SEStran, TACTRAN, Fife Council, Dundee City Council and Transport Scotland

South Tay Park-and-Ride Project

Business Case Analysis

Final Report

Scott Wilson Ltd
May 2010




Revision Schedule

South Tay Park-and-Ride (P&R) Project

Business Case Analysis

May 2010
S106888

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E.2.1 Two options were tested, for a 350 No. spaces and a 458 No. spaces designs, which were developed in a previous study. No adverse engineering issues were identified that would prevent the potential proposals being opened by 2015, which was assumed as being a suitable opening year for appraisal purposes.

Cost Estimates

E.2.2 The construction costs of the proposed scheme were calculated, which included infrastructure costs (comprising access road, car park and terminal building) and other delivery costs (comprising land purchase, management, site preparation, client costs and other items). Additional contingencies were estimated at 15% of the base cost. This led to base capital costs of £3.05m and £2.69m respectively for the 458 spaces and 350 spaces options (expressed in Q4 2009 prices).

E.2.3 Operating costs for the proposal were obtained from the original STAG Report and amounted to a total of £40,100 per annum in 2009 prices. Maintenance and renewal costs were assumed to be equivalent to 5% of the total capital costs of the project, which in this context include contingencies, risk and optimism bias.

Project Risks and Optimism Bias

E.2.4 A quantified risk assessment (QRA) was carried out on the proposals to quantify and include the potential costs due to risk and uncertainty. A risk workshop was conducted with key stakeholders and the results of these discussions were taken forward in the development of a Risk Register and the calculation of the resulting monetary estimates. Furthermore, a soil survey as undertaken to further reduce risks and Optimism Bias.

E.2.5 As a result, the Risk Value was estimated at £799,800 at 2009 prices and an Optimism Bias of 8% were used in the final capital costs calculations.

Total Scheme Capital Costs

E.2.6 Based on the above, the total scheme costs were estimated (in Q4 2009 prices) at £4.05m and £3.67m, respectively for the 458 spaces and 350 spaces options.

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Demand Forecasts

E.3.1 The demand assessment was sourced from the original STAG study and a daily parking demand of 315 spaces by 2022 was assumed.

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E.3.2 The economic appraisal was based on two different funding scenarios: one based on a 100% lump sum availability of public resources at the start of the appraisal period, and the

other involving borrowing 100% of the capital requirements based on a 'prudential borrowing' schedule. Results (expressed in 2002 prices) are shown in the following table.

1.1.1 ***Summary of the Economic Evaluation Results***

	350 Spaces		458 Spaces	
	(100% Public)	(100% Borrowed)	(100% Public)	(100% Borrowed)
Net Present Value (NPV)	£4.21m	£3.31m	£3.65m	£2.66m
Benefit-to-Cost Ratio (BCR)	1.69	1.47	1.54	1.35

Procurement, Financial and Management Case

E.3.3 Regarding Procurement Strategy, SEStran will be the procurement body / sponsor responsible for all procurement and management for delivery of the scheme. The various options for the procurement strategy will be decided upon as the scheme proceeds towards detailed engineering, to deliver the scheme in accordance with best practice.

E.3.4 The Financial Case for the scheme will confirm whether the project is affordable to the principle funding parties. The demand analysis has shown that the potential revenue streams from the bus companies involved with the Park-and-Ride operation will be more than sufficient to cover the operating costs of the project.

E.3.5 Regarding the Management Case, a Project Execution Plan (PEP) will be developed to ensure that planning, cost control, change control progress measurement and status reporting is managed with agreed processes and procedures. The capital cost estimates include an allowance for a scheme project manager and a resident engineer, and additional costs were included to address planning and other processes required for scheme delivery.

Strategic Transport Appraisal

E.3.6 An appraisal of the proposal was undertaken using a simplified version of the Appraisal Summary Table (AST) for Intervention D11 (Strategic Park-and-Ride / Park-and-Choose Strategy) in Annex of Report 3 in the Strategic Transport projects review (STPR). The results of the STPR-based appraisal confirm that the South Tay P&R intervention supports the objectives to make public transport more competitive against the car, and to facilitate access to Dundee City Centre.

E.3.7 We have also undertaken a qualitative appraisal of how the scheme Output Objectives defined in the STAG Report match against the STPR National Objectives. The results of this comparison, in terms of interdependent relationships, show that there is a relatively high degree of interrelationship between the Scheme Output Objectives and the STPR National Objectives. This suggests the project has a good fit within the STPR National Objectives.

