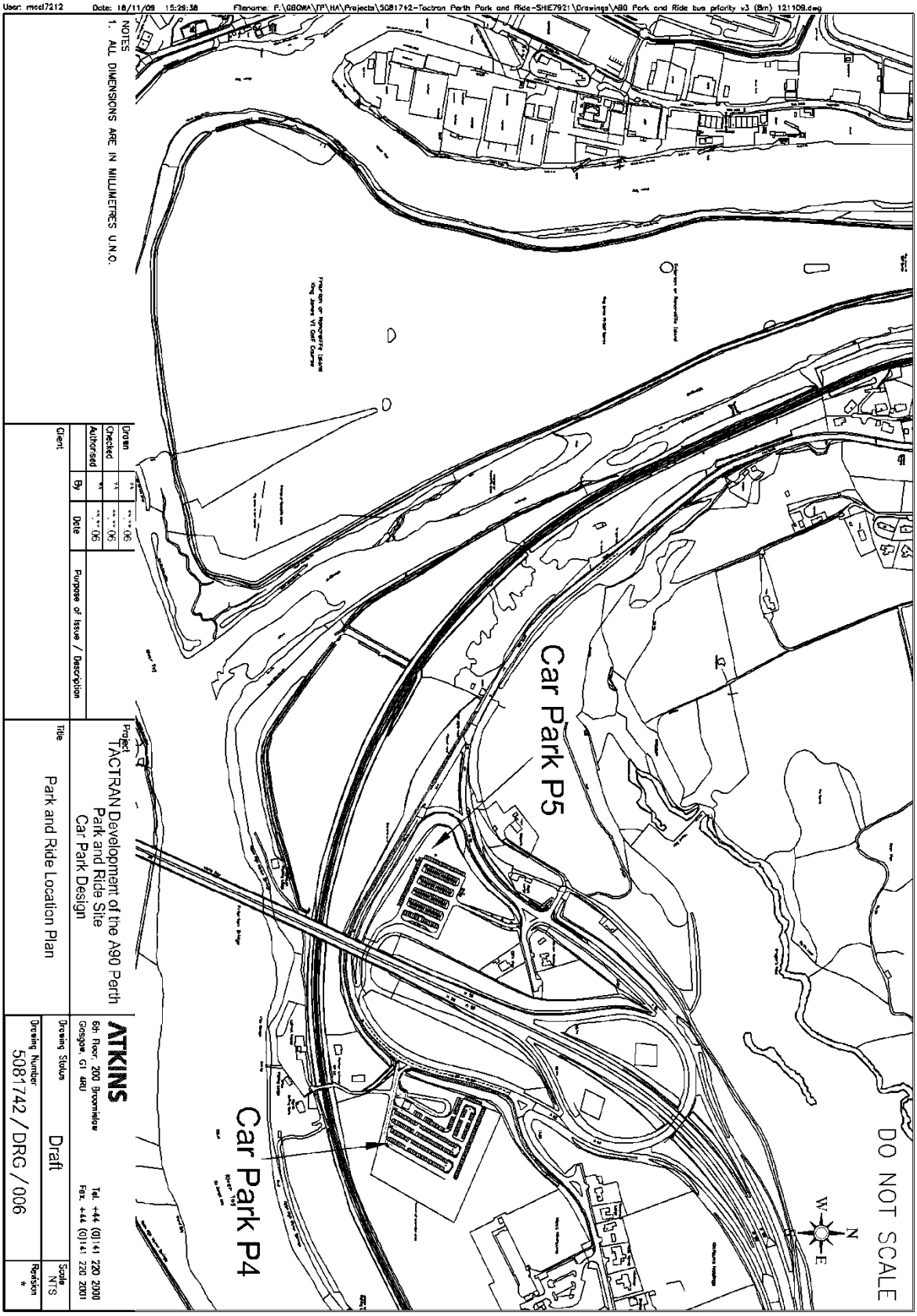
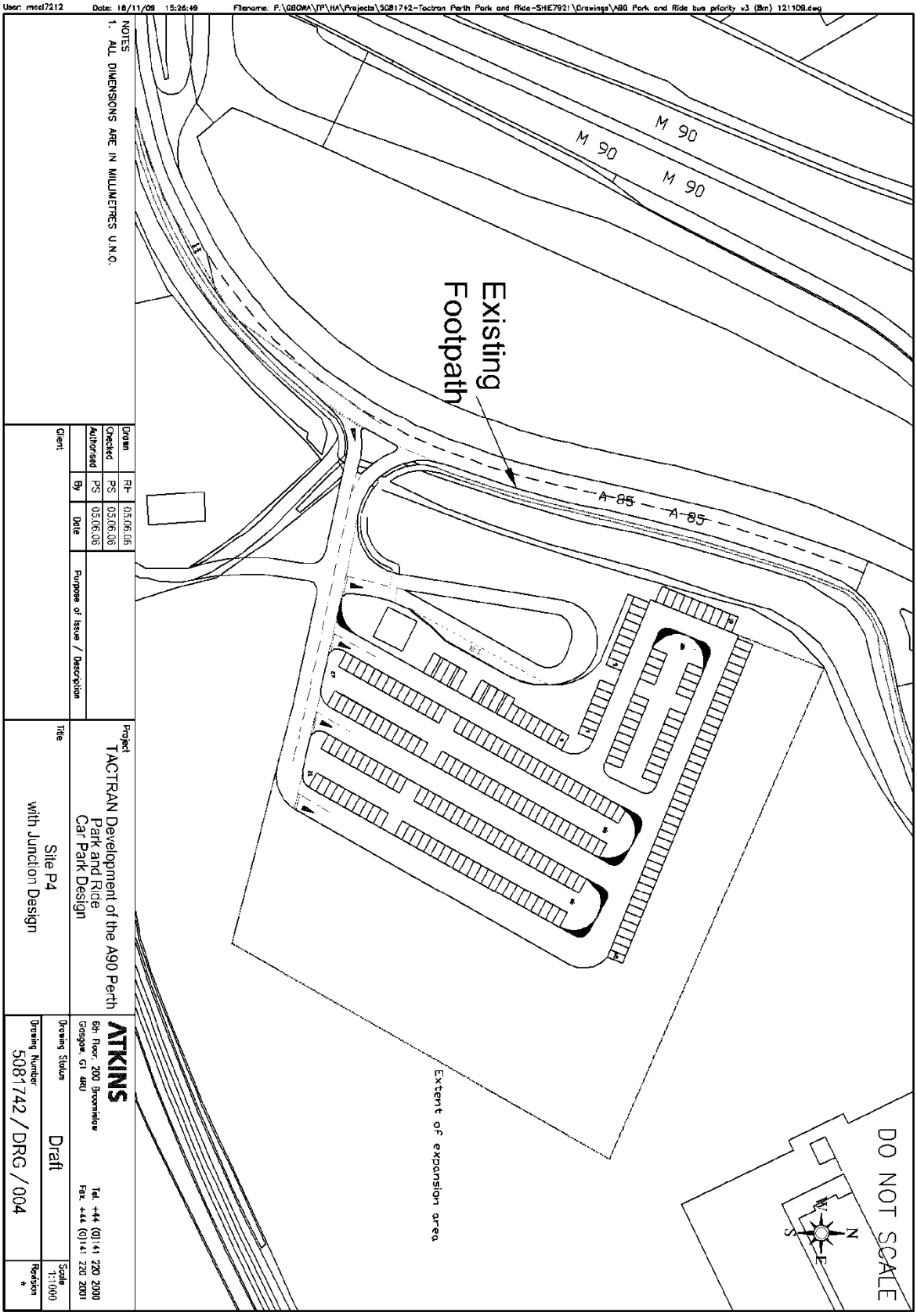


Figure 6.2 –Site P4 Layout Design



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Site P5 Layout Design

6.9 Site P5 is located on a greenfield site on land located within the gyratory system of Barnhill Interchange; the junction of the A85 trunk road, M90 and A90; to the south east of Perth's urban form.

6.10 The site is relatively flat and is bounded by the eastbound A85 to the north, the westbound A85 to the south and the A90 / M90 road corridor to the east. A link road connecting the eastbound / westbound carriageways completes the boundary to the west.

6.11 In the vicinity of the site, the A85 carriageways are in embankment with the M90 approximately 10m above the site, thus a degree of earthworks for the park and ride site access road will be required if connection to the A85 is to be formed, unless the connection is made below the Friarton Bridge or via an existing farm access road. A Site Layout Plan is contained within Figure 6.3.

6.12 Whilst the site is relatively remote from existing development, it can be noted that three farmhouses overlook the site with two farmhouses sharing an access road with the proposed site exit.

6.13 Similar to Site P4, the need for a high quality car park design is required with an appropriate landscape framework in place to satisfy planning requirements. Whilst a full Environmental Impact Assessment is not required, a suitable environmental study will be needed appropriate to the site's size and use before planning consent is required. Similarly, a Transport Statement / Assessment is likely to be required before planning consent is granted.

6.14 Vehicular access to the car park could be gained via an entry only junction located below the Friarton Bridge on the inside of a right hand sweeping bend. An exit from the site at this point would be unsuitable as forward and side visibility criteria cannot be met. If this proposal was adopted, all vehicular traffic would be have to exit the A85 Dundee Road from the offside lane of a two lane one-way carriageway which is not desirable. It is therefore proposed to exit the site via an existing farm access that currently has a right in right out arrangement with the offside lane of the eastbound A85 Dundee Road. The layout of this existing junction is unconventional; however given the low number of vehicles accessing the farmhouses on a daily basis, no major issues have been reported. However, given the increase in traffic associated with the park and ride in place, this junction layout may become an issue for Transport Scotland, TACTRAN and PKC in terms of safety. Access into the site at this point is unsuitable as the intensification of traffic generated by the park and ride and the unconventional layout of the junction would present logistical and road safety problems. The latter access point is also located below the minimum distance required between junctions and would form a crossroads with a farm access road. Therefore the junction will not comply with the Design Manual for Roads and Bridges, which is one of the criteria, set by Transport Scotland.

6.15 A preliminary layout of car park P5 is contained within Figure 6.3, however the following problems are present for this site and therefore the design has not been developed beyond the early preliminary stages.

6.16 Site P5 has accessibility problems for all users, whether it is by car or bus, by foot or by cycle. It can be noted that Site P5 has accessibility problems for all users. Access by car and bus is difficult without requiring relaxations and departures from road design standards, which would need to be agreed with Transport Scotland and BEAR Scotland, the trunk road operators. The proposal for Site P5 will have the following road-based accessibility problems:

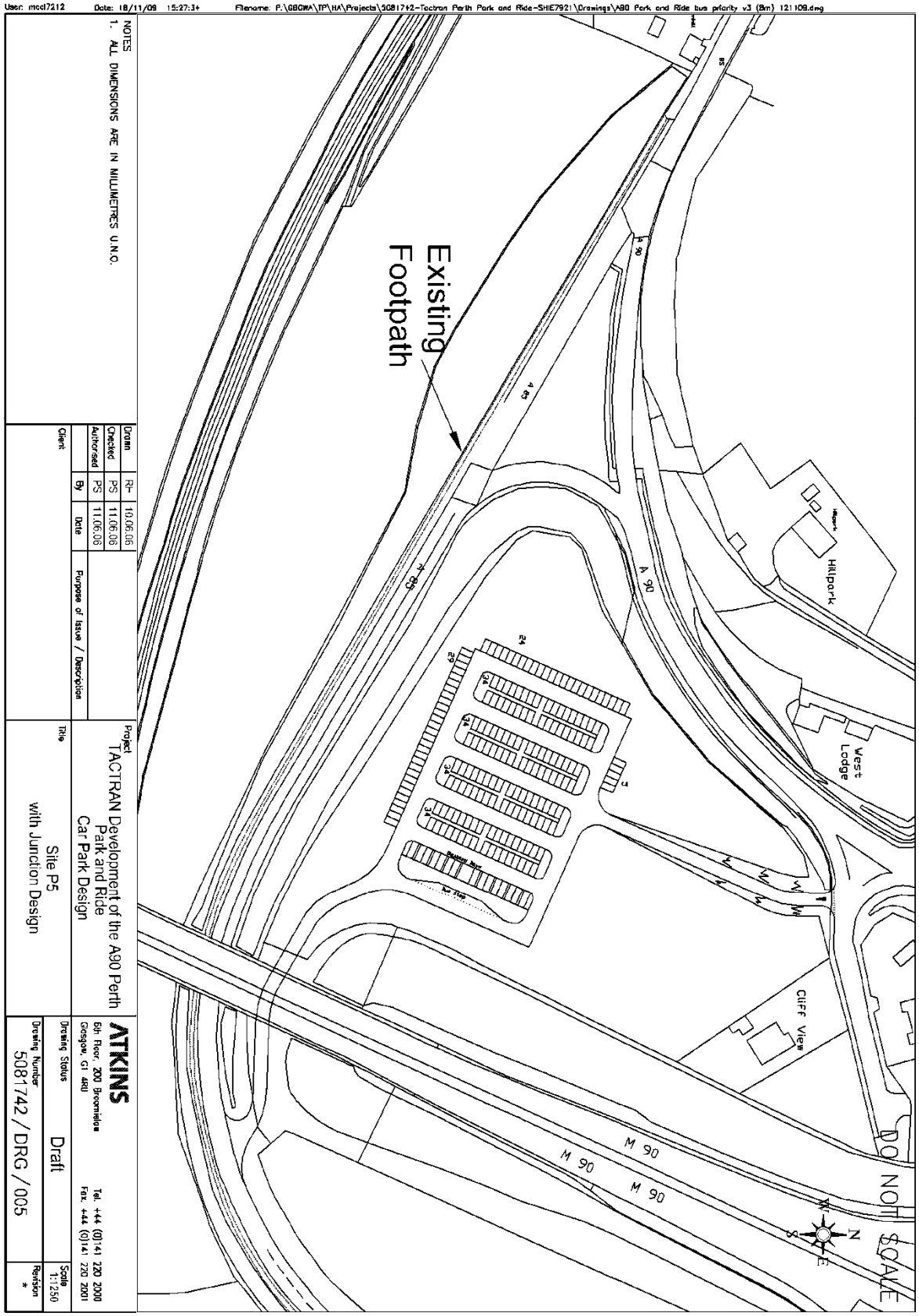
- Junction spacing; the site is located on land which is located in the centre of the gyratory of the Barnhill Interchange between the eastbound and westbound carriageway of the A85 Dundee Road. Slip roads from the M90 and a link road that connects the eastbound and westbound carriageway forms a boundary to the site. Therefore, any new access junction with the westbound carriageway of the A85 trunk road would be located within 170m of an existing junction, which is below the minimum junction spacing distance recommended within the Design Manual for Roads and Bridges (DMRB). Similarly, a new junction with the

eastbound A85 carriageway would be within 75m of an existing junction, which is also located below the minimum junction spacing distance cited within DMRB.

- Substandard visibility splay; a new junction with a main road requires to have adequate side visibility to enable vehicles to leave the junction in a safer manner. The visibility splay requirement is 4.5m x 215m for connection to a main road with a design speed of 120kph. For this particular site, a justification for a relaxation of standards may be permitted to a design speed of 85kph and an associated splay of 4.5m x 160m. Either way, this criterion cannot be met.
- Road Network Operation Issues; access to site P5 can only be gained via the offside lane of the A85 Dundee Road which is unconventional, and presents road safety issues particularly if HGVs or PSVs are accelerating / decelerating whilst manoeuvring through the junction.
- Inaccessibility by foot and cycle; site P5 is surrounded by two high speed roads and has no existing pedestrian or cycle access provision. As such, pedestrians must traverse the A85 trunk road to gain access to the site by foot, which has a speed restriction of 60mph. This is undesirable and raises road safety issues. Similarly access by cycle must be gained from the offside lane of the A85 trunk road, which again is undesirable. Alternatively crossing facilities for people travelling on foot and by cycle could be provided, however this would require the speed limit of the road to be changed which is time consuming and open to objection.

6.17 Poor accident record; the junction between the A85 eastbound carriageway and the M90 off slip road suffers from a poor accident record. The introduction of a new junction nearby will increase vehicle conflict and the propensity of accidents.

Figure 6.3 – Site P5 Layout Design



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Bus Operations

Existing Bus Services

6.18 As stated previously, the bus services contained within Table 6.1 currently pass the sites.

Table 6.1 – Bus Services Passing the Sites

Service Number / Operator / Service	Frequency
16 – Stagecoach - Dundee to Perth	Minimum 2 per hour (weekday)
53 – Stagecoach Strathtay – Coupar Angus to Perth	1 return journey (Tue / Thurs)
54b – Stagecoach in Perth – Walnut Grove to Perth	1 return journey every 2 hours (weekday)
333 – Stagecoach NHS Tayside PRI – Ninewells	1 per hour
Megabus Dundee – Perth	3 per hour

Bus Routeing

6.19 The timetabled journey time between the sites and Perth City Centre is 13 minutes during the morning peak and 10 minutes during the evening peak with the off-peak journey time set at 8 minutes. In order to reduce bus operation costs, the use of existing bus services was analysed to establish if a park and ride service could be utilised without using dedicated park and ride buses.

6.20 As previously stated, the following bus services pass the site: Stagecoach Number 16 Perth to Dundee; Stagecoach / NHS Tayside Number 333 (Perth Royal Infirmary to Ninewells Hospital); Stagecoach Number 53 (Coupar Angus to Perth) and the Stagecoach Number 54b (Perth to Walnut Grove).

6.21 An examination of how bus services could potentially serve the preferred site was undertaken and three scenarios were identified. Any scenario will require further discussion with bus operators and public transport officers. The detailed timetable information is located within Appendix B however the results of the analysis are summarised below.

Use of Existing Bus Services Only

6.22 This option considers using the existing bus services that pass the site to cater for park and ride passengers. No dedicated park and ride would be used.

6.23 No bus service passes the site toward Perth between 07:23 and 08:08 and again between 08:29 and 09:36. This would leave waiting times of 45minutes and 67minutes respectively for passengers using the park and ride. Similarly, a 40minute waiting time and 52minute waiting time exists between 15:36 and 16:16 and between 16:36 and 17:28 respectively which would not be acceptable to park and ride passengers.

6.24 In addition, buses leaving Perth toward Dundee follow a similar pattern with a waiting time of 50minutes and 30minutes present between 07:28 and 08:18 and 08:43 and 09:13 respectively. Similarly, a waiting time of 45minutes and 40minutes exists between 15:23 and 16:08 and 16:43 and 17:23 respectively.

6.25 Given the existing gaps in service, it has been concluded that it is not feasible to consider the provision of park and ride using existing services only as the existing timetable does not provide an adequate level of service. Therefore this option has not been considered for further analysis.

Existing Services Supplemented by Dedicated by Park and Ride Service ('Hybrid' Service)

6.26 This option considers using the existing bus services that pass the site (No. 16 and 54b) to minimise the requirement for a new dedicated bus service. In addition, a bus service (number 333) runs between Perth Royal Infirmary and Ninewells Hospital in Dundee, offering a direct connection between the two hospitals. Operating hourly on weekdays and every two hours at weekends, the service offers fast, convenient travel between these two locations to patients, visitors and NHS

Tayside staff. The re-routeing of the No. 333 has also been considered within the 'Hybrid' bus scenario.

6.27 It is envisaged that one new single bus could feasibly serve the site, with a headway of typically 15 minutes with the existing bus services supplementing the proposed park and ride. However, on occasion the headway increases to between 19 minutes and 29 minutes in both the inbound and outbound direction. Alterations to existing timetables may help somewhat but still not achieve a headway of 15 minutes which is desirable for a successful park and ride service. It is estimated that existing bus services which are re-routed into the site will incur an average delay of approximately 2 minutes on their existing timetables.

6.28 Furthermore a strategic bus service between Dundee and Perth operated by Megabus passes the site in a westbound (to Perth) direction, which could possibly be diverted into the site, however given its strategic nature it is very unlikely that it would be feasible to divert the service into the park and ride site.

6.29 Whilst several other local bus services currently operate in and around Perth, it is considered that they would not be suitable for serving the park and ride site as they would require considerable diversions, this would impact on the attractiveness of the existing bus services and any future park and ride services.

Dedicated Park and Ride Service No Existing Bus Services ('Dedicated' Service)

6.30 This option considers using a dedicated bus service only without the use of existing bus services to supplement the park and ride facility.

6.31 Given the timetabled journey times between the site and Perth City Centre, it can be deduced that a single dedicated bus would be able to serve the site with a headway of 15minutes during the interpeak. However during the peak hours a second bus is required due to the additional bus journey times. This scenario has also been subject to an economic analysis, to enable a fully informed decision on bus costs be made.

6.32 It has been assumed that the park and ride bus service will serve Canal Street, Scott Street and South Street within the Perth City Centre.

6.33 It is predicted that the demand for people using the park and ride facility to access Perth Bus Station would be low as outlying areas of Perth served by bus can be accessed directly by private car without interchanging at the park and ride site. In addition, the most of the strategic bus services that serve the bus station can be accessed via the existing Broxden Park and Ride facility which itself is also served by a number of the strategic bus services. It is therefore likely that the Broxden Park and Ride will be more attractive to people wishing to access the strategic bus services through one point of interchange rather than interchanging at either of the park and ride sites considered within this study and then again at the bus station.

6.34 Similarly, there will be low demand for people wishing to access Perth Rail Station via the park and ride site. Recent surveys revealed that 47% of all visitors to the station come by private car and that 5% of the 47% originate from the catchment area of the park and ride. Therefore it is proposed that the park and ride bus service does not serve either the bus or rail station. This could be reviewed at a later date if such a demand arises.

6.35 The number 16 and 54b service described previously currently serve the Walnut Grove community. However it should be noted that, because of the existing road layout, the number 16 only travels along Walnut Grove in a westbound (to Perth) direction. Eastbound travellers are required to walk from a stop on the north side of the A90 some distance away across a busy high-speed road. The re-routeing of the No. 16 has been considered within the 'Hybrid' bus scenario.

6.36 Service 54b serves Walnut Grove via a subsidised service, which has a frequency of one bus every two hours. Bus stops are located on Walnut Grove, however passenger usage is currently very low.

6.37 It would therefore be possible to route the new park and ride service along Walnut Grove and the A90 in an anti-clockwise direction travelling from Perth City Centre before entering the park and ride site. However this convoluted routeing and associated delay is likely to be unpopular with

prospective park and ride passengers who will expect a direct service between the site and Perth City Centre and could therefore impact on the passenger demand and therefore the viability of the park and ride service.

6.38 Therefore, it has been assumed that the park and ride bus service replaces the existing 54b service and is routed through Walnut Grove with the same frequency as the 54b (once every two hours off-peak). The park and ride service would travel directly to Perth City Centre at all other times. This would remove the subsidy requirement, which is understood to be in place for bus service number 54b.

6.39 Discussions with Stagecoach (Perth) and Smith and Sons (operators of the Broxden Park and Ride bus service) revealed that both companies would be interested in serving a new park and ride site either by diverting an existing service (Stagecoach) or by providing a dedicated new service (Smith and Sons).

6.40 Noting the above, a level of competition could be encountered when tendering for the new park and ride service, as an existing bus service currently follows the proposed route, this could influence the level of subsidy required.

6.41 From interrogation of the Paramics model, it has been confirmed that the park and ride bus can reach the city centre and return within 24 minutes. This means that, unless the park and ride site is supplemented by existing services then two dedicated park and ride buses with a headway of 12 minutes would be required during peak times and, as stated earlier, one dedicated bus during the off-peak. It has been assumed that the park and ride bus serves the city centre only.

Bus Priority

6.42 In order to maximise the use of the park and ride facility and to get people to change from car to bus, the bus journey should be as attractive as possible, in quality, price and journey time terms. One of the most effective measures for increasing the attractiveness is to give bus priority over the private car. This reduces the overall bus journey time, often at the expense of the private car and reduces associated bus operating costs.

6.43 It has been confirmed that traffic signals within Perth City Centre including the Dundee Road / South Street river crossing signals incorporate bus induction loops to reduce delay for buses approaching the signals. It is therefore important that all park and ride buses have a transponder fitted.

6.44 The A85 Dundee Road corridor, between the site and Perth City Centre was assessed to establish what locations could be utilised for the introduction of bus priority measures. The possible bus priority measures considered are listed below:

- Bus gates;
- Bus only lane on the A85 Dundee Road;
- Bus only lane on the Queens Bridge river crossing; and
- Points for queue relocation whereby traffic signals are introduced that stops general traffic on the main route and buses are able to bypass the signals via a bus only lane. In theory, general traffic journey times will not increase as the queue is relocated from the Queens Bridge crossing to the new traffic signals.

6.45 In order for a bus priority scheme to work effectively, areas of traffic congestion are required that buses can ‘bypass’ using bus only infrastructure, which reduces the journey times for bus passengers. Site observations and analysis of the PARAMICS model revealed that, for a typical day, congestion was observed at the signals at either end of the Queens Bridge; however no other significant congestion is experienced along the section of the A85 within the study. Slight delay is experienced within the city centre itself; however there is little scope to introduce bus priority within the centre, with the exception of bus loops and transponders incorporated within the traffic signals, which are already in place.

6.46 Of the bus priority measures discussed above, the introduction of queue relocation in combination with a bus only lane on the A85 appears to be the most feasible option for improving bus journey

times. This could relocate the queue from the Queens Bridge to the dual carriageway section of the A85 where a bus lane would permit bus services to bypass the queue. It is therefore recommended that this is subject to a further study. Further discussions with Transport Scotland are also required in order to gauge their acceptance of such proposals as the dual carriageway section of the A85 is a trunk road.

Lorry Park

6.47 Following the **Overnight Lorry Parking in the TACTRAN Region study** which was undertaken to establish the extent of overnight lorry parking on the public road network in the TACTRAN region (discussed Chapter 3),it is recognised that a requirement for overnight parking exists within the region. To some extent, lorry parking exists within the existing park and ride car park at Broxden, however it is regarded as an informal arrangement which should be addressed in the future. Whilst the geometric layout of the park and ride car park has been designed to accommodate the swept path of turning lorries, it is also recognised that other mitigation measures would be required to reduce the impact of lorries such as landscaping, earthworks, deeper pavement thicknesses, more arduous surfacing etc.

6.48 Whilst the use of the park and ride car park as a lorry park could offset the capital costs of constructing a new lorry park the following issues and associated costs would need to be considered;

- The construction of the car park pavement would need to consider the heavier axle weights associated with laden lorries which incurs higher construction costs;
- Many lorry loads would incur leaching and spillages on the car park surface which adds expense and may impact negatively with the public's perception of the park and ride;
- A formalised lorry park may require to have associated buildings such as changing areas, washrooms, toilets, etc;
- A formal lorry park may introduce an increase in rubbish and debris which would have a detrimental impact on the perception of the park and ride car park;
- Many lorries require to have their refrigerated units switched on overnight resulting in a noise impact on nearby receptors;
- Engine noise from vehicles arriving / departing the car park will impact on nearby receptors in terms of noise and air borne emissions. This would happen when the background noise / air emissions are at the lowest therefore increasing the environmental impact;

Taking note of the above, the park and ride site for the east of Perth has been designed to be able to accommodate the turning movements of HGV vehicles in geometric terms. However, the additional construction costs associated with the provision of a stronger pavement thickness, more arduous surfacing, nor the environmental impact of lorry parking has not been considered as part of the business case.

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7. Option Appraisal

Appraisal Against Study Transport Planning Objectives

7.1 An appraisal of each site has been undertaken set against the study planning objectives and is contained within the Appraisal Summary Tables (ASTs) in Appendix C of this report. Each site was scored on a 7 point scale ranging from –3 (major negative) to +3 (major positive). The results of the refined Option Appraisal are contained within Table 7.1 and summarised in the ASTs contained within Appendix C.

Table 7.1 – Study Transport Planning Objectives

Ref	Criteria	Site P4	Site P5
AO1	To reduce car traffic flows on the A85 between the M90 and the centre of Perth.	1	1
AO2	To increase levels of accessibility for all by sustainable modes from the A90 catchment to the centre of Perth and to specific employment, health, leisure and retail locations in Perth	2	-2
AO3	To achieve high user satisfaction for users of park and ride associated with personal and vehicle security and safety.	2	-2
AO4	AO4 To increase the amount of interchange of travel between the A90 catchment area and services located in Perth centre	1	1

7.2 Referring to Table 7.1, it can be noted that site P4 scores significantly higher than P5 when appraised against the study transport planning objectives. The reduction in traffic volume, and the reductions in travel / interchange times experience similar results with each car park. However, it can be noted that Site P5 scores significantly lower than P4 when appraised against Objectives 2 and 3. This is based on the road safety issues that arise following the substandard geometry requirements of a new junction design and the access problems experienced by people travelling by all modes to site P5. A full explanation is detailed within the AST tables contained in Appendix C.

Appraisal Against STAG Criteria

7.3 The appraisal of the park and ride site against the Government's five STAG criteria is discussed below, detailed within Table 7.2 and summarised within the Appraisal Summary Tables contained in Appendix C.

Table 7.2 - STAG Criteria

STAG Criteria	Site P4	Site P5
Environment	-1	-1
Safety	1	-2
Economy	-1	-1
Integration	2	-2
Accessibility and Social Inclusion	2	-1

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Environment

7.4 With regards to the environment criteria and based on the predicted demand (Colin Buchanan Pride model) the following can be deduced:

- Biodiversity and Habitats – Site P4 is located close to the River Tay Special Conservation Area (SAC) and is separated from the river by a railway line, no constraints were identified during a site visit by an ecologist;
- Cultural Heritage – it is likely that the effects of the proposal will be minor, as one historic building, located on the other side of the river and railway is located within 500m of the site. Other historic buildings in the vicinity of the A85 road corridor will benefit from a reduction in traffic;
- Landscape – A landscape framework will be required to be integrated within the detailed design of the park and ride site. This will reduce the visual impact of the development. Site P5 is located within an Area of Great landscape Value (AGLV).
- Visual Amenity – As part of the landscape framework, suitable vegetation will be incorporated within the design to ensure the impact on nearby receptors is reduced.
- Global Air Quality – The change in carbon dioxide levels is linked directly with the change in emissions associated with the change in traffic volume. The change in traffic volume will be identified in the traffic model. Change in traffic volume is predicted to be low. The majority of vehicles visiting the site will already be on the road network and will divert to the park and ride site;
- Local Air quality – The change in PM10 and No2 levels is linked directly with the change in traffic volume, which will be identified within the traffic model. The change in traffic volume diverting from their existing route to the site is predicted to be low;
- Noise and Vibration – The change in noise and vibration is linked directly with the change in traffic volume identified within the traffic model. It is likely that traffic volume will decrease by fewer than 25% on the A85 Dundee Road. This is the threshold level where change in traffic volume becomes discernable to the human ear;
- Water Quality, Drainage and Flood Defence – Discussions will be undertaken with SEPA to discuss drainage issues and to identify the flood plain of the River Tay during the detailed design stage of the park and ride facility;
- Geology - Determination of contaminated land potential is required; and
- Agriculture and Soils –Land classification to be confirmed.

Safety

7.5 Sites P4 and P5 are considered to deliver similar security benefits with CCTV and street lighting incorporated within the design of the car parks. Passive security will also be similar as each site is located somewhat remote from existing development.

7.6 As previously stated, site P5 has a lower score against the study transport planning objectives and for road safety reasons as the required entry / exit junctions cannot be constructed in accordance with DMRB standards.

Economy

Bus Subsidy / Revenues

7.7 From comparison with other nearby park and ride facilities (Broxden, Perth and Castleview, Stirling) and the expected demand calculations undertaken by Colin Buchanan & Partners, it is estimated that the revenue accrued from ticket sales would not be sufficient to cover the costs for a new bus service and therefore it is likely that a subsidy will be required. The subsidy would therefore be a cost to local government. The level of subsidy required would be similar for sites P4 and P5.

7.8 In addition, the capital costs associated with Sites P4 and P5 will be similar, as both car park layouts will be of similar size and design.

7.9 In terms of the Economic Activity and Location Impacts (EALI) and Wider Economic Benefits (WEBS), it is expected that each site will have similar impacts, which are considered to be marginal.

Integration

7.10 Sites P4 and P5 deliver contrasting scores for Integration, as Site P4 introduces the ability to interchange between walk / cycle and the bus, whilst Site P5 has difficulties for access by walking and cycling modes. An increase in public transport use and a reduction in traffic-based emissions also align well with current health policy objectives. However, given the access problems of Site P5, its score will be significantly lower than P4.

Accessibility and Social Inclusion

7.11 The introduction of park and ride marginally increases accessibility with areas within walking and cycling distance of the park and ride facility benefiting from a more frequent, higher quality bus service. Outside the immediate area of the park and ride, a part of the journey is still required to be undertaken by car. As discussed previously Site P5 is more remote from Walnut Grove and is relatively inaccessible by walking, cycling and the site access junction's present departures from road design standards. Therefore Site P5 scores lower for this criterion.

Risk of Abstraction

7.12 It was identified as part of the Park and Ride Strategy and Action Plan that a significant proportion of demand was taken from the existing park and ride site currently in operation at Broxden. However following further investigation and by the analysis of an origin and destination survey recently undertaken at Broxden, it can be deduced that the magnitude of abstraction has been initially over estimated. The recent survey suggests that a maximum of 10% from the catchment area of either site P4 or P5 currently use Broxden. Therefore the abstraction value for both sites has been set at Low.

7.13 As previously stated, Stagecoach currently operate a bus service between Dundee and Perth and Walnut Grove and Perth City Centre. The abstraction of passengers from the Walnut Grove service has been disregarded due its low use (two people per day) and by the fact that this service is likely to be replaced. However there is a slight risk of abstraction of Dundee to Perth passengers as a small percentage of people may substitute their Dundee to Perth bus journey to travel by private car to the park and ride with the final part by bus. Taking cognisance of this the risk has been set as Medium.

7.14 It is expected that the new park and ride site will not be serviced by long distance bus users therefore the risk for abstracting strategic bus journeys has been set at Low. Risk of Abstraction ratings are contained within Table 7.3 and Appendix C.

Table 7.3 - Risk of Abstraction

Risk of Abstraction	Site P4	Site P5
Risk of Abstraction from other Park and Ride sites	Low	Low
Risk of abstraction from existing long distance public transport	Low	Low
Risk of abstraction from local bus services	Medium	Medium

7.15 An Implementability Appraisal of Sites P4 and P5 was undertaken, the results of which are contained within Table 7.4 and presented within Appendix C. Site P4 scores higher than P5 because of the access issues highlighted within this report. Site P4 scores significantly higher in the operational implementability criterion because the site is located closer to a local community and buses can enter / exit the site in a less circuitous manner than Site P5 where the gyratory must be negotiated upon entry and exit.

Table 7.4 - Implementability Appraisal

Implementability Appraisal	Site P4	Site P5
Technical implementability	2	-3
Operational implementability	1	0
Financial implementability	-1	-1
Public acceptability	0	-1

7.16 It is considered that TACTRAN, Perth and Kinross Council and Transport Scotland would find the above issues associated with Site P5 unacceptable and the statutory planning authority would resist planning consent based on road safety reasons.

7.17 Therefore Site P5 has been disregarded from further analysis within this study for its poor score against the study planning objectives and more importantly its very poor scoring with its technical implementability and the fact that Transport Scotland, TACTRAN or the general public would not support it based on poor site accessibility and road safety reasons.

7.18 Considering all the planning objectives and the Government objectives, site P4 scores the higher and is therefore the preferred option. This is mainly because Site P5 scores poorly in the accessibility criterion and the technical implementability criterion.

Options for Detailed Analysis and Appraisal

7.19 The analysis has identified that Site P5 scores considerably lower than P4. Given the design issues previously highlighted with the Option Development section, only option Site P4 will be considered for a more detailed appraisal.

7.20 Site P4 will be appraised for two bus routeing scenarios; Scenario 1 the ‘Hybrid’ Service (existing bus services supplemented by one new dedicated bus) and Scenario 2 the ‘Dedicated’ Service (two new dedicated buses during peak times and one during off-peak). The following chapter looks at this preferred option following the detailed assessment methodology.

8. Detailed Appraisal

Introduction

8.1 This chapter sets out the findings of a detailed appraisal against the Government's five appraisal criteria and the study transport planning objectives. These objectives are summarised within the appraisal summary tables contained within Appendix D.

8.2 Following the option development and the initial appraisal exercise, the following options have been retained and subject to a detailed appraisal within this chapter.

8.3 As stated previously, a Paramics model has been developed for Perth City Centre which is available for this study. The Paramics model will provide a key input to a COBA model developed for the appraisal process which will provide the calculation of vehicle operating costs, reduced journey times etc. Future demand matrices incorporate future Structure Plan aspirations and traffic growth contained within the Traffic Model for Scotland (TMfS) and are consistent with the Perth Area Transport Study currently being undertaken by Perth and Kinross Council.

Do-Minimum

8.4 Within the detailed appraisal, the options have been appraised against the Do-Minimum option, which includes transport infrastructure and development improvements that are considered committed. For this study, Do Minimum traffic flows have been extracted from the 2018 Do Minimum Paramics model for the future year appraisal of Site P4 for the opening year of 2012. The Do-Minimum was also used as a base for the detailed appraisal stage.

Reference Case

8.5 A Reference Case has also been considered for the detailed appraisal stage. This considers the traffic change associated with a new link road and river crossing which is proposed that connects the A9 with the A94. Traffic information for the Reference Case was extracted from the 2018 Reference Case Paramics model for the future year appraisal of Site P4.

8.6 Outputs from the Perth Paramics traffic model have been used to inform the COBA model and the detailed appraisal. Full details on the modelling methodology are given in Appendix F of this report.

Park and Ride Location Option for Appraisal

8.7 Two possible sites adjacent to the Barnhill Interchange were identified within the Park and Ride Strategy and Action Plan, Site P4 located south of Walnut Grove and Site P5 located within the gyratory system of Barnhill Interchange. Site P5 has been disregarded from the detailed analysis due to its poor score against the Transport Planning Objectives and also due to implementability issues. Therefore Site P4 alone has been considered within the detailed analysis.

Bus Routeing

8.8 Two bus routeing options have been considered within the detailed analysis:

- Option 1; the 'Hybrid' service where a new bus service is used to serve the site together with the diversion of existing bus services; and
- Option 2; the 'Dedicated' service where new a new dedicated park and ride service is considered only. Existing bus services are not used.

Demand Analysis

8.9 Demand for a park and ride service is normally estimated using a generalised cost model[4] or through the application of 'intercept rates'. Intercept rates are defined as the percentage of vehicles passing the park and site, or travelling into the urban centre, which are 'captured' by the new park and ride service.

8.10 Previous work by Colin Buchanan and Partners (CBP) developed a generalised cost model for Site P4 (the PRIDE model), which predicted daily demands of 159 vehicles in 2012.

8.11 For this study, Atkins has chosen to use intercept rates to validate the demand for Site P4. This approach provides an alternative method of calculating demand, the outputs from which provide similar levels of demand suggested by the PRIDE model.

8.12 There are two types of intercept rates that can be used to calculate demands for park and ride; 'daily' intercept rates or those based upon the 'active' park and ride period. For comparative purposes Atkins has produced demands for Site P4 using both daily and active period interception rates. The daily rates have been calculated using existing appropriate park and ride sites currently in operation where the usage of the park and ride site and the AADT of the nearby commuter route has been used to calculate estimated daily demand. A full explanation of demand calculations is included within Appendix E. A summary is presented below.

Summary of Demand

8.13 Table 8.1 presents the daily intercept rates for similar sites within the UK together with the CBP rates calculated using the PRIDE model.

Table 8.1 - Demand Calculation 'Daily' Intercept Rates

Method of calculation	Estimated daily demands for Site P4 (vehicles)	No. of passengers (1.2[5] per vehicle)
Colin Buchanan PRIDE model	159	191
'Daily' intercept rates	155-210	186 – 252

8.14 Referring to Table 8.1, it can be noted that using the daily intercept rate, between 155 and 210 vehicles are predicted to use the park and ride site, the results of which correlate well with the CBP PRIDE model. This equates to approximately between 186 and 252 people assuming 1.2 passengers per car.

8.15 The above estimation equates to between 11% and 15% which is similar to that stated within the TACTRAN Park and Ride Strategy Best Practice Review where as much as 20% or 30% for more successful sites can be experienced.

8.16 It is important to understand the sensitivities of demand and therefore a 5% and 10% intercept rate of the 'Active' period demand is contained within Table 8.2. These intercept values are recognised (TAS Bus Based Park and Ride – A Pilot Scheme) as typical values expected for park and ride sites within the UK.

[4] A generalised cost model compares the cost of making the same journey by park and ride and private vehicle, and estimates the number of people who will switch to the park and ride service. It considers elements such as in-vehicle journey time, parking charges, wait/walk times and bus journey times.