1.0 INTRODUCTION

1.1 Background

1.1.1 The northern bridgehead of the Tay Bridge is encircled by the City of Dundee, Scotland's fourth largest city. Moreover, Dundee is a regional employment, education, cultural and retail centre, with three hundred thousand people living within a 30 minute drive of Dundee city centre (double that within an hour's drive time).

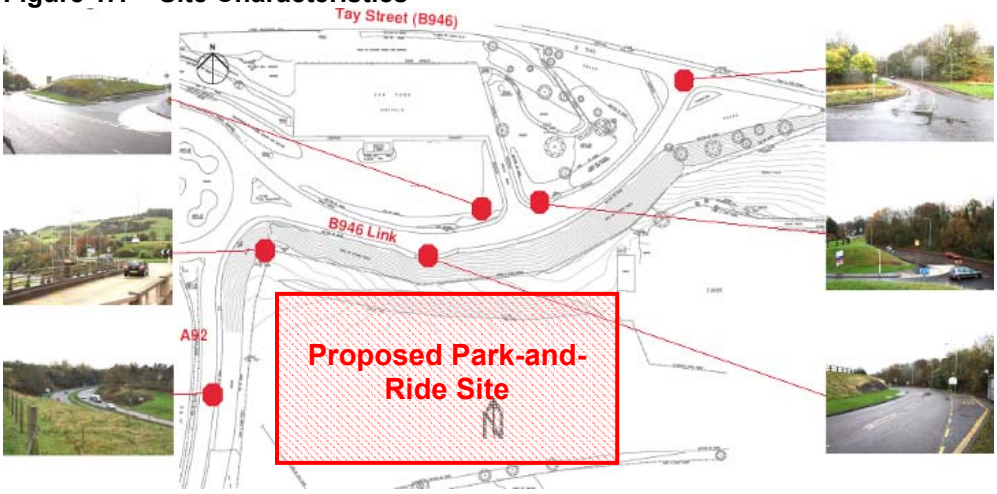
1.1.2 Rising employment in Dundee and a growing peripheral population requires increased transport investment, not least to control the high level of car use and the congestion problems this generates in Dundee itself. This is recognised in Dundee City Council's policy commitments to increase the use of public transport for journeys to, from and within Dundee.

1.1.3 SEStran (South East of Scotland Transport Partnership), in partnership with TACTRAN (Tayside and Central Scotland Transport Partnership), originally commissioned JMP Consultants to undertake a "Cross Tay Sustainable Transport Study"[1]. The study examined the feasibility of a number of potential Park-and-Ride sites and their suitability in serving the Dundee area. Fife and Dundee City Councils were also on the Steering Group for this commission.

1.1.4 The Cross Tay Sustainable Transport Study concluded that the development of a Park-and-Ride site on the approach to the Tay Road Bridge should be pursued. Various locations for potential Park-and-Ride were appraised using the Scottish Transport Appraisal Guidance (STAG) process. This included a transport economic efficiency (TEE) appraisal comparing the benefits against the outline costs of the various options. The best performing option was at a location termed the "Landfall Site" which is situated on the south side of the Tay Bridge (approximately south-east of the A92 roundabout). This option was found to offer the best combination of net present value (NPV) and benefit-to-cost ratio (BCR)[2].

1.1.5 Consequently, the Landfall Site was selected as being the preferred option to take forward towards more detailed development. Figure 1.1 below shows the location of the proposed Park-and-Ride site and surrounding key features.

Figure 1.1 – Site Characteristics



[1] Cross Tay Sustainable Transport Study, JMP Consultants, April 2009
[2] Table 10.22, Page 134, of the Cross Tay Sustainable Transport Study Report

1.1.6 Scott Wilson Ltd were subsequently appointed by a client group comprising of SEStran, TACTRAN, Transport Scotland, Fife Council and Dundee City Council, to provide technical support for the further development of the South Tay Park-and-Ride (P&R) Project. This involved identifying outline layout options for the P&R site and providing preliminary engineering analysis on these layouts. Part of the work also gave consideration to environmental issues. As a result, a preferred engineering solution was developed which included a detailed design, landscaping plan and construction cost estimate.