[5] Figure of 1.2 passengers per vehicle taken from DMRB and Broxden Park and Ride Surveys

Table 8.2 - Range of Demand

Method of calculation	Estimated daily demands for Site P4 (vehicles)	No. of passengers (1.2[6] per vehicle)
Colin Buchanan PRIDE model	159	191
'Active period' intercept rates based on Census Journey to Work (JTW) data (5% / 10%)	71 / 140	85 / 168
'Active period' intercept rates based on flows from the Perth Paramics model (5% / 10%)	68 / 135	82 / 162

8.17 The mid rate demand of 159 vehicles has been selected for inclusion within the economic analysis for the two bus routeing ('Hybrid' and 'Dedicated') and options for both the Do Minimum and the Reference Case.

Abstraction from the Broxden Park and Ride Site.

8.18 An origin and destination survey was undertaken at Broxden Park and Ride site as part of a data collection exercise for the Transport Model for Scotland. Summarising the survey results, a total of 74 passengers were surveyed between 07:30 and 13:45. A total of 281 cars and LGVs entered the park and ride site between 09:00 and 14:00. The survey therefore represents a 26% sample of drivers arriving at the site.

8.19 In total, 60 of the 74 passengers intended to use the 301 park and ride bus service to Perth. Table 8.3 shows the origin of these passengers.

Table 8.3 - Strategic Route Origin of Broxden Park and Ride Passengers

Origin	Number of people	%
A85 from west	5	8%
A9 from north	7	11%
A90 from east	7	11%
A912 from south	3	5%
A93 from north	1	2%
A94 from north	0	0%
M90 from south	9	15%
A9 from west	21	34%
Other (within Perth)	7	13%
TOTAL	60	

8.20 Table 8.3 shows that 26% of surveyed passengers using the Broxden Park and Ride arrived from the A90 east and M90 south. This demonstrates that the catchment areas of the Broxden Park and Ride and the Site P4 service are unlikely to greatly overlap.

8.21 Table 8.3 also shows that 11% of Broxden passengers came via the A90 east and 15% from the M90 south. If Site P4 were to open, it is reasonable to assume that all passengers arriving from the A90 east would switch to this facility.

[6] Figure of 1.2 passengers per vehicle taken from DMRB and Broxden Park and Ride Surveys

8.22 Of the nine passengers who arrived from the M90 south, six had final destinations within Perth City Centre. The remaining three passengers had final destinations adjacent to Glasgow Road outside the central core.

8.23 Analysis shows that the distance from Junction 10 of the M90 (just before the A912 slips) to the Broxden Park and Ride site is 5.8km. The distance to Site P4 from this location is 3.4km.

8.24 Based upon these relative distances to Broxden and Site P4 from the M90 and the associated travel times, it has been assumed that the six passengers travelling to the city centre would switch to Site P4. The remaining three passengers surveyed would remain on the Broxden service, as it passes in close proximity to their destination.

8.25 Based upon the survey information presented above, 21.6% (13/60) of Broxden trips are likely to be abstracted from Broxden as a result of Site P4.

Table 8.4 – Predicted Abstraction at Broxden Park & Ride (vehicles)

Scenario	2012 demands		
	AM	IP	Total
Broxden (stand-alone) – CBP figures	173	55	228
Broxden (with Site P4 open) – revised figures	136	43	179

8.26 Table 8.4 shows that a total of 49 (228 – 179) vehicles are expected to switch from Broxden to Site P4 once the park and ride facility is introduced.

8.27 The vehicles abstracted from Broxden have been assumed to be already captured in the demand estimates for Site P4, and have not been added as additional trips. The loss of fare revenue from the Broxden Park and Ride service as a result of these switching vehicles has been included within the P4 business case.

Future Year Park and Ride Demands

8.28 As presented in Table 8.2, demand for the park and ride service in 2012 was estimated as 159 vehicles or 192 passengers. It is likely that demand for the service would grow in future years as a result of increased traffic flow passing the site, and the perception of the operation of the park and ride service increases.

8.29 Passenger demand could also increase for a number of reasons, including:

- As a result of increased parking charges within Perth City Centre when compared with bus travel costs. This effectively results in a reduction in cost for the park and ride service compared to the private car;
- As a result of the increased attractiveness of Perth as a shopping/tourist destination. As these trips do not result from new developments they will not be picked up by the Perth Paramics model.
- ‘Natural growth’ as a result of the success of the service. Further marketing and promotion could supplement this.

8.30 2018 traffic flows (from the 2018 Perth Paramics model) form the basis for the flows used within the COBA model. The appraisal period within COBA is 2012-2071, in line with the proposed opening year of the park and ride service.

8.31 To maintain consistency with other traffic studies, including the Perth Area Transport Study currently being undertaken by Perth and Kinross Council (which are making use of the Perth Paramics Model), low NRTF traffic growth has been applied to the COBA model – firstly to factor 2018 flows back to 2012, and secondly to factor traffic flows between 2018-2031. Post 2031 no traffic growth is assumed, as this is the last year of NRTF forecasts.

8.32 Demands for the park and ride service have been factored in line with low NRTF. This results in the following future year demands

Table 8.5 – Growth in Demand for Park and Ride

Year	Demand (vehicles)	Demand (passengers)	% change from 2012
2012	159	191	0%
2018	169	203	6%
2031	182	218	14%

8.33 Increased congestion on the A85 might result in an increased demand for park and ride. If an increase in congestion did occur, bus journey times between Site P4 and the city centre would need to be significantly better than the same journey by car in order for park and ride demand to increase. In this event it is recommended, as previously noted, that further work on investigating the feasibility of introducing bus priority measures are investigated.

Detailed Appraisal Criteria

Economy

Scheme Costs

8.34 The total predicted cost for the park and ride scheme can be divided into two areas: infrastructure costs and operating costs.

8.35 Table 8.6 presents the predicted infrastructure costs for Site P4. All costs are presented in 2009 Quarter 1 (2009 Q1) prices, and include Optimism Bias (OB) where indicated.

Optimism Bias

8.36 OB is the term used to reflect a tendency for the true capital cost, operational cost or works duration of schemes in the public sector to be underestimated, which in turn results in an overestimation of the benefits of the scheme.

8.37 In accordance with the latest advice from Transport Scotland and DfT's Transport Analysis Guidance, the total scheme cost estimates quoted in this report include an uplift of 25% (where indicated in Table 8.6) to take account of OB. Twenty five percent OB has been applied because Atkins has considerable experience of constructing park and ride sites and was part of the project team that constructed the Broxden Park and Ride car park located to the east of Perth City Centre and therefore the construction costs can be estimated with a degree of certainty.

Table 8.6 - Site P4 – Estimated Infrastructure Costs

Cost element	Estimated cost (2009 Q1 prices)	Optimism Bias Applied	Assumptions
Car Park and access junction, including land purchase costs	£1,129,729	25%	Includes site clearance, access road, footways, landscaping, CCTV, road signs and street furniture.
Subsurface Drainage System	£343,750	25%	In vicinity of the River Tay SAC, therefore drainage is relatively expensive
Total	**£1,473,479**		

8.38 Noting the contents of Table 8.6, it is estimated that the total infrastructure costs including land purchase and drainage are expected to be £1.473M at 2009 Q1 prices.

8.39 It is estimated that the costs associated with the provision of a car park with a carriageway thickness strong enough to accommodate lorry movements is an increase of £375,000 approximately. The extra costs associated with increase in noise, air borne emissions, additional mitigative measures derived from the lorry park has not been considered within this analysis. Similarly the benefits associated with the park and ride car park also being used as a lorry park has also not been captured within this analysis.

8.40 The figures presented in Table 8.7 present the annual operating costs to local government if Site P4 was to be built and become operational in 2009.

Table 8.7 - Site P4 – Annual operating costs (based on 2012 daily demand of 191 passengers)

	Annual Total ('Hybrid' Bus Service)[7]	Annual Total ('Dedicated' (Bus Service)[8]	Notes
Total Annual Bus Operating Costs			
Drivers	£41,279	£59,153	
Other direct	£17,581	£30,842	Includes fuel and tyre costs.
Engineering	£13,786	£22,146	Bus maintenance.
Depreciation	£14,157	£28,314	
Total Direct	**£86,804**	**£140,456**	
Indirect	£8,985	£17,970	
Depot overhead	£5,588	£11,177	The total cost of running a bus depot is usually split between all the services operated.
Head office overhead	£2,739	£5,479	The total cost of running the head office of a bus operator is usually split between all the services operated.
Total Indirect and Overheads	**£17,313**	**£34,626**	
Total	**£104,117**	**£175,082**	
Other P&R Costs			
Ticketing Equipment	£0	£0	Tickets purchased on bus.
Quality Monitoring	£0	£0	Assumed within existing PKC budget.
Marketing and Promotion	£0	£0	Assumed within existing PKC budget.
Reduction in income from fares at Broxden	£17,396	£17,396	Based upon a total of 59 passengers per day abstracted to Site P4.
Reduction in parking income in the city centre	£69,152	£69,152	Based upon people previously parking in Canal Street, South Inch and Victoria Street car parks. Loss of income from those parking in car parks outside PKC control not included.
Car Park Maintenance and Cleaning	£7,412	£7,412	Average annual maintenance cost (undiscounted). Includes Optimism Bias of 25%. Allows for resurfacing in 2027 and 2057 and reconstruction in 2042. Factoring included.
Subsidy Saving 54b	£10,001	£10,001	The provision of a new bus service would replace the existing 54b service, which PKC currently subsidises.
Total Other P&R Costs	**£83,959**	**£83,959**	

[7] Requiring one dedicated midi bus and making use of existing services.

[8] Requiring two dedicated midi buses and no existing services.

	Annual Total ('Hybrid' Bus Service)[7]	Annual Total ('Dedicated' (Bus Service)[8]	Notes
Park and Ride Demand Revenue			
Annualised Demand	58,194	58,194	Based on demand of 191 passengers per weekday and Saturday.
Annualised Revenue	£56,448	£56,448	Assumes return fare of £1. 10% of passengers qualify for concessionary fares. Operator receives 70p from Central Government.
Annual subsidy required by bus operator	-£47,668	-£118,634	P&R Annualised Revenue less Bus Operating Cost.
Cash Flow			
Total Costs	£188,075	£259,041	Total Bus Operating Costs plus Other P&R Costs.
Total Revenue	£56,448	£56,448	Annualised Revenue from Fares.
Cash Flow Projection	-£131,627	-£202,593	
Total monies required from PKC	**£131,627**	**£202,593**	

All costs in £ and 2009 Q1 prices

Calculation of Operator Subsidy

8.41 The amount of subsidy paid to the operator of a park and ride service can be calculated as the total cost to the operator of running the service (including a profit margin) minus the income expected from fares. The cost of bus operation (and hence the subsidy required) will be more expensive for the dedicated bus service as an extra bus will be required for the peak hours.

8.42 The estimated total cost to the operator of running the Site P4 bus service is £104,117 for the 'Hybrid' Service and £175,082 using the 'Dedicated' service (2009 Q1 prices). These figures have been calculated using Atkins 'Public Transport Operational Cost' spreadsheet model, and based upon the following frequencies:

- 2 new round-trip bus journeys per hour throughout the day for the 'Hybrid' service; and
- 4 new round trip bus journeys per hour in the AM and PM peak periods, and 2 in the off-peak and at weekends for the 'Dedicated' service.

8.43 Park and ride bus journey times have been modelled using the 2018 Paramics model. Modelled journey times for the round-trip park and ride service in the AM peak are between 12 and 18.5 minutes. This includes the trip into Perth City Centre, a 1.5 minute layover as passengers alight, and the return leg of the journey.

8.44 Based upon these journey times, a 'Hybrid' bus service would require a single 'Dedicated' park and ride bus for the duration of the day. A new dedicated bus service not using existing services would require a total of two dedicated buses in the AM and PM peak periods with a single bus during the interpeak period.

8.45 Estimated annual fare revenue is £56,448. This is based upon 191 passengers per day using the service, 10% of which are concessionary travellers. The projected return fare is £1 per passenger. For each concessionary passenger, the operator receives approximately 70p in fares from the Scottish Government. Table 8.8 presents the calculation of annual fare income.

Table 8.8 - Calculation of Annual Income From Fares

Number of passengers	191
Return fare	£1.00
90% paying full fare	£171.72
10% at concessionary rate	£13.36
Total Daily revenue (weekday and Sat.)	£185.08
Annual revenue (excluding Sundays and Bank Holidays)	£56,448.00

8.46 Based upon the estimated total cost to the operator of running the Site P4 service, and the forecast annual revenue from fares, the total subsidy required from Perth and Kinross Council is estimated to be £47,668 per annum for the provision of the 'Hybrid' bus service and £118,634 using the 'Dedicated' bus service.

8.47 However, it should be noted that the adoption of the 'Hybrid' bus service will present financial complexities as any ticket revenue received as part of the park and ride would be required to be shared with all operators serving the site. Depending on the procurement process this could lead to two different operators serving the site. The Business Case considered within this report considers that 100% of the ticket revenue is captured by one bus operator and therefore reduces any subsidy payments. In reality this may be hard to deliver.

Transport Economic Efficiency (TEE)

8.48 The Transport Economic Efficiency (TEE) analysis appraises the economic impact of the scheme in terms of road user costs and benefits, over a sixty year period.

8.49 The Economic appraisal of the proposed park and ride was undertaken using the Design Manual for Roads and Bridges (DMRB) guidelines and the standard 60 year appraisal period.

Discounting and the Price Basis

8.50 Price discounting has been applied in the economic assessment of Site P4 as per standard Department for Transport (DfT) appraisal guidance[9].

8.51 Price discounting reflects the principle that different values are placed on the same cost or benefit according to the year that it occurs in. It is preferable that costs are incurred in future years and benefits are accrued as soon as possible, both as consumers and in the public and corporate sectors.

8.52 Projected costs in future years are discounted to reflect this situation. The discount rate is 3.5% per annum for the first 30 years of assessment, and 3% per annum thereafter in accordance with current guidelines.

Traffic Model Development

Use of the Perth Paramics Model

8.53 The existing Perth Paramics model was developed by SIAS consultants on behalf of Perth and Kinross Council (PKC) in 2003. The model was designed to test committed and proposed developments within Perth, and has recently been used to test the impact of the Perth and Kinross Local Plan up to 2018. It covers the whole of the Perth city urban area, and the strategic network of major roads around the city.

8.54 The Perth Paramics model has been previously calibrated and validated by Perth and Kinross Council's term consultant, SIAS, although the model has not been audited by Transport Scotland. It has been assumed to be fit for purpose for use in this study.

[9] WEBtag unit 3.5.2, Department for Transport, February 2006.

8.55 More information regarding the calibration and validation of the Paramics model is contained within Appendix A.

8.56 The Perth Paramics model has been used in this assessment to:

- Provide Base year (2003) and future year (2018) link flows and turning flows for use in demand estimates, and for input into the COBA model. The Paramics model was used because:
  - The model can provide flows on each of the required links in the COBA model, whereas available traffic count and ATC information is not comprehensive. Link flows have been calibrated and validated and should therefore be representative of the Base situation;
  - The Paramics model could provide traffic flows for each vehicle type, which was important to be able to model park and ride; and
  - Paramics can provide future year estimates of traffic flows, allowing for differential growth rates on each link. This is preferable to applying blanket traffic growth factors to existing patterns and levels of traffic.
- Provide estimates of bus journey times to inform bus route development and headway and frequency calculations.

8.57 The 2018 Do Minimum Perth Paramics model was used to provide traffic flows for the COBA 'Do Minimum' scenario. Flows for the Reference Case scenario were taken from the 2018 'Option C FrB' Paramics model, which includes the A9, A93 and A94 link road, and accommodates the predicted traffic growth between 2003 and 2018.

8.58 The Paramics model (and economics 'bolt on' package PEARS) was not used to calculate the Transport Economic Efficiency (TEE) of Site P4. Initial tests showed that because the scheme results in relatively small changes in traffic flows (around 100 vehicles over the three hour AM peak period, compared to an overall matrix size of 36,000 vehicles), the impact of the scheme is masked by slight variations in each Paramics run. Instead, a COBA model was developed for the TEE analysis.

About COBA

8.59 The COBA (**CO**st **B**enefit **A**nalysis) program has been used to calculate the costs/benefits of the Site P4 bus service across the wider road network. COBA compares the costs of providing road schemes with the benefits derived by road users (in terms of time, vehicle operating costs and accident reduction) and expresses the results in terms of a monetary valuation. The appraisal is undertaken over a sixty year period, starting in the scheme opening year. In the case of the Perth east Park and Ride scheme the appraisal period is 2012 to 2071.

8.60 The output contributes to the appraisal process in the following ways:

- It informs the 'Economy' Objective: Journey time and Vehicle Operating Cost (VOC) changes;
- It informs the 'Safety' Objective: Changes in Accident Costs and Casualty costs; and
- It forms the 'Environment' Objective: Changes in the environmental impacts associated with changes to traffic volumes.

8.61 A full description of how the COBA model has been built is provided within Appendix F of this report, however the following scenarios have been tested within COBA:

- Do Minimum;
- Do Minimum with Site P4 using 'Hybrid' bus scenario;
- Do Minimum with Site P4 using 'Dedicated' bus scenario;
- Reference Case Scenario;
- Reference Case Scenario with Site P4 using 'Hybrid' bus scenario: and
- Reference Case Scenario with Site P4 using 'Dedicated' bus scenario.

8.62 The Do Minimum assumes that the current road network does not change throughout the appraisal period. The Reference Case scenario includes the effects of the proposed link road which will connect the A9, A93 and A94 routes to the north of Perth. The link road is not a committed development at this time. Advice from officers at Perth and Kinross Council suggested that the development should be considered as a Reference Case within this study.

8.63 Each 'with Site P4' scenario was tested based on predicted a demand of 159 vehicles (191 passengers).

COBA Model Results

8.64 The COBA output includes a series of tables which show travel time costs, vehicle operating costs, accident costs and carbon costs. By comparing these total network costs both with and without park and ride, the monetary costs of the park and ride service can be calculated.

8.65 Separate Do Minimum models have been created for the 'Hybrid' and 'Dedicated' bus services. This was required to correctly model differing bus occupancy levels between the two proposed services, which is explained in Appendix F. The difference between each Do Minimum and each 'with park and ride ' scenario is the key figure.

8.66 Table 8.9 presents the results from the COBA modelling exercise in terms of travel time costs and vehicle operating costs. As discussed previously, a delay of 2 minutes has been added to all existing bus services diverted into the site in the 'Hybrid Service' scenario. All costs are shown in £k, discounted to 2002 prices.

8.67 A positive value in the 'Impact' row indicates an overall increase in costs compared to the Do Minimum Scenario.

Table 8.9 - COBA Travel Time and VOC Results Against Do Minimum Scenario

Cost element	Do Minimum Scenario	Do Minimum Scenario plus Park and Ride ('Hybrid' Service)	Do Minimum Scenario ('Dedicated' Service)	Do Minimum Scenario plus Park and Ride ('Dedicated' Service)
Travel Time Costs	£754,261	£754,765	£700,406	£700,293
Vehicle Operating Costs	£211,675	£211,943	£211,675	£212,055
Sub-Total	£965,936	£966,708	£912,081	£912,348
Impact		**£772**		**£267**
Car parking charges - benefit to user[10]		-£577		-£577
Total Cost		£195		-£310

Costs in £k discounted to 2002 values

8.68 Table 8.9 shows that the 'Hybrid' park and ride service results in a disbenefit of £0.195M over the 60 year appraisal period. The 'Dedicated' service results in a a benefit of £0.310M.

8.69 Table 8.9 also shows that the introduction of park and ride at Site P4 is likely to have a small effect on overall travel times over the 60 year appraisal period. Characteristics include:

- A reduction in the overall number of vehicles on the road, and overall vehicle kilometres travelled.

[10] Users of the park and ride service will benefit from the reduced cost of parking at Site P4 compared with parking charges in the city centre.

- Passengers abstracted from the Broxden service travelling from the A90 and M90 not travelling as far to reach Site P4.
- Traffic conditions are likely to ease slightly at junctions which are remote from the park and ride bus route, from which a small amount of cars have been removed. However, at junctions on the bus route, particularly within the city centre, 48 bus movements (two way total, 'Hybrid' service) per day are added, with only a proportion of 318 car movements (two way total) removed. At some junctions, total vehicular movements could increase as a result of the introduction of bus movements.
- Passengers on existing buses which divert into the park and ride as part of the 'Hybrid' scenario will be delayed by approximately two minutes compared to the present situation.
- Savings to individual park and ride users through lower cost of park and ride bus fare compared to parking tarrif in city centre.

8.70 Vehicle operating costs with the 'Hybrid' service are similar to the Do Minimum, with the reduction in car trips and increase in bus trips largely cancelling each other out. Similarly for travel time costs there is a slight increase mainly due to a 2 minute delay for existing bus users. With the 'Dedicated' service, Vehicle Operating Costs increase due to the increased cost required to run and maintain extra park and ride buses.

8.71 Table 8.10 presents scheme accident costs compared to the Do Minimum scenario over the sixty year appraisal period. A negative impact means that there are forecast to be overall accident savings as a result of the P4 scheme.

Table 8.10 - COBA Accident Costs Against Do Minimum Scenario

Cost element	Do Minimum Scenario	Do Minimum Scenario plus Park and Ride ('Hybrid' Service)	Do Minimum Scenario ('Dedicated' Service)	Do Minimum Scenario plus Park and Ride ('Dedicated' Service)
Accident Costs	**£93,791**	**£93,493**	**£93,791**	**£93,549**
Impact		-0,298		-0,242

Costs in £k discounted to 2002 values

8.72 Table 8.10 shows that using the 'Hybrid' service for Site P4 will result in a slight reduction in accident costs over the sixty year appraisal period of £298k. The use of the 'Dedicated' service results in a reduction in accident costs of £242k.

8.73 Accident benefits accrue from the overall reduction in the number of vehicle kilometres within the COBA model as a result of the scheme. The slightly reduced benefits from the 'Dedicated' service are due to the addition of more new bus movements within the city centre when compared to the 'Hybrid' service.

8.74 Table 8.11 presents predicted carbon costs for the Do Minimum Scenario. A positive value indicates that more carbon is likely to be produced as a result of the P4 scheme.

Table 8.11 - COBA Carbon Costs Against Do Minimum Scenario

Cost element	Do Minimum Scenario	Do Minimum Scenario plus Park and Ride ('Hybrid' Service)	Do Minimum Scenario ('Dedicated' Service)	Do Minimum Scenario plus Park and Ride ('Dedicated' Service)
Carbon Costs	**£44,817**	**£44,759**	**£44,817**	**£44,804**
Impact		-£0,058		-£0,013

Costs in £k discounted to 2002 values

8.75 Table 8.11 shows that the use of the 'Hybrid' service with Site P4 is likely to result in a slight decrease in carbon costs of £58k and £13k for the 'Dedicated' service. It can be noted that the extra use of bus movements attributed with the 'Dedicated' service contributes to the difference in carbon costs.

8.76 Table 8.12 presents a summary of all COBA outputs over the sixty year appraisal period, along with predicted scheme costs presented for the Do Minimum Scenario. Note that carbon costs are not included within the summary, as these costs are not typically presented in TEE analysis.

Table 8.12 - COBA Model Results Summary Table Against Do Minimum Scenario[11]

Impact	P4 ('Hybrid' Service)	P4 ('Dedicated' Service)	Notes
TEE Impacts			
Consumer and Business User Impacts	**-0.195**	**0.310**	Includes travel time and Vehicle Operating Costs.
Private Sector Provider Impacts	**0.170**	**0.286**	Profit accruing to operator of park and ride service.
Accident Benefits	**0.298**	**0.242**	
Present Value of Benefits (PVB)	**0.274**	**0.839**	Positive figure represents benefit compared to the Do Minimum Scenario without Park and Ride.
Government Funding			
Present Value of Costs (PVC)	**2.859**	**3.968**	Includes all infrastructure and running costs. 'Dedicated' service has a higher cost than 'Hybrid' due extra service buses required.
Overall Impact			
Net Present Value (NPV)	**-2.586**	**-3.130**	NPV is the PVB minus PVC.
Benefit to Cost Ratio (BCR_{Gov})	**0.10**	**0.21**	The BCR ratio is the ratio of PVB to PVC. BCR Gov (BCR to Central Government) includes the impacts of the scheme on revenue from Indirect Taxation (VAT on fuel).
Benefit to Cost Ratio (BCR_{FA})	**0.10**	**0.21**	BCR FA (Funding Agency) is calculated in the same way as BCR Gov, but excludes the effects of Indirect Taxation, as this is not accrued by the Funding Agency. In this instance it has not been possible to calculate Indirect Taxation effects, so the two figures are identical.

Costs in £m discounted to 2002 values

8.77 Table 8.12 shows that in the Do Minimum Scenario, the adoption of the 'Hybrid' bus service is expected to result in a £0.274M benefit ('Hybrid' Service) over the 60 year appraisal period,

[11] Note that due to the non-standard methodology used to appraise the P4 scheme, it has not been possible to quantify the effect on income from indirect taxation. Indirect taxation consists of the income from VAT on fuel. These costs/benefits do not impact upon PKC as a Local Authority, but would be incurred by Central Government.

producing a BCR of 0.10. In the 'Dedicated' Service scenario, the expected benefit is £0.839M with a corresponding BCR of 0.21.

8.78 A BCR of 1 indicates that the overall benefits of a scheme are equal to overall costs over the 60 year appraisal period. A BCR of less than 1 indicates that a transport scheme does not represent value for money in terms of the TEE analysis conducted. A negative BCR indicates that the TEE total benefits across the transport system are reduced by the introduction of the scheme.

8.79 The above methodology was applied for the Reference Case Scenario (inclusion of the link road and new bridge crossing). Table 8.13 presents the results for the Reference Case scenario.

Table 8.13 - COBA Model Summary Table Against Reference Case Scenario

Impact	P4 ('Hybrid' Service)	P4 ('Dedicated' Service)	Notes
TEE Impacts			
Consumer and Business User Impacts	**-0.054**	**0.566**	Includes travel time and Vehicle Operating Costs.
Private Sector Provider Impacts	**0.170**	**0.286**	Profit accruing to operator of park and ride service.
Accident Benefits	**0.361**	**0.305**	
Present Value of Benefits (PVB)	**0.478**	**1.158**	Positive figure represents benefit compared to the Do Minimum Scenario without Park and Ride.
Government Funding			
Present Value of Costs (PVC)	**2.859**	**3.968**	Includes all infrastructure and running costs. 'Dedicated' service has a higher cost than 'Hybrid' due extra service buses required.
Overall Impact			
Net Present Value (NPV)	**-2.382**	**-2.811**	NPV is the PVB minus PVC.
Benefit to Cost Ratio (BCR_{Gov})	**0.17**	**0.29**	The BCR ratio is the ratio of PVB to PVC. BCR Gov (BCR to Central Government) includes the impacts of the scheme on revenue from Indirect Taxation (VAT on fuel).
Benefit to Cost Ratio (BCR_{FA})	**0.17**	**0.29**	BCR FA (Funding Agency) is calculated in the same way as BCR Gov, but excludes the effects of Indirect Taxation, as this is not accrued by the Funding Agency. In this instance it has not been possible to calculate Indirect Taxation effects, so the two figures are identical.

Costs in £m discounted to 2002 values

8.80 Table 8.14 shows that in the Reference Case Scenario the use of the 'Hybrid' service at Site P4 results in a 0.478M benefit over the 60 year appraisal period, producing a BCR of 0.17. In the ''Dedicated'' Service scenario, the expected benefit is £1.158M with a BCR of 0.29.

8.81 Carbon Costs in the Reference Scenario are presented in Table 8.14.

Table 8.14 - COBA Carbon Costs Against Reference Case Scenario

Cost element	Do Minimum Scenario	Do Minimum Scenario plus Park and Ride ('Hybrid' Service)	Do Minimum Scenario plus Park and Ride ('Dedicated' Service)
Carbon Costs	£49,013	£49,017	£49,073
Impact		£0,004	£0.060

Costs in £k discounted to 2002 values

Summary of TEE results

8.82 The BCR's produced during the TEE analysis are as shown in Table 8.15:

Table 8.15 – BCRs for Site P4 Scheme

Scenario	Total Cost	Total Benefit	BCR
Do Minimum ('Hybrid' service)	2.859	0.274	0.10
Do Minimum ('Dedicated' service)	3.968	0.839	0.21
Reference Case ('Hybrid' service)	2.859	0.478	0.17
Reference Case ('Dedicated' Service)	3.968	1.158	0.29

Costs in £m discounted to 2002 values

8.83 Results from the Do Minimum and Reference Case scenarios show that the 'Hybrid' Service has a BCR of 0.10 and 0.17 respectively, indicating that the benefits of the scheme are not as high as the predicted costs, but that some TEE benefits are expected to accrue.

8.84 Results for the 'Dedicated' Service scenarios show that the requirement for an extra added bus (with no increase in passenger trips) has a slightly beneficial effect on the BCR (largely due to existing buses not being adversely affected). The BCR rises marginally to 0.21 in the Do Minimum scenario and 0.29 in the Reference Case.

8.85 A completed set of standard TEE tables is included within Section 9 'Cost to Government'.

Demand Sensitivity Testing

8.86 As a sensitivity test, separate COBA runs and financial analyses have been carried out with 'high' and 'low' demand estimates, using the 'Hybrid' bus service and the Reference Case scenario. This has been chosen as this scenario requires the lowest subsidy from PKC, and is also the most likely future year scenario to occur.

8.87 The high and low demand figures which have been used are shown in Table 8.16. For comparison, the middle demand estimates are also presented.

Table 8.16 – Sensitivity Test Demands (2012)

Demands	Vehicles	Passengers
High	210	252
Mid	159	191
Low	68	82

8.88 High demand estimates were obtained by applying a calculated intercept rate from Broxden (1.52%) to the AADT on the A85 (13,800). Low demand estimates were obtained by applying a

5% intercept rate to peak period flows obtained from the Perth Paramics model. Full details of demand calculations are included within Appendix D.

8.89 The sensitivity test has used the same assumptions regarding traffic growth and future growth in park and ride demands as the main assessment.

8.90 Table 8.17 presents the results

Table 8.17 - Site P4 – Annual Operating Costs ('Hybrid' Low and High Demand)

	Annual Total ('Hybrid' Bus Service)[12] Low demand	Annual Total ('Hybrid' (Bus Service)[13] High Demand	Notes
Total Annual Bus Operating Costs			
Drivers	£41,279	£41,279	
Other direct	£17,581	£17,581	Includes fuel and tyre costs.
Engineering	£13,786	£13,786	Bus maintenance.
Depreciation	£14,157	£14,157	
Total Direct	**£86,804**	**£86,804**	
Indirect	£8,985	£8,985	
Depot overhead	£5,588	£5,588	The total cost of running a bus depot is usually split between all the services operated.
Head office overhead	£2,739	£2,739	The total cost of running the head office of a bus operator is usually split between all the services operated.
Total Indirect and Overheads	**£17,313**	**£17,313**	
Total	**£104,117**	**£104,117**	
Other P&R Costs			
Ticketing Equipment	£0	£0	Tickets purchased on bus.
Quality Monitoring	£0	£0	Assumed within existing PKC budget.
Marketing and Promotion	£0	£0	Assumed within existing PKC budget.
Reduction in income from fares at Broxden	£17,396	£17,396	Based upon a total of 59 passengers per day abstracted to Site P4.
Reduction in parking income in the city centre	£13,107	£100,469	Based upon people previously parking in Canal Street, South Inch and Victoria Street car parks. Loss of income from those parking in car parks outside PKC control not included.
Car Park Maintenance and Cleaning	£7,412	£7,412	Average annual maintenance cost (undiscounted). Includes Optimism Bias of 25%. Allows for resurfacing in 2027 and 2057 and reconstruction in 2042. Factoring included.
Subsidy Saving 54b	£10,001	£10,001	The provision of a new bus service would replace the existing 54b service, which PKC currently subsidises.
Total Other P&R Costs	**£27,913**	**£115,275**	

[12] Requiring one dedicated midi bus and making use of existing services.

	Annual Total ('Hybrid' Bus Service)[12] Low demand	Annual Total ('Hybrid' (Bus Service)[13] High Demand	Notes
Park and Ride Demand Revenue			
Annualised Demand	25,010	76,860	Based on demand of 82 and 252 passengers per weekday and Saturday.
Annualised Revenue	£24,260	£74,554	Assumes return fare of £1. 10% of passengers qualify for concessionary fares. Operator receives 70p from Central Government.
Annual subsidy required by bus operator	-£79,857	-£29,562	P&R Annualised Revenue less Bus Operating Cost.
Cash Flow			
Total Costs	£132,030	£219,392	Total Bus Operating Costs plus Other P&R Costs.
Total Revenue	£24,260	£74,554	Annualised Revenue from Fares.
Cash Flow Projection	-£107,770	-£144,837	
Total monies required from PKC	107,770	144,837	

All costs in £ and 2009 Q1 prices

8.91 Table 8.18 shows that the subsidy required from Perth and Kinross Council (PKC) is estimated to be £79,857 in the low demand scenario, and £29,562 in the high demand scenario. This reduction is due to an increase in fare revenue which offsets the bus operator's costs. However, parking revenue is estimated to fall by £13,107 in the low demand scenario (as most passengers are abstracted from Broxden and therefore do not currently park in the city centre), compared to a reduction of £100,469 in the high demand scenario. This means that, perhaps counter-intuitively, the total monies required from PKC are higher in the high demand scenario than the low, £144,837 compared to £107,770 per annum.

8.92 Table 8.18 presents a summary of all COBA outputs over the sixty year appraisal period, along with predicted scheme costs presented for the sensitivity test scenarios. Note that carbon costs are not included within the summary, as these costs are not typically presented in TEE analysis.

Table 8.18 - COBA Model Results Summary Table – Sensitivity Test

Impact	'Hybrid' Reference Case with low demands	'Hybrid' Reference Case with high demands	Notes
TEE Impacts			
Consumer and Business User Impacts	**-1.156**	**0.198**	Includes travel time and Vehicle Operating Costs.
Private Sector Provider Impacts	**0.170**	**0.170**	Profit accruing to operator of park and ride service.
Accident Benefits	**0.012**	**0.575**	
Present Value of Benefits (PVB)	**-0.974**	**0.943**	Positive figure represents benefit compared to the Do Minimum Scenario

Impact	'Hybrid' Reference Case with low demands	'Hybrid' Reference Case with high demands	Notes
			without Park and Ride.
Government Funding			
Present Value of Costs (PVC)	**2.539**	**3.385**	Includes all infrastructure and running costs.
Overall Impact			
Net Present Value (NPV)	**-3.513**	**-2.441**	NPV is the PVB minus PVC.
Benefit to Cost Ratio (BCR_{Gov})	**-0.38**	**0.28**	The BCR ratio is the ratio of PVB to PVC. BCR Gov (BCR to Central Government) includes the impacts of the scheme on revenue from Indirect Taxation (VAT on fuel).
Benefit to Cost Ratio (BCR_{FA})	**-0.38**	**0.28**	BCR FA (Funding Agency) is calculated in the same way as BCR Gov, but excludes the effects of Indirect Taxation, as this is not accrued by the Funding Agency. In this instance it has not been possible to calculate Indirect Taxation effects, so the two figures are identical.

Costs in £m discounted to 2002 values

8.93 Table 8.19 shows that adopting 'Hybrid' service with low demands, the introduction of the park and ride has a BCR of -0.38. With high demands, TEE benefits rise to £0.943m compared to total costs of £3.385m. This results in a BCR of 0.28.

8.94 The sensitivity test results demonstrate that due to the loss of parking revenue, the park and ride scheme is likely to become more expensive to Perth and Kinross Council the more vehicles it removes from parking within the city centre. In TEE terms, the benefits of the scheme have been shown to be extremely sensitive to passenger demand. With low demands of 82 passengers per day (in 2012), the scheme has TEE disbenefits. With high demands of 252 passengers per day (in 2012) a BCR of 0.28 is achieved.

Wider Economic Benefits (WEBs)

8.95 Wider economic benefits are an innovation in appraisal and are currently treated as a sensitivity test in STAG, in the absence of accumulated evidence on these additional benefits and how they have been generated by transport projects. These benefits are additional to standard economic benefits and arise because of market imperfections, the principle one being effects which are external to the firm or industry and therefore not captured in standard appraisal. These effects, referred to as agglomeration arise through increased density of economic activity, which has been shown to be correlated with increased productivity.

Agglomeration

8.96 Agglomeration effects are based on the idea that the productivity of firms/workers may increase within geographical clusters of economic activity. Transport improvements can affect industrial agglomeration in three fundamentally different ways.

8.97 Firstly, reductions in travel times (i.e. 'generalised costs') will facilitate interaction between firms/workers allowing a variety of positive interaction effects; these include greater specialisation, access to larger markets and larger labour pools, and for the dissemination of best practice (etc).

8.98 Secondly, even without any change in total employment by area affected, the improvement of commuting opportunities will help to match workers with suitable positions. Finally, any (long-run) relocation of firms (and net employment) within existing industrial clusters may bring about a second round increase in productivity from agglomeration effects.

8.99 In undertaking the estimation of the overall effect of improved transport on agglomeration, there is a model embedded in STAG; however, if estimating these effects for a scheme such as park and ride it is preferable to follow the DfT's guidance in 'Transport, Wider Economic Benefits and Impacts on GDP'. This involves breaking down the link from better transport to higher productivity into two stages:

- The effect of improving transport on the 'effective density of employment' (including any long-run relocation of firms); and
- The effect of higher employment density on productivity and output.

8.100 Estimating how an intervention would change effective employment density involves the production of a matrix showing generalised costs of travel (for each origin-destination pairing). For each zone affected by the scheme, the change in generalised costs of travel to/from every other zone must be combined with the employment in each of those zones. The objective is to create a weighted average (percentage) change in generalised cost, and this defines the change in 'effective employment density' within any given zone. As the 'matching' effect depends on commuting costs, and the 'interaction' effect on business travel costs, the measure of 'effective employment density' must allow for both.

8.101 The effect on total output within a given zone is then estimated by applying industry-level elasticities of productivity with respect to employment density. Converting from productivity changes to output changes - using forecasts of industry-level GDP, and summing across industries gives the change in output for a single zone. These calculations are replicated for all zones significantly affected by the project.

8.102 Having looked at the changes in generalised costs for business and non-business travel, our view is that the changes in generalised costs are small and affect very few people and have no direct effects on business to business travel. Further, in some cases changes in travel times are negatively associated with changes in journey times (users of park and ride experience longer journey times but enjoy a welfare gain), which is not addressed in the WEB calculation. Accordingly our view is that the agglomeration effects associated with the introduction of the park and ride facility will be negligible.

Labour market effects

8.103 Improvements to transport links are likely to cause some workers to accept offers of higher paid employment that they would otherwise have rejected because of the previous lower quality of commuting opportunities. The welfare gains flowing to the affected individuals are accounted for in traditional analyses via the 'Rule of Half'.

8.104 However, job acceptance decisions depend upon changes in disposable income; i.e. net of taxation and changes in commuting costs (including time costs). The marginal worker accepting higher paid employment - i.e. he/she who is indifferent in overall welfare terms between the two employment alternatives – will be paying additional tax to the Exchequer allowing the State to provide additional public sector output for society in general, or to cut other taxes. Thus, the extra tax income represents a positive externality from improving transport[14].

[14] A similar line of argument applies to those who enter or re-enter the labour market in response to improvements in commuting opportunities. Our approach also provides estimates of these societal gains.

8.105 The estimation of such labour market spin-offs requires a rise in the total number of incoming commuting trips to a zone: then a proportion of the increment is assumed to reflect additional local employment. Growth in commuting trips between any origin and destination can be disaggregated into the following four effects:

- Transfer of trips from another bus route with the same destination but a different origin. This could either be due to residential relocation, or changes in access (i.e. park-and-ride) behaviour;
- Transfer of trips from another mode to travel between the same origin and destination;
- Transfer of trips from another mode to travel between the same origin and a different destination;
- Generation of wholly new commuting - generally this is a very small effect.

8.106 Of these effects, only the last two are assumed to reflect a change in employment status or location, with potential for WEBs. Effect 3 is assumed to involve the loss of a job at the original destination of the trip (i.e. the non-P&R trip made without the scheme) and an extra job occurring at the revised destination. This is relevant not only for calculating tax changes, but also agglomeration benefits via the changed spatial pattern of employment. Effect 4 is assumed to reflect net (national) employment growth, again with implications for agglomeration.

8.107 However, while it is acknowledged that Perth City Centre will become more accessible with the introduction of a high quality, frequent, reliable bus service for people travelling from the A90 / M90 direction, there is little likelihood of the park and ride scheme changing the work destinations of commuters. This is because (under current road layout, parking availability and cost) everywhere is accessible by car to those who choose use park and ride, which has a smaller number of destinations available. Therefore for those arriving at the park and ride site by car there is no change in access to jobs. There is also no evidence that park and ride will increase the number of commuter trips and therefore there will be no labour market benefits.

Imperfect market effect

8.108 Due to imperfections in markets (which cause prices to diverge from marginal costs) the business time savings captured in the cost benefit analysis will underestimate the total benefits to industry. The guidance simply requires the business time savings to be uplifted by 10%. However, park and ride is not expected to be used for business to business travel so any business time savings will be indirect, due to fewer PCUs on the network. The value of indirect business time savings need to be uplifted to account for the existence of imperfect competition in markets

Freight

8.109 The transportation of freight and goods along the A85 will become very marginally more efficient and reliable with the reduction in traffic volume along the A85 Dundee Road. In addition, a decision on co-locating overnight lorry parking at this park and ride site may improve the overall freight infrastructure provision in the Tactran area.

Economic Activity Location Impacts

8.110 WEBs are national level impacts although it is likely that a high proportion would accrue within the Perth area: EALIs are intended to provide a more bottom up analysis of how transport effects feed through the real economy. EALI impacts are therefore examined principally at the local level. To assess EALIs it is necessary to develop models of how the transport effects work to change performance in different sectors of the economy.

8.111 The scoping analysis has indicated two likely effects, namely

- Increased job search within Perth; and
- Increased retail activity due to changes in access for shoppers.

8.112 The reduction in traffic volume, congestion and delay and the offer of wider travel choices to residents living within the catchment of the park and ride will make Perth a better place to work,

therefore a more pleasant travel environment. However, for reasons discussed in the WEBs section where the analysis suggests it will be minimal.

8.113 Transport access within a corridor can change the location of development, especially for residential and some commercial developments. However, the evidence suggests developments respond to discrete and noticeable changes in accessibility which is not the case here. It is also likely that a development in one part of the greater Perth area would simply relocate from some other part of the same region, and would not be a net gain.

8.114 There is some survey evidence (provided by Perth and Kinross Council) which suggests that a small proportion of retail visitors perceive Perth to be difficult for parking. Residents in settlements roughly half way between Perth and competing retail centres (such as Errol) will choose where to shop based on factors such as quality of shops, access and parking, and (because of their location) will be less influenced by distance. Improving access through park and ride could therefore increase Perth's market and attract more economic activity. Where residents would otherwise make a longer journey to another retail destination there would also be an environmental gain due to shorter distances travelled.

8.115 The evidence here is limited but as parking does affect choice of retail destination any improvement in parking will have a positive impact. However the impacts are likely to be minor. Further research would be needed to improve the degree of confidence in the qualitative assessment and primary research would be needed to develop a quantitative appraisal.

Environment

Appraisal Scope and Method

8.116 The appraisal reported below has been based primarily on a desk based assessment. The exception is the biodiversity study, which has been informed by a site walkover undertaken in March 2009. In view of the need to undertake a detailed assessment, the method has been informed by Section 4.2 of the refresh STAG document. Proportionality has been applied in a number of cases and where impacts are considered to be low, the effects have been scoped out. The approach has:

- Considered impacts for each of the appraisal environmental sub-criteria based on the advice contained within each criterion in Section 7.4 of STAG;
- Focused on potential significant impacts and scoped out those that are not likely to be significant, with justification;
- Where potential for significant impacts is identified, and where possible given the data availability and analyses undertaken to date, an appraisal using both quantitative and qualitative measures through application of the methods outlined in Section 7 of the STAG Technical Database has been provided; and
- Where potentially significant impacts can be reduced through implementation of mitigation measures, to include the assumptions of inclusion of such mitigation in the appraisal score, but to highlight the nature of the assumptions in the appraisal narrative and as a footnote in the AST has been provided.

Establishing Requirement for EIA

8.117 Section 4.2.6 of STAG and Section 7.2 of the STAG Technical Database both make clear the need for consideration of whether or not an EIA is required.

8.118 The park and ride proposal falls under Schedule 2 of the Environmental Impact Assessment (Scotland) 1999 Regulations (urban-based infrastructure projects including car parks). Although the limited size of the car park at a maximum of 200 spaces may not alone warrant an Environmental Impact Assessment (EIA), its proximity to the River Tay Special Area of Conservation (SAC) (international designation under the EC Habitats Directive) may bring it under the EIA Regulations. This can only be determined after an EIA screening decision has been

sought from the Planning Authority during the planning application stage. It is noted that if an EIA is required, a detailed appraisal can be undertaken alongside and informed by an EIA.

Noise and Vibration

Scoping and Evaluation of Potentially Significant Impacts

Access Routes

8.119 Traffic noise arises primarily from vehicle engines, exhaust systems and transmissions, and also from tyres running over the road surface. Noise levels vary depending on type of vehicle, vehicle speed, the road surface and whether the surface is wet or dry. Noise from traffic, as it is perceived, depends on factors including the volume of traffic flow, speed and the proportion of HGVs, road gradient and road surface characteristics. Other factors are also important, such as distance from the noise source, the intervening ground surface and whether or not there are obstructions between the road and the location under consideration.

8.120 Impacts will arise when either:

- There is a significant change in noise level such that the degree of noise-related annoyance will alter; or
- Existing absolute noise levels at sensitive receptors are sufficiently high so that any increase in noise level, no matter how small, is not acceptable.

8.121 Indications from the traffic model are that there will be a maximum of 40 additional vehicles per hour travelling to the park and ride site. Changes in noise levels arising from the scheme are likely to be confined to:

- The A85 to the west of the A90/M90 where a slight decrease in noise levels can be expected due to the suppression of car movements into the city;
- The A85 between the site and the M90/A90 southbound where a slight increase in traffic flow may be anticipated due to a proportion of vehicles accessing the new park and ride site switching from another commuter route (i.e. diversion from the A912 and abstraction from Broxden); and
- Within the proposed car park.

8.122 Doubling the energy level (for example the volume of traffic) typically increases the noise level by 3dB (A), which is often taken to constitute a 'significant' change. Recent evidence suggests that people are relatively more sensitive to abrupt changes in traffic noise: people were found to benefit (or disbenefit) when such an abrupt change in noise levels are as small as 1dB (A), which is equivalent to an increase in traffic flow of 25% or a decrease in traffic flow of 20%. The Design Manual for Roads and Bridges (DMRB) 11:3:7 also follow this determination of significance for vehicle noise.

8.123 Considering the majority of traffic using the park and ride will be mainly existing vehicles that divert into the site and the change in traffic flow along the A90 and M90 will be approximately 1% which is well below the 25% threshold, no discernible change in noise level nor an increase in absolute noise levels from road traffic at nearby receptors is anticipated. Although there may be a slight percentage increase in traffic volume on the A85 in the vicinity of the site, this is unlikely to significantly increase traffic related noise at nearby properties. Indeed noise levels on the site will be dominated by traffic on the A90/M90. Scottish Noise Mapping[15] indicates that baseline noise levels are between 65dB – 70dB on site, 70dB – 75dB where southbound traffic leaves the M90/A90 and 75dB – 85dB on the motorway itself. Consequently, noise related effects along the M90/A90 and A85 are unlikely to be significant (below the 25% increase in traffic required for a 1dB increase and disbenefit due to noise). Effects in terms of noise and vibration are therefore considered to be **neutral.**

[15] Available at: http://www.scottishnoisemapping.org/public/view-map.aspx [Accessed 02/06/09]

Noise Generated within Park and Ride Site During Operation

8.124 On-site noise may be generated from vehicle movements (cars travelling within the site, bus movements) and from other activities, notably car door closing. A desk based review has indicated that this could potentially affect up to 35 properties within 200m of the site, the majority of which are residential, with the remainder being used for a combination of commercial, recreational or industrial purposes. However, owing to the proximity of the M90/A90 such effects are likely to be dominated by noise from the traffic on that road. Furthermore, it is considered that any such impacts that may occur at such receptors will be minimised through careful site design. Notably the location of the bus stop, where activity and hence noise generation is likely to be the greatest, will be located distant from sensitive receptors. People prefer to park near the bus stop, thus ensuring that the areas closest to the receptors are used less frequently, thus minimising noise impacts. Providing such design and mitigation measures are implemented, and considering the design will locate the bus stop as far as possible from sensitive receptors, where possible the noise impacts at nearby residential properties will be **neutral**, h**o**wever a **medium negative** may be experienced for between three and five properties that overlook the site.

Construction Noise

8.125 There is potential for the receptors (approximately 35 (see above) within 200m of the site to be affected by noise during the construction period. However, such impacts will be temporary in nature, will be associated with standard construction methods, and can be controlled through appropriate working hours and uses of appropriate working methods and equipment. Consequently construction noise effects are considered to be **minor negative**.

Reference Case

8.126 Following an inspection of the Perth Paramics model, the volume of traffic flow along the A85 trunk road as it passes Site P4, the A90 and M90, does not alter significantly from the do-minimum scenario once the new link road is in place. Therefore the impacts on the Noise and Vibration criterion will not alter significantly (<20%) along the A85 road corridor and Perth City Centre from that discussed within this sub-section and therefore the impact is considered to be **neutral** with a **medium negative** for neighbouring properties.

Demand Sensitivity

8.127 The car park has been designed to accommodate approximately 240 vehicles at any one time which is almost 20% greater than the demand predicted which is predicted to be between 70 and 210 vehicles over a typical day. This will reduce the likelihood of people searching for a parking space and thus noise impacts will be reduced. However, it is acknowledged that values based on the upper end of the demand will result in more people parking on the edge of the car park thus nearer nearby receptors. Overall the noise impacts will be **neutral** however a **medium negative** may be experienced for between three and five properties that overlook the site.

Global Air Quality

Scoping and Evaluation of Potentially Significant Impacts

8.128 STAG refers to DMRB 11:3:1 and DMRB determines that the monetisation of carbon effects is required only if the following traffic and alignment criteria are met:

- Road alignment will change by 5m or more; or
- Daily traffic flows will change by 1,000 AADT or more; or
- Heavy Duty Vehicle (HDV) flows will change by 200 AADT or more; or
- Daily average speed will change by 10 km/hr or more; or
- Peak hour speed will change by 20 km/hr or more.

8.129 Although there is potential for the proposed development to reduce carbon dioxide levels due to a modal shift away from the private car to public transport[16], it could also potentially encourage traffic movements by diverting people, who would normally travel more locally, to travel to Perth. Indications from the demand calculations are that there will be a maximum of 40 additional vehicles per hour due to the park and ride site. Given that the predicted number of car movements is relatively small (predictions are based on a site accommodating no more than 250 vehicles) changes in CO_2 are unlikely to be significant and impacts are at worst **minor negative** for between three and five properties that overlook the site although overall the impact will be **neutral** or **minor positive**.

Reference Case

8.130 Following an inspection of the Perth Paramics model, the volume of traffic flow along the A85 trunk road as it passes Site P4, the A90 and M90, does not alter significantly from the do-something scenario once the new link road is in place. Therefore the impacts on the Global Air Quality criterion will not alter significantly along the A85 road corridor and within Perth City Centre from that discussed for the do-minimum scenario and therefore the impact is considered to be **neutral**.

Demand Sensitivity

8.131 The car park has been designed to accommodate approximately 240 vehicles at any one time which is almost 25% greater than the demand predicted which is predicted to be a maximum of 210 vehicles over a typical day. This will reduce the likelihood of people searching for a parking space and thus vehicle emissions will be reduced. However, it is acknowledged that values based on the upper end of the demand will result in more people parking on the edge of the car park thus nearer nearby receptors. Overall the change in CO_2 will be **neutral** however a **minor negative** may be experienced for between three and five properties that overlook the site.

Local Air Quality

Scoping and Evaluation of Potentially Significant Impacts

A85 Dundee Road Site Access to Perth

8.132 Changes in road traffic can alter roadside PM_{10}[17] and NO_2 levels. Indications from the traffic model are that there will be a maximum of 40 additional vehicles per hour due to the park and ride site. On this assumption, none of the roads affected by the scheme (including the route from the site into Perth) fall within the traffic / alignment criteria (Volume 11, Section 3, Part 1) for which an air quality assessment is required[18]. Furthermore, any air quality impacts arising from the change in traffic volume on the A85 between the A90/M90 and the site are likely to be dominated by air quality impacts from the adjacent A90/M90 road corridor. It is noted that the site is within an Air Quality Management Area (AQMA) and the mode shift from car to bus, and therefore the reduction in traffic volume along the A85 access route into Perth and traffic within the city centre, may result in a slight decrease in traffic air emissions. Impacts on local air quality are considered to be **neutral.**

Impacts on Ecological Sites

8.133 As none of the roads affected by the scheme (including the route into Perth) fall within the criteria (Volume 11, Section 3, Part 1) for which an air quality assessment is required, significant impacts are considered to be unlikely. However, given the status of the nearby River Tay as an SAC (a site designated at an international level under the EC Habitats Directive to ensure that rare, endangered or vulnerable habitats or species or communities of interest are either maintained at,

[16] Steer Davies Gleave (February 2008). *Strategic Environmental Assessment of the TACTRAN Bus Strategy and Community and Demand Responsive Action Plan: Environmental Report.*

[17] Particulate matter less than x micrometers.

[18] DMRB 11:3:1, paragraph 3.12 states that affected roads (for which necessitate a local air quality assessment) are those which meet any of the following criteria: road alignment will change by 5 m or more; or daily traffic flows will change by 1,000 AADT or more; or Heavy Duty Vehicle (HDV) flows will change by 200 AADT or more; or daily average speed will change by 10 km/hr or more; or peak hour speed will change by 20 km/hr or more.

or restored to, a favourable conservation status), effects including those arising from changes in local air quality should be considered as part of an Appropriate Assessment Screening exercise at the next stage of the design process.

Local Air Quality Impacts for Activities within Park and Ride Site During Operation

8.134 On-site air quality impacts may be generated from vehicle movements (cars travelling within the site, bus movements etc). Owing to the proximity of the A90/M90 road corridor, local air quality is likely to be dominated by this source therefore the local air quality effects from the park and ride site are unlikely to be significant.

8.135 However it is considered that effects of traffic associated with park and ride traffic on air quality will be further minimised through careful site design, notably by locating the bus stop, where activity and hence emissions are likely to be the greatest, remote from sensitive receptors. People will tend to park near the bus stop thus ensuring that the areas closest to the receptors are used less frequently, thus minimising impacts. Providing such design and mitigation measures are implemented, local air quality impacts at nearby residential properties would at most be **minor negative**.

Local Air Quality During Construction

8.136 There is potential for the receptors within 200m of the site to be affected by effects on air quality (primarily dust) during the construction period. However, such impacts will be temporary in nature and can be controlled through working hours (e.g. working during the hours when people are most likely to be absent from residential receptors) and use of appropriate working methods and equipment. Consequently construction noise effects are considered to be **minor negative.**

Requirement for Further Work

8.137 STAG recommends that the increases in PM_{10} and NO_2 should be determined quantitatively to determine the impact on people and properties using the method described in DMRB 11.3.1. The appraisal reported here has been limited to a qualitative assessment of the likely levels of PM_{10} and NO_2 levels based on the level of scheme design and the change in traffic volume that is predicted when the park and ride site is operational.

8.138 However, noting the thresholds given in DMRB, the traffic changes associated with the park and ride proposal (40 additional vehicles per hour; will not be significant. Therefore the need for calculation of changes in PM_{10} and NO_2 values has been eliminated.

Reference Case

8.139 Following an inspection of the Perth Paramics model, the volume of traffic flow along the A85 trunk road as it passes Site P4, the A90 and M90, does not alter significantly from the do-minimum scenario once the new link road is in place. Therefore the impacts on the Local Air Quality criterion will not alter significantly along the A85 road corridor and within Perth City Centre from that discussed for the do-minimum scenario and therefore the impact is considered to be **neutral to minor positive**.

Demand Sensitivity

8.140 The car park has been designed to accommodate approximately 240 vehicles at any one time which is almost 25% greater than the expected demand which is predicted to be a maximum of 210 vehicles over a typical day. This will reduce the likelihood of people searching for a parking space and thus vehicle emissions will be reduced. However, it is acknowledged that values based on the upper end of the demand will result in more people parking on the edge of the car park thus nearer nearby receptors. Overall the change in traffic flow (approximately 70 vehicles between 07.00 and 15.00) impacts on local air quality at nearby residential properties will be dominated by the impact of the existing trunk road network that passes the site and therefore, overall the impact will be **neutral** however a **medium negative** may be experienced for between three and five properties that overlook the site if the high demand is experienced.

Water Quality, Drainage and Flood Defence

Scoping and Evaluation of Potentially Significant Impacts

Water Quality

8.141 The River Tay is classified as a salmonid river (SEPA baseline river digital network[19]) and a FWF Salmonid Monitoring Area[20]. The water quality classification of the Tay is A1: Excellent[21] and it is designated as a Special Area of Conservation (SAC).

8.142 During construction, potential for sedimentation and pollution through contaminants may arise. Owing to the high quality and designated status of the river, this could result in significant effects if strict control measures are not put into place. Once the park and ride scheme is operational, pollution of the watercourse may also arise through oil and hydrocarbon run-off from vehicles, discharges to the river, etc. Further, if Sustainable Urban Drainage Systems (SUDS) measures are located in the floodplain there could be mobilisation of pollutants during flood events. Consequently, owing to the importance of the watercourse, effects on water quality must be considered as potentially **major negative**, although with appropriate design measures (e.g. no discharges or drainage to the river, use of interceptors, etc), this can be reduced to **neutral**.

8.143 The site is not in a groundwater protection zone and there is no groundwater sensitivity or vulnerability within either site. The groundwater is a *non or weakly permeable aquifer* with negligible permeability, generally regarded as containing insignificant quantities of groundwater[22]. This suggests that the soils do not have a high leaching potential. Hence effects on groundwater quality and resource are considered to be **neutral.**

Drainage

8.144 The increase in paved area will result in runoff and hence has potential to impact on drainage. Although full design details are not yet available, this can be addressed through SUDS which should be in accordance with SEPA recommendations for run-off to be limited to greenfield.

8.145 As the proposed car park will provide less than 1000 car parking spaces, no SUDS licence will be required although the work will be required to adhere to General Binding Rules 10, 11 and 21 and two levels of treatment will require to be provided (preferably with one level being permeable paving or form paving). Providing such measures are put in place, impacts will be **neutral.**

Flood Defence

8.146 The River Tay at Perth has a history of severe flood events, most recently in 1993. SEPA has indicated that they have a flood level for the 1993 flood event at Friarton which was 4.76m AOD. They also indicated that this event had a return period of approximately 1:100 years, that the peak flow occurred during the low tide and that the tide will have an impact on flood levels within the reach of the site.

8.147 The functional floodplain of the River Tay which extends from the river up to the railway embankment, i.e. does not include the site, is indicated by SEPA's Indicative River and Coastal Flood Map for Scotland and confirmed by consultation with SEPA[23]. However, SEPA stresses that these maps are indicative and should not be used for specific sites as they may over-predict or under-predict the actual flood risk.

8.148 SEPA has indicated that if there is any loss of functional flood plain, then compensatory flood plain storage would have to be provided and recommended that SEPA Technical Guidance on land raising and compensatory flood plain storage should be followed[24]. SEPA also recommends that the existing ground levels remain unchanged within the flood plain. They also note that the raising

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[19] http://www.sepa.org.uk/pdf/data/salmonid/map_of_salmonid_waters.pdf [Accessed 06/03/09]
[20] Pers.comm: SEPA EPO for Perth (27/03/09)
[21] SEPA Water Quality Classification Map: http://www.sepa.org.uk/rqc/map.asp [Accessed 17/03/09]
[22] Landmark Information Group (2009). *Envirocheck Report* on NGR 313310, 721960 (100m, 200m, 500m slices).
[23] http://www.multimap.com/clients/places.cgi?client=sepa [Accessed 18/03/09]
[24] SEPA (January 2008). *Technical Flood Risk Guidance for Stakeholders*, Version 2.

of land on a greenfield site may be contrary to guidance within Scottish Planning Policy 7 on Planning and Flooding.

8.149 As no studies have as yet been undertaken regarding the extent of the floodplain other than consideration of SEPA's map, the impacts associated with flood risk must be considered as potentially **major negative** although it is possible that this can be reduced to **minor negative** or **neutral** with suitable further study and mitigation.

Reference Case

8.150 Impacts on Water Quality, Drainage and Flood Defence will not change from the do-minimum scenario as discussed above and will remain **major negative** reducing to **minor negative** or **neutral** with further mitigation.

Demand Sensitivity

8.151 The car park has been designed to accommodate over 200 vehicles at any one time which is almost 25% greater than the expected demand which is predicted to be between 159 vehicles over a typical day. Therefore the impact on water quality, drainage and flood defence will not alter from that discussed for the do-something scenario and will remain **major negative** reducing to **minor negative** or **neutral** with further mitigation.

Requirement for Further Work

8.152 The STAG 2 requirements in terms of consideration of impacts with respect to the value and number of affected watercourses as well as incorporation of SEPA's river and groundwater classifications and EC fisheries classifications has been undertaken. However, a risk analysis to assess impacts, in particular on the River Tay quality and flooding hazard, and potential effects on floodplain capacity has not been undertaken and may be required.

8.153 Further given the proximity of the site to the functional floodplain (defined by a 0.5% annual probability flood envelope (1 in 200 year return period)), it may be necessary to demonstrate to the Council that the site lies beyond the 0.5% flood event zone (taking account of climate change) and *"will not increase the probability of flooding elsewhere* in the catchment *or reduce the naturalness of the river."*[25] This will remove the need for a flood risk assessment. Further consultation with SEPA on flooding constraints may also need to be undertaken.

8.154 Although not required by STAG, as part of ongoing development, further appraisal should consider the effects of increasing the paved area for car park development on drainage, the potential mobilisation of pollutants from parked vehicles towards the river, and the requirements for SUDS (Sustainable Urban Drainage Systems) measures. The design of SUDS will need to be conducted in consultation with SEPA, PKC and SNH on treatment, attenuation and discharge requirements. The design and space allocation for SUDS ponds should be informed by on-site ground / soil / groundwater conditions, the depth of the water table, the barrier created by the Dundee-Perth railway line and any existing culverts and drainage channels within the local area.

Biodiversity and Habitats

Surveys

8.155 An ecological walkover survey was undertaken on 19 March 2009, by an Atkins Ecologist to identify habitats with botanical interest, assess the potential of the proposed sites to support protected species and to assess requirements for further surveys and consultation.

8.156 The survey did not aim to provide a detailed ecological assessment of the site; rather it was designed to highlight potential issues which would require further investigation. No detailed flora or fauna surveys were undertaken. The survey only aimed to assess the location for the proposed site. No signs of badger or otter were identified during this site visit and therefore these species are not discussed further in this report.

[25] Perth & Kinross Council (2003). *Perth and Kinross Structure Plan: Written Statement* (Approved 13th June 2003), p50

Scoping and Evaluation of Potentially Significant Impacts

Designated Sites

8.157 River Tay Special Area of Conservation (SAC) – The River Tay SAC situated 18m from the south perimeter of the developable area at its closest point, is an internationally designated area under the EC Habitats Directive to ensure that rare, endangered or vulnerable habitats or species or communities of interest are either maintained at, or restored to, a favourable conservation status. The Directive is transposed into national law by the Conservation (Natural Habitats &c) Regulations 1994 (as amended by (No 2) (Scotland) Regulations 2009) which also provides for the control of potentially damaging operations, whereby consent may only be granted by the competent authority once it has been shown through Appropriate Assessment that the proposed operation will not adversely affect the integrity of the site.

8.158 The River Tay qualifies as a SAC due to the presence of Atlantic salmon, three types of lamprey (brook, sea and river), otters, and *'clear-water lakes or lochs with aquatic vegetation and poor to moderate nutrient levels'*. These species and habitat are the 'qualifying interests', which determine its importance at an international level.

8.159 Although there will be no land-take from the SAC, due to its proximity to the site, careful consideration will need to be given to avoid impacts in particular pollution to the watercourse as a result of the proposals as both construction and operation pose a risk to the river and thus in turn the qualifying features of the SAC.

8.160 Given the current level of design, the interim stage of the drainage proposals and the high status of the designation (an internationally important European site with strict legislation governing its protection under the EC Habitats Directive), the impacts of the scheme on designated sites cannot be scoped out at this stage and must be considered as potentially **major negative**. However should a design be progressed that ensures protection of the SAC through appropriate use of SUDS measures and limitation of run-off to greenfield as recommended by SEPA, it should be possible to reduce this to **neutral**.

8.161 **Kinnoull Hill Site of Specific Scientific Interest (SSSI)** Kinnoull Hill, located 440m north of the site, is designated as an SSSI due to its extensive area of open heathland surrounded by oak, birch and rowan woodland which is gradually colonising the heathland area. This is the only known example of this habitat type in the region. The south side of Kinnoull Hill has spectacular cliffs of andesite[26] which have an exceptionally varied range of flora including several species approaching their northern limit in Britain.

There will be no land-take from Kinnoull Hill SSSI and direct impacts have been scoped out from assessment due to the distance from the site.

Although heathland is known to be sensitive to nitrogen deposition, which can lead to changes in species composition, and a decline in heather[27], indications are that the number of additional vehicles induced by the scheme is unlikely to be significant. As such, the indirect impacts on Kinnoull Hill SSSI through increased traffic are likely to be **neutral**.

Habitats of Conservation Value

8.162 The site is covered by relatively improved rough grassland with species including buttercup, white clover and Yorkshire fog, although survey of floristic diversity was limited by seasonality. The grassland also showed evidence of grazing, largely by rabbits.

8.163 Within the site periphery, scattered scrubs and young trees can be found. Species present include alder, Scots pine, beech, birch and hawthorn. The majority of this vegetation is located on the western boundary of the site, between the site and the A85. A small drainage channel is present within this band of vegetation, which was dry at the time of survey and is not considered to have any amphibian interest.

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[26] Igneous volcanic rock

[27] http://www.apis.ac.uk/overview/ecosystems/overview_heath.htm [Accessed 24/03/09]

8.164 No mature trees are present within, or on the periphery of the site.

8.165 Inspection of the Local Biodiversity Action Plan (LBAP) for Tayside confirms that there are no priority habitats within the development site. Consequently impacts are considered to be **neutral**

Protected and Priority Species

8.166 No evidence of protected species was recorded within the site and it is considered to have only minimal potential to support such species.

8.167 From a search of Ordnance Survey (OS) maps within the proposed site location, no ponds were located that would be suitable habitat for great crested newts and so this species is not considered further.

8.168 Although there is no on-site habitat for breeding birds, it is noted that there is potential in on the periphery of the site (layers created by scattered shrubs and young trees) to support breeding birds. This vegetation is all of native origin and provides good bird nesting habitat. Breeding birds and their nests, whilst being built or in use, are protected from taking, damage, destruction or other interference under the Wildlife and Countryside Act, 1981, as amended by the Nature Conservation (Scotland) Act, 2004. Loss of such features even outside the breeding season could result in a **significant impact** due to loss of nest sites, which is in contravention of the law. With appropriate mitigation based on the retention of shrubs and young trees around the site boundary, incorporation of this vegetation into the landscape design, and sensitive design and timing of construction of compounds and access routes, the impact on breeding birds can be reduced to **neutral**. If any of the trees and shrubs do require removal this must be undertaken outside of the nesting bird season.

8.169 From inspection of the LBAP, it is considered that no priority species will be affected by the proposals.

8.170 The site appears to be managed (e.g. mowing of grass) to an extent that suggests the risk associated with floristic diversity would be low. Impacts associated with protected and priority botanical species are therefore considered to be **neutral**.

Reference Case

8.171 Impacts on Biodiversity and Habitats will not alter from the do-minimum scenario as discussed above and will remain **neutral.**

Demand Sensitivity

8.172 The car park has been designed to accommodate approximately 240 vehicles at any one time which is almost 25% greater than the expected demand which is predicted to be a maximum of 210 vehicles over a typical day. Therefore the impact on Biodiversity and Habitats will not alter from that discussed for the do-something scenario and will remain **neutral**.

Requirement for Further Work

8.173 A qualitative and quantitative appraisal of international / national / regional / local designated features and their importance has been undertaken and an assessment of the effects on protected species (including breeding birds) has also been provided.

8.174 The effects on the internationally designated River Tay SAC is subject to further assessment and, depending on the ability to rule out potential impacts may require an Appropriate Assessment screening exercise, as required under Regulation 48 of the Conservation (Natural Habitats & c.) Regulations 1994 (as amended) for any works, which have the potential to result in an adverse impact upon a SAC. Perth and Kinross Council (as the competent authority) is obliged under Regulation 48 of the Habitats Regulations to consider the following:

> *"A competent authority, before deciding to undertake or give any consent, permission or other authorisation for, a plan or project which a) is likely to have a significant effect on a European site in Great Britain (either alone or in combination with other plans or projects), and b) is not directly connected with or necessary to the management of the site, shall make*

an appropriate assessment of the implications for the site in view of that site's conservation objectives."

8.175 Until details on the design become available and, in particular, proposals for drainage are confirmed, it is not possible to assess the need for an Appropriate Assessment or quantify the impact on the River Tay SAC. Consultation will be required with SNH to agree or not the need for an Appropriate Assessment and any mitigation measures and design of drainage measures for SUDS.

8.176 A Phase 1 Habitat Survey has not been carried out for the appraisal but given the limited potential for protected species and valuable habitat on site, this is not considered to be a high risk in terms of altering the appraisal scores. However, due to the natural mobility of animals the results of the initial walkover survey only remain valid for one year and would require to be updated should this period elapse before a consent application is made.

Landscape

Scoping and Evaluation of Potentially Significant Impacts

Designated Landscapes

8.177 Inspection of maps including Proposals Map A of the adopted Perth Area Local Plan[28] indicates that the site is approximately 140m from an Area of Great Landscape Value (AGLV) to the west of the M90 with an elevated motorway embankment between the site and the AGLV to the west and north-west. The Scottish Natural Heritage (SNH) Ancient Woodland Inventory records woodland some 270m to the north of the site. Although there will be no land-take from either the AGLV or the Ancient Woodland, there may be some impacts on their setting. It is noted from mapping that the park and ride site is located next to a major motorway junction and elevated section of motorway which is likely to dominate the landscape. It is also noted that AGLV boundary to the west of the site follows the urban edge of Perth. Furthermore, it is likely that any impacts arising from the site can be addressed through careful site design including use of planting and siting of intrusive activities. However, the impact is considered **moderate negative**, although it is likely that with further analysis and careful design this could reduce to **minor negative or neutral**.

Landscape Character

8.178 The site is located within the Firth Lowlands landscape character type, which in turn sits within the Tayside Lowlands regional Landscape Character Area (LCA), as defined by the Tayside Landscape Character Assessment No.122[29].

8.179 The Firth Lowlands landscape character type extends from a point approximately 100m north of the A90 to the north bank of the Tay and is characterised in the Tayside Lowlands LCA as 'rich farmlands along the estuarine reaches of the River Tay between Perth and Dundee' (p188). The Firth Lowlands is largely rural in nature with some urban influences and has the following key characteristics:

- Predominantly flat, fertile area;
- Enclosed by the steep Sidlaw Hills escarpment to the north and bounded by the Firth of Tay to the south;
- Estuarine reed-beds and mudflats;
- Large rectangular fields;
- Decaying structure of hedges and hedgerow trees; and
- Well-settled with some urban influences.

[28] Perth & Kinross Council (adopted 1996). *Perth Area Local Plan: Proposals Map A.* Available at: http://www.pkc.gov.uk/NR/rdonlyres/241BC783-9BA1-44E0-9BEB-4026302C8328/0/Perth_Adopted_LandA.pdf [Accessed 12/03/09]
[29] SNH / Land Use Consultants (1999)

8.180 The surrounding landscape types are *Igneous Hills* to the north and northwest of the site and *Lowland Hills* to the south of the site, beyond the south bank of the River Tay. The former is described as 'coniferous woodland and rounded, open moorland' (p188) and the latter as 'rounded upland character' (p149) in the Tayside Landscape Character Assessment.

8.181 Urban land exists to north-east of the study area where the built-up area of Perth city extends to the north and west.

8.182 As the landscape around the site is on the urban fringe of Perth, it is considered unlikely that the park and ride scheme would be out of character with the setting of the surrounding landscape. It is also likely that any setting impact can be addressed through careful site design including use of planting and siting of intrusive activities. Consequently as a precautionary approach, the impact on landscape character must be considered **moderate negative**, although it is likely that with further analysis this could reduce to **minor negative or neutral**.

8.183 The quantitative requirement of STAG to record all designated sites has been met as has the requirement to consider LCAs and to further sub-divide them where appropriate (in this case into types).

Reference Case

8.184 Impacts on Landscape will not change from the do-minimum scenario as discussed above and will remain **moderate negative** reducing to **minor negative** or **neutral** with further mitigation.

Demand Sensitivity

8.185 The car park has been designed to accommodate approximately 240 vehicles at any one time which is almost 25% greater than the expected demand which is predicted to be a maximum of 210 vehicles over a typical day. Therefore the impact on Landscape will not alter from that discussed for the do-something scenario and will remain **moderate negative** reducing to **minor negative** or **neutral** with further mitigation.

Visual Amenity

Scoping and Evaluation of Potentially Significant Impacts

Visual Receptors

8.186 Consideration of potential visual receptors has been limited to receptors contained within an indicative Zone of Visual influence (ZVI). From inspection of maps and analysis of the indicated topography from contour information, it is possible to provide a general indication of the likely extent of the ZVI. This ZVI remains speculative and adopts a 'worst case scenario' approach.

8.187 The ZVI is likely to extend 500m north to the Kinnoull Hill escarpment and potentially 1km to Tarsappie Hill in the south. To the immediate northeast, the cluster of up to 35 residential properties within Walnut Grove may have views to the site, the offices owned by Erdington Group Ltd and any intervening vegetation may provide some screening of views for some properties. In the northwest it is likely to follow the natural contour provided by Kinnoull Hill but with potential views up to 1km, although there are some potential views from Kinfauns Castle Historic Garden and Designated Landscape (HDGL) and any public footpaths associated with the castle grounds.

8.188 To the southwest, the ZVI could extend beyond the sewage works to Dow Hill approximately 1km from the site boundary. In the southeast, properties in the southeast of Perth city are likely to be screened by the M90 (Friarton Bridge), although it is possible that receptors in the cluster of buildings around the industrial estate and the prison (approximately 500m from the most southwest extent of the site boundary) will have views of the site under the bridge. Branklyn Garden HGDL is likely to be screened from the site by the screening provided by the Ancient Woodland of Kinnoull Hill.

8.189 Within this indicative ZVI, there are potential visual amenity receptors represented by the scattered villages and farm tracks which junction with principal roads such as the A85. There are also several recreational receptors, including Limeyhaugh Fishing Lodge (at approximately 80m south of the site boundary), Perth Sailing Club and Ships Fishing Lodge (at approximately 70m

from the site boundary) Friarton Bridge Park (approximately 415m west of the site boundary), and an office block that will have views directly onto the site. There is one footpath within the indicative ZVI from map inspection, running along the A85 from Perth City Centre to Walnut Grove.

8.190 The magnitude of visual impact will be dependent on the relative openness / restriction of views to the proposed development site which will be influenced by factors such as topography, landform and vegetation cover, and cannot therefore be determined in the absence of a site visit. However a general statement can be made that some properties could be subject to significant impacts due to traffic movements, the presence of vehicles and glare, night-time lighting, though it is likely that this could be addressed though sensitive design e.g. lighting, screening with vegetation.

8.191 It is therefore likely that these visual impacts can be addressed through careful site design including use of planting and siting of intrusive activities. Some potential measures include:

- Retention of as much existing vegetation and key landscape features as possible;
- Replacement and screen planting along the site to minimise the visual impact using indigenous trees and shrubs to marry with local vegetation, landscape planting to soften the appearance of the site with existing vegetation; and
- Keeping the use of signage to a minimum.

8.192 It is noted from mapping that the park and ride site is located next to a major road junction and elevated section of motorway which is likely to screen some visual receptors within the ZVI from the site. The impact is considered **moderate negative**, although it is possible that with further analysis and careful design this could reduce to **minor negative or neutral** for some receptors.

Special Views or Panoramas

8.193 There are no special views or panoramas indicated in the adopted Perth Area Local Plan but, without a site visit being undertaken, it is not possible to establish where viewpoints might exists and further work is therefore required to for the assessment of impact on viewpoints. As with impacts on visual receptors above, the impact on views is considered **moderate negative**, with the potential to reduce to **minor negative** with further analysis and careful design.

Reference Case

8.194 Impacts on Visual Amenity will not change from the do-minimum scenario as discussed above and will remain **moderate negative** reducing to **minor negative** with careful design.

Demand Sensitivity

8.195 The car park has been designed to accommodate approximately 240 vehicles at any one time which is almost 25% greater than the expected demand which is predicted to be the maximum of 210 vehicles over a typical day. Therefore the impact on Visual Amenity will not alter from that discussed for the do-something scenario and will remain **moderate negative** reducing to **minor negative** with careful design.

Agriculture and Soils

Scoping and Evaluation of Potentially Significant Impacts

Loss or Severance or Damage of Agricultural Land

8.196 The Macaulay Institute's Land Capability for Agriculture (Sheet 53: Blairgowrie)[39] indicates that Site P4 is unclassified though some of the surrounding areas is Class 3_2, which means that is not prime agricultural land but it is land capable of producing a moderate range of crops (average production but high yields of barley, oats and grass are often obtained). Consequently, loss of "best quality land" will not occur. Further the Macaulay Institute's Soil Survey for Scotland for Perth & Arbroath[41] indicate that the soils within the study area are poorly drained estuarine silts and clays of Low Raised Beach (gleyed warp soils), developed on Terrace and Raised Beach deposits which means that the soils are poorer due to wetness so the loss of unclassified agricultural land is unlikely to be a significant issue. The level of air pollutants and dust generation

and run of will be too low to impact on soils quality. Consequently effects resulting from loss severance or damage to agricultural land are considered to be **neutral**.

Seedbanks

8.197 The site has minimal conservation interest so loss of seedbanks is not an issue and effects will be **neutral**.

Viability of Holdings

8.198 From inspection of OS mapping, there appear to several scattered farmsteads, particularly in the north-west between 500m and 1km from the site and in the southeast within 500m of the site. However, details of land holdings were not available at the time of the study nor were consultations undertaken with local farmers or landowners. It has therefore not been possible to establish whether the scheme will result in loss of land from existing holding such that it affects their viability. This is however considered unlikely as the site lies in an area identified as part of Site Bi1 in the adopted Perth Area Local Plan, which was identified as suitable for an office headquarters or for a site for a single high amenity user. It is unlikely that the Council would have the site identified within the Local Plan for development unless gaining control of the land was not feasible. However until the land has been acquired effects on viability of holdings must be considered to be a potentially **major adverse** issue although it is highly likely that this will reduce to **neutral** once such details are determined.

Contaminated Sites

8.199 Although an Envirocheck Report does not highlight any on site source of contamination it identifies the presence of one existing former landfill site located at approximately 130m from the site boundary to the west of the site (at NO313227, E721996), one waste transfer site used for recycling purposes (at E312757, N721343, approximately 800m from the site boundary) and three waste treatment and disposal sites also used for recycling purposes (at E312842, N721347; E312800, N721300; and at E312730, N721300, all approximately 800 to 850m from the site boundary). There is also sewage treatment works at approximately 310m east from the site and a railway line running along the southern boundary of the site, identified from OS mapping.

8.200 The waste transfer and waste treatment / disposal sites used for recycling purposes and the sewage treatment works are sufficiently distant to be unaffected by the scheme but the impacts associated with the contaminated land, particularly the existing former landfill site, requires some further investigation through consultation with Perth & Kinross Council Contaminated Land Officer to determine the existence, and current and historical activity of the contaminated land features. Consequently, the impact is considered **minor negative** or **neutral**.

Reference Case

8.201 Impacts on Agriculture and Soils will not change from the do-minimum scenario as discussed above.

Demand Sensitivity

8.202 The car park has been designed to accommodate approximately 240 vehicles at any one time which is almost 25% greater than the expected demand which is predicted to be in the region of 210 vehicles over a typical day. Therefore the impact on Agriculture and Soils will not alter from that discussed for the do-minimum scenario and will remain **moderate negative** reducing to **minor negative** or **neutral** with further mitigation.

Requirement for Further Work

8.203 The STAG 2 methods for considering prime “best quality” agricultural and soils as a nature conservation resources have been followed. Some further work is however required both to establish the viability of holdings and the potential for issues associated with contaminated land.

Cultural Heritage

Scoping and Evaluation of Potentially Significant impacts

Buildings, Structures and Built Features of Cultural Heritage Value

8.204 There are no Conservation Areas within the study area and this has been confirmed with PKC Planning Department. Although there are no listed buildings on the site one Category C(S) Listed Building: West Lodge, Kinfauns Castle Gate Piers (Kinfauns Castle West Lodge); Historic Building Number 11962 (NO130220), is located some 270m to the northwest of the site. While there will be no direct effect on that building, owing to its proximity the site there could be potential for effects arising from changes in setting. It is noted from mapping that the park and ride site is located next to a major road junction and elevated section of motorway which is likely to provide screening between the development and the listed building noted above. Furthermore, it is likely that any impacts arising from the site can be addressed through careful site design including use of planting and siting of intrusive activities. The impact must be considered **moderate negative**, although it is likely that with careful design this could reduce to **minor negative or neutral**.