1.1.7 Following on from the above, Scott Wilson Ltd were then asked to prepare a Business Case Analysis for the proposed engineering design at the Landfall Site. The intention is to enable the client group to assess the potential for implementing the project. This report sets out the results of the Business Case Analysis, with further details on the appraisal aims described below.

1.2 Aims of this Appraisal

1.2.1 SEStran issued Scott Wilson Ltd with a Study Brief on Monday 8 February 2010 requesting various tasks to be completed for developing a Business Case Analysis of the P&R project[3]. A meeting was held with SEStran on Wednesday 10 February 2010 to discuss their needs and agree a suitable methodology. The Brief identified the following outcomes for the study:

- undertake Risk Analysis and estimate Optimism Bias in line with Treasury Guidelines;
- based on the demand and benefit forecasts produced in the original STAG report by JMP Consultants and the cost estimates of the preferred engineering design prepared by Scott Wilson Ltd, undertake a public-sector Business Case Analysis for the project; and
- prepare a simple analysis of how the proposed scheme meets the National Objectives as outlined in the Strategic Transport Projects Review (STPR).

1.2.2 An important aspect of the Brief, and our subsequent meeting with SEStran on 10 February 2010, was that the appraisal should be high-level and make use of the previous demand modelling undertaken during the original STAG work by JMP Consultants.

1.3 Structure of this Report

1.3.1 The structure of this report was discussed and agreed with the Client Steering Group at the project Inception Meeting[4] as follows:

Chapter 2 – presents an overview of the scheme. This includes a description of the project, an evaluation of the project capital and running costs, and a review of the project risks and Optimism Bias estimate. Based on these the total scheme costs are also shown;

Chapter 3 – describes the transport appraisal results including a description of the demand forecasts and the subsequent Business Case Analysis. The chapter also puts forward the commercial, financial and management case for the scheme before finally appraising the scheme from a strategic transport perspective; and

Chapter 4 – summarises the conclusions.

1.3.2 Various appendices also contain supporting documents such as CAD drawings and other information.

[3] South Tay Park-and-Ride Project – Towards Implementation Brief, SEStran, 20 September 2009
[4] Based on the project Inception Meeting on 12 November 2009 held at SEStran's Offices

2.0 OVERVIEW OF THE PROPOSED SCHEME

2.1 Introduction

2.1.1 This chapter presents an overview of the proposed Park-and-Ride scheme at the Landfall Site. The chapter briefly describes key features of the project, and outlines the construction costs of the scheme. These include costs for infrastructure and non-infrastructure items. In addition, the annualised running costs of the project are also set out. These cover the operating, maintenance and renewals (OMR) costs. A review of the project risks and the estimation of the Optimism Bias are then described to give the total scheme costs that are taken forward in the Business Case Analysis.

2.2 Project Details

2.2.1 Details of the Landfall Site proposals have been published in a previous Technical Note prepared by Scott Wilson Ltd[5]. This covers the engineering design, infrastructure, landscaping and traffic appraisal aspects of the project. Therefore, this section provides a summary of the issues covered in the Technical Note. Appendix A of this report shows a Computer Aided Design (CAD) drawing of the proposals.

Engineering Design and Infrastructure

2.2.2 During the development of the scheme, junction access and road geometry were considered to ensure viability. On agreement of the preferred design solution, a layout for the junction was developed in detail comprising of a ghost island arrangement formed by creating two exit lanes from the A92 roundabout onto the B946 Link Road, with the right hand lane dedicated for traffic turning into the Park-and-Ride site.

2.2.3 The layout of the access road and location of the bus terminus were a function of the vertical difference in height between the B946 Link Road and the car park site. This offered little flexibility in terms of land use for the north and eastern areas of the site.

2.2.4 The design of the bus terminus has been developed to create a circulatory system around a terminal building. The terminus floor area is modelled on the existing facilities at the Ingliston Park-and-Ride site as a benchmark allowing for waiting, ticket booths and kiosk.

2.2.5 The layout of the car park was developed to maximise the number of spaces by achieving a high ratio of spaces to surfaced area. The car park layout comprises of standard 5m x 2.5m parking bays, which gives a maximum number of parking spaces of 458 which can be accommodated within the site. Overall demand is initially forecast to be 249 vehicles in 2012 rising to 315 vehicles in 2022. Clearly, providing an engineering solution for significantly more spaces would be an over-design. Hence, following discussion with the client group, a core scheme of 350 spaces was developed which was closer to the estimate of demand but allowed for fluctuations in the numbers of users due to weekend peaks, seasonal fluctuations, etc. This is the proposed scheme, but the 458 space option has also been retained for future expansion potential should the scheme usage exceed forecasts.