Historic Gardens & Designated Landscapes (HGDLs)

8.205 There are two HGDLs within 1km of the site:

- Branklyn Garden and Designated Landscape, approximately 1km from the northern-most corner of the extent of the site; and
- Kinfauns Castle Garden and Designated Landscape in the north-east, approximately 515m from the most north-easterly extent of the site.

The impact on HGDLs is considered **moderate negative**, although it is likely that with further analysis this would reduce to **minor negative** or **neutral**.

Buried Archaeology

8.206 The adopted Perth Area Local Plan[30] indicates that the site is not within an area designated for archaeology or SAMs or findspots.

8.207 Perth & Kinross Heritage Trust Historic Environment Record (HER) indicates that there is potential for prehistoric funerary, hunting and settlement activity within the area, evidenced by recorded find spots of lithic tools, burial mounds and souterrains[19]. Later settlement activity is suggested by the presence of riverside structures dating from around the late 18th century, and possibly earlier. There is therefore some potential for effects on archaeology although the level of significance would be determined by the importance of such features rather than the pure presence of the feature and therefore cannot be determined without further study.

8.208 It is however likely that if potential for significant effects is highlighted by further studies, that such effects could be addressed through construction management activities, e.g. pre-construction archaeological excavation, preservation of important buried archaeological remains in situ through appropriate design, maintenance of appropriate archaeological monitoring during construction works. The exact nature of any mitigation works would be dependent on consultation with Perth and Kinross Heritage Trust who provide Perth & Kinross Council with archaeological development control advice. Consequently, as a precautionary approach, until such confirmation is undertaken, impact on buried archaeology must be considered **moderate negative**, although it is likely that with further analysis this could reduce to **minor negative** or **neutral**.

Reference Case

8.209 Impacts on Cultural Heritage will not change from the do-minimum scenario as discussed above.

Perth & Kinross Council (1996): Perth & Kinross Council (adopted 1996). *Perth Area Local Plan: Proposals Map B (Inset Map).* Available at: http://www.pkc.gov.uk/NR/rdonlyres/C28F2945-F1C4-4725-9220-F0122B57AA91/0/Perth_Adopted_MapB.pdf [Accessed 12/03/09]

[30] Perth & Kinross Council (adopted 1996). *Perth Area Local Plan: Proposals Map A.* Available at: http://www.pkc.gov.uk/NR/rdonlyres/241BC783-9BA1-44E0-9BEB-4026302C8328/0/Perth_Adopted_LandA.pdf [Accessed 12/03/09]

Demand Sensitivity

8.210 The car park has been designed to accommodate approximately 240 vehicles at any one time which is almost 25% greater than the expected demand which is predicted to be 210 vehicles over a typical day. Therefore the impact on Cultural Heritage will not alter from that discussed for the do-minimum scenario and will remain **moderate negative** reducing to **minor negative** or **neutral** with further mitigation.

Requirement for Further Work

8.211 Although a quantitative and qualitative appraisal in terms of designated sites has been undertaken, the quantitative assessment has not taken full account of the potential for as yet undiscovered features.

Safety

8.212 The impact of an option on the number of transport related accidents and/or severity has been considered within the study process. Similarly consideration has been given to any security impacts of an option considering vulnerable users of the scheme such as pedestrians, cyclists, children, the elderly or women travelling alone.

8.213 Accordingly, the proposed park and ride scheme has been appraised considering the following two sub-criteria:

- Accidents; and
- Site Security.

Accidents

8.214 As discussed previously, local accident data for the last five years for the local roads around the proposed site was supplied by Perth and Kinross Council (PKC) for the local road network and Transport Scotland (TS) for the trunk road network. The data provided covers reported road traffic accidents that have occurred between January 2003 and December 2007. The data has been examined to define the local accident characteristics for the relevant road network between the proposed park and ride site and Perth City Centre.

8.215 Accident data has been analysed on the A85 between the Barnhill Interchange and Perth City Centre (on the A85), and within the city centre itself. Table 8.19 presents a summary of these results.

Table 8.19 - Recorded Personal Injury Accidents 2003-2008

Location	Fatal	Serious	Slight	Total
Within the city centre (west of South Street Bridge)	0	23	76	99
A85 between South Street Bridge and 60mph speed limit (non-trunk road)	1	1	4	6
A85 trunk between 40mph speed limit and M90	0	3	12	15
	1	27	92	**120**

8.216 An initial examination of the data indicates that a total of 120 personal injury accidents have been recorded within this area within the last five years.

8.217 The following summary highlights the key points identified during the analysis;

- There was one fatal accident on the A85 within the five year period;
- In addition, 27 serious and 92 slight accidents have occurred within the study area within the five year period;

- A cluster (4 slight, 2 serious) of road traffic accidents have been reported within the Barnhill Interchange with the majority of incidents reported on the A85 eastbound carriageway at the junction with the slip roads of the A90 and M90 (western facing). One slight accident has also been reported at the southbound off slip junction with the A85 gyratory;
- There have been twenty-five slight accidents and nine serious accidents on the A989 inner ring road of Perth City Centre; and
- Two slight accidents and one serious accident were recorded on Queens Bridge.

8.218 Following discussion with BEAR Scotland, the trunk road operator, it is understood that the Barnhill Interchange has been subject to recent accident remedial works and that priority has now been given to traffic leaving the motorway network over eastbound traffic along the A85, therefore it is hoped that the future accident rate at the junction will be reduced.

8.219 A comparison of observed accident rates on the local road network and national rates for comparable road types is presented in Table 8.20 below.

Table 8.20 - Accident Data Within the Study Area (2003 – 2007)

Road section	Accident Number	Calculated Rate (per Mvkm)	National Rate[31] (per Mvkm)
A85 non-trunk section	3	0.103	1.004
Queens Bridge	3	0.611	0.844
South Street between York Place and Scott Street	10	1.947	0.844
South Street between Scott Street and Queen's Bridge	8	1.873	0.844
Canal Street between Tay Street and King Street	8	1.643	0.844
A989 between Rose Terrace and Perth Bridge	4	0.630	0.844
A989 between Perth Bridge and Queen's Bridge	2	0.778	0.844
A989 between Queen's Bridge and Edinburgh Road	4	0.770	0.844

National Rate Based on Link and Junction Combined analysis

Assessing the Cost of Accidents

8.220 The COBA (**CO**st **B**enefit **A**nalysis) program has been used to calculate likely accident costs of the road network with and without the park and ride service. The appraisal is undertaken over a sixty year period, starting in the scheme opening year. In the case of the Site P4 scheme the appraisal period is 2012 to 2071 and is based on a demand of approximately 159 vehicles per day with a maximum of 32 cars per hour travelling to/from the site.

8.221 Further details of the appraisal process including modelled scenarios and accident analysis is presented within the Economy criterion. A summary of the accident costs over the 60 year appraisal period using national rates is provided in Table 8.21. A negative impact indicates an accident cost saving whereas a positive impact indicates a cost disbenefit.

[31] COBA default values for combined Link and junction accident rates are presented in this table.

Table 8.21 - Summarised Accident Costs in £k (discounted to 2002 prices)

	Do Minimum Scenario	Do Minimum Scenario plus Park and Ride ('Hybrid' Service)	Do Minimum Scenario plus Park and Ride ('Dedicated' Service)
Accident Costs	**£93.791**	**£93.493**	**£93.549**
Impact		-0.298	-0.242
Reference Case			
Accident Costs	**88.126**	**87.765**	**87.821**
Impact		-0.361	-0.305

Costs in £k discounted to 2002 values

8.222 Table 8.22 shows that in the Do Minimum ('Hybrid' Service) scenario, there is expected to be £298,000 accident savings as a result of the scheme over the 60 year period. When the 'Dedicated' Service is considered, this reduces to a £242,000 benefit, as there are the same number of cars removed from the road network, yet an increase in the number of park and ride buses are experienced.

8.223 In the Reference Case, accident benefits are £361,000 in the 'Hybrid' Service scenario, but reduce to a benefit of £305,000 in the 'Dedicated' Service scenario.

8.224 As stated previously, it is predicted that the park and ride site will generate a demand of approximately 159 vehicles per day with a maximum of 32 cars per hour travelling to/from the site. A large percentage of this traffic (>90%) will already be on the network travelling past the site and therefore the actual increase in traffic flow will be very low.

8.225 A slight decrease in traffic volume will be experienced on the A85 between the site and the city centre, across the Queens and Perth bridges and on the streets located within the core network of the city centre. This decrease in traffic will benefit cyclists and pedestrians and also freight and business users who currently use the A85 road corridor.

8.226 In addition, low floored buses and parking for the disabled will serve the site to make it easier and safer for passengers with mobility problems use the bus service, thus enhancing the safety aspects of the park and ride service.

8.227 Furthermore clearly signed delineated footpaths and footways will be incorporated within the design of the car park, which will benefit pedestrians, cyclists, and general users of the car park and help reduce the chance of accidents within the park and ride site.

8.228 Considering the low changes in traffic volume predicted as a result of the park and ride, and the limited length of road benefiting from the reduction in traffic flow, the change in the number of million vehicle kilometres travelled because of this scheme will be relatively low as shown within Table 8.22. Therefore the impact of the park and ride on the number of and severity of accidents is considered to be **minor positive.**

Table 8.22 - Vehicle Kilometres Travelled (over 60 year appraisal period)

	Do Minimum (without park and ride)	Do-Something (with park and ride) ('Hybrid' Service)	Do-Something (with park and ride) ('Dedicated' Service)
Million Vehicle Kilometres	8697	8678	8679

	Do Minimum (without park and ride)	Do-Something (with park and ride) ('Hybrid' Service)	Do-Something (with park and ride) ('Dedicated' Service)
Reference Case			
Vehicle Kilometres	9099	9079	9080

Security

8.229 The aim of this sub-criterion is to assess and reflect changes in security arising from the park and ride scheme and the likely number of users affected.

8.230 The success of a park and ride relies on the public's perception of the facility in terms of quality of service, price, convenience and personal safety and security. Therefore it is imperative that the park and ride facility is safe to use in terms of both personal and road safety terms. Similarly, the security of vehicles parked within the car park is also important.

8.231 High levels of site activity and a permanent staff presence are the easiest ways to achieve both high levels of security and high perception of security. Staffing is expensive but the benefits can often justify the costs.

8.232 The design of the car park will have a major influence on site security issues and importantly the public's perception of site security. The site will be designed following the concepts adopted for the design of Broxden Park and Ride with fencing, lighting, appropriate landscaping and CCTV in place to complement the 'open' design of the car park which will facilitate passive security from other users.

8.233 Designing the car park to accord with the 'Park Mark' (safer parking) scheme would help add comfort to park and ride users. This has been adopted at the Springkerse and Castleview park and ride sites in Stirling.

8.234 The security of the proposed park and ride development could be best considered through a comparison with nearby similar developments.

8.235 The Broxden Park and Ride site exhibits similar site characteristics to the proposed park and ride development through its lack of natural surveillance from residential and properties located near the site. Tayside Police were contacted regarding the security of Broxden Park and Ride site where it was confirmed that there has been no reports of personal assaults or of vehicle theft or vandalism since the park and ride was opened. It would be expected that Site P4 will have a similar accident record.

8.236 It is predicted that there will not be any additional security problems as a result of the park and ride. Therefore the impact of the park and ride on the security of users is considered to be **neutral.**

Reference Case

8.237 The Reference Case impact against the Security criterion does not differ from that presented above.

Sensitivity Analysis

8.238 The higher number of people using the park and ride site will increase profile and passive security of the park and ride scheme. In addition, the more people using the facility will raise the general public's perception; this in turn will impact on demand.

Integration

8.239 The option of a the proposed Park and Ride will be appraised against the Integration criteria by a detailed appraisal of the two sub-criteria of;

- Transport Integration;
- Transport and Land-use Integration; and
- Policy Integration.

Transport Integration

Services and Ticketing

8.240 As stated previously, the 'Hybrid' bus service requires the use of existing services. Overall the headway for buses is never greater than 15 minutes, however on occasion this increases to approximately 30 minutes. If the 'Hybrid' service is adopted it would be expected that this gap is supported by additional existing services at no extra cost to Perth and Kinross Council. If a 'Dedicated' service is adopted then the bus service will have a headway of no longer than 20 minutes. Careful negotiations with bus operators are required at an early stage if the 'Hybrid' service is chosen, to ensure that all bus providers agree to accept any ticket purchased at the park and ride site regardless of its origin with profits split appropriately. Similarly one single bus stop located within Perth City Centre is required in order to provide one stop for park and ride services. This will reduce passenger confusion and help increase profile.

8.241 The bus route adopted for the appraisal shows the park and ride service travelling between the site and the city centre via the A85 Dundee Road and across the River Tay via the Queens Bridge. Once in the city centre it will follow a loop that could include Tay Street, Canal Street and Mill Street before returning to the park and ride site via Queens Bridge. The exact route will need to be established with public transport officers. This will provide access to the main shopping area of Perth City Centre with a short walk envisaged for passengers wishing to continue their journey from Perth Rail Station or Perth Bus Station.

8.242 Several local buses stop on Mill Street currently, making interchange between different bus services undertaken in a simple straightforward manner.

8.243 It has been assumed that tickets will be purchased on the bus and priced the same as the Broxden Park and Ride service with holders of the National Entitlement Card travelling free. In relation to this study, a return fare for an adult day return of £1.00 has been assumed and a child day return of £0.50. It is envisaged that up to two children will be able to travel free with a full paying adult outside the peak hours to encourage families in low incomes to use the service. As stated previously, it has been assumed that a level of cross ticketing will occur and be agreed by all participants.

8.244 Monthly and annual passes will be available at competitive prices to encourage frequent users.

Infrastructure and Information

8.245 The park and ride facility will be designed and constructed to current design standards taking cognisance of the TACTRAN Park and Ride Best Practice document and considering the strengths and weaknesses of nearby park and ride sites at Broxden in Perth and Springkerse and Castleview in Stirling.

8.246 High quality bus shelters will be provided with timetable, service and bus fare information to give customers the sense of 'place' as they wait for the bus. In addition, cycle storage facilities and segregated disabled parking areas will be provided to serve the public and the car park will be constructed as a 'level' site with stairs and ramps kept to a minimum.

8.247 Footways and cycleways will be provided within proposed desire lines to facilitate safe movement of people travelling by these modes. Pedestrian crossing points will be delineated by appropriate lining and signing in order to reduce conflict with moving vehicles.

8.248 The design of the car park and bus waiting area will not preclude the possibility of providing passenger waiting facilities, toilets and staff changing areas within a single building if future demand and public opinion warrants it.

8.249 Sympathetic landscaping areas will be provided given the close proximity of the Landscape Area of Great Value and the River Tay Special Conservation Area. Landscaping will be used to mitigate noise and the reduction in visual amenity for receptors overlooking the site.

8.250 The use of bus priority will be limited along the A85 and may be introduced if traffic volumes and congestion continue to rise within the corridor. However fitted transponders within the buses will introduce a form of bus priority within Perth.

8.251 The introduction of a park and ride facility will provide significant benefits for Transport Integration by:

- Improving the pedestrian and cycle linkage with public transport facilities. Residents living local to the site, particularly Walnut Grove will have the opportunity to walk / cycle to the site before continuing their journey to Perth City Centre by bus;
- Improving interchange between the private car and bus; and
- Improving the interchange between the private car and walking and cycling. Facilities at the park and ride site will accommodate pedestrian and cycle movements thus offering the opportunity for car based travellers to drive to the site before continuing their journey on foot or by cycle. It is acknowledged that numbers of people walking to Perth City Centre from the park and ride site will be low due to the lengthy walking distance.

Transport and Land Use Integration

8.252 Overall, Site P4 integrates well with land use policy. The site under consideration is allocated as a single user site within the Perth and Kinross Local Plan with park and ride identified as being a suitable land use.

8.253 Scottish Planning Policy (SPP17) – Planning for Transport aims to grow the economy and achieve the objectives of the National Transport Strategy through the integration of land use development, transport planning, economic development and maintaining the environment. SPP17 outlines the following integration objectives:

- To maintain and enhance the built environment through avoiding or mitigating adverse environmental impacts and minimising environmental intrusion;
- To maintain and enhance the quality of urban life, particularly the vitality and viability of urban centres;
- To reinforce the economy and way of life; and
- To ensure that the impact of development proposals on the transport network does not compromise its safety or efficiency.

8.254 The park and ride facility will bring a positive contribution to a number of these objectives as follows:

- Construction of the park and ride facility is not anticipated to result in increased traffic, rather a transfer of existing traffic away from the populated town centre of Perth. Marginal improvements in local air quality along the A85 and within the town centre will bring marginal health benefits to the local population;
- Improvements to public transport will contribute to achieving mode shift towards more active modes of travel; and
- Reducing the demand for parking within Perth City Centre will reduce the need for new city centre car parks thus improving the streetscape of the city.

Policy Integration

8.255 A detailed assessment of policy integration was undertaken for the proposed park and ride site, during the preparation of both the RTS and the Park and Ride Strategy and Action Plan. These assessments highlighted that in terms of policy integration, site P4 provides a strong fit with the objectives of the Local Transport Strategy (LTS) and the Perth and Kinross Local Plan. It has been demonstrated within this document that the introduction of park and ride at Site P4 aligns strongly with the objectives contained within the National Transport Strategy, Regional Transport Strategy and the TACTRAN Park and Ride Strategy and Action Plan.

8.256 It is equally important that the proposed scheme contributes to, and is consistent with, other Government policies and legislation beyond transport. The proposed Park and Ride site will contribute to the following wider Government policies:

Disability: the facility will be designed to meet modern design standards, which include specific provision for the physically impaired. All improvements will be designed to meet the requirements of the Disability Discrimination Act 1995 and will include low floor buses.

Health: the expected transfer of trips from the adjacent road network to the proposed park and ride site will contribute to reductions in harmful emissions along the A85 and in the city centre. Public transport improvements will also encourage increased walking, cycling and public transport use along the A90 Perth to Dundee road corridor.

Social exclusion: the proposal fits with policies to reduce social exclusion by providing general improvements to walking, cycling and public transport infrastructure in the city centre as an integrated part of the scheme. Removal of a proportion of traffic from the city centre will provide better access by public transport and improve journey times and reliability. This is discussed more in the Accessibility and Social Exclusion sub criterion.

8.257 As discussed above and the assessment undertaken during the initial development stages, the proposed park and ride site is consistent with local and regional transport policy and also policies beyond transport.

Accessibility and Social Inclusion

8.258 The consideration of Accessibility and Social Inclusion is an essential element of the appraisal process. A more formal description of the term social exclusion has been articulated by the Social Exclusion Unit – '*Social exclusion reflects the existence of barriers which make it difficult or impossible for people to participate fully in society.*'[32] *- Several case studies*[33] *have demonstrated that access to transport is a real concern for some people and that different transport access does affect participation in what are considered normal activities of citizens.*

8.259 A study undertaken by Church et al (1999)[34] has identified seven categories of social exclusion connected to transport;

- Physical exclusion – where physical barriers inhibit the accessibility of services; this could be experienced by parents with small children, the elderly and infirm, those carrying heavy loads and those who do not speak the dominant language of society;
- Geographical exclusion – where poor transport provision and resulting inaccessibility can exclude people living in rural areas and the edge of the urban form;
- Exclusion from facilities – the distance of employment centres, health, shopping, leisure, education etc from people's homes, particularly for those with no access to the car make access difficult;

[32] Social Exclusion Unit, 1998

[33] The Role of Transport

[34] Church A, and Frost M (1999) Transport and Social Exclusion in London: Exploring current and potential indicators. London: London Transport Planning.

- Economic exclusion – the high monetary cost of travel can prevent or limit access to jobs and thus income;
- Time based exclusion – other demands on time such as caring restrict the time available to travel;
- Fear based exclusion – where worry and anxiety influence how public transport are used particularly by women, children and the elderly;
- Space exclusion – where security and space management strategies can discourage individuals from using public transport spaces.

8.260 For this appraisal, two types of accessibility impacts will be considered; community accessibility and comparative accessibility;

- Community accessibility measures the changes in accessibility looking at access such as education, health and shopping by public transport and by walking and cycling.
- Comparative accessibility defines the spatial and social distribution of impacts by social group, such as the mobility impaired, those who do not have access to a car and those within an area of deprivation.

Community Accessibility

Public Transport Network Coverage

8.261 Whilst the change in geographical coverage of the public transport system may not be significant, the increase in quality, frequency and reliability will be. Commuters, general visitors and tourists will all benefit from the introduction of a high quality park and ride facility which will increase access to jobs, services, shopping and retail facilities.

8.262 A small reduction in travel time for bus users along the A85 will be experienced by the introduction of the park and ride, however comparative times with the private car will remain the same as buses and cars share the same road space. Pedestrians and cyclists will also benefit slightly from the reduction in traffic volume along the A85 corridor and within Perth City Centre.

8.263 Bus frequencies will be a maximum of 4 per hour depending on what scenario is adopted. Estimated bus journey times into Perth in the AM peak are expected to be between 5 and 10 minutes, depending upon bus departure time.

8.264 It is therefore concluded that the bus services that use the A85 will become more efficient, reliable and consequently more attractive if a park and ride facility is provided at Site P4.

Local Accessibility

8.265 The park and ride bus service will increase access to local facilities by introducing a more frequent, reliable bus service that can increase trips to the city centre for business, leisure or shopping purposes.

8.266 In addition, the park and ride site will be accessible by drivers who may want to complete their journey on foot or by cycle, thus increasing more active modes of travel for people travelling to Perth. A reduction in traffic volume along the A85 will help create a better environment for walking and cycling along the road corridor and within Perth City Centre.

8.267 Overall, it is estimated that the introduction of the park and ride facility will improve accessibility by providing greater travel choice, introduce a high quality bus service and provide improved facilities for walking and cycling.

Comparative Accessibility

8.268 It is important to measure what impact the park and ride facility will have on all sections of society by age group, socio-economic status, gender ethnicity and mobility status.

8.269 Single parents, particularly mothers with children, the elderly, disabled and those on low incomes are more likely to suffer from poor access to goods and services. Taking cognisance of this, the

park and ride car park will have marked disabled bays located close to the bus stop with holders of the National Entitlement card travelling free.

8.270 In addition, low floor buses, street lighting and CCTV will help make the facility more attractive to all members of society.

8.271 However, depending upon the bus service scenario pursued, the hybrid option will provide a slight disadvantage to those who do not have access to a car in the Lower Carse/A90 corridor as the current number 16 service would be delayed by approximately 2 minutes by servicing the park and ride site.

9. Cost to Government

9.1 In order for an overall value for money assessment to be made it is important to understand what costs and benefits are accrued by the public sector.

9.2 For this scheme, the predicted costs outweigh the predicted revenue from fare revenue, requiring a subsidy from local government to the bus service operator. Similarly capital construction costs and maintenance costs will all be incurred to local government. It has been assumed that 100% of construction costs will be incurred in 2011 with the maintenance costs spread over the 60 year appraisal period.

9.3 A reduction in parking revenue within Perth City Centre will also be experienced as people switch mode from private car to bus and indirect taxation costs from a reduction in the use of fuel associated with the change in the number of million vehicle kilometres travelled.

9.4 The monetised costs and revenue associated with this scheme are contained within Tables 9.1 to 9.3. Note that these tables are modified versions of the standard TEE summary tables. The non-standard methodology employed to calculate TEE benefits using COBA could not separate the costs/benefits accruing to consumer users and business users separately. The costs/benefits for these two groups have been presented as a joint figure.

9.5 The valuation of indirect taxation costs/benefits due to the scheme could not be calculated using the methodology applied. This figure represents the amount of income gained/lost by central government from VAT income on fuel. No indirect costs would be attributable to PKC, who do not receive revenues from VAT.

Table 9.1 - The Economic Efficiency of the Road System in Market Prices (impact)

Impact	£ (M)			
	Do Minimum ('Hybrid' Service)	Do Minimum ('Dedicated' Service)	Reference Case ('Hybrid' Service)	Reference Case ('Dedicated' Service')
Scheme				
Consumer and Business User Benefits				
User Benefits				
Travel Time	**-0.504**	**0.113**	**-0.385**	**0.362**
Vehicle Operating Costs	**-0.268**	-0.380	**-0.266**	**-0.373**
Parking Charge saving to users	**0.577**	**0.577**	**0.577**	**0.577**
Travel Time & Vehicle Operating Costs				
During Construction	0	0	0	0
During Maintenance	0	0	0	0
Net Consumer Benefits				
Private Sector Provider Impacts				
Operating Costs (Due to Scheme)	0.170	0.286	0.170	0.286
Operating Costs (Due to Construction & Maintenance)	0	0	0	0
Other Business Impacts				
Developer and Other Contributions	0	0	0	0
Net Business Impact	**0**	**0**	**0**	**0**
Total Present Value of TEE Impacts	**-0.024**	**0.597**	**-0.461**	**0.853**

Note: This Analysis is based on NRTF Low traffic growth

Table 9.2 - Public Accounts in Market Prices (impact)

Impact	£ (M)			
	Do Minimum ('Hybrid' Service)	Do Minimum ('Dedicated' Service)	Reference Case ('Hybrid' Service)	Reference Case ('Dedicated' Service')
Local Government Funding				
Investment Costs (Capital Costs)	**0.903**	**0.903**	**0.903**	**0.903**
Operating Costs	**1.854**	**2.963**	**1.854**	**2.963**
Maintenance Costs				
Non-Traffic	0	0	0	0
Traffic Related	**0.102**	**0.102**	**0.102**	**0.102**
Developer & Other Contributions				
Net Impact	**2.859**	**3.968**	**2.859**	**3.968**
Central Government Funding				
Investment Costs (Capital Costs)	0	0	0	0
Operating Costs	0	0	0	0
Maintenance Costs				
Non-Traffic	0	0	0	0
Traffic Related	0	0	0	0
Developer & Other Contributions				
Indirect Taxation	Not calculated	Not calculated	Not calculated	Not calculated
Net Impact				
Present Value of Costs (PVC)	**2.859**	**3.968**	**2.859**	**3.968**

Note: This Analysis is based on NRTF Low traffic growth

Table 9.3 - Analysis of Monetised Costs and Benefits in Market Prices (impact)

Impact	£ (M)			
	Do Minimum ('Hybrid' Service)	Do Minimum ('Dedicated' Service)	Reference Case ('Hybrid' Service)	Reference Case ('Dedicated' Service')
Scheme				
TEE Impacts				
Consumer and Business User Impacts	**-0.195**	**0.310**	**-0.054**	**0.566**
Private Sector Provider Impacts	**0.170**	**0.286**	**0.170**	**0.286**
Accident Benefits	**0.298**	**0.242**	**0.361**	**0.305**
Present Value of Benefits (PVB)	**0.274**	**0.839**	**0.478**	**1.158**
Government Funding				
Present Value of Costs (PVC)	**2.859**	**3.968**	**2.859**	**3.968**
Overall Impact				
Net Present Value (NPV)	**-2.586**	**-3.130**	**-2.382**	**-2.811**
Benefit to Cost Ratio (BCR_{Gov})	**0.10**	**0.21**	**0.17**	**0.29**
Benefit to Cost Ratio (BCR_{FA})	**0.10**	**0.21**	**0.17**	**0.29**

9.6 Table 9.3 shows that in the Do Minimum Scenario using the 'Hybrid' service, the park and ride service is expected to result in a £0.274M benefit over the 60 year appraisal period, producing a BCR of 0.10. In the 'Dedicated' Service scenario, the expected benefit is £0.839M with a corresponding BCR of 0.21.

9.7 A BCR of 1 indicates that the overall benefits of a scheme are equal to overall costs over the 60 year appraisal period. A BCR of less than 1 indicates that a transport scheme does not represent value for money in terms of the TEE analysis conducted. A negative BCR indicates that the TEE totals benefits across the transport system are reduced by the introduction of the scheme.

9.8 Table 9.3 shows that in the Reference Case, the adoption of the 'Hybrid' Scenario is expected to result in a 0.478M benefit over the 60 year appraisal period, and a BCR of 0.17. In the 'Dedicated' Service scenario, the expected benefit is £1.158M with a BCR of 0.29.

10. Risk and Uncertainty

Risk Identification, Assessment and Mitigation

10.1 All transport investments are associated with an element of risk. The following therefore outlines the main risks likely to affect the delivery and operation of the scheme being appraised. Steps need to be undertaken before and during implementation, to prevent and mitigate these perceived risks and uncertainties.

Costs

10.2 The costs to implement and maintain the park and ride car park have been developed by Atkins. Due to the tendency of most appraisers to be overly optimistic on project costs, benefits and duration, HM Treasury have recommended adjustment percentages for generic project categories.

10.3 In accordance with the Green Book Guidance on Optimism Bias, a 25% optimism bias adjustment was used. It will be prudent to review all the contributory factors that lead to cost overruns.

Construction Risks

10.4 There is a risk that the preferred option will have a slight negative impact on surface water quality and drainage in the short term during construction. Best construction practices will be adopted to minimise any sediment laden or contaminated run off during construction particularly noting the proximity of the River Tay.

10.5 Similarly the residents in Walnut Grove may not be supportive of the scheme which may impact on the final design of the park and ride car park and the requirement for mitigation measures.

Operational Risks

10.6 Installation of Sustainable Drainage Systems (SUDS) where appropriate will ensure that the operation of the car park and access road will not result in any adverse impacts on water quality.

Environmental Risks

10.7 The park and ride proposal falls under Schedule 2 of the Environmental Impact Assessment (Scotland) 1999 Regulations (urban-based infrastructure projects including car parks). Although the limited size of the car park at a maximum of 200 spaces may not alone warrant an Environmental Impact Assessment (EIA), its proximity to the River Tay Special Area of Conservation (SAC) (international designation under the EC Habitats Directive) may bring it under the EIA Regulations. This can only be determined after an EIA screening decision has been sought from the Planning Authority. It is noted that if an EIA is required, a detailed appraisal can be undertaken alongside and informed by an EIA.

Political Risks

10.8 Given the open and transparent manner the process has followed with the participation and consultation involved, there is low political risk associated with the delivery of the park and ride. It is expected that the public will remain favourable towards the park and ride should there be any changes in political leadership in the future.

11. Monitoring and Evaluation

Introduction

11.1 Monitoring and evaluating the performance of a project is a key part of the appraisal process that should help build an evidence base and provide lessons for future investments. Monitoring gathers information on a regular basis on performance indicators that will tell the implementers whether or not the project is meeting its delivery objectives and targets during the implementation stage, and whether it is doing what it was intended to do once operational.

11.2 A process evaluation is a more detailed assessment of the delivery and implementation process while an outcome evaluation is a formal exercise designed to test whether an intervention has achieved its objectives, and whether it has represented a sound use of resources. Monitoring involves gathering and interpreting a focussed and useful set of information on a regular basis and should identify any areas of under-performance, which would inform the planners where and when to implement appropriate changes during the early stages of the project.

11.3 The objectives of this study are set out in Chapter 4. This sets out the basis of the monitoring framework; the SMART targets are set out in Table 11.1 below.

ATKINS

Table 11.1 - Study Planning Objectives and SMART targets

Study Planning Objectives	SMART Target	Rationale
AO1 To reduce car traffic flows on the A85 between the M90 and the centre of Perth.	By an average of *3%* during the AM & PM peak period and by an average of *3%* during the off peak period by the end of year one of the park and ride.	The traffic flow along the A85 is tidal, with westbound traffic flow higher in the AM peak and eastbound traffic flow higher during the PM peak as people travel to/from their place of work. Typically 850 vehicles are observed entering / leaving Perth City Centre along this corridor during the peak hours and 450 vehicles are observed during the interpeak. It is therefore thought that 3% is an achievable target which will be monitored through traffic surveys. Traffic data will be required to be collected before the implementation of the park and ride scheme.
AO2 To increase levels of accessibility for all by sustainable modes from the A90 catchment to the centre of Perth and to specific employment, health, leisure and retail locations in Perth.	Increase number of passengers by *3%* per year in the catchment area of the park and ride. Maintain bus journey time in comparison to the private car along A85 road corridor. Increase the frequency of buses along the A85 between the M90 and Perth City Centre to 4-6 buses per hour, with a round trip journey time of between 24 and 30 minutes in year one of the park and ride.	Whilst existing bus services serve the A85 / A90 corridor, there is still room for improvement and therefore an increase of 3% passenger ridership figures appear appropriate. In order to achieve this, the quality, frequency and reliability of bus services should also increase.
AO3 To achieve high user satisfaction for users of park and ride associated with personal and vehicle security and safety.	Achieve *80%* of satisfied park and ride users of the Walnut Grove park and ride site within one year of opening.	The design of the park and ride site will be undertaken to deliver a first class modern day interchange. High quality materials will be used during construction and the bus service tender process will ensure that buses are modern, clean and adhere to strict quality procedures. Therefore, in order to achieve objectives AO1, AO2 and AO3 a high number of satisfied users must be achieved.
AO4 To increase the amount of interchange of travel between the A90 catchment area and services located in Perth centre.	Increase sustainable trips from the park and ride catchment area to target destinations by *5%* in year one of the park and ride.	In addition to an increase in bus trips, an objective is to increase walking and cycling along the transport corridor. This may occur as traffic volume decreases along the A85 between the site and the city centre. In addition the park and ride scheme will offer walkers and cyclists outside Perth's limits the opportunity to drive and then complete their journey on foot and on cycle.

11.4 The proposed Monitoring Plan for the project is contained within Table 11.2. It can be noted that in order to assess the success of the park and ride site a series of surveys require to be undertaken in the base case (before the implementation of the park and ride) and do something case (with the park and ride service in place.

11.5 With regards to Objective AO1, the objective is to reduce traffic volume which in turn will reduce congestion, vehicle delay, congestion and journey times and the environmental impact associated with road traffic. It is suggested that a series of traffic surveys are undertaken to establish the volume of traffic travelling along a number of roads within the scope of influence of the park and ride site. In addition, surveys should also be undertaken on neighbouring roads outside the sphere of influence as a control measure. Surveys should be undertaken at appropriate times of the year and repeated at the same time every year to ensure continuity.

11.6 Referring to Objective AO2, it is proposed to undertake passenger surveys within the first month of the park and ride opening to gauge initial usage and then again at the end of year 1, to gauge the increase in usage. It is also recommended that surveys are also undertaken during the summer months and at Christmas to understand seasonality effects. The surveys should be undertaken at key interchange points (Site P4) and bus stops in the catchment area of the park and ride facility. This will capture abstraction values from existing bus services.

11.7 Relevant to Objective AO3 and AO4, it is proposed that passenger perception surveys are undertaken to capture users' thoughts in the quality of service in terms of satisfaction, reliability, cost etc. Other information such as post code, gender, disability status etc will help understand what groups of people benefit from the service.

11.8 Similar to the surveys undertaken for Objective AO1, traffic surveys (including walking and cycling) should be undertaken at key points along the A85 road corridor to gauge if there is an increase in travel by sustainable modes. Seasonality and weather will play an important factor on the number of people walking and cycling.

Table 11.2 - Monitoring Plan

Objective	Indicator	Target and Methods
AO1 To reduce car traffic flows on the A85 between the M90 and the centre of Perth.	**Automatic Traffic Counter at:** A90 trunk road north of Barnhill Interchange;	Control purposes only. Local Authority Surveys.
	M90 trunk road south of Barnhill Interchange;	
	A85 trunk road west of Barnhill Interchange;	Reduce inbound traffic volume by 3% during the AM peak and by 3% outbound during the PM peak by the end of year 1. Reduce traffic volume by 3% inter peak period by the end of year 1. Local Authority Surveys
	A85 Dundee Road east of Queens Bridge;	
	Queens Bridge; and Perth Bridge.	
AO2 To increase levels of accessibility for all by sustainable modes from the A90 catchment to the centre of Perth and to specific employment, health, leisure and retail locations in Perth.	Bus passenger surveys undertaken at identified Perth city centre bus stops, Site P4 park and ride, at bus stops within Bridge of Earn and identified bus stops located in the Carse of Gowrie.	Increase number of passengers by *5%* per year in the catchment area of the park and ride within year 1 of the park and ride.
	Journey time surveys undertaken between the Barnhill Interchange and Tay Street in Perth City Centre.	Maintain bus journey time in comparison to the private car along A85 road corridor within year 1 of the park and ride.
	Passenger perception surveys undertaken at Site P4 park and ride.	Increase number, frequency and reliability of bus services along the A85 Dundee Road in year one of the park and ride.

Objective	Indicator	Target and Methods
AO3 To achieve high user satisfaction for users of park and ride associated with personal and vehicle security and safety.	Passenger perception surveys undertaken at Site P4 park and ride.	Achieve *80%* of satisfied park and ride users of the Walnut Grove park and ride site within year one of the park and ride.
AO4 To increase the amount of interchange of travel between the A90 catchment area and services located in Perth centre.	Undertake Site P4 park and ride user survey	Increase sustainable trips from the park and ride catchment area to target destinations by *5%* in year one of the park and ride.
	Undertake mode split surveys on the A85 trunk road west of Barnhill Interchange	
	Undertake mode split surveys on the A85 at Queens Bridge	

Appendix A

A.1 Perth Paramics Model

Introduction

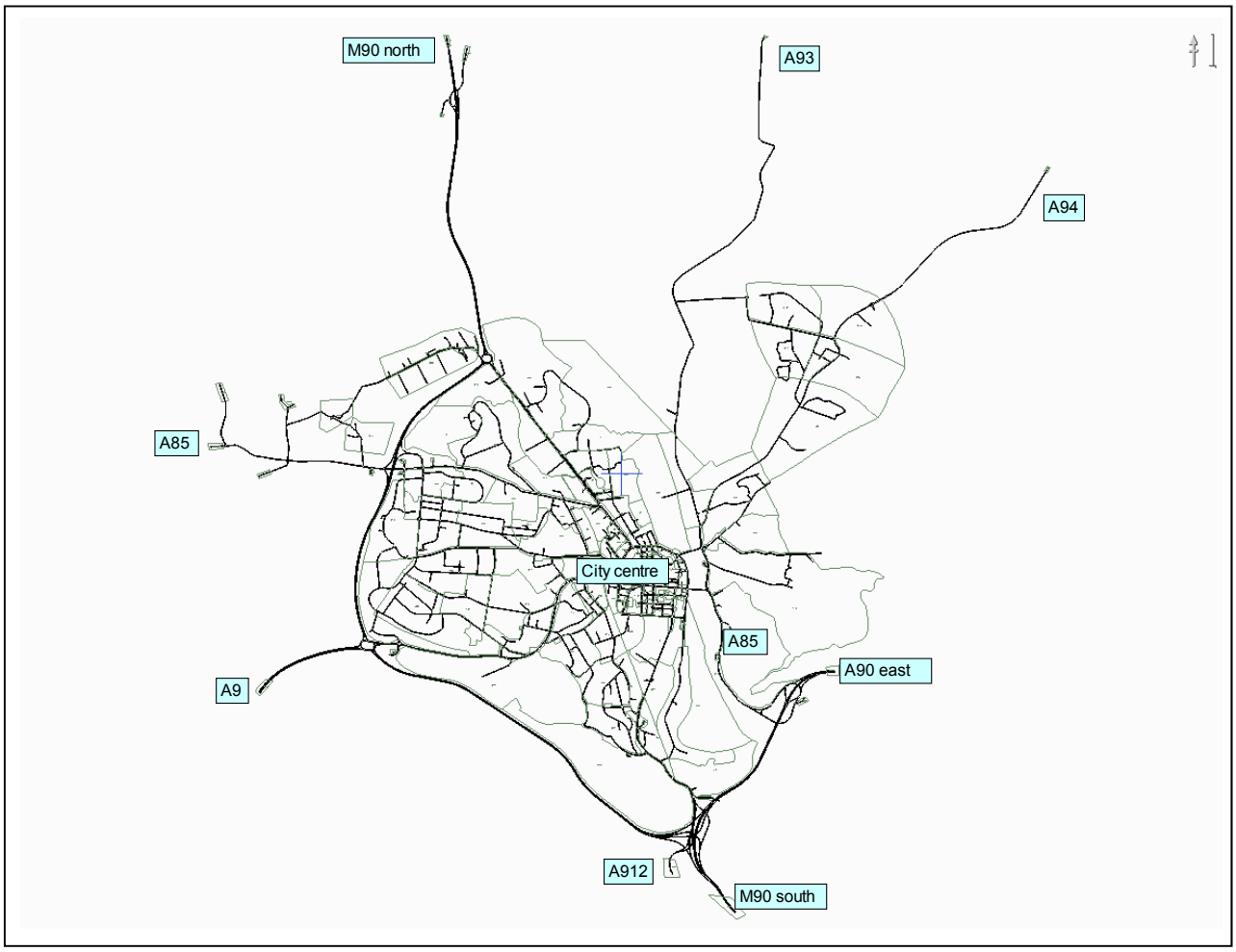
A.1.1 The existing Perth Paramics model was developed by SIAS ltd on behalf of Perth and Kinross Council (PKC) in 2003. The model was designed to test committed and proposed developments within Perth, and has recently been used to test the impact of the Draft Perth and Kinross Local Plan up to 2018.

A.1.2 This appendix presents a summary of the model, and discusses its suitability for use in the TACTRAN park and ride study.

Model coverage

A.1.3 The area covered by the model is shown in Figure A.1.

Figure A.1 – Coverage of the Perth Paramics Model



A.1.4 The model was originally developed in 2003 and validated to a base year of 2003. In 2007 the model area was extended northwards to increase coverage of the A9, A93 and A94 to the north of Perth. This was to allow option testing of a potential crossing of the River Tay linking the A93 to the A9 to be undertaken. The extended model was rerun and found to still validate against 2003 survey data.

Construction of Base 2003 model

Zone Structure

A.1.5 The Paramics model zone structure shown in Figure A.1 is based upon 2001 census output areas, with the zone structure generally becoming more detailed closer to the city centre. This allowed base data for each zone to be extracted from 2001 census information, and should ensure future compatibility with future census data.

A.1.6 There are 119 zones within the model, which can be subdivided into the following categories:

- Internal zones which represent the main areas of housing and employment, which bear close resemblance to 2001 census output area boundaries;
- External zones which reflect main routes into and out of Perth, for example the A90 or A85; and
- Major car parks within Perth City Centre.

Network

A.1.7 The Paramics network was constructed using the following information:

- Ordnance Survey mapping information;
- Traffic signal timings supplied by PKC. Where applicable SCOOT output for groups of traffic signals within the city centre was incorporated into the model;
- Pedestrian crossing call times supplied by PKC. This data was analysed to identify the call rate during peak hours and the subsequent delays to vehicles;
- Public transport information. Bus routes were coded into the model from timetable information, and bus dwell times at stops identified from sample surveys;
- Access restrictions supplied by PKC; and
- Various site visits undertaken by SIAS Ltd.

Modelled time periods

A.1.8 The following time periods are modelled within the Perth Paramics model:

- AM peak period – 06:30 to 09:30;
- PM peak period – 15:30 to 18:30;

The above periods cover the peak hours, and allow the build up and dissipation of congestion and delay to be observed. The peak hours within the model were identified as:

- AM peak hour – 08:15 to 09:15; and
- PM peak hour – 16:30 to 18:30.

Matrix development

A.1.9 Two vehicle matrices were used within the model: light vehicles (cars and LGVs) and heavy vehicles (OGV1, OG2 and coaches). Service buses were coded as fixed route vehicles within the model, as is standard practice.

There follows a brief summary of the matrix building process:

- A prior matrix was produced using land-use estimates, available counts and census data analysis.;
- This prior matrix was assigned to the network, and checks undertaken at critical junctions on the network; and
- Matrix estimation was undertaken based upon surveyed junction turning counts. Surveys were undertaken in May 2003, and this neutral month was adopted for the model demands.

A.1.10 The developed matrix was assigned to the model network using a series of 28 traffic profiles, which were developed from observed traffic count information.

Model calibration and validation

Calibration

A.1.11 The model was calibrated using;

- Individual junction simulations, which compared modelled to observed throughput;

- Checks on vehicle routeing paths through the network; and
- Comparison of turning counts with modelled flows.

A.1.12 The model was calibrated by comparing traffic flows across 48 screenlines and 213 links. Model results after calibration for the whole mode area are presented below:

Table A.2 – Peak Hour Screenline Summary GEH Statistics

Scenario	Count	GEH<5
2003 AM (08:15-09:15)	48	94%
2003 PM (16:30-17:30)	48	92%

Table A.3 – Peak Hour Link Count Summary GEH Statistics

Scenario	Count	GEH<5
2003 AM (08:15-09:15)	48	88%
2003 PM (16:30-17:30)	48	83%

A.1.13 The above results show that good levels of calibration were achieved, but this is to be expected given that the screenline counts and link counts were used within the matrix building and matrix estimation process.

Validation

A.1.14 The model was validated by comparing against ATC data, journey time surveys and queue location information.

A.1.15 A summary of model validation in the AM and PM peak periods is shown in Table A.3.

Table A.4 – Peak Hour Validation Summary

Scenario	AM model validation	PM model validation
City centre ATC counts	75% of links have GEH less than 5	87% of links have GEH less than 5
Main routes ATC counts	88% of links have GEH less than 5	82% of links have GEH less than 5
Journey time routes	15/16 journey time routes meet DMRB criteria	13/16 journey time routes meet DMRB criteria
Queue lengths	Subjectively identified as being broadly representative	

A.1.16 Only the peak hour flows were assessed for validation, as per the guidance in DMRB Volume 12. The guidance suggests that for a model to be successfully validated, 85% of individual link flows should have a GEH of ≥5.

A.1.17 SIAS Ltd suggest that for the Perth Paramics model a reasonable result criteria would be for 70% of individual link flows to have a GEH of ≥5, a departure from standard practice.

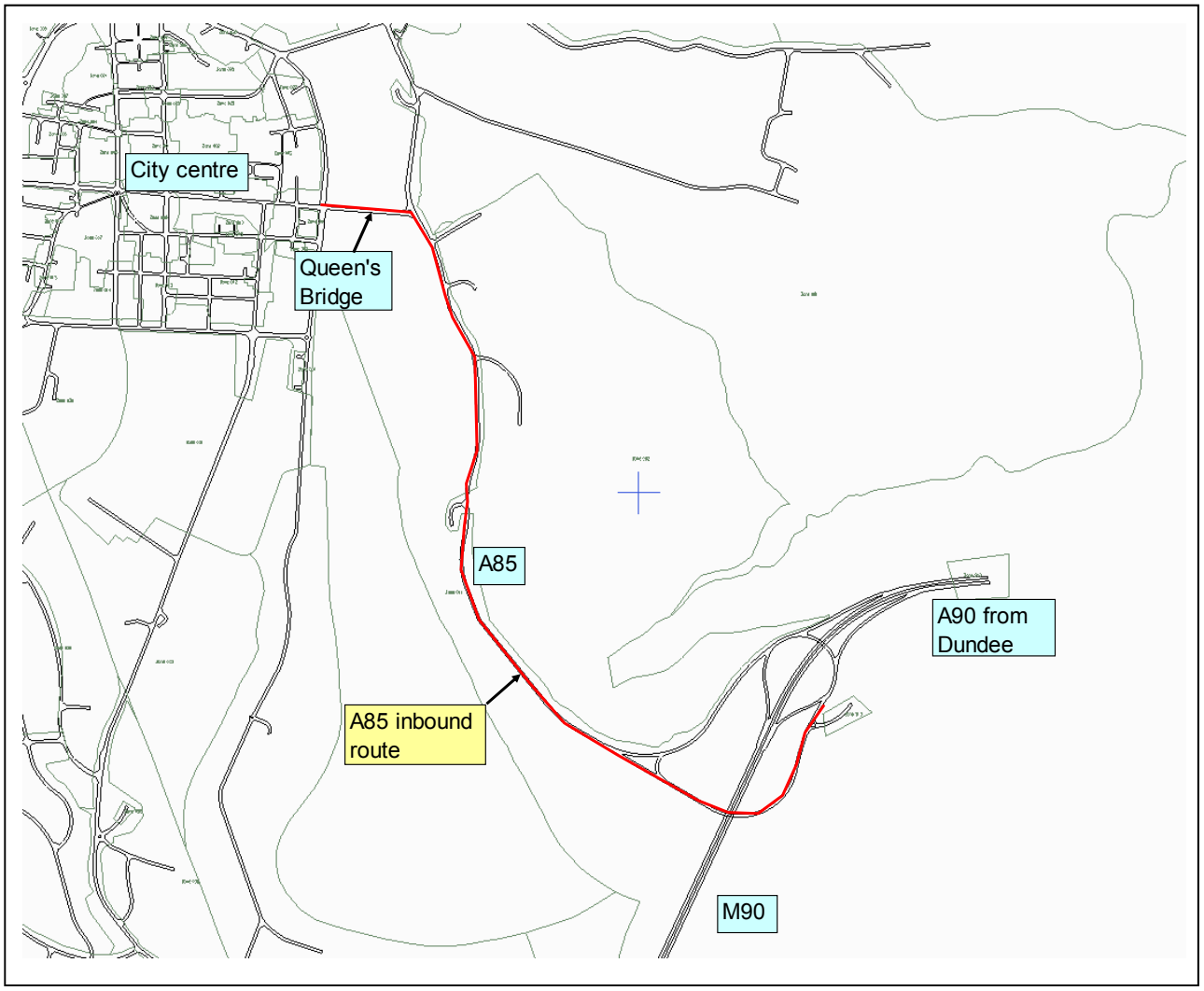
A.1.18 Table A.3 shows that the Perth Paramics model does not meet exact DMRB validation criteria, but is deemed to be ‘reasonably’ validated as per SIAS’ statement.

Model Suitability for the TACTRAN Park and Ride Study

A.1.19 In terms of the TACTRAN park and ride study it is important to examine those areas of the Paramics model which are of most importance to the study. The AM peak period model is deemed to be most important in terms of park and ride demand and economic forecasting, so it is this time period which is discussed below.

A.1.20 Figure A.2 shows the Perth Paramics model in the vicinity of the proposed park and ride sites.

Figure A.2 – Perth Paramics Model Between A90 and Perth City Centre



A.1.21 Table A4 presents a comparison of observed versus modelled flows on key links in the network, as shown in Figure 2. These have been taken from the 2003 Base model.

Location	Observed	Modelled	Difference	GEH
Queen's Bridge[35] (Inbound)	756	651	-105	4.0
Queen's Bridge (Outbound)	576	620	44	1.8
A85 Dundee Road (Inbound)	697	597	-100	3.9
A85 Dundee Road (Outbound)	529	507	-22	1.0

Table A.5 – AM Peak Hour (08:15-09:15) Comparison of Model Outputs

A.1.22 Table A.5. shows that the 2003 base model slightly underestimates the amount of traffic heading into Perth in the AM peak hour on both Queen's Bridge and A85 Dundee Road. Park and ride demand forecasts for sites P4 and P5 will need to take this under-estimation of flows into account.

[35] This is the A93 South Street bridge.

A.1.23 Atkins has collected further information from the Base 2003 model relating to the section of A85 between the A90 and Perth City Centre. This was done in order to separate the amount of traffic using the route to access the city centre from that continuing onto the A93/A94.

A.1.24 This analysis showed that 285 vehicles travelled along the A85 and onto the Queen's Bridge in the AM peak hour. This also demonstrated that approximately 312 vehicles (597 minus 312) continue straight on at Queen's Bridge to travel towards the A93/A94.

A.1.25 Further analysis will assess the accuracy of these demands, but if correct they suggest a low car-based commuter demand on the A85. This is supported by examination of the Base 2003 demand matrices, which suggests that in the AM modelled period (06:30 to 09:30), only 92 vehicles which originate from the A90 Dundee zone have a destination within Perth City Centre.

A.1.26 Whilst further demand estimation work will be required to confirm the validity of the Paramics demands (comparison with Census 2001 data for example), this low figure could prove problematic in terms of economic appraisal. If for example park and ride demand estimates at P4/P5 suggest that 100 trips are attracted to site P4/P5 from the Dundee area, this number could not be subtracted from the existing demand matrices.

A.1.27 The 2018 future year demand matrices have not yet been analysed, so no conclusions can yet be drawn concerning future year demands on the A85 or between the Dundee area and Perth City Centre.

A.1.28 The modelled time taken to travel from the A90 to the Queen's Bridge (a distance of 2.1km) peaked at just over four minutes at 08:45 in the AM peak period.

A.1.29 Observation of the model showed that traffic queues were evident across the full length of Queen's Bridge at peak times, and queues on the A85 approach reached approximately 15 vehicles in length.

A.1.30 Journey times and queuing on the A85 route into Perth from the A90 are important to the TACTRAN park and ride study. Again, further analysis is required to establish the accuracy of the Paramics model.

Future year testing

A.1.31 Future year models have been produced by SIAS for 2018, the horizon year of the Perth and Kinross Local Plan. The scenarios modelled by SIAS are summarised in Table A6.

Table A.6 – Future Year Modelled Scenarios.

Scenario	Year	Road network	Demands
Validated Base	2003	As 2003	Base 2003
Do Minimum	2018	As Base 2003	Local Plan demands 2018 - committed traffic (traffic growth reduced to 25%, the maximum level the model will run at)
Option C_DMR	2018	As per the Do Minimum option, but including localised transport improvements and a new link road between A94, A93 and A9. Bridge alignment ties into A9 just north of Inveralmond Roundabout	As Do Minimum 2018
Option C_DS	2018	As Option C_DMR	Local Plan demands 2018 – committed development
Option C_DS_FRB	2018	As Option C_DMR, but with east-facing slips from the M90 to Friarton Bridge	Local Plan demands 2018 – committed development

		at Rhynd Road.	
Option C_Ref	2018	As Option C_DMR	Local Plan demands 2018 – committed plus aspirational development
Option C_Ref_FRB	2018	As Option C_DMR, but with east-facing slips from the M90 to Friarton Bridge at Rhynd Road	Local Plan demands 2018 – committed plus aspirational development

A.1.32 Table A6 shows that the Do Minimum road network was only shown to function with traffic growth forecast between 2003 and 2018 reduced to 25% of its calculated level.

A.1.33 The generation of development trips within the 2018 models is presented within SIAS' briefing note, "Perth Developments – Summary of Development Information', submitted to PKC on 20th March 2009.

A.1.34 Housing and Employment developments contained within the Draft Perth Local Plan or the adopted Structure Plan were included as committed development within the 2018 demand matrices. Other housing or employment developments were included as aspirational.

A.1.35 As well as the addition of the above development trips, low NRTF was applied to external to external trips on the strategic road network.

A.1.36 Table A7 shows the resultant growth in the Perth Paramics model between 2003 and 2018

Table A.7 – Traffic Growth Within the Perth Paramics model 2003-2018

Scenario		AM peak period	PM peak period
2003 Base	Total	36,456	51,672
2018 Committed	Total	41,566	60,017
	Difference from Base	5,110	8,345
	% difference from Base	14%	16%
2018 Reference Case	Total	44,502	62,456
	Difference from Base	8,046	10,784
	% difference from Base	22%	21%

A.1.37 Table A7 shows that with committed development, there is a 14% growth in total trips in the AM peak between 2003 and 2018. This rises to 22% when aspirational development is included.

A.1.38 In terms of identifying the future year scenario to be used in the TACTRAN park and ride demand modelling and economic forecasting, these initial investigations suggest that two future year scenarios should be considered:

- 2018 Do Minimum with as much traffic growth as the road network will allow;
- A 2018 Reference Case scenario with the A93/A94/A9 link in place and associated city centre improvements; and
- As a sensitivity test, the above scenarios with changes in parking charges within Perth's CPZ.

A.1.39 The above scenarios would be considered with and without a park and ride at P4/P5 in operation.

A.1.40 The increase in traffic demands in 2018 is likely to result in increased demands for a park and ride service in 2018. A methodology which takes this growth into account will need to be developed to forecast future park and ride demand.

Summary

A.1.41 The Perth Paramics model will be used by Atkins for two purposes within the TACTRAN park and ride project. Firstly it will be used to support demand forecasting for the proposed P4/P5 park and ride sites. This will involve analysis existing peak hour flows within the model, which will be compared with results from the 2001 Census analysis to establish directional commuting patterns into Perth.

A.1.42 The second main use of the Perth Paramics model will be in the economic appraisal of park and ride from site P4/P5, and should help to quantify network congestion and reduced journey times. The model may also be used for operational analysis and testing of changes to the road network as a result of a park and ride scheme.

A.1.43 Initial analysis of the Base 2003 Perth Paramics model shows that the number of car trips on the A85 heading towards Queen's Bridge in the AM peak hour is slightly lower than observed: 651 modelled vehicles compared to 756 observed. Only 92 vehicles originating from the Dundee area were found to destinate in Perth City Centre. These initial findings need to be checked, and referenced with Census 2001 data to confirm their validity.

A.2 Further investigation will be required to establish the Paramics model's suitability for both park and ride demand estimation and economic forecasting.

Appendix B

B.1 Bus Timetable Analysis

Existing Services AM Peak

B.1.1 Walnut Grove to Perth City Centre

	333	16/A	16/A	333	16/A	333	333	16/A	16/A	333	16/A	54b	16/A	333	16/A	16/A	333	16/A	54b	16/A	333	16/A	16/A
Walnut Grove Bus Shelter		07:03	07:23	07:23	08:08	08:29	09:36	09:46	10:16	10:36	10:46	10:58	11:16	11:36	11:46	12:16	12:36	12:46	12:58	13:16	13:36	13:46	14:16
Perth Canal Street	06:40	07:10	07:30	07:30	08:20	08:43	09:43	09:53	10:23	10:43	10:53	11:05	11:23	11:43	11:53	12:23	12:43	12:53	13:05	13:23	13:43	13:53	14:23
RunTime		*7*	*7*	*7*	*12*	*14*	*7*	*7*	*7*	*7*	*7*	*7*	*7*	*7*	*7*	*7*	*7*	*7*	*7*	*7*	*7*	*7*	*7*
Interval (WG)			**20**	**0**	**45**	**21**	**67**	**10**	**30**	**20**	**10**	**12**	**18**	**20**	**10**	**30**	**20**	**10**	**12**	**18**	**20**	**10**	**30**

B.1.2 Perth City Centre to Walnut Grove

	333	16/A	16/A	333	16/A	16/A	333	16/A	16/A	333	16/A	54b	16/A	333	16/A	16/A	333	16/A	54b	16/A	333	16/A	16/A	333
Perth South Street	06:55	07:12	07:20	08:10	08:35	09:05	09:15	09:35	10:05	10:15	10:35	10:50	11:05	11:15	11:35	12:05	12:15	12:35	12:50	13:05	13:15	13:35	14:05	14:15
Walnut Grove WRE		07:20	07:28	08:18	08:43	09:13	09:23	09:43	10:13	10:23	10:43	10:58	11:13	11:23	11:43	12:13	12:23	12:43	12:58	13:13	13:23	13:43	14:13	14:23
RunTime		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Interval (WG)			**8**	**50**	**25**	**30**	**10**	**20**	**30**	**10**	**20**	**15**	**15**	**10**	**20**	**30**	**10**	**20**	**15**	**15**	**10**	**20**	**30**	**10**

Existing Services PM Peak

B.1.3 Walnut Grove to Perth City Centre

	16/A	16/A	333	54b	16/A	16X	333	16/A	16/A	333	16/A	333	16/A	333
Walnut Grove Bus Shelter	13:46	14:16	14:36	14:58	15:16		15:36	16:16	16:33	16:36	17:28	17:36	18:16	18:36
Perth Canal Street	13:53	14:23	14:43	15:05	15:23	15:28	15:43	16:23	16:40	16:43	17:35	17:43	18:23	18:43
RunTime	*7*	*7*	*7*	*7*	*7*		*7*	*7*	*7*	*7*	*7*	*7*	*7*	*7*
Interval (WG)	**10**	**30**	**20**	**12**	**18**		**20**	**40**	**17**	**3**	**52**	**8**	**40**	**20**

B.1.4 Perth City Centre to Walnut Grove

	16/A	333	16/A	54b	16/A	333	16/A	333	16/A	333	16/A	16/A	16/A	333	16/A	P+R	333	16/A
Perth South Street	14:05	14:15	14:35	14:50	15:05	15:15	15:55	16:10	16:35	17:10	17:15	17:45	18:15	18:15	18:35	18:50	19:00	19:15
Walnut Grove WRE	14:13	14:23	14:43	14:58	15:13	15:23	16:08	16:23	16:43	17:23	17:28	17:58	18:23	18:23	18:43	18:58	19:23	19:23
RunTime	*8*	*8*	*8*	*8*	*8*	*8*	*13*	*13*	*8*	*13*	*13*	*13*	*8*	*8*	*8*	*8*	*23*	*8*
Interval (WG)	**30**	**10**	**20**	**15**	**15**	**10**	**45**	**15**	**20**	**40**	**5**	**30**	**25**	**0**	**20**	**15**	**25**	**0**

‘Hybrid’ Service AM Peak

B.1.5 Walnut Grove to Perth City Centre

	333	16/A	16/A	333	P+R	P+R	16/A	333	P+R	P+R	P+R	333	16/A	P+R	16/A	P+R	333	16/A	P+R	16/A	P+R	333	16/A	P+R	16/A	P+R	333	16/A	P+R	16/A	P+R
Walnut Grove Bus Shelter		07:03	07:23	07:23	07:35	07:55	08:08	08:29	08:38	09:07	09:31	09:36	09:46	10:01	10:16	10:31	10:36	10:46	11:01	11:16	11:31	11:36	11:46	12:01	12:16	12:31	12:36	12:46	13:01	13:16	13:31
Perth Canal Street	06:40	07:10	07:30	07:30	07:43	08:05	08:20	08:43	08:50	09:17	09:38	09:43	09:53	10:08	10:23	10:38	10:43	10:53	11:08	11:23	11:38	11:43	11:53	12:08	12:23	12:38	12:43	12:53	13:08	13:23	13:38
RunTime		*7*	*7*	*7*	*8*	*10*	*12*	*14*	*12*	*10*	*7*	*7*	*7*	*7*	*7*	*7*	*7*	*7*	*7*	*7*	*7*	*7*	*7*	*7*	*7*	*7*	*7*	*7*	*7*	*7*	*7*
Interval (WG)			**20**	**0**	**12**	**20**	**13**	**21**	**9**	**29**	**24**	**5**	**10**	**15**	**15**	**15**	**5**	**10**	**15**	**15**	**15**	**5**	**10**	**15**	**15**	**15**	**5**	**10**	**15**	**15**	**15**

B.1.6 Perth City Centre to Walnut Grove

	333	16/A	16/A	P+R	333	P+R	16/A	P+R	16/A	333	P+R	16/A	P+R	16/A	333	P+R	16/A	P+R	16/A	333	P+R	16/A	P+R	16/A	333	P+R	16/A	P+R	16/A	333	P+R
Perth South Street	06:55	07:12	07:20	07:45	08:10	08:25	08:35	08:54	09:05	09:15	09:20	09:35	09:50	10:05	10:15	10:20	10:35	10:50	11:05	11:15	11:20	11:35	11:50	12:05	12:15	12:20	12:35	12:50	13:05	13:15	13:20
Walnut Grove WRE		07:20	07:28	07:53	08:18	08:33	08:43	09:02	09:13	09:23	09:28	09:43	09:58	10:13	10:23	10:28	10:43	10:58	11:13	11:23	11:28	11:43	11:58	12:13	12:23	12:28	12:43	12:58	13:13	13:23	13:28
RunTime		*8*	*8*	*8*		*8*	*8*	*8*	*8*		*8*	*8*	*8*	*8*		*8*	*8*	*8*	*8*		*8*	*8*	*8*	*8*		*8*	*8*	*8*	*8*		*8*
Interval (WG)			**8**	**25**	**25**	**15**	**10**	**19**	**11**	**10**	**5**	**15**	**15**	**15**	**10**	**5**	**15**	**15**	**15**	**10**	**5**	**15**	**15**	**15**	**10**	**5**	**15**	**15**	**15**	**10**	**5**

‘

B.1.7 Hybrid' Service PM Peak

B.1.8 Walnut Grove to Perth City Centre

	P+R	16/A	P+R	333	16/A	P+R	16/A	16X	P+R	333	P+R	16/A	P+R	16/A	333	P+R	P+R	16/A	333	P+R	P+R	16/A	P+R	333	16/A
Walnut Grove Bus Shelter	14:01	14:16	14:31	14:36	14:46	15:01	15:16		15:31	15:36	15:55	16:16	16:26	16:33	16:36	16:57	17:21	17:28	17:36	17:50	18:14	18:16	18:35	18:36	18:41
Perth Canal Street	14:08	14:23	14:38	14:43	14:53	15:08	15:23	15:28	15:38	15:43	16:02	16:23	16:33	16:40	16:43	17:04	17:28	17:35	17:43	17:57	18:21	18:23	18:42	18:43	18:48
RunTime	*7*	*7*	*7*	*7*	*7*	*7*	*7*		*7*	*7*	*7*	*7*	*7*	*7*	*7*	*7*	*7*	*7*	*7*	*7*	*7*	*7*	*7*	*7*	*7*
Interval (WG)	**15**	**15**	**15**	**5**	**10**	**15**	**15**		**15**	**5**	**19**	**21**	**10**	**7**	**3**	**21**	**24**	**7**	**8**	**14**	**24**	**2**	**19**	**1**	**5**

B.1.9 Perth City Centre to Walnut Grove

	16/A	P+R	16/A	333	P+R	16/A	P+R	16/A	333	P+R	P+R	16/A	333	P+R	16/A	P+R	P+R	333
Perth South Street	14:05	14:15	14:35	14:50	15:05	15:15	15:55	16:10	16:35	17:10	17:15	17:45	18:15	18:15	18:35	18:50	19:00	19:15
Walnut Grove WRE	14:13	14:23	14:43	14:58	15:13	15:23	16:08	16:23	16:43	17:23	17:28	17:58	18:23	18:23	18:43	18:58	19:23	19:23
RunTime	*8*	*8*	*8*	*8*	*8*	*8*	*13*	*13*	*8*	*13*	*13*	*13*	*8*	*8*	*8*	*8*	*23*	*8*
Interval (WG)	**30**	**10**	**20**	**15**	**15**	**10**	**45**	**15**	**20**	**40**	**5**	**30**	**25**	**0**	**20**	**15**	**25**	**0**

Appendix C

C.1 Appraisal Summary Table

Appraisal Summary Table P4			
Proposal Details			
Name and address of authority or organisation promoting the proposal: **Tayside and Central Scotland Transport Partnership Bordeaux House, 31 Kinnoull Street, Perth, PH1 5EN** (Also provide name of any subsidiary organisations also involved in promoting the proposal) **Perth and Kinross Council, The Environmental Service, 2 High Street, Perth PH1 5PH**			
Proposal Name:	TACTRAN WPA034 - Development of the A90 Perth Park & Ride Site	Name of Planner:	*Niall Gardiner*
Proposal Description:	**Park and ride car park P4 located east of A85 Dundee Road trunk road and Walnut Grove. The park and ride bus service will have a 10minute headway peak and 15minute headway off peak. The effect of bus priority is yet to be determined.**	Estimated Total Public Sector Funding Requirement:	Capital costs/grant **TBC** *Annual revenue support* **TBC** *Present Value of Cost to Govt.* **TBC**
Funding Sought From:	N/A	Amount of Application:	*Sum* **TBC**
Background Information			
Geographic Context:	The area under consideration is located in the south east of Perth east of the River Tay and the A85 and encompasses the edge of the Kinnoull Hill public park, the residential areas of Barnhill, the A85 Dundee Road corridor between the M90 and the city centre including the Queens Bridge and Perth Bridge river crossings and Perth City Centre. To the south of the study area, the adjacent lands are undeveloped with open farmland and farmsteads prevalent. To the south of the road corridor a railway line and River Tay exists and runs parallel to the A85 road corridor. It has been noted that there are no areas of deprivation within the immediate area of the road corridor. A reduction in traffic volume could reduce the demand for parking within Perth City Centre.		
Social Context:	There are no areas of deprivation or social exclusion adjacent to the A85 road corridor considered within the study with adjacent housing areas mainly owner - occupier detached Victorian buildings. Car ownership levels are high and the majority of housing stock is owner-occupier low-density detached housing.		
Economic Context:	The hinterland of Perth is very rural with a high level of dependence on agriculture and forestry for income, which suffers from a high level of both perceived and actual peripherality making economic development harder to encourage than it would otherwise be. Despite this Perth, performs well economically with increasing service sector employment and retail activity noted.		

Planning Objectives	
Objective:	Performance against planning objective:
AO1 To reduce car traffic flows on the A85 between the M90 and the centre of Perth.	The location of site P4 is well placed for people wishing to use the park and ride facility, situated just outside the urban form of Perth. Thus a number of people will have the choice to change their mode of travel as they enter the city of Perth. A reduction in car travel, congestion and delay will be experienced along the A85 Dundee Road resulting in an increase in reliability of journey times for all users. The transfer of trips from private car to bus will reduce traffic levels and thus the environmental impact (noise and air quality) associated with traffic will also reduce. The reduction in levels of traffic will also have a direct impact on the number and severity of road traffic accidents experienced along the A85 Dundee Road. **Performance against planning objective: +1**
AO2 To increase levels of accessibility for all by sustainable modes from the A90 catchment to the centre of Perth and to specific employment, health, leisure and retail locations in Perth	A reduction in car travel, congestion and delay will be experienced as Perth visitors switch mode from the private car to bus which will result in an increase in reliability of journey times for all travel modes along the A85 Dundee Road corridor. The introduction of a new bus park and ride facility will increase the number of bus services on offer to all and also provide a more frequent service thus increasing the accessibility to Perth for all, particularly for residents living within the catchment area of the park and ride service. The provision of low floor buses, disabled parking and facilities for the partially sighted will ensure that the facility is accessible by the disabled. In addition, bus fares will be set at affordable levels so people from socially deprived areas can use the facility. However it can be noted that, for the majority of users, part of the trip will be conducted by car. Site P4 is fully accessible by all modes. It is served by a footway and its close proximity to Walnut Grove ensures it is can be accessed by pedestrians and cyclists. In addition, the site is located on a recognised commuter route that can be easily accessed by commuters currently travelling by private car with little delay or diversion of trips. In addition, the site will be totally accessible by people wishing to undertake a part of their journey on cycle or foot and will have parking facilities for cycles incorporated within the design of the car park. **Performance against planning objective: +2**
AO3 To achieve high user satisfaction for users of park and ride associated with personal and vehicle security and safety.	Site P4 will be designed to a high quality to allay personal security fears. The car park will be provided in a level site and will be landscaped appropriately so as not to preclude passive security afforded by other users of the site. CCTV will be provided that can be monitored 24 hours a day 365 days a year and a help security button will be located close to the bus waiting area that can alert the local police to any incidents. In addition adequate street lighting will be provided which is important during periods of darkness. Information leaflets, a passenger notice board, cycle parking and bus shelters with seating areas will be provided on site in order to give the facility a sense of place. Similar to Broxden Park and Ride, police will monitor the area for added security. The bus pick up / drop off area will be segregated from general traffic thus reducing the conflict between passenger vehicle movements. Parking bays, parking aisles and access roads will be designed in accordance with current design standards with adequate signing and lining in place, thus reducing the risk of vehicle collisions. Similarly, footways and crossing points will be designed in excess of minimum standards with appropriate signage in place to direct pedestrians. Outside the car park, the site access junction will be designed in accordance with the Design Manual for Roads and Bridges and in agreement with Transport Scotland thus reducing the chance of road traffic accidents at this location. In addition, site P4 is accessible by pedestrians and cyclists through the existing network of footways, particularly for those residing within Walnut Grove. Thus introducing an opportunity for modal shift for people travelling along the A85 corridor. Care is required to ensure a transfer in traffic from other routes to the A85 is not experienced. **Performance against planning objective: +2**
AO4 To increase the amount of interchange of travel between the A90 catchment area and services located in Perth centre	The provision of a high quality frequent, reliable bus service and high quality facilities at the park and ride site will remove mental barriers that could exist amongst existing car drivers. Branded livery and affordable fares and reduced journey times in relation to cars will all raise the park and ride's profile to the general public. Reduce passenger waiting time when transferring to/from a bus. **Performance against planning objective: +1**
Rationale for Selection or Rejection of Proposal:	It is recommended that the proposal is taken forward for further assessment

Implementability Appraisal	
Technical:	**Strengths**:- A single junction can be formed with the existing A85 trunk road. A relaxation of visibility requirement may be necessary depending on the design speed of the road. This can be justified by undertaking a speed survey, through negotiations with Transport Scotland or the extension of the 40mph speed limit restriction. The point of access will be located at a point where the road embankment is relatively small and therefore the amount of earthworks will be reduced. Access by pedestrians can be achieved via the existing pedestrian network. Limited cyclist provision is nearby however access could be gained via the existing footway. The site is relatively flat and large enough to take the facility and future extension and adequate SUDs infrastructure. The site is allocated as a single user site within the Local Plan. **Weaknesses:-** The site is only directly accessible for traffic driving towards Perth. Traffic travelling northbound on the A85, must take a more circulatory route to access the site. Though it should be noted that this movement will be low and used mainly by park and ride buses. Land required to construct the park and ride facility is owned by a third party requiring land purchase. A private access road requires upgrading for site access. The site will be directly overlooked by three private residential properties. Whilst other properties are present they are somewhat more remote from the site. Whilst the road is a trunk road, early indications are that access will not present a major issue. Performance against Technical Criteria +2 Colour code Green.
Operational:	**Strengths:**- An existing service (No. 16 Dundee – Perth westbound only) and a subsidised local service that serves nearby Walnut Grove pass the site. It would be possible to divert the existing subsidised service (54b) and the number 16 into the park and ride site. Alternatively, the park and ride bus service, could replace the Walnut Grove service by rerouting along Walnut Grove once every two hours and connecting directly to Perth City Centre at all other times. The need for this subsidised service could therefore be removed. The routeing of the park and ride bus service can travel to/from Perth centre in a logical, direct fashion. The westbound Dundee – Perth service would be able to serve the site with minor delay. Early indications are that the bus operators would be interested in serving the site. There is opportunity to 'attract' a higher number of pedestrian / ride demand from Walnut Grove. **Weaknesses:-**The opportunity for the Dundee bound eastbound service to serve the site may reduce the attractiveness of visitors from the Dundee area thus precluding the diversion of the number 16 service. Performance against Operational Criteria +1 Colour code Green.
Financial:	**Strengths:-** With the introduction of the park and ride service, the need for the existing subsidised service will be removed from Walnut Grove. **Weaknesses:-** It is likely that any new bus service will need to be subsidised until demand is at a level where the bus service is self financing. Car parking revenue within Perth may decrease. Performance against Financial Criteria -1 Colour code Red.
Public:	**Strengths:-** The general public are unlikely to raise major concerns . This is strengthened by the fact no major concerns have been raised during the park and ride strategy process, however two residential properties and one business property will be directly affected. The site is large enough to accommodate a car park within its confines. Appropriate screening (berm, trees, landscaping etc) will be in place to reduce impact on nearby properties to aid public acceptability. **Weaknesses:-** Two residential properties and one business property will be affected. A private access road will be required to be realigned / upgraded to facilitate the new junction. Performance against Public Criteria 0 Colour code Amber.

STAG Criteria		
Criterion	**Assessment Summary**	**Supporting Information**
Environment:	*Description of Impacts* Slight cost	**Strengths:-** The site is located in close proximity to two properties and a business property. Therefore noise and vibration of vehicles etc will impact on a low number of people. Noise and visual impacts of the facility can be 'designed out' through careful design and appropriate mitigation measures. The A85 Dundee Road corridor will experience slight benefits as traffic volume and associated impacts are reduced. **Weaknesses:-** The site is on the edge of the River Tay flood plain and care needs to be taken with regard to nesting birds etc. Whilst low numbers of people may be affected by noise, vibration etc, those adjacent to the site will be affected significantly. In addition, the site may be visible from Kinnoul Hill a local tourist spot. Appropriate landscaping will be incorporated within the design of the facility to reduce environmental impacts. Performance against Environmental Criteria -1 Colour code Red.
Safety:	Description of Impacts Slight benefit	**Strengths:-** Personal safety issues will be influenced within the design of the park and ride facility. CCTV and adequate lighting will be provided within the site. Passive security will also be provided by other users of the site. The location of the site access junction will be located on a section of road that has no noted road safety problem. The junction will be designed to appropriate standards. Adequate pedestrian / cycling provision will be incorporated within the design of the car park **Weaknesses:-** A new junction with the trunk road will add vehicular conflict inherent with any new junction. However the risk of accidents will be reduced through the design of the junction to appropriate standards. Performance against Safety Criteria +1 Colour code Green.
Economy:	*Description of Impacts* Moderate cost	**Strengths:-** Vehicle operating costs (vocs) will be reduced along the A85 as there is a mode change from car to bus and associated reduction in traffic, congestion and delay. The perception on the attractiveness of Perth as a place to visit and work in will increase and therefore a slight economic benefit may be measured. **Weaknesses:-** The site is located in third party land which will need to be purchased. Low demand is likely to result in the need for a subsidy to support the bus service. Performance against Economy Criteria -1 Colour code Red.
Integration:	Description of Impacts Moderate benefit	**Strengths:-** The site is located adjacent to the westbound A85 and is very accessible by car users and will encourage integration between car and bus. Similarly the site is close to Walnut Grove and can be reached on foot or by cycle by several residencies in this area. An existing footway passes the site, which can be used by pedestrians and cyclists thus encouraging integration between different modes of travel. **Weaknesses:-** There are no cycle facilities within the immediate vicinity of the site, however access can be gained via the existing road network or the footway. The footway is narrow for cycles and the road is high speed (speed limit 60mph). Performance against Integration Criteria +2 Colour code Green.

Accessibility and Social Inclusion:	*Description of Impacts* Moderate benefit	**Strengths:-** Assuming the service serves Walnut Grove, levels of accessibility increase for the residents of Walnut Grove who do not have access to the private car with the introduction of a more frequent reliable bus service within a short walk / cycle. Similarly residents living along the A85 corridor will also benefit from an improved service. **Weaknesses:-** The catchment for pedestrians and cyclists is limited given the rural nature of the proposal. Performance against Accessibility and Social Inclusion Criteria +2 Colour code Green.

Appraisal Summary Table P5			
Proposal Details			
Name and address of authority or organisation promoting the proposal: **Tayside and Central Scotland Transport Partnership Bordeaux House, 31 Kinnoull Street, Perth, PH1 5EN** (Also provide name of any subsidiary organisations also involved in promoting the proposal) **Perth and Kinross Council, The Environmental Service, 2 High Street, Perth PH1 5PH**			
Proposal Name:	**TACTRAN WPA034 - Development of the A90 Perth Park & Ride Site**	Name of Planner:	*Niall Gardiner*
Proposal Description:	**Park and ride car park P5 located within the gyratory of Barnhill Interchange. The park and ride bus service will have a 12minute headway peak and 15minute headway off peak. The effect of bus priority is yet to be determined.**	Estimated Total Public Sector Funding Requirement:	Capital costs/grant **TBC** *Annual revenue support* **TBC** *Present Value of Cost to Govt:* **TBC**
Funding Sought From:	N/A	Amount of Application:	*Sum* **TBC**
Background Information			
Geographic Context:	The area under consideration is located in the south east of Perth east of the River Tay and the A85 and encompasses the edge of the Kinnoull Hill public park, the residential areas of Barnhill, the A85 Dundee Road corridor between the M90 and the city centre including the Queens Bridge river crossing. To the south of the study area, the adjacent lands are undeveloped with open farmland and farmsteads prevalent. To the south of the road corridor a railway line and River Tay exists and runs parallel to the A85 road corridor. Residential properties in the locale are. It has been noted that there are no areas of deprivation within the immediate area of the road corridor. A reduction in traffic volume could reduce the demand for parking within Perth City Centre.		
Social Context:	There are no areas of deprivation or social exclusion adjacent to the A85 road corridor considered within the study with adjacent housing areas mainly owner - occupier detached Victorian buildings. Car ownership levels are high and the majority of housing stock is owner-occupier low-density detached housing.		
Economic Context:	The hinterland of Perth is very rural with a high level of dependence on agriculture and forestry for income, which suffers from a high level of both perceived and actual peripherality making economic development harder to encourage than it would otherwise be. Despite this Perth, performs well economically with increasing service sector employment and retail activity noted.		

Planning Objectives	
Objective:	Performance against planning objective:
AO1 To reduce car traffic flows on the A85 between the M90 and the centre of Perth.	The location of site P5 is well placed for people wishing to use the park and ride facility, situated just outside the urban form of Perth. Thus a number of people will have the choice to change their mode of travel as they enter the city of Perth. A reduction in car travel, congestion and delay will be experienced along the A85 Dundee Road resulting in an increase in reliability of journey times for all users. The transfer of trips from private car to bus will reduce traffic levels and thus the environmental impact (noise and air quality) associated with traffic will also reduce. The reduction in levels of traffic will also have a direct impact on the number and severity of road traffic accidents experienced along the A85 Dundee Road. **Performance against planning objective: +1**
AO2 To increase levels of accessibility for all by sustainable modes from the A90 catchment to the centre of Perth and to specific employment, health, leisure and retail locations in Perth	A reduction in car travel, congestion and delay will be experienced as Perth visitors switch mode from the private car to bus which will result in an increase in reliability of journey times for all travel modes along the A85 Dundee Road corridor. The introduction of a new bus park and ride facility will increase the number of bus services on offer and also provide a more frequent service thus increasing the accessibility to Perth particularly for residents living within the catchment area of the park and ride service. However it can be noted that, for the majority of users, part of the trip will be conducted by car. The provision of low floor buses, disabled parking and facilities for the partially sighted will ensure that the facility is accessible by the disabled. In addition, bus fares will be set at affordable levels so people from socially deprived areas can use the facility. However site P5 cannot be safely accessed and is somewhat severed from the residents of Walnut Grove. The nearby footway is located across the other side of a high speed (60mph) dual carriageway and access by foot can only be gained via a new pedestrian crossing or a new footbridge. This would require added expense and the speed restriction would need to be extended eastwards. In addition, it is not possible to create a site access junction at a location that accords with DMRB design standards. Junction visibility, junction spacing, access from the offside lane and weaving of existing traffic would all result in road safety issues and prove unacceptable to Transport Scotland. Whilst the site is located on a recognised commuter route that is convenient for commuters currently travelling by private car with little delay or diversion of trips the physical constraints are problematic. **Performance against planning objective: -2**
AO3 To achieve high user satisfaction for users of park and ride associated with personal and vehicle security and safety.	Site P5 will be designed to a high quality to allay personal security fears. The car park will be provided in a level site and will be landscaped appropriately so as not to preclude passive security afforded by other users of the site. CCTV will be provided that can be monitored 24 hours a day 365 days a year and a help security button will be located close to the bus waiting area that can alert the local police to any incidents. In addition adequate street lighting will be provided which is important during periods of darkness. Information leaflets, a passenger notice board, cycle parking and bus shelters with seating areas will be provided on site in order to give the facility a sense of place. Similar to Broxden Park and Ride, police will monitor the area for added security.
AO4 To increase the amount of interchange of travel between the A90 catchment area and services located in Perth centre	The bus pick up / drop off area will be segregated from general traffic thus reducing the conflict between passenger vehicle movements. Parking bays, parking aisles and access roads will be designed in accordance with current design standards with adequate signing and lining in place, thus reducing the risk of vehicle collisions. Similarly, footways and crossing points will be designed in excess of minimum standards with appropriate signage in place to direct pedestrians. However, outside the car park, the site access junction cannot be sited in a location without several relaxations or

	departures from standards, which is likely to prove unacceptable to Transport Scotland. In addition, site P5 is not easily accessible by pedestrians and cyclists without having to cross a high-speed road. This could be problematic given the location of Walnut Grove. **Performance against planning objective: -2** The provision of a high quality frequent, reliable bus service and high quality facilities at the park and ride site will remove mental barriers that could exist amongst existing car drivers. Branded livery and affordable fares and reduced journey times in relation to cars will all raise the park and ride's profile to the general public. Reduce passenger waiting time when transferring to/from a bus. **Performance against planning objective: +1**
Rationale for Selection or Rejection of Proposal:	It is recommended that the proposal is not taken forward for further assessment
Implementability Appraisal	
Technical:	**Strengths:-** The site is visible for traffic travelling north over the Friarton Bridge which may help increase demand at the park and ride facility. The site is relatively flat and large enough to take the facility and limited extension. The site is allocated as single user site within the Local Plan. **Weaknesses:-** The site is only directly accessible for traffic driving toward Perth from the offside lane of a high speed road (national speed limit applies). Location of the proposed site access is difficult as any possible access point will have substandard visibility, junction spacing and weaving values. This proposal could, ultimately be refused by Transport Scotland who expressed concerns at a recent meeting. In addition, the only feasible exit requires the upgrade of a private access, which is located within close proximity of existing residential properties and suffers from the issues described above. Pedestrian access and cycle access would be very difficult and require alterations to the road network with the addition of crossings etc which would in turn require the relocation of the extent of the 40mph speed limit which could prove problematic. Furthermore the site exit would connect with the trunk road at a point, which has a road traffic accident record. The road layout has been recently altered to try and alleviate this problem. Additional traffic loaded onto the network at this point may increase the likelihood of accidents. It can be noted that, due to the one-way system, the entry / egress routes appear to be circuitous which may prove difficult with public perception and thus demand. Land required to construct the park and ride is owned by a third party requiring land purchase. A private access road requires upgrading for site egress. The site will be overlooked by three private residential properties. The site suffers from a level difference further limiting the access opportunities without creating lengthy access roads within the site. Performance against Technical Criteria -3 Colour code Red.
Operational:	**Strengths:-** An existing service (No. 16 Dundee – Perth westbound only) and a subsidised local service that serves nearby Walnut Grove pass the site. It would be possible to divert the existing subsidised service (54b) and the number 16 into the park and ride site. Alternatively, the park and ride bus service, could replace the Walnut Grove service by rerouting along Walnut Grove once every two hours and connecting directly to Perth City Centre at all other times. The need for this subsidised service could therefore be removed. The routeing of the park and ride bus service can travel to/from Perth centre in a logical, direct fashion. The westbound Dundee – Perth service would be able to serve the site with minor delay. Early indications are that the bus operators would be interested in serving the site. There is opportunity to 'attract' a higher number of pedestrian / ride demand from Walnut Grove. **Weaknesses**:- The opportunity for the Stagecoach Dundee bound eastbound service to divert to serve the site may reduce the attractiveness of visitors from the Dundee area thus precluding the diversion of the number 16 service. There is little opportunity to 'attract' a higher number of pedestrian / ride demand from Walnut Grove due to the site's remoteness and accessibility problems. Performance against Operational Criteria 0 Colour code Amber.

Financial:	**Strengths:-** With the introduction of the park and ride service, the need for the existing subsidised service will be removed from Walnut Grove with the new bus service introduced. **Weaknesses:-** Due to the topography, site access is limited without significant earthworks, therefore construction costs may be high if proposed access points are deemed unacceptable by Transport Scotland. It is likely that any new bus service will need subsidised. Car parking revenue within Perth may decrease. Performance against Financial Criteria -1 Colour code Red.
Public:	**Strengths:-** The general public unlikely to raise major concerns . This is strengthened by the fact no major concerns have been raised during the park and ride strategy process, however three residential properties will be affected. The site is large enough to accommodate a car park within its confines. Appropriate screening (berm, trees, landscaping etc) will be in place to reduce impact on nearby properties to aid public acceptability. **Weaknesses:-**Three residential properties will be directly affected. A private access road will be required to be realigned / upgraded to facilitate the new junction. Performance against Public Criteria -1 Colour code red.

STAG Criteria

Criterion	**Assessment Summary**	**Supporting Information**
Environment:	*Description of Impacts:-* Slight cost	**Strengths:-** The site is adjacent to three properties. Therefore noise, vibration of vehicles will impact on a low population. Noise, visual impacts of the facility can be 'designed out' through careful design and appropriate mitigation measures. **Weakness:-** The site is part of a designated Area of Great Landscape Value. Whilst low numbers of people may be affected by noise, vibration etc, those adjacent to the site will be affected significantly. Performance against Environmentall Criteria -1 Colour code Red.
Safety:	Description of Impacts:- Moderate cost	**Strengths:-** Personal safety issues will be influenced within the design of the park and ride facility. CCTV will be provided within the site. Passive security will be provided by other users of the site. **Weaknesses:**- Two new junctions will be required with the trunk road at points where an accident record is present. The junctions will require to be designed as relaxations / departures from standard and agreement will be required from Transport Scotland. Performance against Safety Criteria -2 Colour code Red.
Economy:	*Description of Impacts:-* Slight cost	**Strengths:-** Vehicle operating costs (vocs) will be reduced along the A85 as there is a mode change from car to bus and associated reduction in traffic, congestion and delay. The perception on the attractiveness of Perth as a place to visit and work in will increase and therefore a slight economic benefit may be measured. **Weaknesses:-** The site is located in third party land which will need to be purchased. Low demand may result in the need for a subsidy. Performance against Economy Criteria -1 Colour code Red.
Integration:	Description of Impacts:- Moderate cost	**Strengths:-** The site is located adjacent to the eastbound A85 and is very accessible by car users and will encourage integration between car and bus. An existing footway passes the site however it is located on the opposite side of a high speed carriageway. **Weaknesses:-** There are no cycle facilities within the immediate vicinity of the site, however access can be gained via the outside lane of a high speed road or a footway located on the opposite side of a high speed road(speed limit 60mph). Thus integration between walking / cycling and bus will be limited without the extension of the 40mph speed limit and the provision of a pedestrian crossing. Performance against Integration Criteria -2 Colour code Red.
Accessibility and Social Inclusion:	*Description of Impacts:-* Minor cost	**Strengths:-** Assuming the bus service serves Walnut Grove, levels of accessibility increase for the residents of Walnut Grove who do not have access to the private car with the introduction of a more frequent reliable bus service within a short walk / cycle. Similarly residents living along the A85 corridor will also benefit from an improved service. **Weaknesses:-** The catchment for pedestrians and cyclists is limited given the rural nature of the proposal and the difficulty accessing the site on foot or by cycle. Thus access by walking / cycling and bus will be limited without the extension of the 40mpd

		speed limit and the provision of a pedestrian crossing. Performance against Accessibility and Social Inclusion Criteria -1 Colour code Red.

Appendix D

D.1 Detailed Appraisal Summary Table Site P4 (Do Minimum, mid demand estimate)

Appraisal Summary Table Government Objectives

Proposal Details			
Name and address of authority or organisation promoting the proposal: **Tayside and Central Scotland Transport Partnership Bordeaux House, 31 Kinnoull Street, Perth, PH1 5EN** Subsidiary Organisation:- Perth and Kinross Council			
Proposal Name:	TACTRAN WPA034 - Development of the A90 Perth Park & Ride Site	Name of Planner:	*Niall Gardiner*
Proposal Description:	Park and ride car park located east of A85 Dundee Road trunk road and south of Walnut Grove. The park and ride bus service will have a 12minute headway peak and 15minute headway off peak.	Total Public Sector Funding Requirement:	Capital costs/grant (2009 costs undiscounted) £1.473M including land. 'Hybrid Service' - Annual subsidy to bus operator £48k (2009 prices, Total support by Public Sector £132k (2009 prices) 'Dedicated Service' - Annual subsidy to bus operator £119k (2009 prices, Total support by Public Sector £203k (2009 prices) Present Value of Cost to Govt -£2.859M (Hybrid), -3.968M (Dedicated)
Funding Sought From: (if applicable)	TACTRAN – capital funding Perth and Kinross Council – revenue support	Amount of Application:	As above.
Background Information			
Geographic Context:	The area under consideration is located in the south east of Perth east of the River Tay and the A85 and encompasses the edge of the Kinnoull Hill public park, the residential areas of Barnhill, the A85 Dundee Road corridor between the M90 including the Queens Bridge and Perth Bridge river crossings and Perth City Centre. To the south of the study area, the adjacent lands are undeveloped with open farmland and farmsteads prevalent. To the south of the road corridor a railway line and River Tay exists and runs parallel to the A85 road corridor. It has been noted that there		

	are no areas of deprivation within the immediate area of the road corridor. A reduction in traffic volume could reduce the demand for parking within Perth City Centre.
Social Context:	There are no areas of deprivation or social exclusion adjacent to the A85 road corridor considered within the study with adjacent housing areas mainly owner - occupier detached Victorian buildings. Car ownership levels are high and the majority of housing stock is owner-occupier low-density detached housing.
Economic Context:	The hinterland of Perth is very rural with a high level of dependence on agriculture and forestry for income, which suffers from a high level of both perceived and actual peripherality making economic development harder to encourage than it would otherwise be. Despite this Perth, performs well economically with increasing service sector employment and retail activity noted. Limited public transport outside the peak travel periods restricts access to services by sustainable modes

Planning Objectives	
Objective:	Performance against planning objective:
Transport Planning Objective No. 1 - To reduce car traffic flows on the A85 between the M90 and the centre of Perth. Target – Reduce car traffic flows by an average of *3%* during the AM & PM peak period and by an average of *3%* during the off peak period by the end of year one of the park and ride.	*The introduction of a P&R will reduce car traffic along the A85 Dundee Road, Queens Bridge, Perth Bridge and Perth City Centre as users switch from the private car to park and ride. It is predicted that peak hour demand for the park and ride will be approximately 30 vehicles per hour from an existing of peak flow of approximately 850 vehicles per hour. Off-peak demand is approximately 15 vehicles / hour from existing traffic flow of approximately 450 vehicles per hour.*
Transport Planning Objective No. 2 - To increase levels of accessibility for all by sustainable modes from the A90 catchment to the centre of Perth and to specific employment, health, leisure and retail locations in Perth. Target - Increase number of passengers by 5% per year in the catchment area of the park and ride. Maintain bus journey time in comparison to the private car along A85 road corridor. Increase number, frequency and reliability of bus services along the A85 Dundee Road in year one of the park and ride.	*Access to Perth City Centre is limited for people living along the A85 and A90 road corridors without driving into the city centre of Perth. Levels of walking and cycling along the A85 road corridor are low which could be partially attributed to high vehicle volumes along the A85. A reduction in traffic flow could encourage potential walkers and cyclists who are inhibited by traffic high volumes.*
Transport Planning Objective No. 3 - To achieve high user satisfaction for users of park and ride associated with personal and vehicle security and safety. Target - Achieve 80% of satisfied park and ride users of the Walnut Grove park and ride site within year one.	*The proposed park and ride facility will be designed incorporating best practice as detailed within the TACTRAN document. In addition, a high quality bus service with a modern bus fleet will be used to serve the facility supplemented by existing high quality bus service where required. Thus it is predicted that customer satisfaction will be high. The bus operation will be tendered to ensure minimum standards are met.*
Transport Planning Objective No. 4 - To increase the amount of interchange of travel between the A90 catchment area and services located in Perth centre. Target - Increase sustainable trips from the park and ride catchment area to target destinations by 5% in year one of the park and ride.	*It is envisaged that the park and ride scheme will facilitate interchange between walking, cycling and car use with buses. Similarly there may be an opportunity to introduce interchange between car and walking and cycling if people choose to drive to the site and continue their journey on foot or cycle.*

Rationale for Selection or Rejection of Proposal:	*The park and ride site (P4) has been selected for consideration at detailed appraisal stage. Site P4 is located at the edge of town adjacent to the junction of three strategic roads which is an appropriate location for a park and ride site. It is accessible by several modes; car, bus, foot and by cycle. The site is allocated as a possible park and ride site within the Local Plan. The alternative site (P5) has accessibility issues with a junction connecting to the trunk road particularly problematic. Additionally, poor access by people travelling on foot and by cycle is difficult and therefore Site P5 has been disregarded from the process.*
Planning Objectives	
Objective:	Performance against planning objective:
Rationale for Selection or Rejection of Proposal:	*The park and ride site (P4) has been selected for consideration at detailed appraisal stage. Site P4 is located at the edge of town adjacent to the junction of three strategic roads which is an appropriate location for a park and ride site. It is accessible by several modes; car, bus, foot and by cycle. The site is allocated as a possible park and ride site within the Local Plan. The alternative site (P5) has accessibility issues with a junction connecting to the trunk road particularly problematic. Additionally, poor access by people travelling on foot and by cycle is difficult and therefore Site P5 has been disregarded from the process.*

Implementability Appraisal	
Technical:	***Strengths:***- A single junction can be formed with the existing A85 trunk road. A relaxation of visibility requirement may be necessary depending on the design speed of the road. This can be justified by undertaking a speed survey, through negotiations with Transport Scotland or the extension of the 40mph speed limit restriction. The point of access will be located at a point where the road embankment is relatively small and therefore the amount of earthworks will be reduced. Access by pedestrians can be achieved via the existing pedestrian network. Limited cyclist provision is nearby however access could be gained via the existing footway. The site is relatively flat and large enough to take the facility and future extension and adequate SUDs infrastructure. The site is allocated as a single user site within the Local Plan. Construction techniques will be relatively straightforward using existing accepted techniques. ***Weaknesses:***- The site is only directly accessible for traffic driving towards Perth. Traffic travelling northbound on the A85, must take a more circulatory route around the gyratory of the Barnhill Interchange to access the site. Though it should be noted that this movement will be low and used mainly by park and ride buses. Land required to construct the park and ride facility is owned by a third party requiring land purchase. A private access road requires upgrading for site access. The site will be directly overlooked by three private residential properties. Whilst other properties are present they are somewhat more remote from the site. Whilst the road is a trunk road, early indications are that access will not present a major issue.
Operational:	**Strengths**:- An existing service (No. 16 Dundee – Perth) the No. 333 that shuttles between the PRI and Ninewells Hospital, and a subsidised local service that serves nearby Walnut Grove pass the site. It has been assumed within the provision of the 'Hybrid' service that these buses would supplement a dedicated only midi bus. The 54b would be removed thus introducing a subsidy saving. The location of the park and ride site means buses can travel to/from Perth centre in a logical, direct fashion albeit with a more circulatory route between the city and the site. The westbound Dundee – Perth service would be able to serve the site with minor delay. Early indications are that the bus operators would be interested in serving the site. There is opportunity to 'attract' a higher number of pedestrian or cyclist / demand from Walnut Grove. **Weaknesses:-**The opportunity for the Dundee bound eastbound service to serve the site may reduce the attractiveness of visitors from the Dundee area. This could preclude the diversion of the number 16 service. The park and ride service will require a subsidy which is based on the level of demand predicted within this study. Outside influences could impact on demand assumptions.
Financial:	*Sources for funding are unknown, however it is envisaged that TACTRAN or Perth and Kinross Council will fund the capital costs.* *On-going operating costs will be funded from Perth and Kinross revenue allocation which will require the subsidy for a 'Hybrid' bus service estimated to be £48k per annum* subsidy and £132k in total when other costs are taken into consideration. It is not known how this will be funded.

	On-going operating costs will be funded from Perth and Kinross revenue allocation which will require the subsidy for a 'Dedicated' bus service estimated to be £132k per annum subsidy and £203k in total when other costs are taken into consideration. It is not known how this will be funded.
Public:	*The proposal is not known to the general public, however the site is allocated as a site for park and ride or similar within the Local Plan which is a public document. In acceptability terms it is envisaged that overall, the public will accept the proposals, however the community residing in Walnut Grove may have objections, particularly those living on the western edge.*

Environment			
Mitigation Options Included: (Costs & Benefits)	*Noise and emissions to air during construction and operation* *The location of the, bus stop will be located as remote as possible from sensitive receptors as this is the area where activity and hence noise generation and emissions to air are likely to be the greatest.* *Controlled working hours and use of appropriate working methods and equipment to minimise the temporary impact associated with construction noise and emissions to air (primarily dust) during construction will be applied.* *Use of bunds or landscape barriers to be implemented within the design to mitigate for noise impact if required.* *River Tay (water quality, drainage, flood defence)* *Drainage proposals must ensure protection of the River Tay SAC and must be informed by consultation with SEPA, Perth and Kinross Council and SNH on treatment, attenuation and discharge requirements. In order to increase confidence in level of impact being reduced to neutral, drainage should be limited to Greenfield and SEPA's requirement for two levels of treatment (preferably with one level being permeable paving or form paving) should be incorporated into drainage design where possible.* *The design and space allocation for SUDS ponds should be informed by on-site ground / soil / groundwater conditions, the depth of the water table, the barrier created by the Dundee-Perth railway line and any existing culverts and drainage channels within the local area.* *Agriculture* *Should the scheme result in severance of landholding such that it affects viability adequate compensation will be required.* *Ground stability* *Geotechnical desk study to confirm ground stability and ground investigation followed if required by design specifications to address ground conditions.* *Breeding birds* *Retention of shrubs and young trees around the site boundary will be incorporated within the design, if possible incorporation of this vegetation into the landscape design, and sensitive design and location of construction of compounds and access routes to minimise the potential impact on breeding birds (protected under legislation) in the site periphery vegetation. If any of the trees and shrubs do require removal this must be is undertaken outside of the nesting bird season..* *Landscape character visual amenity and siting of nearby listed buildings* *Develop landscape plan, likely to include retention of as much existing vegetation and key landscape features as possible; replace and screen planting using indigenous trees and shrubs to marry with local vegetation and use landscape planting to soften the appearance of the site vegetation; and keep the use of signage to a minimum.* *Buried archaeology potential* *Further studies followed if necessary by construction management activities (e.g. pre-construction archaeological excavation, preservation of important buried archaeological remains in situ through appropriate design, maintenance of appropriate archaeological monitoring during construction works) to mitigate for the presence of buried archaeology (if potential to be present determined).*		
Sub-criterion	**Qualitative Information**	**Quantitative Information**	**Significance of Impact**
Noise and Vibration	*Owing to the high noise levels from nearby A90 and M90, impacts arising from the scheme will be minimal though a few nearby receptors in Walnut Grove may be subject to noise from on- site movements and construction activity.*	*It is envisaged that a maximum of between three and five properties will be affected with the introduction of the park and ride car park.*	*minor negative*
Global Air Quality – CO_2	*It is considered that the site will not generate traffic and the majority of traffic passing the site will divert to the park and ride. Therefore the level of CO_2 will reduce slightly overall. However this benefit may be outweighed by the number of bus movements introduced by the scheme.*	*It is estimated that carbon emitted over the sixty year appraisal period will reduce by 31 tonnes as a result of the scheme, with an overall benefit of £25k ('Hybrid').* *The 'Dedicated' service results in an overall saving of 163 tonnes of carbon,*	*PV1 = minor positive*

		and overall saving of £16k.	
Local Air Quality – PM_{10} and NO_2	*The site is within an AQMA for Perth. Local air quality is likely to be dominated by the M90/A90 so that activities from the site are unlikely to affect performance against the Perth AQMA.*	*Between three and five properties will experience an increase in PM10.* *Between three and five properties will experience an increase in NO_2.*	*neutral – minor negative*
Water Quality, Drainage and Flood Defence	*Polluted run-off and mobilisation of pollutants during flood events if SUDS is in flood zone.* *Potential drainage/flood impacts associated with the increase in paved area.* *Although not within SEPA indicative flood plain, proximity means there is some potential for impacts.*	*River Tay SAC (international designation); water quality classification A1:Excellent –* *potentially affected.*	. *major adverse – neutral*[36] .
Geology	*Intertidal silt and clay Alluvium may present some risk associated with load bearing capacity and with pavement foundations.*	*No sites designated for geological reasons or mineral reserve.*	*moderate adverse – neutral*[37]
Biodiversity	*Pollution to the watercourse poses a risk to the qualifying features of the SAC.*	*1. River Tay Special Area of Conservation (SAC) internationally important European site with strict legislation governing its protection under the EC Habitats Directive) next to site; and* *2. Potential effects on breeding birds.*	*major negative – neutral*[38]
Visual Amenity	*Although various receptor groups will experience views of the site it is at the urban edge and close to a major highway interchange which dominates the local landscape and visual amenity.*	*No designated views;*	*moderate negative – neutral*
Agriculture and Soils	*Part of the site has been developed as office use. The remainder of the site is owned by one landowner by a single landowner.*	*No "best quality" prime agricultural land.*	*neutral* [39]
Cultural Heritage	*There is some evidence for prehistoric funerary, hunting and settlement activity within the area so potential exists for effects on buried archaeology.*	*1. No Conservation Areas;* *2. Two listed buildings – setting potentially impacted; and* *3. Two Historic Gardens and Designed Landscapes – setting potentially impacted.*	*moderate negative – neutral*[40]

36 The major ranking arises from international status of SAC and the outline stage of the drainage proposals, as well as the absence of consideration of flood risk. Once these are undertaken the score is likely to reduce though extent will depend on the measures and outcomes of the studies.

37 Until geotechnical study is undertaken, the impact must be considered moderate although it is likely that with further analysis this could reduce to minor negative or neutral.

38 The major score is due to international status of SAC and to date lack of design detail to demonstrate how this will be protected. The score could reduce to neutral with such design in place. May require appropriate assessment screening exercise to determine the potential for adverse impact on the River Tay SAC. Also requires appropriate mitigation to ensure the protection of breeding birds in the site periphery vegetation.

39 Effects on viability of holdings must be considered to be a potentially significant issue until details of land holding are established, although it is highly likely that this will reduce to neutral once such details are determined.

40 Impact on buried archaeology must be considered, although it is likely that with further analysis, his could reduce to minor negative or neutral, particularly if effects can be addressed through construction management activities.

Landscape	*Although the site is in a largely rural LCA it is at the urban edge and close to a major highway interchange which dominates the local landscape so unlikely to impact the area.*	*There will be no land-take from designated landscape including Areas of Great Landscape Value or Ancient Woodland though potential effect on setting of an adjacent such area.*	*moderate – neutral*[41]
Physical Fitness	*Although a slight increase in physical activity may be experienced with the park and ride facility in place, it is envisaged that the increase in activity will be low.*	*It is considered that the number of lives and lost working days will be negligible.*	*PV2 = 0*
Monetised summary	*Not Quantified*		
Monetary Impact Ratio	*Not Quantified)*		

41 It is assumed to be moderate although likely to reduce with design of appropriate mitigation.

Safety			
Sub-criterion	**Item**	**Qualitative Information**	**Quantitative Information**
Accidents	Change in Annual Personal Injury Accidents	*The number of million vehicle kilometres travelled will be reduced with the introduction of the park and ride. A journey length of approximately 5.6km will be saved per vehicle for each return trip which will reduce the number of accidents.*	15 fewer PIA over 60 year appraisal period in high demand scenario, same PIA over 60 year appraisal period in low demand scenario. *£298k saving with 'Hybrid' service demand scenario and £242k benefit in 'Dedicated' scenario over 60 year appraisal period.*
	Change in Balance of Severity	*It is considered that the change in balance of severity of accidents will not alter* with the introduction of the park and ride proposals.	
	Total Discounted Savings		*£298k saving with 'Hybrid' scenario and £242k benefit with 'Dedicated' scenario over 60 year appraisal period.*
Security		*The site will be designed following the concepts adopted for the design of Broxden park and ride with fencing, lighting, appropriate landscaping and CCTV in place to complement the 'open' design of the car park which will facilitate passive security from other users.* *It is predicted that there will not be any additional security problems as a result of the park and ride. Therefore the impact of the park and ride on the security of users is*	*Neutral* *Tayside Police were contacted regarding the security of Broxden park and ride site where it was confirmed that there has been no reports of personal assaults or of vehicle theft or vandalism since the park and ride was opened*

		considered to be neutral.	
Monetised summary		*£242k saving to £298k benefit over 60 year appraisal period*	
Monetary Impact Ratio		***0.05 (Hybrid), 0.01 (Dedicated)***	

Economy (Transport Economic Efficiency)			
Sub-criterion	**Item**	**Qualitative Information**	**Quantitative Information**
User Benefits	Travel Time	*Travel time saving for existing cars on the A85. In the 'Hybrid' scenario this saving is offset by the delay incurred to existing passengers by the diversion of buses into the park and ride site. In the 'Dedicated' scenario the travel time saving for existing cars on the network will be similar (slight decrease) however the delay to the passengers of existing bus services will be removed. Interpeak, the removal of vehicles may be subsumed by the additional bus movements associated with the addition of bus movements.*	*113k travel time savings in the 'Dedicated' scenario, £504k disbenefit in the 'Hybrid' scenario over 60 year appraisal period.* *The travel time disbenefit in the 'Hybrid' scenario is caused by a delay of approximately two minutes to each existing bus service which diverts into the park and ride site.* *(2002 prices discounted to 2002)*
	User Charges	*Fare of £1 per return journey. Assumed that 10% of users will benefit from concessionary travel.* Users with gain benefits by not paying for parking in the city centre.	*Total annual fare costs 'Hybrid' and 'Dedicated' scenario = £56.4k per annum (2009 prices)* *User savings on parking costs £36,825 per annum (2009 prices, once bus fare has been taken into account) or £577k over 60 year appraisal period (2002 prices, discounted)*
	Vehicle Operating Costs	Slight increase in overall VOC. Car and LGV operating costs reduce due to reduced vehicle kilometres as a result of the scheme. This is offset by an increase in bus VOC, created by new park and ride service.	*Disbenefit of £268k to £380k* ('Hybrid'/'Dedicated' scenario) over 60 year appraisal period. *(2002 prices discounted to 2002)*

	Quality / Reliability Benefits	*Greater reliability and quality of bus service expected on the A85 corridor between the site and the city centre.*	Not quantified
Private Sector Operator Impacts	Investment Costs	*No investment costs expected.*	*£0*
	Operating & Maintenance Costs	*Costs covered by Local Government subsidy*	*£0*
	Revenues	*Revenue income from fares. Expected passenger demand 191.*	*Total annual fare revenue in 'Dedicated' and 'Hybrid' scenario = £56.4k per annum (2009 prices)*
	Grant/Subsidy payments	*Annual subsidy payment from Local Government. Calculated as the cost of providing the bus service, minus fare income.*	Annual subsidy to bus operator £48k 'Hybrid'(2009 prices, and 118k 'Dedicated' (2009 prices)
Monetised summary			
Monetary Impact Ratio			

Economy (Wider Economic Benefits)			
Sub-criterion	Item	Qualitative information	Quantitative information
Wider Economic Benefits	Agglomeration economies (WB1)	*Negligible due to small changes in generalised cost of journeys as a result of the scheme*	*Not quantified*
	Increased output in perfectly competitive markets (WB3)	*No evidence that park and ride will result in increased output.*	*Not quantified*
	Wider benefits arising from improved labour supply (WB4)	*No evidence that park and ride will increase the number of commuter trips, therefore no labour market benefits expected..*	*Not quantified*
Monetised summary		*Not quantified*	
Monetary Impact Ratio		*Not quantified*	

Economy (Economic Activity and Location Impacts)			
Sub-criterion	**Item**	**Qualitative Information**	**Quantitative Information**
Economic Activity and Location Impacts	Local Economic Impacts	*Minor benefit expected to retail sector within Perth city centre as a result of increased desirability from shoppers who currently have difficulty parking.*	*Not quantified.*
	National Economic Impacts	*No impacts expected*	*Not quantified.*
	Distributional Impacts	*No significant impacts expected*	*Not quantified.*

Integration			
Sub-criterion	**Item**	**Qualitative Information**	**Quantitative Information**
Transport Interchanges	Services & Ticketing	*Depending on the scenario adopted. The bus service will have a maximum of 15 minute(Hybrid interpeak) and 20 minutes (Dedicated interpeak) headway during working hours of the park and ride in order to provide a seamless as possible transition between different transport modes and the bus. Agreement with all transport providers to accept cross ticketing is recommended.* *Tickets will be purchased on the bus and priced the same as the Broxden park and ride service with holders of the National Entitlement Card travelling free. It is envisaged that up to two children will be able to travel free with a full paying adult outside the peak hours to encourage families in low incomes to use the service.* *Monthly and annual passes will be available at competitive prices to encourage frequent users.*	*Moderate positive impact.* *A maximum of 54 outbound and 54 inbound new bus journeys per day (108 in total), which as approximately 16,848 new circular bus trips per year.*
	Infrastructure & Information	*The park and ride facility will be designed and constructed to current design standards. High quality bus shelters will be provided with timetable, service and bus fare information to give customers the sense of 'place' as they wait for the bus. Sympathetic landscaping areas will be provided given the close proximity of the Landscape Area of Great Value and the River Tay Special Conservation Area. CCTV will be provided to give higher levels of personal security.*	*Moderate positive impact.* *A maximum of 54 outbound and 54 inbound new bus journeys per day (108 in total), which as approximately 16,848 new circular bus trips per year.*

Land-use Transport Integration		*Overall the park and ride integrates well with land use policy, namely SPP17 Planning for Transport, Regional Transport Strategy and National Transport Strategy and the Perth and Kinross Local Plan.*	
Policy Integration		*The scheme will meet the Disability Discrimination Act, Joined Up Policy and Practice in Health and Transport, Climate Change Delivery Plan*	
Accessibility & Social Inclusion			
Sub-criterion	**Item**	**Qualitative Information**	**Quantitative Information**
Community Accessibility	Public Transport Network Coverage	*Whilst the change in geographical coverage of the public transport system may not be significant, the increase in quality, frequency and reliability will be. Commuters, general visitors and tourists will all benefit from the introduction of a high quality park and ride facility which will increase access to jobs, services, shopping and retail facilities.*	*Approximately 100 residential dwellings in Walnut Grove have an increase in frequency of bus services from 1 bus every 2 hours to a minimum of four an hour.* Approximately 191 passengers per day (2012) will have access to a bus service and not have to travel into Perth City Centre by car.
	Access to Other Local Services	*Perth City Centre will be more accessible to people who live within the catchment of the park and ride facility. With education, leisure, jobs and retail facilities all being able to be accessed by people travelling by public transport.*	*Settlements such as Walnut Grove, Errol, St Madoes etc. will benefit from a travel choice not currently available in terms of quality, reliability and frequency.*

Comparative Accessibility	Distribution/Spatial Impacts by Social Group	*Residents of Walnut Grove will be able to walk, cycle or drive to the park and ride facility before continuing their journey by bus. This will reduce the distance travelled by car. The car park design will accommodate those with disabilities and offer secure parking facilities so as not to inhibit the more vulnerable members of society i.e. parents with children, the mobility impaired etc*	*As part of the journey will be undertaken by car for the majority of users the change in ratio of the vulnerable groups will be low. However extra parking capacity within Perth City Centre will increase the city's overall ambience.*
	Distribution/Spatial Impacts by Area	*The park and ride facility will benefit people living in towns and settlements on the A85, A90 and M90 road corridors. Whilst other commuter routes may experience benefits they are considered to be minor. Identify main broad distributional impacts by urban/rural, area classification, etc.*	*The change in ratio of impacts on the socially excluded will be low given the A85 travels through an area comprising detached owner occupier houses.*

Strategic Environmental Assessment (SEA)		
Summary of SEA outcome where appropriate	Not applicable.	
Cost to Public Sector		
Item	**Qualitative information**	**Quantitative information**
Public Sector Investment Costs	*Includes land acquisition, infrastructure* and drainage system	*£1.473M (2009 prices, undiscounted)*
Public Sector Operating & Maintenance Costs	*Annual maintenance cost relating to maintenance of infrastructure over 60 year period.*	*£7,412k per annum (2009 prices, undiscounted)*
Grant/Subsidy Payments	*Annual subsidy payment to park and ride operator. This is calculated as cost of providing the bus service minus the expected income from fares.*	*£48k per annum ('Hybrid')*

		£118k per annum ('Dedicated) Both 2009
Revenues	*No revenue from the service goes to public sector – this accrues to the operator of the service.* Lost revenue from reduction in parking income in city centre. Reduction in fare income from passengers abstracted from the Broxden park and ride service. Includes savings in subsidy from 54b bus service which is no longer required.	*£77k per annum ('Dedicated' and 'Hybrid' Both 2009 prices*
Taxation impacts	*Reduction in VAT income to central government due to decrease in overall vehicle kilometres as a result of the scheme*	*Not quantified*

Monetised Summary	
Present Value of Transport Benefits	*£0.274M ('Hybrid')* *£0.839M ('Dedicated')*
Present Value of Cost to Government	*-£2.859M ('Hybrid')* *-3.968M ('Dedicated')* *(Negative values =cost to government)*
Net Present Value	*£-2.586 ('Hybrid')* *£-3.130M ('Dedicated')*
Benefit-Cost to Government Ratio	*0.10 ('Hybrid')*

	0.21 ('Dedicated') *Effects of indirect taxation not quantified.*
Benefit-Cost to Government Ratio (including WEBs)	*Only a qualitative assessment of WEBs undertaken.*
Benefit-Cost to Funding Agency Ratio	*0.10 ('Hybrid')* *0.21 ('Dedicated')* *Effects of indirect taxation not quantified.*

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D.2 Detailed Appraisal Summary Table Site P4 (Reference Case, mid demand estimate)

Appraisal Summary Table Government Objectives

Proposal Details			
Name and address of authority or organisation promoting the proposal: **Tayside and Central Scotland Transport Partnership Bordeaux House, 31 Kinnoull Street, Perth, PH1 5EN** Subsidiary Organisation:- Perth and Kinross Council			
Proposal Name:	TACTRAN WPA034 - Development of the A90 Perth Park & Ride Site	Name of Planner:	*Niall Gardiner*
Proposal Description:	Park and ride car park located east of A85 Dundee Road trunk road and south of Walnut Grove. The park and ride bus service will have a 12minute headway peak and 15minute headway off peak.	Total Public Sector Funding Requirement:	Capital costs/grant (2009 costs undiscounted) £1.473M including land. 'Hybrid Service' - Annual subsidy to bus operator £48k (2009 prices, Total support by Public Sector £132k (2009 prices) 'Dedicated Service' - Annual subsidy to bus operator £119k (2009 prices, Total support by Public Sector £203k (2009 prices) Present Value of Cost to Govt -£2.859M (Hybrid), -3.968M (Dedicated)
Funding Sought From: (if applicable)	TACTRAN – capital funding Perth and Kinross Council – revenue support	Amount of Application:	As above.
Background Information			
Geographic Context:	The area under consideration is located in the south east of Perth east of the River Tay and the A85 and encompasses the edge of the Kinnoull Hill public park, the residential areas of Barnhill, the A85 Dundee Road corridor between the M90 including the Queens Bridge and Perth Bridge river crossings and Perth City Centre. To the south of the study area, the adjacent lands are undeveloped with open farmland and farmsteads prevalent. To the south of the road corridor a railway line and River Tay exists and runs parallel to the A85 road corridor. It has been noted that there are no areas of deprivation within the immediate area of the road corridor. A reduction in traffic volume could reduce the demand for parking within Perth City Centre.		

Social Context:	There are no areas of deprivation or social exclusion adjacent to the A85 road corridor considered within the study with adjacent housing areas mainly owner - occupier detached Victorian buildings. Car ownership levels are high and the majority of housing stock is owner-occupier low-density detached housing.
Economic Context:	The hinterland of Perth is very rural with a high level of dependence on agriculture and forestry for income, which suffers from a high level of both perceived and actual peripherality making economic development harder to encourage than it would otherwise be. Despite this Perth, performs well economically with increasing service sector employment and retail activity noted. Limited public transport outside the peak travel periods restricts access to services by sustainable modes

Planning Objectives	
Objective:	Performance against planning objective:
Transport Planning Objective No. 1 - To reduce car traffic flows on the A85 between the M90 and the centre of Perth. Target – Reduce car traffic flows by an average of *3%* during the AM & PM peak period and by an average of *3%* during the off peak period by the end of year one of the park and ride.	*The introduction of a P&R will reduce car traffic along the A85 Dundee Road, Queens Bridge, Perth Bridge and Perth City Centre as users switch from the private car to park and ride. It is predicted that peak hour demand for the park and ride will be approximately 30 vehicles per hour from an existing of peak flow of approximately 850 vehicles per hour. Off-peak demand is approximately 15 vehicles / hour from existing traffic flow of approximately 450 vehicles per hour.*
Transport Planning Objective No. 2 - To increase levels of accessibility for all by sustainable modes from the A90 catchment to the centre of Perth and to specific employment, health, leisure and retail locations in Perth. Target - Increase number of passengers by 5% per year in the catchment area of the park and ride. Maintain bus journey time in comparison to the private car along A85 road corridor. Increase number, frequency and reliability of bus services along the A85 Dundee Road in year one of the park and ride.	*Access to Perth City Centre is limited for people living along the A85 and A90 road corridors without driving into the city centre of Perth. Levels of walking and cycling along the A85 road corridor are low which could be partially attributed to high vehicle volumes along the A85. A reduction in traffic flow could encourage potential walkers and cyclists who are inhibited by traffic high volumes.*
Transport Planning Objective No. 3 - To achieve high user satisfaction for users of park and ride associated with personal and vehicle security and safety. Target - Achieve 80% of satisfied park and ride users of the Walnut Grove park and ride site within year one.	*The proposed park and ride facility will be designed incorporating best practice as detailed within the TACTRAN document. In addition, a high quality bus service with a modern bus fleet will be used to serve the facility supplemented by existing high quality bus service where required. Thus it is predicted that customer satisfaction will be high. The bus operation will be tendered to ensure minimum standards are met.*
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Rationale for Selection or Rejection of Proposal:	*The park and ride site (P4) has been selected for consideration at detailed appraisal stage. Site P4 is located at the edge of town adjacent to the junction of three strategic roads which is an appropriate location for a park and ride site. It is accessible by several modes; car, bus, foot and by cycle. The site is allocated as a possible park and ride site within the Local Plan. The alternative site (P5) has accessibility issues with a junction connecting to the trunk road particularly problematic. Additionally, poor access by people travelling on foot and by cycle is difficult and therefore Site P5 has been disregarded from the process.*

Implementability Appraisal	
Technical:	***Strengths:***- A single junction can be formed with the existing A85 trunk road. A relaxation of visibility requirement may be necessary depending on the design speed of the road. This can be justified by undertaking a speed survey, through negotiations with Transport Scotland or the extension of the 40mph speed limit restriction. The point of access will be located at a point where the road embankment is relatively small and therefore the amount of earthworks will be reduced. Access by pedestrians can be achieved via the existing pedestrian network. Limited cyclist provision is nearby however access could be gained via the existing footway. The site is relatively flat and large enough to take the facility and future extension and adequate SUDs infrastructure. The site is allocated as a single user site within the Local Plan. Construction techniques will be relatively straightforward using existing accepted techniques. ***Weaknesses:***- The site is only directly accessible for traffic driving towards Perth. Traffic travelling northbound on the A85, must take a more circulatory route around the gyratory of the Barnhill Interchange to access the site. Though it should be noted that this movement will be low and used mainly by park and ride buses. Land required to construct the park and ride facility is owned by a third party requiring land purchase. A private access road requires upgrading for site access. The site will be directly overlooked by three private residential properties. Whilst other properties are present they are somewhat more remote from the site. Whilst the road is a trunk road, early indications are that access will not present a major issue.
Operational:	**Strengths**:- An existing service (No. 16 Dundee – Perth) the No. 333 that shuttles between the PRI and Ninewells Hospital, and a subsidised local service that serves nearby Walnut Grove pass the site. It has been assumed within the provision of the 'Hybrid' service that these buses would supplement a dedicated only midi bus. The 54b would be removed thus introducing a subsidy saving. The location of the park and ride site means buses can travel to/from Perth centre in a logical, direct fashion albeit with a more circulatory route between the city and the site. The westbound Dundee – Perth service would be able to serve the site with minor delay. Early indications are that the bus operators would be interested in serving the site. There is opportunity to 'attract' a higher number of pedestrian or cyclist / demand from Walnut Grove. **Weaknesses:-**The opportunity for the Dundee bound eastbound service to serve the site may reduce the attractiveness of visitors from the Dundee area. This could preclude the diversion of the number 16 service. The park and ride service will require a subsidy which is based on the level of demand predicted within this study. Outside influences could impact on demand assumptions.
Financial:	*Sources for funding are unknown, however it is envisaged that TACTRAN or Perth and Kinross Council will fund the capital costs.* *On-going operating costs will be funded from Perth and Kinross revenue allocation which will require the subsidy for a 'Hybrid' bus service estimated to be £48k per annum* subsidy and £132k in total when other costs are taken into consideration. It is not known how this will be funded.

	On-going operating costs will be funded from Perth and Kinross revenue allocation which will require the subsidy for a 'Dedicated' bus service estimated to be £132k per annum subsidy and £203k in total when other costs are taken into consideration. It is not known how this will be funded.
Public:	*The proposal is not known to the general public, however the site is allocated as a site for park and ride or similar within the Local Plan which is a public document. In acceptability terms it is envisaged that overall, the public will accept the proposals, however the community residing in Walnut Grove may have objections, particularly those living on the western edge.*

Environment			
Mitigation Options Included: (Costs & Benefits)	*Noise and emissions to air during construction and operation* *The location of the, bus stop will be located as remote as possible from sensitive receptors as this is the area where activity and hence noise generation and emissions to air are likely to be the greatest.* *Controlled working hours and use of appropriate working methods and equipment to minimise the temporary impact associated with construction noise and emissions to air (primarily dust) during construction will be applied.* *Use of bunds or landscape barriers to be implemented within the design to mitigate for noise impact if required.* *River Tay (water quality, drainage, flood defence)* *Drainage proposals must ensure protection of the River Tay SAC and must be informed by consultation with SEPA, Perth and Kinross Council and SNH on treatment, attenuation and discharge requirements. In order to increase confidence in level of impact being reduced to neutral, drainage should be limited to Greenfield and SEPA's requirement for two levels of treatment (preferably with one level being permeable paving or form paving) should be incorporated into drainage design where possible.* *The design and space allocation for SUDS ponds should be informed by on-site ground / soil / groundwater conditions, the depth of the water table, the barrier created by the Dundee-Perth railway line and any existing culverts and drainage channels within the local area.* *Agriculture* *Should the scheme result in severance of landholding such that it affects viability adequate compensation will be required.* *Ground stability* *Geotechnical desk study to confirm ground stability and ground investigation followed if required by design specifications to address ground conditions.* *Breeding birds* *Retention of shrubs and young trees around the site boundary will be incorporated within the design, if possible incorporation of this vegetation into the landscape design, and sensitive design and location of construction of compounds and access routes to minimise the potential impact on breeding birds (protected under legislation) in the site periphery vegetation. If any of the trees and shrubs do require removal this must be is undertaken outside of the nesting bird season..* *Landscape character visual amenity and siting of nearby listed buildings* *Develop landscape plan, likely to include retention of as much existing vegetation and key landscape features as possible; replace and screen planting using indigenous trees and shrubs to marry with local vegetation and use landscape planting to soften the appearance of the site vegetation; and keep the use of signage to a minimum.* *Buried archaeology potential* *Further studies followed if necessary by construction management activities (e.g. pre-construction archaeological excavation, preservation of important buried archaeological remains in situ through appropriate design, maintenance of appropriate archaeological monitoring during construction works) to mitigate for the presence of buried archaeology (if potential to be present determined).*		
Sub-criterion	**Qualitative Information**	**Quantitative Information**	**Significance of Impact**
Noise and Vibration	*Owing to the high noise levels from nearby A90 and M90, impacts arising from the scheme will be minimal though a few nearby receptors in Walnut Grove may be subject to noise from on- site movements and construction activity.*	*It is envisaged that a maximum of between three and five properties will be affected with the introduction of the park and ride car park.*	*minor negative*
Global Air Quality – CO_2	*It is considered that the site will not generate traffic and the majority of traffic passing the site will divert to the park and ride. Therefore the level of CO_2 will reduce slightly overall. However this benefit may be outweighed by the number of bus movements introduced by the scheme.*	*It is estimated that carbon emitted over the sixty year appraisal period will reduce by 6 tonnes as a result of the scheme, with an overall benefit of £4k ('Hybrid').* *The 'Dedicated' service results in an overall saving of 90 tonnes of carbon,*	*PV1 = minor positive*

		and overall saving of £60k.	
Local Air Quality – PM_{10} and NO_2	*The site is within an AQMA for Perth. Local air quality is likely to be dominated by the M90/A90 so that activities from the site are unlikely to affect performance against the Perth AQMA.*	*Between three and five properties will experience an increase in PM10.* *Between three and five properties will experience an increase in NO_2.*	*neutral – minor negative*
Water Quality, Drainage and Flood Defence	*Polluted run-off and mobilisation of pollutants during flood events if SUDS is in flood zone.* *Potential drainage/flood impacts associated with the increase in paved area.* *Although not within SEPA indicative flood plain, proximity means there is some potential for impacts.*	*River Tay SAC (international designation); water quality classification A1:Excellent –* *potentially affected.*	. *major adverse – neutral*[42] .
Geology	*Intertidal silt and clay Alluvium may present some risk associated with load bearing capacity and with pavement foundations.*	*No sites designated for geological reasons or mineral reserve.*	*moderate adverse – neutral*[43]
Biodiversity	*Pollution to the watercourse poses a risk to the qualifying features of the SAC.*	*1. River Tay Special Area of Conservation (SAC) internationally important European site with strict legislation governing its protection under the EC Habitats Directive) next to site; and* *3. Potential effects on breeding birds.*	*major negative – neutral*[44]
Visual Amenity	*Although various receptor groups will experience views of the site it is at the urban edge and close to a major highway interchange which dominates the local landscape and visual amenity.*	*No designated views;*	*moderate negative – neutral*
Agriculture and Soils	*Part of the site has been developed as office use. The remainder of the site is owned by one landowner by a single landowner.*	*No "best quality" prime agricultural land.*	*neutral* [45]
Cultural Heritage	*There is some evidence for prehistoric funerary, hunting and settlement activity within the area so potential exists for effects on buried archaeology.*	*1. No Conservation Areas;* *4. Two listed buildings – setting potentially impacted; and* *5. Two Historic Gardens and Designed Landscapes – setting potentially impacted.*	*moderate negative – neutral*[46]

42 The major ranking arises from international status of SAC and the outline stage of the drainage proposals, as well as the absence of consideration of flood risk. Once these are undertaken the score is likely to reduce though extent will depend on the measures and outcomes of the studies.

43 Until geotechnical study is undertaken, the impact must be considered moderate although it is likely that with further analysis this could reduce to minor negative or neutral.

44 The major score is due to international status of SAC and to date lack of design detail to demonstrate how this will be protected. The score could reduce to neutral with such design in place. May require appropriate assessment screening exercise to determine the potential for adverse impact on the River Tay SAC. Also requires appropriate mitigation to ensure the protection of breeding birds in the site periphery vegetation.

45 Effects on viability of holdings must be considered to be a potentially significant issue until details of land holding are established, although it is highly likely that this will reduce to neutral once such details are determined.

46 Impact on buried archaeology must be considered, although it is likely that with further analysis, his could reduce to minor negative or neutral, particularly if effects can be addressed through construction management activities.

Landscape	*Although the site is in a largely rural LCA it is at the urban edge and close to a major highway interchange which dominates the local landscape so unlikely to impact the area.*	*There will be no land-take from designated landscape including Areas of Great Landscape Value or Ancient Woodland though potential effect on setting of an adjacent such area.*	*moderate – neutral*[47]
Physical Fitness	*Although a slight increase in physical activity may be experienced with the park and ride facility in place, it is envisaged that the increase in activity will be low.*	*It is considered that the number of lives and lost working days will be negligible.*	*PV2 = 0*
Monetised summary	*Not Quantified*		
Monetary Impact Ratio	*Not Quantified)*		

47 It is assumed to be moderate although likely to reduce with design of appropriate mitigation.

Safety			
Sub-criterion	**Item**	**Qualitative Information**	**Quantitative Information**
Accidents	Change in Annual Personal Injury Accidents	*The number of million vehicle kilometres travelled will be reduced with the introduction of the park and ride. A journey length of approximately 5.6km will be saved per vehicle for each return trip which will reduce the number of accidents.*	15 fewer PIA over 60 year appraisal period in high demand scenario, same PIA over 60 year appraisal period in low demand scenario. *£361k saving with 'Hybrid' service demand scenario and 305k benefit in 'Dedicated' scenario over 60 year appraisal period.*
	Change in Balance of Severity	*It is considered that the change in balance of severity of accidents will not alter* with the introduction of the park and ride proposals.	
	Total Discounted Savings		*£361k saving with 'Hybrid' scenario and 305k benefit with 'Dedicated' scenario over 60 year appraisal period.*
Security		*The site will be designed following the concepts adopted for the design of Broxden park and ride with fencing, lighting, appropriate landscaping and CCTV in place to complement the 'open' design of the car park which will facilitate passive security from other users.* *It is predicted that there will not be any additional security problems as a result of the park and ride. Therefore the impact of the park and ride on the security of users is*	*Neutral* *Tayside Police were contacted regarding the security of Broxden park and ride site where it was confirmed that there has been no reports of personal assaults or of vehicle theft or vandalism since the park and ride was opened*

		considered to be neutral.	
Monetised summary		*£361k saving to 305k benefit over 60 year appraisal period*	
Monetary Impact Ratio		***0.12 (Hybrid), 0.07 (Dedicated)***	

Economy (Transport Economic Efficiency)			
Sub-criterion	**Item**	**Qualitative Information**	**Quantitative Information**
User Benefits	Travel Time	*Travel time saving for existing cars on the A85. In the 'Hybrid' scenario this saving is offset by the delay incurred to existing passengers by the diversion of buses into the park and ride site. In the 'Dedicated' scenario the travel time saving for existing cars on the network will be similar (slight decrease) however the delay to the passengers of existing bus services will be removed. Interpeak, the removal of vehicles may be subsumed by the additional bus movements associated with the addition of bus movements.*	*£362k travel time savings in the 'Dedicated' scenario, £365k disbenefits in the 'Hybrid' scenario over 60 year appraisal period.* *(2002 prices discounted)*
	User Charges	*Fare of £1 per return journey. Assumed that 10% of users will benefit from concessionary travel.* Users with gain benefits by not paying for parking in the city centre.	*Total annual fare costs 'Hybrid' and 'Dedicated' scenario = £56.4k per annum (2009 prices)* *User savings on parking costs £36,825 per annum (2009 prices, once bus fare has been taken into account) or £577k over 60 year appraisal period (2002 prices, discounted)*
	Vehicle Operating Costs	Slight increase in overall VOC. Car and LGV operating costs reduce due to reduced vehicle kilometres as a result of the scheme. This is offset by an increase in bus VOC, created by new park and ride service.	*Disbenefit of £266k to £373k* ('Hybrid'/'Dedicated' scenario) over 60 year appraisal period. *(2002 prices discounted)*

	Quality / Reliability Benefits	*Greater reliability and quality of bus service expected on the A85 corridor between the site and the city centre.*	Not quantified
Private Sector Operator Impacts	Investment Costs	*No investment costs expected.*	*£0*
	Operating & Maintenance Costs	*Costs covered by Local Government subsidy*	*£0*
	Revenues	*Revenue income from fares. Expected passenger demand 191.*	*Total annual fare revenue in 'Dedicated' and 'Hybrid' scenario = £56.4k per annum (2009 prices)*
	Grant/Subsidy payments	*Annual subsidy payment from Local Government. Calculated as the cost of providing the bus service, minus fare income.*	Annual subsidy to bus operator £48k 'Hybrid'(2009 prices, and 118k 'Dedicated' (2009 prices)
Monetised summary			
Monetary Impact Ratio			

Economy (Wider Economic Benefits)			
Sub-criterion	Item	Qualitative information	Quantitative information
Wider Economic Benefits	Agglomeration economies (WB1)	*Negligible due to small changes in generalised cost of journeys as a result of the scheme*	*Not quantified*
	Increased output in perfectly competitive markets (WB3)	*No evidence that park and ride will result in increased output.*	*Not quantified*
	Wider benefits arising from improved labour supply (WB4)	*No evidence that park and ride will increase the number of commuter trips, therefore no labour market benefits expected.*	*Not quantified*
Monetised summary		*Not quantified*	
Monetary Impact Ratio		*Not quantified*	

Economy (Economic Activity and Location Impacts)			
Sub-criterion	**Item**	**Qualitative Information**	**Quantitative Information**
Economic Activity and Location Impacts	Local Economic Impacts	*Minor benefit expected to retail sector within Perth city centre as a result of increased desirability from shoppers who currently have difficulty parking.*	*Not quantified.*
	National Economic Impacts	*No impacts expected*	*Not quantified.*
	Distributional Impacts	*No significant impacts expected*	*Not quantified.*

Integration			
Sub-criterion	**Item**	**Qualitative Information**	**Quantitative Information**
Transport Interchanges	Services & Ticketing	*Depending on the scenario adopted. The bus service will have a maximum of 15 minute (Hybrid interpeak) and 20 minute (Dedicated interpeak) headway during working hours of the park and ride in order to provide a seamless as possible transition between different transport modes and the bus. Agreement with all transport providers to accept cross ticketing is recommended.* *Tickets will be purchased on the bus and priced the same as the Broxden park and ride service with holders of the National Entitlement Card travelling free. It is envisaged that up to two children will be able to travel free with a full paying adult outside the peak hours to encourage families in low incomes to use the service.* *Monthly and annual passes will be available at competitive prices to encourage frequent users.*	*Moderate positive impact.* *A maximum of 54 outbound and 54 inbound new bus journeys per day (108 in total), which as approximately 16,848 new circular bus trips per year.*

	Infrastructure & Information	*The park and ride facility will be designed and constructed to current design standards. High quality bus shelters will be provided with timetable, service and bus fare information to give customers the sense of 'place' as they wait for the bus. Sympathetic landscaping areas will be provided given the close proximity of the Landscape Area of Great Value and the River Tay Special Conservation Area. CCTV will be provided to give higher levels of personal security.*	*Moderate positive impact.* *A maximum of 54 outbound and 54 inbound new bus journeys per day (108 in total), which as approximately 16,848 new circular bus trips per year.*
Land-use Transport Integration		*Overall the park and ride integrates well with land use policy, namely SPP17 Planning for Transport, Regional Transport Strategy and National Transport Strategy and the Perth and Kinross Local Plan.*	
Policy Integration		*The scheme will meet the Disability Discrimination Act, Joined Up Policy and Practice in Health and Transport, Climate Change Delivery Plan*	

Accessibility & Social Inclusion

Sub-criterion	Item	Qualitative Information	Quantitative Information
Community Accessibility	Public Transport Network Coverage	*Whilst the change in geographical coverage of the public transport system may not be significant, the increase in quality, frequency and reliability will be. Commuters, general visitors and tourists will all benefit from the introduction of a high quality park and ride facility which will increase access to jobs, services, shopping and retail facilities.*	*Approximately 100 residential dwellings in Walnut Grove have an increase in frequency of bus services from 1 bus every 2 hours to a minimum of four an hour (Hybrid scenario) and three an hour (Dedicated scenario).* Approximately 191 passengers per day (2012) will have access to a bus service and not have to travel into Perth City Centre by car.

	Access to Other Local Services	*Perth City Centre will be more accessible to people who live within the catchment of the park and ride facility. With education, leisure, jobs and retail facilities all being able to be accessed by people travelling by public transport.*	*Settlements such as Walnut Grove, Errol, St Madoes etc. will benefit from a travel choice not currently available in terms of quality, reliability and frequency.*
Comparative Accessibility	Distribution/Spatial Impacts by Social Group	*Residents of Walnut Grove will be able to walk, cycle or drive to the park and ride facility before continuing their journey by bus. This will reduce the distance travelled by car. The car park design will accommodate those with disabilities and offer secure parking facilities so as not to inhibit the more vulnerable members of society i.e. parents with children, the mobility impaired etc*	*As part of the journey will be undertaken by car for the majority of users the change in ratio of the vulnerable groups will be low. However extra parking capacity within Perth City Centre will increase the city's overall ambience.*
	Distribution/Spatial Impacts by Area	*The park and ride facility will benefit people living in towns and settlements on the A85, A90 and M90 road corridors. Whilst other commuter routes may experience benefits they are considered to be minor. Identify main broad distributional impacts by urban/rural, area classification, etc.*	*The change in ratio of impacts on the socially excluded will be low given the A85 travels through an area comprising detached owner occupier houses.*

Strategic Environmental Assessment (SEA)		
Summary of SEA outcome where appropriate	Not applicable.	
Cost to Public Sector		
Item	**Qualitative information**	**Quantitative information**

Public Sector Investment Costs	*Includes land acquisition, infrastructure* and drainage system	*£1.473M (2009 prices, undiscounted)*
Public Sector Operating & Maintenance Costs	*Annual maintenance cost relating to maintenance of infrastructure over 60 year period.*	*£7,412k per annum (2009 prices, undiscounted)*
Grant/Subsidy Payments	*Annual subsidy payment to park and ride operator. This is calculated as cost of providing the bus service minus the expected income from fares.*	*£48k per annum ('Hybrid')* *£118k per annum ('Dedicated)* Both 2009
Revenues	*No revenue from the service goes to public sector – this accrues to the operator of the service.* Lost revenue from reduction in parking income in city centre. Reduction in fare income from passengers abstracted from the Broxden park and ride service. Includes savings in subsidy from 54b bus service which is no longer required.	*£77k per annum ('Dedicated' and 'Hybrid' Both 2009 prices*
Taxation impacts	*Reduction in VAT income to central government due to decrease in overall vehicle kilometres as a result of the scheme*	*Not quantified*

Monetised Summary	
Present Value of Transport Benefits	*£0.478M ('Hybrid')* *£1.158M ('Dedicated')*
Present Value of Cost to Government	*-£2.859M ('Hybrid')* *-3.968M ('Dedicated')* *(Negative values =cost to government)*

Net Present Value	*£-2.382 ('Hybrid')* *£-2.811M ('Dedicated')*
Benefit-Cost to Government Ratio	*0.17 ('Hybrid')* *0.29 ('Dedicated')* *Effects of indirect taxation not quantified.*
Benefit-Cost to Government Ratio (including WEBs)	*Only a qualitative assessment of WEBs undertaken.*
Benefit-Cost to Funding Agency Ratio	*0.17 ('Hybrid')* *0.29 ('Dedicated')* *Effects of indirect taxation not quantified.*

Appendix E

E.1 Demand Analysis

E.1.1 This section provides more detail regarding the demand figures presented within the main body of the report.

E.1.2 Demand for a park and ride service is normally estimated using a generalised cost model[48] or through the application of 'intercept rates'. Intercept rates are defined as the percentage of vehicles passing the park and site, or travelling into the urban centre, which are 'captured' by the new park and ride service.

E.1.3 Previous work by Colin Buchanan and Partners developed a generalised cost model for Site P4 (the PRIDE model), which predicted daily demands of 159 vehicles in 2012.

E.1.4 For this study, Atkins has chosen to use intercept rates to calculate demands for Site P4. This approach provides an alternative method of calculating demand, the outputs from which generally agree with the figures suggested by the PRIDE model.

11.9 There are two types of intercept rates that can be used to calculate demands for park and ride; daily intercept rates or those based upon the 'active' park and ride period. For comparative purposes Atkins has produced demands for Site P4 using both daily and active period interception rates.

Daily Intercept Rates

E.1.5 To calculate the likely daily intercept rate for Site P4, a comparison of daily intercept rates at other existing park and ride sites across the United Kingdom was undertaken. The formula for calculating the daily intercept rate for a park and ride site is presented below.

Daily Intercept Rate = Daily Demand for park and ride / Average Annual Daily Traffic flow (AADT)

E.1.6 These intercept rates are shown in Table E.1. These rates are based upon the two-way average annual daily traffic flows (AADT) passing each site.

[48] A generalised cost model compares the cost of making the same journey by park and ride and private vehicle, and estimates the number of people who will switch to the park and ride service. It considers elements such as in-vehicle journey time, parking charges, wait/walk times and bus journey times.

Table E.1 -Daily Intercept Rates for UK Park and Ride sites[49]

	Location	Park and Ride Site (s)	Spaces	Fare (AM Peak)	Centre Parking Charges	Observed Demand (average cars per day)	Flow (AADT)	Calculated Intercept Rate (%)
1	Aberdeenshire	Ellon	250	£3.25	£4.39	126	11,423	1.10
2	Bath	Newbridge	450	£2.20	£3.66	240	16,439	1.46
3	Durham	Belmont	424	£1.70	£5.87	175	26,515	0.66[1]
4	Durham	Sniperley	294	£1.70	£5.87	150	15,000	1.00[1]
5	Perth	Broxden	244	£1.00	£2.75	228	15,031	1.52
6	Ipswich	London Road	550	£3.00	£6.63	321	4,115	7.80[1]
7	Edinburgh	Ferrytoll	1,000	£4.50	£5.67	558	55,800	0.60-1.00[1]
8	Maidstone	Willington	400	£2.00	£1.34	548	11,480	4.77
9	Maidstone	London Road	518	£2.00	£1.34	626	45,706	1.37
10	Maidstone	Sittingbourne	470	£2.00	£1.34	485	43,217	1.12
11	Salisbury	Beehive, Wilton, Britford, London Road	1686 (combined)	£2.00	£1.62	1,214 (combined)	53,352	2.27

E.1.7 The results in Table E1 involved research of existing sites across the country to establish the size of park and ride on offer and also to understand what level of traffic flow passed the site. Sources of data varied from site to site, however research work undertaken by the Transport Advisory Service in 2007 and permanent traffic count sites were used in many cases. The data sources are detailed below.

E.1.8 The intercept rates for Ellon, Newbridge, and Broxden have been calculated using the formula detailed above. The intercept rate for Ellon was calculated using an AADT figure obtained from a Transport Scotland permanent count site located near the site, and a park and ride demand figure obtained from Aberdeenshire Council.

E.1.9 The intercept rates for Durham, Ipswich, Bath Newbridge and Edinburgh have been obtained from the Transport Advisory Service (TAS) Partnership 'Park and Ride Great Britain 2007' report.

E.1.10 An AADT figure obtained from a Highways Agency permanent count site located near the Bath Newbridge was used to inform the analysis.

E.1.11 The intercept rate for Broxden was obtained from demand data estimated by Colin Buchanan's PRIDE model and an AADT figure calculated using flows from the Perth Paramics model[50].

E.1.12 The intercept rate for Maidstone sites was calculated using 2006/7 demand data contained within a report from Maidstone Borough Council's (MBC) Development Community Services team, and AADT data from a 2004 MBC Air Quality Management assessment.

[49] Note that the Maidstone Coombe Quarry site closed in 2007 and has not been included within this table. Park and ride sites at Bedford, Taunton and Shrewsbury were identified as potentially similar to Perth, but either observed demand or AADT figures were not available, and an interception rate could not be calculated.

E.1.13 The intercept rate for the Salisbury sites was calculated using the demand figures obtained from the TAS 'Park and Ride Great Britain 2007' report and AADT information from the Salisbury Core Strategy Assessment (2008).

E.1.14 Not all of the sites listed above are considered comparable to the Site P4. Ellon has been discounted on the basis that it is effectively a remote rural park and ride service serving Aberdeen city. Both Durham sites have been discounted as Durham city centre operates a congestion charge for vehicles entering its core, which is likely to increase interception rates. Ipswich and Edinburgh have been discounted due to the high parking charges, which are in effect in the urban centre, which provide a higher incentive for car drivers to switch to park and ride. The sites worthy of consideration have been included in Table E.2 for comparative purposes. These sites have daily intercept rates ranging from 1.12% to 4.77%.

E.1.15 The measured AADT passing Site P4 in 2008 was 13,800 vehicles[51]. Table E.2 presents P4 park and ride demands calculated using this AADT and the range of daily intercept rates presented above.

Table E.2 - Intercept Range Demand Projections

Intercept Rate (%)	A85 Flow (AADT)	Demand (Cars) (average per day)
1.12 (Sittingbourne)	13,800	155
1.37 (London Road)	13,800	189
1.46 (Bath)	13,800	201
1.52 (Broxden)	13,800	210
2.27 (Salisbury sites)	13,800	313
4.77 (Willington)	13,800	658

E.1.16 Referring to the results in Table E.2, it can be noted that the sites correlate well with the exception of the Salisbury sites and the site in Willington which score exceptionally highly. Therefore these sites have been discounted from the analysis.

E.1.17 Applying the intercept range to the 2008 AADT for the A85 as it passes Site P4, results in demand figures ranging from 155-658 cars per day. Correlating these figures, it can be determined that typical intercept rates of between 1.12 and 1.52 would be expected for site P4. The sites in Salisbury and Willington are significantly above the trend line and have been discounted from the analysis.

E.1.18 The application of a daily intercept rate provides a useful method of estimating the likely range of park and ride demands, but do not take into account the final origin / destination of trips. Further demand analysis based upon the park and ride 'active period' interception rate is presented below.

Intercept Rates Based on Park and Ride 'Active Periods'

E.1.19 An alternative method of applying interception rates is suggested by the Transport Advisory Service (TAS) Partnership, whereby an interception rate based upon the active park and ride period (07:00 to 15:00) is used.

E.1.20 The active park and ride period covers the most likely times during which there is a passenger demand to head into the urban centre. After 15:00, park and ride passengers tend to consist of those returning by bus to their parked vehicles.

[51] Based on 2008 information supplied by Perth and Kinross Council

E.1.21 TAS' research and analysis of existing park and ride operations suggests that overall interception rates based upon the 'active' park and ride period are typically between 5% and 10% of traffic flows into the urban centre on the adjacent highway link[52].

E.1.22 The TAS report states that rates towards or in excess of the top end of this scale are more commonly associated with urban centres where:

Park and ride provision is linked to parking restraint in the town/city centre; and

The differential pricing between parking charges in the town/city centre and the park and ride site provides an incentive to use park and ride.

E.1.23 Two sources of data were used to ascertain traffic flows heading into Perth:

Flows from the Base 2003 Perth Paramics model; and

Census 2001 Journey to Work data.

E.1.24 Modelled link flows from the Base 2003 Perth Paramics model are presented in Table E.3.

Table E.3 - Modelled Paramics Flows (cars)

Description	AM Peak Hour flow (08:15 to 09:15)	Flow in AM modelled period (06:30 to 09:30)
A85 westbound into Perth	532	1125
A912 northbound into Perth after M90 merge	755	1321
A912 northbound into Perth south of M90	307	543
M90 northbound travelling onto A912	448	778

E.1.25 Analysis of the Paramics model flows show that of the 1125 cars passing the site in the AM period, 645 turn left and head into Perth City Centre (via the Queens Bridge or Perth Bridge). The remaining 480 vehicles continue straight ahead onto the A93 and A94. A total of 778 cars travel into Perth from the M90, via the A912 during the 3 hour AM period.

E.1.26 Table E.4 presents the total potential demand for Site P4 based upon the above information based on a range of intercept rates of between 5% and 10%. It has been assumed that 33% of the traffic currently heading into Perth from the M90 is considered as contributing to a potential demand for the Site P4.

Table E.4– Calculated Demand Using Paramics Link Flows

Intercept Rate (%)	Inbound flow on A85 (calculated from Paramics model) (07:00 – 10:00)	AM Demand (Cars) (07:00 to 10:00)	Total Demand (Cars) (07:00 to 15:00)
5%	902	45	68
10%	902	90	135

The inbound flow of 902 cars has been calculated as 645 vehicles on the A85 heading into Perth City Centre (via the Queens Street or South Street bridges) plus 33% of 778, the inbound flow on the A912.

Table B5 shows that based on the Paramics model link flows, a total of 68 to 135 vehicles are expected to use Site P4 between 07:00 and 15:00.

[52] 'Bus Based Park and Ride – A Pilot Scheme', The TAS Partnership Limited, 2002.

Likely trip numbers in the interpeak period in E.4 have been calculated using available survey data from the Broxden Park and Ride site, which was undertaken in 2008. Table B6 presents the observed number of cars and LGVs entering the Broxden site in each period.

Table E.5 - Number of Cars and LGVs Entering Broxden Park & Ride

Time period	Number of vehicles	Percentage
AM peak (07:00 to 10:00)	186	66%
Inter peak (10:00 to 14:00)	95	34%
Total	281	100%

E.1.27 Table E.5 shows that 34% of vehicles entering Broxden did so during the inter-peak period between 10:00 and 14:00. Demand for park and ride in the PM peak period is considered to be low. The figures contained within Table E.5 provide the basis for factoring the estimated Site P4 demands by 50% to calculate interpeak demands.

E.1.28 Census Journey to Work (JTW) data was also used to estimate the amount of traffic passing Site P4, which heads into Perth City Centre. This dataset provides a ward-to-ward breakdown of the modes that people use to travel to their place of employment. Census JTW data does not specify what time of day a particular trip is made, but the majority of commuter trips to a place of work are likely to be made within the period 07:00 to 10:00. Census JTW data was used to estimate demand in the AM peak period, which was again factored by 50% to generate interpeak demands.

E.1.29 Further analysis was undertaken to identify the number of car-based trips stopping in the North Inch and South Inch wards. These wards cover the Perth central area, and represent a reasonable reflection of the destination of commuters to Perth City Centre.

E.1.30 The total number of car drivers stopping in the North Inch and South Inch wards is shown in Table E.6, along with the strategic route they are likely to travel on.

Table E.6- Census 2001 JTW data - Total Car Driver Trips Into Perth City Centre

Strategic Route	North Inch	South Inch	Total	%age
A85 from west	167	144	311	9
A9 from north	259	208	466	13
A90 from east	432	356	788	22
A912 from south	200	201	400	11
A93 from north	177	138	315	9
A94 from north	323	266	589	16
M90 from south	211	218	430	12
A9 from west	156	147	303	8%
TOTAL	1924	1676	3600	100%

E.1.31 It has been assumed that all cars travelling into Perth City Centre from the A90 east will use the A85, and thus pass Site P4 as this is the shortest and most convenient route. In addition to this, it has also been assumed that 33% of commuters travelling into the city centre from the M90 south will use the A85.

E.1.32 This results in a total of 930 cars, which are likely to travel past Site P4 in the AM peak period and stop in North Inch and South Inch.

E.1.33 Applying the suggested range of active period intercept rates (5% to 10%) to the calculated Census JTW data (car drivers only) results in the demands tabulated within Table E.7.

Table E.7 - Intercept Range Demand Projections (from Census JTW)

Intercept Rate (%)	Inbound flow on A85 (calculated from Census JTW data) (07:00 – 10:00)	AM Demand (Cars) (07:00 to 10:00)	Total Demand (Cars) (07:00 to 15:00)
5%	930	47	71
10%	930	94	140

E.1.34 Demands in the interpeak period have been factored from AM demands using the methodology presented previously.

E.1.35 Table E.7 shows that based on Census 2001 JTW data a total of 71 to 140 passengers are expected to use Site P4 between 07:00 and 15:00.

Summary of Demands

E.1.36 Table E.8 presents a summary of demand information

Table E.8- Summary of demands

Method of calculation	Estimated daily demands for Site P4 (vehicles)	No. of passengers (1.2 per vehicle)
Colin Buchanan PRIDE model	159	191
'Daily' intercept rates	155-210	186 - 252
'Active period' intercept rates based on Census JTW data (5%-10% range)	71-140	86 - 168
'Active period' intercept rates based on flows from the Perth Paramics model (5%-10% range)	68-135	82 - 162

E.1.37 It can be noted that demands calculated using Census JTW data and the Paramics link flows for the 'active period' are similar.

E.1.38 It is recommended that the business case and economic analysis for Site P4 consider demand of 159 vehicles per day. A lower figure of 68 vehicles and an upper figure of 210 vehicles will also be presented for comparative purposes. It has been assumed that the vehicle occupancy will be 1.2 passengers per car in accordance with the Broxden Park and Ride survey results.

E.1.39 It is unlikely that these passenger demands would be realised in the opening year of 2012. Experience suggests that demand would build slowly once the service was in operation. This is dependent on the frequency, quality and public perception of the park and ride service, city centre parking policy and bus priority measures in place along the A85 road corridor.

Appendix F

F.1 COBA Model

Development of the COBA model

F.1.1 This appendix presents more information regarding the production of the Perth COBA model.

Approach to Modelling

F.1.2 The economic modelling of a complex public transport scheme usually requires the creation of a new multi-modal, Variable Demand Model (VDM). The model would need to cover the entire catchment of Site P4, as well as the area in which travel patterns would be expected to change. Such a model would require the commissioning of a series of transport surveys, and a lengthy model build period. The scale of this exercise is considered to be disproportionate to the expected changes in transport costs and patterns as a result of the Site P4 scheme.

F.1.3 A variable demand modelling exercise has been undertaken using a COBA highway model as a means of providing approximate costs and benefits to road users as a result of the Park and Ride scheme. Car, LGV and bus traffic demands have been manually altered to reflect the impact of the Perth Park and Ride service. This is a non-standard use of COBA, which is recommended only for use in fixed trip matrix assessments. The results from the COBA assessment are not deemed to be defensible at a planning enquiry, for which a more detailed multi-modal model would be required.

F.1.4 However, the adopted approach to the TEE appraisal for Site P4 is proportionate to the scale of the scheme, as recommended by the STAG refresh of 2007. The estimated costs/benefits resulting from the service are likely to be small in scale, and are not expected to form a major part of the business case for the scheme. The determinant of the scheme's development is likely to be the level of subsidy required for the bus service, rather than the projected TEE figures.

F.1.5 The following assumptions have been made in this exercise:

- Demands for Park and Ride have been calculated outside of the modelling process (as discussed previously);
- No increase/decrease in overall trip numbers when park and ride is introduced will be experienced (i.e. no induced traffic) This is because the overall change in journey costs as a result of the scheme is small, and is unlikely to generate new demands. Traffic growth, and a growth in demand for park and ride use has been applied, as discussed previously;
- With the exception of some trips abstracted from the Broxden Park and Ride service, all park and ride demand consists of existing car trips which switch to park and ride. No trips switch to park and ride from other public transport services;
- Demands on other bus services within the Perth Paramics model area have been assumed to remain the same with or without the park and ride scheme in place; and
- There will be no change in the timing of trips due to park and ride (i.e. no peak spreading).

F.1.6 Peak period traffic flows were extracted from either the 2018 Do Minimum or 2018 Reference Case Perth Paramics models, and factored to 12 hour totals for use in COBA using factors obtained from available ATC data. Traffic flows are discussed in more detail later in this section.

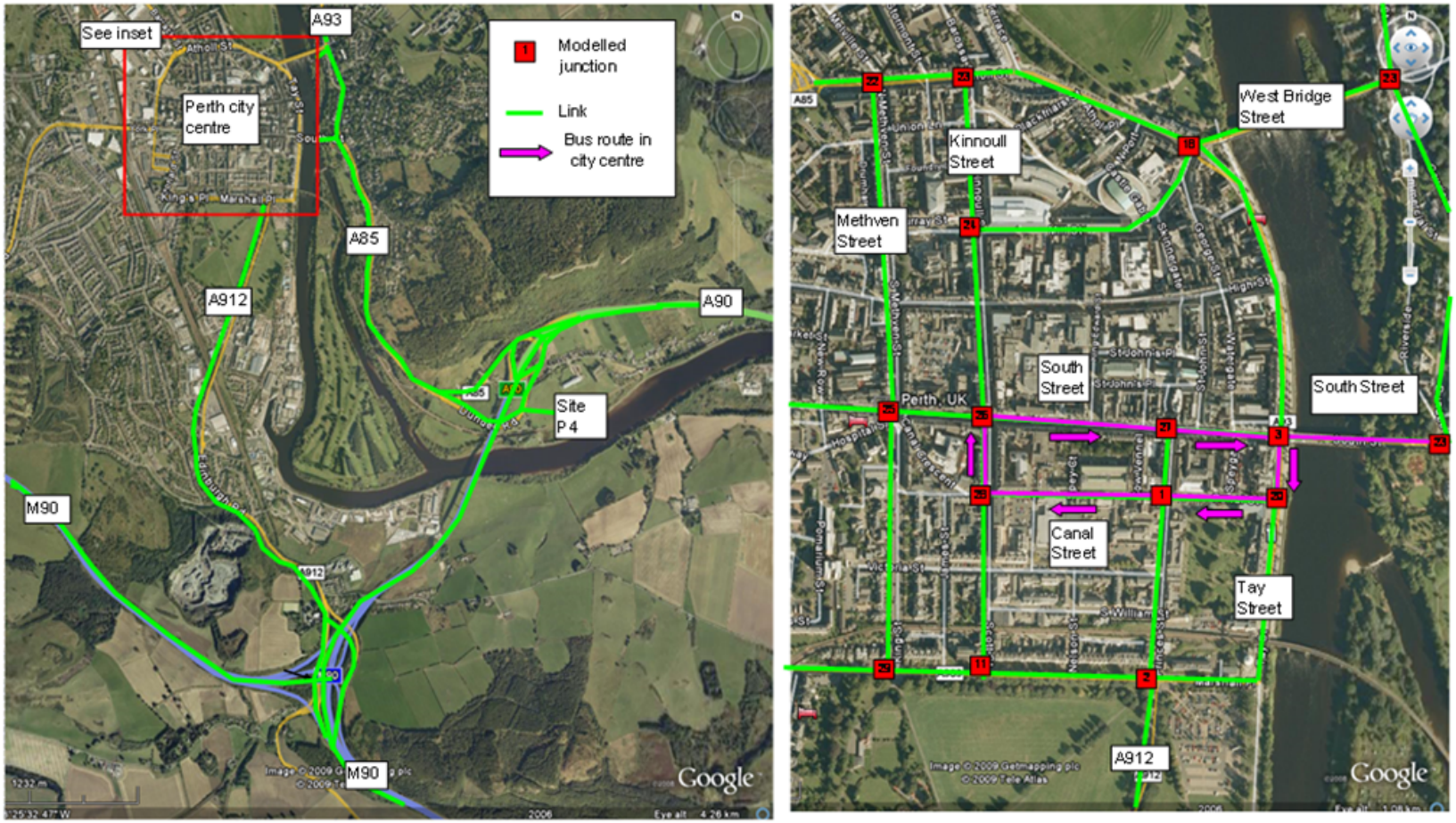
F.1.7 The COBA model consists of a network of links and nodes, which represent roads and junctions respectively. Figure F.1 shows the COBA network used in the study.

F.1.8 The COBA model includes those links which are expected to experience significant changes in traffic flows and composition as a result of the Site P4 park and ride scheme.

F.1.9 Junctions within the city centre (as shown on Figure F.1) have been modelled to calculate expected changes in delay and accident costs as a result of the scheme. The A93 / West Bridge Street signals and the A93 / A85 signals at Queens Bridge have also been modelled.

F.1.10 The route of the Site P4 service within the city centre is shown in Figure F.1.

Figure F.1 – COBA Network Coverage



ATKINS

COBA Model Coverage

Figure F.1
NTS

Traffic Flow

F.1.11 Peak period traffic flow was obtained from either the 2018 Do Minimum or 2018 Reference Case Perth Paramics models. The 2018 models include the proposed residential and employment developments within the Perth area between 2003 and 2018, as well as including an allowance for background traffic growth. The model runs cover the periods 07:00 to 09:00 in the AM and 16:00 to 18:00 in the PM.

F.1.12 COBA requires 12hr traffic flows to be input. Therefore the four hour link totals from the Paramics models were factored up to 12 hour flows using traffic trends taken from available Automatic Traffic Count (ATC) sites on the A85, A90, M90 and A912. These ATCs record traffic volumes 24hrs a day, and thus allowed a conversion factor to be calculated.

F.1.13 The calculated 12 hour traffic flows were input into COBA for each modelled link in the network. In order to maintain consistency with the ongoing Perth Area Study[53], low NRTF traffic growth was applied to traffic flows within the model. This was used to factor back 2018 flows to 2012 (scheme opening year), and to factor 2018 flows forward to 2031. No traffic growth is assumed after 2031, the last year of NRTF forecasts.

F.1.14 COBA annualises the input 12hr traffic data, and splits it into ten flow groups, which represent the AM, Interpeak, PM and overnight periods on both weekdays and weekends.

Modelling of Park and Ride

F.1.15 The Site P4 park and ride site is expected to open in 2012. Its operation was modelled in COBA by:

Removing inbound/outbound cars from the A912 and A85 routes into Perth, and from links in the city centre;

Based on a vehicular demand of 159 vehicles, this results in the redistribution of 318 car trips (inbound plus outbound) from the network over a 12 hour weekday period. Of these 318 trips, 98 represent cars diverted from Broxden to Site P4, and the remaining 220 trips are cars which previously travelled into Perth City Centre, but now park at Site P4.

Car travellers currently heading into Perth were assumed to be parking in one of the five long stay car parks in the city centre. This was assumed because the P4 service is likely to attract only those car travellers who currently pay for parking within the city centre. It is likely that people parking within the periphery of the Perth controlled parking zone (CPZ) will continue to do so unless the CPZ is extended. The number of cars travelling to each car park has been calculated and removed from each link on the route; and

Adding buses to the links which make up the park and ride bus route. Based upon the bus frequencies, this results in the addition of 24 circular (48 in total) Park and Ride bus trips over the 12 hour weekday period for the 'Hybrid' service and 48 circular (96 in total) Park and Ride bus trips over the 12 hour weekday period for the 'Dedicated' service.

Adjusting average bus occupancy levels within COBA to ensure that the number (by journey purpose) of car drivers and car passengers switching to the park and ride service is reflected in the average number of passengers travelling on each bus.

Accident Rates and Costs

F.1.16 COBA calculates accident costs at links and junctions both with and without the proposed transport scheme, and reports changes in accident costs. The addition of the P4 park and ride service will alter the level and pattern of traffic flows on the road network within Perth, and hence alter the incidence of, and overall costs associated with, accidents.

[53] Investigation of a possible A9/A94/A93 link road currently being undertaken by Halcrow Consultants and SIAS Consultants.

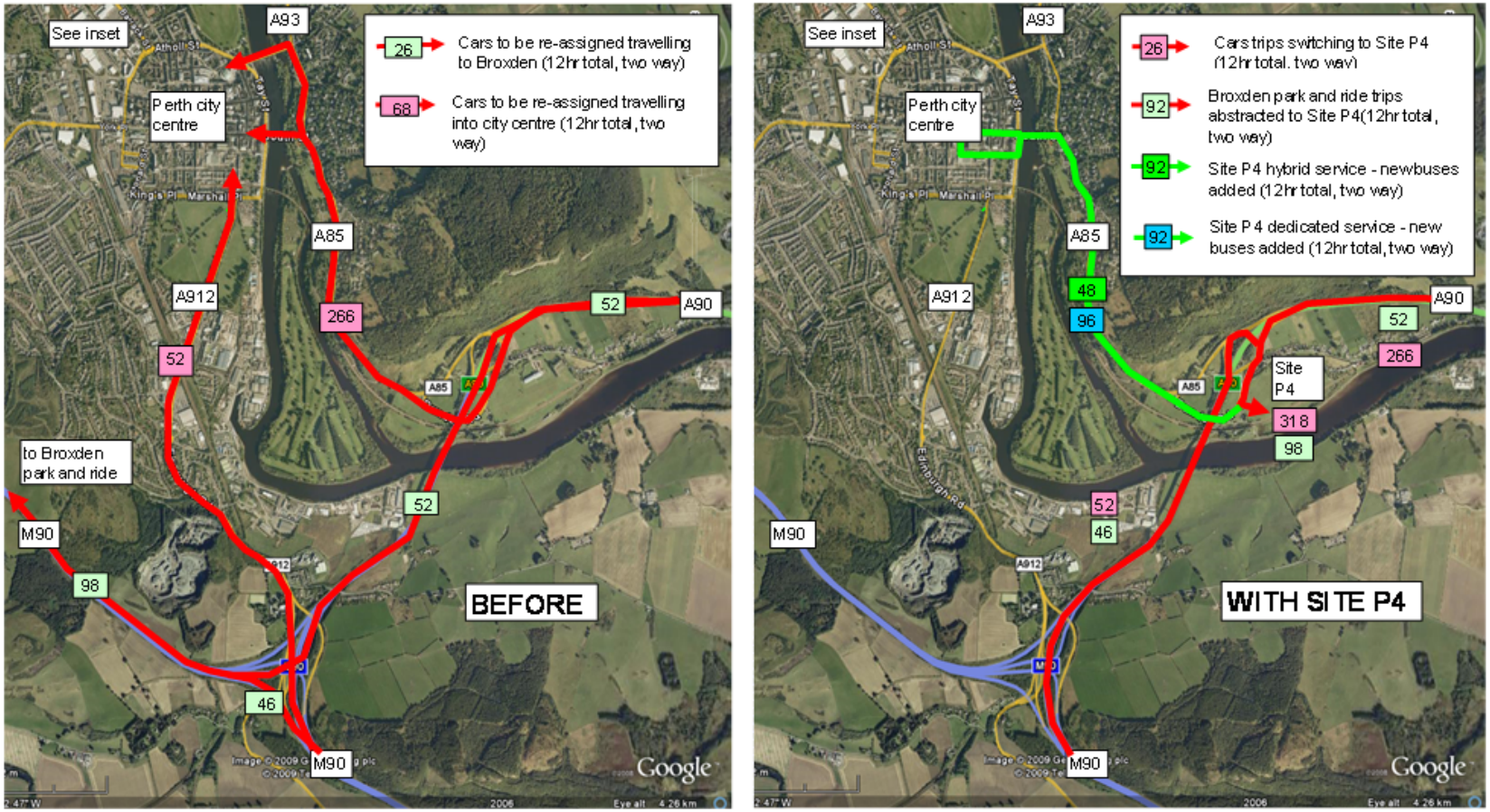
F.1.17 Accident rates are used to calculate the number of accidents that are likely to occur on a given road given a particular level of traffic flow.

F.1.18 Default accident rates were used within the COBA assessment, as historical accident data was not available in sufficient detail over the whole model network to generate local accident rates for each link within the model. These default rates vary by road type, and are based upon national data collected between 1999 and 2001. There is a declining trend in the incidence of accidents, which COBA takes into account when forecasting future accidents.

Scheme Construction Costs

F.1.19 Scheme costs, were input into COBA in 2002 prices (factored back using RPI values), as required by the program.

F.1.20 All site construction was assumed to begin and be completed in 2011. In terms of car park maintenance, resurfacing was forecast to take place in 2027 and 2057, with pavement reconstruction in 2042.



Site P4 - Change in traffic flows

Figure F.2

NTS

Model Coding

F.1.21 The COBA model consists of a network of links and nodes, which represent junctions..

F.1.22 The COBA model includes those links and junctions which are expected to experience changes in traffic flows and compositions as a result of the P4 scheme.

Traffic Links

F.1.23 Links were coded using information gathered from site visits and aerial imagery.

F.1.24 Attributes such as link type, link length and speed limit were input into the program. Table F.1 presents a summary of the coded link information.

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Table F.1 - COBA links

COBA Link number	Description	Road type	Length (km)	Width (m)	Speed limit (kph)
1	Marshall Place	Urban, central	0.24	8	48
2	Princes Street	Urban, central	0.25	8	48
3	A989 Tay St north of South Street Bridge	Urban, central	0.43	8	48
4	Tay St south of canal St	Urban, central	0.4	8	48
5	A85 Gowrie Street	Suburban single carriageway	0.3	7.3	64
6	A912 between Marshall Place and Glenearn Road	Suburban single carriageway	1.23	7.3	64
7	A912 between Glenearn Road and Breadalbane Terrace	Suburban single carriageway	0.17	7.3	64
8	A912 between Breadalbane Terrace and Gleneagles Road	Suburban single carriageway	0.33	7.3	64
9	A912 between Gleneagles Road and Friarton Road	Suburban single carriageway	0.2	7.3	64
10	A912 between Friarton Road and Rhynd Road	Suburban single carriageway	0.6	7.3	64
11	A912 northbound between M90 and Rhynd Road	Rural single carriageway	0.8	4	97
12	M90 south of A912 slips	Motorway, dual 2-lanes	0.5	14.6	113
13	A912 southbound between Rhynd Road and M90	Rural single carriageway	0.8	4	97
14	M90 between A912 slips and A90	Motorway, dual 2-lanes	2.48	14.6	113
15	A85 between South Street Bridge and Gyratory	Suburban single carriageway	1.62	7.3	64
16	A85 gyratory north	Rural all-purpose dual 2-lane single carriageway	0.52	7.3	97
17	M90 eastbound off slip	Rural single carriageway	0.24	4	97
18	M90 westbound on slip	Rural single carriageway	0.2	4	97
19	A90	Rural all-purpose dual 2-lane single carriageway	0.6	14.6	113
20	M90 eastbound on slip	Rural single carriageway	0.34	4	97
21	M90 westbound off slip	Rural single carriageway	0.3	4	97
22	A85 gyratory east	Rural all-purpose	0.3	7.3	97

COBA Link number	Description	Road type	Length (km)	Width (m)	Speed limit (kph)
		dual 2-lane single carriageway			
23	A85 gyratory south	Rural all-purpose dual 2-lane single carriageway	0.4	7.3	97
24	West Bridge Street	Urban, non-central	0.25	11	113
25	Atholl Street	Urban, non-central	0.25	11	48
26	A93 Main Street	Suburban single carriageway	0.21	7.3	48
27	Not used				
28	A90 east entry link	Rural all-purpose dual 2-lane single carriageway	0.1	14.6	113
29	P+R site entry link	Suburban single carriageway	0.1	7.3	48
30	South Street Bridge	Urban, non-central	0.22	0	48
31	A85 gyratory north east	Rural all-purpose dual 2-lane single carriageway	0.2	7.3	97
32	South Street EB	Urban, central	0.15	8	48
33	Canal Street	Urban, central	0.15	8	48
34	A989 between South and Canal St	Urban, central	0.1	12	48
35	Atholl Street (w)	Urban, central	0.1	16	48
36	Atholl Street (e)	Urban, central	0.13	16	48
37	N. Methven Street	Urban, central	0.45	8	48
38	Kinnoull Street (n)	Urban, central	0.21	12	48
39	Mill St	Urban, central	0.35	8	48
40	Kinnoull Street (s)	Urban, central	0.26	8	48
41	County Place	Urban, central	327	12	48
42	South St (w)	Urban, central	0.13	8	48
43	South St (e)	Urban, central	0.26	8	48
44	Scott St (n)	Urban, central	0.12	12	48
45	Canal St w)	Urban, central	0.25	8	48
46	King St	Urban, central	0.36	8	48
47	Scott St (s)	Urban, central	0.24	8	48

COBA Link number	Description	Road type	Length (km)	Width (m)	Speed limit (kph)
48	King James Place (w)	Urban, central	0.17	8	48
49	King James Place (e)	Urban, central	0.13	8	48
50	Princes St (n)	Urban, central	0.1	12	48
51	A90 west of Perth	Motorway, dual 2-lanes	4.6	14.6	113

F.1.25 Within COBA, each link is assigned an 'Accident type' depending upon its Road type. This defines the accident rate which the program uses to calculate the incidence of accidents, and hence overall accident costs.

F.1.26 Other variables to describe links are required by the program. In the absence of more detailed information, values suggested within the COBA manual (for each link type) were input into the program. A list of these variables is presented below:

Table F.2 - COBA variables

Variable	Description	Suggested min / max values and adopted value		Notes
DES	Defines whether road is designed to TD9 (DMRB 6.1.1) standards. Roads built post 1980 usually comply with this.	0 or 1		All rural roads assumed to be constructed before 1980, therefore not compliant.
Hills	Total rise and fall (m / km)	0	45	
		15		
Bend	Total change of direction (deg/km)	0	150	Only required for rural roads
		20-75 depending on road class		
VWID	Average verge width (m)	0	7	Only required for rural roads
		1		
Visi	Average sight distance (m)	100	550	Only required for rural roads
		200		
AXS	Number of minor intersections and private drives (no/km)	5	75	Only required for suburban roads
		30		
Devel	Percentage of road network with frontage development	50	90	Only required for urban roads
		70		
Int	Frequency of major intersections	2	9	Only required for suburban and urban roads
		As per each individual link		

Junctions

F.1.27 Table F.3 presents the junctions that were modelled in detail within the COBA model, using layout and signal information from the Perth Paramics model. This was done in order to capture the changes in delay at these points in the network as a result of the scheme.

Table F.3 - Signalised Junctions Modelled within COBA

COBA node number	Description
1	Canal Street / Princes Street
2	A912 Edinburgh Road / A989 Marshall Place
3	A989 Tay Street / A93 South Street Bridge
4	A85 Dundee Road / A93 South Street Bridge
18	A989 Charlotte Street / West Bridge Street
19	A93 Main Street / West Bridge Street
20	A989 Tay Street / Canal Street
22	A989 Atholl Stet / North Methven Street
23	A989 Atholl Street / Kinnoull Street
24	North Methven Street / Mill Street
25	South Street / King Street
26	South Street / Scott Street
27	South Street / Princes Street
28	King Street / Canal Street

F.1.28 For each junction the following information was entered:

The link number of each approach;

The number of lanes on each approach and allowed turns;

Lane width (average of 3.5m per lane assumed);

Signal staging (taken from Perth Paramics model);

Amount of lost time per cycle. This includes intergreen time and any pedestrian stages. Lost time was assumed to be an average six seconds per stage;

Traffic turning proportions. This was taken from the AM period Perth Paramics model; and

Junction tidality. This allows COBA to calculate junction delays in both the AM and PM periods.

Traffic Flows

F.1.29 12hr traffic flows within the COBA model were developed using peak period flows from the 2018 Perth Paramics model.

Perth Paramics Model

F.1.30 The existing Perth Paramics model was developed by SIAS consultants on behalf of Perth and Kinross Council (PKC) in 2003. The model was designed to test committed and proposed developments within Perth, and has recently been used to test the impact of the Perth and Kinross Local Plan up to 2018. It covers the whole of the Perth city urban area, and the strategic network of major roads around the city.

F.1.31 The following time periods are modelled within the Perth Paramics model:

AM peak period – 06:30 to 09:30; and

PM peak period – 15:30 to 18:30.

F.1.32 Base 2003 and future year 2018 models have been developed by SIAS. 2018 was chosen as it is the horizon year of the Perth and Kinross Local Plan. The models used in this study are presented in Table F.4.

Table F.4 - Perth Paramics Model Scenarios

Scenario	Year	Road network	Demands
Validated Base	2003	As 2003	Base 2003
Do Minimum	2018	As Base 2003	Local Plan demands 2018 - committed traffic (traffic growth reduced to 35%, the maximum level the model will run at before gridlock occurs)
Reference Case	2018	As per the Do Minimum option, but including localised transport improvements and a new link road between A94, A93 and A9. This bridge alignment ties into the A9 just north of Inveralmond Roundabout	Local Plan demands 2018 – committed plus aspirational development

F.1.33 The Base 2003 model was calibrated and validated as discussed below. The 2018 models were developed from the 2003 Base, and include future infrastructure and traffic demand forecasts as specified.

F.1.34 Table F.4 shows that the Do Minimum road network was only shown to function with traffic growth forecast between 2003 and 2018 reduced to 35% of its calculated level.

F.1.35 The Reference Case model includes all housing and employment developments contained within the Draft Perth Local Plan and the adopted Structure Plan. It also includes other housing or employment developments which are regarded as aspirational.

F.1.36 The 2003 Base model was calibrated using:

Individual junction simulations, which compared modelled to observed throughput;

Checks on vehicle routeing paths through the network; and

Comparison of turning counts with modelled flows.

F.1.37 The 2003 Base model was validated by comparing against ATC data, journey time surveys and queue location information.

F.1.38 A summary of model validation in the AM and PM peak periods is shown in Table F5.

Table F.5 - Base 2003 Peak Hour Validation Summary

Scenario	AM model validation	PM model validation
City centre ATC counts	75% of links have GEH less than 5	87% of links have GEH less than 5
Main routes ATC counts	88% of links have GEH less than 5	82% of links have GEH less than 5
Journey time routes	15/16 journey time routes	13/16 journey time routes

Scenario	AM model validation	PM model validation
	meet DMRB criteria	meet DMRB criteria
Queue lengths	Subjectively identified as being broadly representative	

F.1.39 Only the peak hour flows were assessed for validation, as per the guidance in DMRB Volume 12. The guidance suggests that for a model to be successfully validated, 85% of individual link flows should have a GEH of ≥5.

F.1.40 SIAS Ltd suggest that for the Perth Paramics model a reasonable result criteria would be for 70% of individual link flows to have a GEH of ≥5, a departure from standard practice.

F.1.41 Table F.5 shows that the Perth Paramics model does not meet exact DMRB validation criteria, but is deemed to be 'reasonably' validated as per SIAS' statement.

Use in COBA

F.1.42 Flows for the Do Minimum Scenario were obtained from the 2018 Do Minimum Perth Paramics model.

F.1.43 Flows for the Reference Case scenario were taken from the 2018 'OptionC FrB' Paramics model, which includes the A9, A93 and A94 link road, and accommodates all of the predicted traffic growth between 2003 and 2018.

F.1.44 COBA requires traffic flows for each scenario to be input as a 12hr Annual Average Traffic (AADT). COBA annualises the input 12hr traffic data, and splits it into ten flow groups which represent the AM, Interpeak, PM and overnight periods on both weekdays and weekends.

F.1.45 The peak hour flows from the Perth Paramics model were factored to equivalent 12hr traffic flows using traffic data from Automatic Traffic Counters (ATCs) on the A90, M90 A85 and A912.

F.1.46 Using the ATC information for each location on the road network, a local conversion factor was calculated. The AM (07:00 to 09:00) and PM (16:00 to 18:00) Paramics model flows on each link were added together and then factored using the figures shown in Table F.6.

Table F.6 - Average Peak Period Conversion Factors

Location	Factor (AM+PM peaks to 12hr)
A85 Dundee Road	2.501
A912 Edinburgh Road	2.638
M90 Junction 10 Friarton Bridge	2.706
M90 Friarton Bridge South of A85	2.599
A90 East of Kinfauns Castle	2.579

F.1.47 Tables F.7 and F.8 present the modelled traffic flows as extracted from the Perth Paramics model, and the estimated AADT flows calculated using the factors shown above for the Do Minimum and Reference Case scenario.

Table F.7 - 2018 Do Minimum traffic flows (without Park and Ride)

COBA link number	Description	Cars and LGVs (vehs)		OGV1 and OGV2 (vehs)		PSV (vehs)		Nearest ATC	Factor (4hr to 12hr)	Calculated 12hr flows (vehs)			
		AM (07:00 to 09:00)	PM 16:00 to 18:00)	AM (07:00 to 09:00)	PM 16:00 to 18:00)	AM (07:00 to 09:00)	PM 16:00 to 18:00)			Cars and LGV	OGV1 and OGV2	PSV	Total12hr AADT
1	Marshall Place	1161	1797	84	46	41	38	A85 Dundee Road	2.5	7396	326	197	7918
2	Princes Street	238	350	18	8	19	13	A85 Dundee Road	2.5	1470	66	80	1616
3	A989 Tay St north of South Street Bridge	359	969	22	35	21	26	A85 Dundee Road	2.5	3321	142	118	3581
4	Tay St south of canal St	919	1215	73	48	27	29	A85 Dundee Road	2.5	5335	304	139	5779
5	A85 Gowrie Street	1763	2404	157	112	35	39	A85 Dundee Road	2.5	10421	671	185	11276
6	A912 between Marshall Place and Glenearn Road	1308	2017	97	60	56	54	A912 Edinburgh Road	2.6	8774	414	290	9478
7	A912 between Glenearn Road and Breadalbane Terrace	1776	2648	161	84	81	68	A912 Edinburgh Road	2.6	11671	645	392	12708
8	A912 between Breadalbane Terrace and Gleneagles Road	1364	1932	138	68	67	54	A912 Edinburgh Road	2.6	8694	541	317	9552
9	A912 between Gleneagles Road and Friarton Road	1794	2473	173	83	85	68	A912 Edinburgh Road	2.6	11258	675	403	12336
10	A912 between Friarton Road and Rhynd Road	1966	2347	214	109	106	83	A912 Edinburgh Road	2.6	11376	853	498	12727
11	A912 northbound between M90 and Rhynd Road	722	417	98	24	43	18	A912 Edinburgh Road	2.6	3005	323	161	3489
12	M90 south of A912 slips	5209	6045	525	314	222	176	M90 Junction 10 Friarton Bridge	2.7	30449	2271	1076	33797
13	A912 southbound between Rhynd Road and M90	339	795	55	50	24	31	A912 Edinburgh Road	2.6	2992	277	145	3414
14	M90 between A912 slips and A90	4656	5398	517	399	213	216	M90 Friarton Bridge - S of A85	2.6	26127	2381	1116	29624
15	A85 between South Street Bridge and Gyratory	1720	2016	88	87	37	57	A85 Dundee Road	2.5	9343	437	235	10015
16	A85 gyratory north	907	1269	57	32	23	23	A85 Dundee Road	2.5	5441	222	115	5777
17	M90 eastbound off slip	242	283	22	5	7	2	A85 Dundee Road	2.5	1313	66	22	1401
18	M90 westbound on slip	265	432	12	24	5	11	A85 Dundee Road	2.5	1743	90	39	1872
19	A90	4151	4682	483	372	201	203	A90 - East of Kinfauns Castle	2.6	22777	2205	1042	26024
20	M90 eastbound on slip	638	814	45	7	18	10	A85 Dundee Road	2.5	3631	129	69	3829
21	M90 westbound off slip	613	490	8	49	5	30	A85 Dundee Road	2.5	2758	141	88	2988
22	A85 gyratory east	837	813	31	55	14	33	A85 Dundee Road	2.5	4127	216	120	4462
23	A85 gyratory south	836	812	31	55	14	33	A85 Dundee Road	2.5	4122	217	119	4458
24	West Bridge Street	1854	2255	0	0	47	52	A85 Dundee Road	2.5	10275	0	249	10525
25	Atholl Street	2058	2542	10	25	40	50	A85 Dundee Road	2.5	11504	87	224	11815
26	A93 Main Street	2872	3882	131	83	69	61	A85 Dundee Road	2.5	16892	535	325	17752
28	A90 east entry link	5402	5988	496	428	224	244	A90 - East of Kinfauns Castle	2.6	29374	2384	1206	32964

COBA link number	Description	Cars and LGVs (vehs)		OGV1 and OGV2 (vehs)		PSV (vehs)		Nearest ATC	Factor (4hr to 12hr)	Calculated 12hr flows (vehs)			
		AM (07:00 to 09:00)	PM 16:00 to 18:00)	AM (07:00 to 09:00)	PM 16:00 to 18:00)	AM (07:00 to 09:00)	PM 16:00 to 18:00)			Cars and LGV	OGV1 and OGV2	PSV	Total12hr AADT
29	P+R site entry link	0	0	0	0	0	0	A85 Dundee Road	2.5	0	0	0	0
30	South Street Bridge	1979	3067	175	142	48	64	A85 Dundee Road	2.5	12620	793	279	13692
31	A85 gyratory north east	510	740	35	29	12	15	A85 Dundee Road	2.5	3124	159	68	3351
32	South Street EB	1126	2287	111	62	47	40	A85 Dundee Road	2.5	8537	433	217	9187
33	Canal Street	591	778	53	77	8	26	A85 Dundee Road	2.5	3421	327	85	3833
34	A989 between South and Canal St	1486	1941	117	122	34	52	A85 Dundee Road	2.5	8570	596	216	9382
35	Atholl Street (w)	2542	3324	73	58	79	95	A85 Dundee Road	2.5	14670	328	436	15434
36	Atholl Street (e)	2010	2445	23	29	66	80	A85 Dundee Road	2.5	11142	128	366	11637
37	N. Methven Street	612	1012	49	38	41	42	A85 Dundee Road	2.5	4061	218	209	4488
38	Kinnoull Street (n)	541	1054	21	27	52	68	A85 Dundee Road	2.5	3989	120	298	4408
39	Mill St	87	400	2	5	2	9	A85 Dundee Road	2.5	1217	19	27	1262
40	Kinnoull Street (s)	470	999	40	37	52	66	A85 Dundee Road	2.5	3675	193	294	4162
41	County Place	1338	2499	116	70	110	118	A85 Dundee Road	2.5	9594	464	569	10628
42	South St (w)	1023	1641	88	39	56	52	A85 Dundee Road	2.5	6663	317	272	7251
43	South St (e)	751	1487	82	32	38	32	A85 Dundee Road	2.5	5596	285	175	6056
44	Scott St (n)	569	1163	55	45	55	62	A85 Dundee Road	2.5	4331	249	294	4874
45	Canal St w)	636	1344	61	63	23	35	A85 Dundee Road	2.5	4951	311	144	5405
46	King St	181	169	17	4	7	3	A85 Dundee Road	2.5	875	52	25	951
47	Scott St (s)	507	934	36	32	52	56	A85 Dundee Road	2.5	3605	168	269	4042
48	King James Place (w)	953	1695	63	29	58	60	A85 Dundee Road	2.5	6622	230	296	7148
49	King James Place (e)	1033	1590	74	28	64	59	A85 Dundee Road	2.5	6559	255	306	7121
50	Princes St (n)	333	664	25	31	8	8	A85 Dundee Road	2.5	2495	140	40	2675
51	A90 west of Perth	4158	5200	455	393	182	210	M90 Junction 10 Friarton Bridge	2.5	23405	2120	979	26504

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Table F.8 - Reference Case traffic flows (without Park and Ride)

COBA link number	Description	Cars and LGVs (vehs)		OGV1 and OGV2 (vehs)		PSV (vehs)		Nearest ATC	Factor (4hr to 12hr)	Calculated 12hr flows (vehs)			
		AM (07:00 to 09:00)	PM 16:00 to 18:00)	AM (07:00 to 09:00)	PM 16:00 to 18:00)	AM (07:00 to 09:00)	PM 16:00 to 18:00)			Cars and LGV	OGV1 and OGV2	PSV	Total12hr AADT
1	Marshall Place	1074	1881	85	47	36	41	A85 Dundee Road	2.5	7390	332	191	7913
2	Princes Street (s)	173	251	11	5	16	12	A85 Dundee Road	2.5	1061	41	72	1173
3	A989 Tay St north of South Street Bridge	253	966	21	45	21	25	A85 Dundee Road	2.5	3049	164	115	3328
4	Tay St south of South Street Bridge	697	1032	52	28	20	16	A85 Dundee Road	2.5	4325	200	91	4616
5	A85 Gowrie Street	1690	2267	95	73	27	32	A85 Dundee Road	2.5	9894	419	149	10462
6	A912 between Marshall Place and Glenearn Road	1125	2093	92	60	52	55	A912 Edinburgh Road	2.6	8490	400	281	9172
7	A912 between Glenearn Road and Breadalbane Terrace	1774	2899	161	84	75	70	A912 Edinburgh Road	2.6	12328	645	384	13356
8	A912 between Breadalbane Terrace and Gleneagles Road	1401	2310	140	74	63	58	A912 Edinburgh Road	2.6	9792	565	317	10674
9	A912 between Gleneagles Road and Friarton Road	2109	3012	179	92	85	75	A912 Edinburgh Road	2.6	13508	715	422	14645
10	A912 between Friarton Road and Rhynd Road	2262	2956	236	137	112	99	A912 Edinburgh Road	2.6	13765	985	556	15306
11	A912 northbound between M90 and Rhynd Road	664	494	103	26	44	20	A912 Edinburgh Road	2.6	3052	338	168	3559
12	M90 south of A912 slips	5518	6400	531	319	223	188	M90 Junction 10 Friarton Bridge	2.7	32247	2301	1111	35659
13	A912 southbound between Rhynd Road and M90	369	843	55	49	23	30	A912 Edinburgh Road	2.6	3198	275	141	3614
14	M90 between A912 slips and A90	5618	5966	576	428	238	241	M90 Friarton Bridge - S of A85	2.6	30103	2608	1244	33955
15	A85 between South Street Bridge and Gyratory	1678	1980	66	56	31	41	A85 Dundee Road	2.5	9149	303	180	9633
16	A85 gyratory north	919	1244	40	17	19	16	A85 Dundee Road	2.5	5408	141	88	5637
17	M90 eastbound off slip	571	509	31	10	12	4	A85 Dundee Road	2.5	2700	104	41	2845
18	M90 westbound on slip	556	614	15	17	7	8	A85 Dundee Road	2.5	2926	79	38	3042
19	A90 EB	4489	4845	530	401	219	229	A90 - East of Kinfauns Castle	2.6	24070	2402	1154	27626
20	M90 eastbound on slip	640	817	33	3	16	8	A85 Dundee Road	2.5	3643	90	59	3792
21	M90 westbound off slip	522	458	2	30	3	22	A85 Dundee Road	2.5	2453	81	60	2594
22	A85 gyratory east	786	781	26	39	13	25	A85 Dundee Road	2.5	3918	163	94	4175
23	A85 gyratory south	783	779	26	39	13	25	A85 Dundee Road	2.5	3905	162	94	4161
24	West Bridge Street	1279	1723	0	0	37	43	A85 Dundee Road	2.5	7507	1	201	7709
25	Atholl Street	1450	2401	9	34	30	41	A85 Dundee Road	2.5	9633	107	177	9917
26	A93 Main Street	2074	2891	70	44	50	40	A85 Dundee Road	2.5	12419	285	225	12928
28	A90 east	5656	6123	565	435	237	258	A90 - East of Kinfauns Castle	2.6	30374	2581	1277	34232

COBA link number	Description	Cars and LGVs (vehs)		OGV1 and OGV2 (vehs)		PSV (vehs)		Nearest ATC	Factor (4hr to 12hr)	Calculated 12hr flows (vehs)			
		AM (07:00 to 09:00)	PM 16:00 to 18:00)	AM (07:00 to 09:00)	PM 16:00 to 18:00)	AM (07:00 to 09:00)	PM 16:00 to 18:00)			Cars and LGV	OGV1 and OGV2	PSV	Total12hr AADT
29	P+R site entry link	0	0	0	0	0	0	A85 Dundee Road	2.5	0	0	0	0
30	South Street Bridge	1559	2486	107	96	37	43	A85 Dundee Road	2.5	10115	509	200	10824
31	A85 gyratory north east	846	933	38	24	15	13	A85 Dundee Road	2.5	4449	155	70	4674
32	South Street EB	920	1816	76	43	39	34	A85 Dundee Road	2.5	6841	297	183	7321
33	Canal Street	493	648	38	67	9	21	A85 Dundee Road	2.5	2855	261	76	3191
34	A989 between South and Canal St	1175	1644	81	92	26	37	A85 Dundee Road	2.5	7051	432	159	7641
35	Atholl Street (w)	2065	3150	71	59	72	85	A85 Dundee Road	2.5	13043	325	392	13760
36	Atholl Street (e)	1558	2305	26	30	58	75	A85 Dundee Road	2.5	9661	139	331	10131
37	N. Methven Street	567	926	46	39	40	41	A85 Dundee Road	2.5	3735	214	203	4151
38	Kinnoull Street (n)	581	998	23	24	53	70	A85 Dundee Road	2.5	3949	119	308	4375
39	Mill St	93	295	2	4	2	9	A85 Dundee Road	2.5	970	15	27	1013
40	Kinnoull Street (s)	523	809	39	30	55	68	A85 Dundee Road	2.5	3330	173	307	3810
41	County Place	1137	2255	82	47	105	116	A85 Dundee Road	2.5	8483	323	552	9359
42	South St (w)	915	1525	68	28	54	50	A85 Dundee Road	2.5	6103	241	259	6604
43	South St (e)	704	1279	60	19	34	30	A85 Dundee Road	2.5	4960	196	160	5316
44	Scott St (n)	535	1030	55	41	57	62	A85 Dundee Road	2.5	3912	240	299	4451
45	Canal St w)	567	1162	46	53	24	33	A85 Dundee Road	2.5	4323	246	142	4710
46	King St	155	200	17	4	8	5	A85 Dundee Road	2.5	887	54	30	971
47	Scott St (s)	467	861	31	26	51	55	A85 Dundee Road	2.5	3321	143	266	3730
48	King James Place (w)	764	1561	56	33	54	61	A85 Dundee Road	2.5	5815	222	289	6326
49	King James Place (e)	862	1557	71	32	60	61	A85 Dundee Road	2.5	6050	257	302	6610
50	Princes St (n)	177	415	14	24	4	4	A85 Dundee Road	2.5	1479	94	21	1593
51	M90 west	4673	5236	486	399	201	219	M90 Junction 10 Friarton Bridge	2.5	24781	2214	1049	28044

F.1.48 As detailed within the main body of the report, the Site P4 park and ride service was modelled within COBA by removing the predicted number of car trips from the network, re-routeing cars to Site P4 and by adding in park and ride buses on the route into/out of Perth City Centre.

F.1.49 Table F.9 presents the changes in 12 hour link flow totals which were applied to both the Do Minimum and Reference Case scenarios, for both 'Hybrid' and 'Dedicated' bus services, using a park and ride demand of 159 vehicles. Figures in Table F.9 include both outward and return journeys

Table F.9 - Changes in traffic flow as a result of Site P4 (12 hr totals)

COBA link number	Description	'Hybrid' Service		'Dedicated' Service	
		Cars removed	Buses added	Cars removed	Buses added
1	Marshall Place	-18	0	-18	0
2	Princes Street	-33	0	-33	0
3	A989 Tay St north of South Street Bridge	-12	0	-12	0
4	Tay St south of canal St	-41	0	-41	0
5	A85 Gowrie Street	-93	0	-93	0
6	A912 between Marshall Place and Glenearn Road	-13	0	-13	0
7	A912 between Glenearn Road and Breadalbane Terrace	-39	0	-39	0
8	A912 between Breadalbane Terrace and Gleneagles Road	-39	0	-39	0
9	A912 between Gleneagles Road and Friarton Road	10	0	10	0
10	A912 between Friarton Road and Rhynd Road	-39	0	-39	0
11	A912 northbound between M90 and Rhynd Road	-20	0	-20	0
12	M90 south of A912 slips	0	0	0	0
13	A912 southbound between Rhynd Road and M90	-20	0	-20	0
14	M90 between A912 slips and A90	32	0	32	0
15	A85 between South Street Bridge and Gyratory	-200	48	-200	96
16	A85 gyratory north	-31	24	-31	48
17	M90 eastbound off slip	42	0	42	0
18	M90 westbound on slip	42	0	42	0
19	A90	-53	0	-53	0
20	M90 eastbound on slip	53	0	53	0
21	M90 westbound off slip	0	0	0	0

COBA link number	Description	'Hybrid' Service		'Dedicated' Service	
22	A85 gyratory east	-31	24	-31	48
23	A85 gyratory south	-31	24	-31	48
24	West Bridge Street	-93	0	-93	0
25	Atholl Street	-105	0	-105	0
26	A93 Main Street	0	0	0	0
28	A90 east entry link	0	0	0	0
29	P+R site entry link	0	48	0	96
30	South Street Bridge	-107	48	-107	96
31	A85 gyratory north east	85	24	85	48
32	South Street EB	-53	24	-53	48
33	Canal Street	-25	24	-25	48
34	A989 between South and Canal St	-66	24	-66	48
35	Atholl Street (w)	-30	0	-30	0
36	Atholl Street (e)	-30	0	-30	0
37	N. Methven Street	0	0	0	0
38	Kinnoull Street (n)	-76	0	-76	0
39	Mill St	0	0	0	0
40	Kinnoull Street (s)	0	0	0	0
41	County Place	-6	0	-6	0
42	South St (w)	-3	0	-3	0
43	South St (e)	-25	24	-25	48
44	Scott St (n)	-28	24	-28	48
45	Canal St w)	-56	24	-56	48
46	King St	-10	0	-10	0
47	Scott St (s)	-8	0	-8	0
48	King James Place (w)	0	0	0	0
49	King James Place (e)	-10	0	-10	0
50	Princes St (n)	-25	0	-25	0
51	M90 west of Perth	-98	0	-98	0

Bus Occupancy

F.1.50 The key challenge within the COBA model was to switch the correct number of person trips from private vehicles to the Site P4 park and ride service. This is not as simple as removing 'x' number of cars from the network and adding 'x' number of buses. The issue is complicated by vehicle occupancy levels (which differ by vehicle, journey purpose and flow group). No person trips should be removed from the model, but should be transferred by mode.

F.1.51 The average car occupancy within COBA (taking into account journey purpose and average kilometres travelled in each flow group) is 1.68 people. Thus for every car removed from the network, 1.68 person trips are removed.

F.1.52 In the 'mid' demand scenario, 159 vehicles are assumed to use the park and ride site. For the purposes of fare, parking revenue and subsidy calculations, which are calculated outside COBA, car occupancy of 1.2 has been used. This results in 191 passengers. However, removing 159 vehicles within COBA results in 267 person trips being removed (159*1.68).

F.1.53 In order to ensure that no person trips were lost within COBA, bus occupancy levels (and the proportionate journey purpose of occupants) were amended within the program. If this option is chosen, COBA assumes that all buses within the network contain the stated number of persons.

F.1.54 Average park and ride bus occupancy was calculated over the 12 hour modelled period by dividing the total number of passengers[54] by the total number of **new** buses added to the network as a result of the scheme. This assumes that all park and ride passengers will use the new buses (rather than travelling on existing buses which are diverted to the park and ride site). In reality park and ride demand would be split between new and existing services using Site P4. However, this assumption was made to ensure that passengers switching to park and ride did not 'disappear' from the COBA model, and that their journey costs were captured.

F.1.55 As an example;

100 passengers were predicted on park and ride over the 12 hr period

There are a total of 20 bus journeys (10 outward, 10 inward).

Of these 20, 10 are made by new buses, and 10 by existing services.

Average bus occupancy in reality would be 5 (100/20). However, in COBA, only 10 new bus journeys would be added to the model, meaning that only 50 (10*5) passenger journeys would be captured.

To mitigate this, the average bus occupancy coded into COBA would be 10 (100/10). This would mean that the full 100 (10*10) journeys would be captured.

F.1.56 The 'new buses only' issue only occurs in the 'Hybrid' service scenario. With a 'Dedicated' park and ride service, all buses serving the park and ride site are new to the network.

F.1.57 Table F.10 presents the results of this calculation.

Table F.10 - Bus occupancy (mid demand)

	Total demand (cars)	Person trips removed from COBA model	Total new bus trips (two-way)	Average bus occupancy (persons)
'Hybrid' service	159	267	48	11.13
'Dedicated' service	159	267	96	5.57

F.1.58 COBA will assume that all buses within the model have the above occupancy levels and journey purpose of passengers. In reality, other bus services within the COBA model area are likely to have differing occupancy levels. However, as these other bus services have been assumed to be identical in the 'without park and ride' and 'with park and ride' scenarios, differences in bus based costs between the 'without' and 'with' scenarios will only arise from the new park and ride service.

F.1.59 There are three journey purposes within COBA; 'Working', Commuting' or 'Other' (which includes shopping and leisure trips). Again, these had to be balanced to ensure that the correct number of trips by purpose were retained within the model. Tables F.11 and F.12 show this calculations.

[54] Calculated by the number of cars removed from the network multiplied by the average car occupancy within COBA.

Table F.11 – Bus occupancy by journey purpose ('Hybrid' service)

Journey Purpose	Average journey purpose split for cars from COBA manual Table 1/1	Resulting purpose split for buses (person trips, average per bus)
Work	0.13	1.46
Commute	0.25	2.82
Other	0.62	6.86
TOTAL	1.00	11.13

Table F.12 – Bus occupancy by journey purpose ('Dedicated' service)

Journey Purpose	Average journey purpose split for cars from COBA manual Table 1/1	Resulting purpose split for buses (person trips, average per bus)
Work	0.13	0.73
Commute	0.25	1.41
Other	0.62	3.43
TOTAL	1.00	5.57

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