2.2.6 No adverse engineering or technical issues have been identified which would prevent the potential proposals being constructed and opened by 2015. This has been assumed to be a suitable opening year for appraisal purposes.

[5] South Tay Park-and-Ride Project, Technical Note, Scott Wilson, February 2010

Landscaping

2.2.7 There appears to be no specific landscape or conservation designations which impact upon the plans at the site location. The open grassy nature of the site has only minimal landscape value in terms of ecology.

2.2.8 The impact of the proposals on the character of the local area would be relatively small with appropriate mitigation works. The footprint of the development falls within the area of one field and therefore would cause only a minor impact on the pattern of field boundaries.

2.2.9 The landscape impact of the development is largely visual, but relatively easy to mitigate. Those affected include passing road users, some picnic site users and a small number of residents close by. However, various landscaping improvements have been developed as part of the scheme to mitigate the visual effects of the new Park-and-Ride facility. A considerable area of tree and shrub planting within and around the car park will screen the Park-and-Ride facility from passing motorists and local residents.

Traffic Appraisal

2.2.10 Following the identification of the preferred design, a traffic appraisal was undertaken for both the A92 / B946 Link Road roundabout and the proposed entrance to the site. Traffic surveys were undertaken to identify key traffic movements, Similarly, current and historic data from Automatic Traffic Counter (ATC) sites were used to identify observed traffic growth, and these were applied to the traffic surveys to predict future traffic flows. The ARCADY and PICADY computer programs were then used to test the impacts of the future traffic flows from the Park-and-Ride proposals on the junctions.

2.2.11 In terms of the traffic impact on the A92 / B946 Link Road roundabout it was found that the introduction of the proposed Park-and-Ride facility would lead to a slight decrease in the Ratio-of-Flows to Capacity (RFC) and associated queue lengths for most turning movements at the junction, with no noticeable impact on congestion. This would be due to traffic re-distributing itself when the new Park-and-Ride site is introduced. In terms of queuing stacking capacity on the B946 Link Road, the estimated queuing length is predicted to be lower than available road length, therefore the queue lengths are considered acceptable.

2.2.12 The above results were based on an average scenario derived from observed and historic traffic conditions. However, sensitivity tests were undertaken to examine the impact in different scenarios. These sensitivity tests also showed that both junctions would operate satisfactorily.

2.3 Construction Cost Estimates

Infrastructure Costs

2.3.1 The infrastructure costs of the scheme are based on three major components: those associated with the access road, those related to the car park and those linked with the terminal building. The estimated costs are based on cost plans for similar schemes compiled in late 2009. Rates used to estimate infrastructure construction costs were sourced from a recent tender for a Park-and-Ride site in West Central Scotland.

2.3.2 Appendix B shows the detailed infrastructure costs table, a summary of which is shown in Table 2.1 overleaf. These are for both the 350 and 458 spaces layout options.

Table 2.1 – Estimated Infrastructure Costs

Component	Cost Estimate	
	458 spaces	350 spaces
Access Road	£481,400	£481,400
Car Park	£1,283,700	£1,027,000
Terminal Building	£75,000	£75,000
Total Infrastructure Costs	***£1,840,100***	***£1,583,400***

Notes: - figures have been rounded to the nearest £100
- values are in Q4 2009 prices

2.3.3 As can be seen from Table 2.1, the total infrastructure costs range from £1.58m to £1.84m, depending on the number of parking spaces, of which over half for both scenarios are due to the construction of the car park. It should be noted that, at this stage, no allowance has been made for costs associated with physical contingencies, risk or Optimism Bias, although these are described later in this report.

Other Delivery Costs

2.3.4 There are a number of other costs associated with the establishment of the proposals other than the infrastructure costs. These costs include management, site preparation, client costs and other items. Table 2.2 shows these other delivery cost components and their estimates.

Table 2.2 – Estimated Other Delivery Costs

Component	Cost Estimate	
	458 spaces	350 spaces
Land Purchase[6]	£31,000	£31,000
Landscaping	£51,300	£51,300
Contractors Prelims	£368,000	£316,700
Management, Contract & Design costs	£150,000	£150,000
Site Investigations	£30,000	£30,000
Client cost & Planning Process	£120,000	£120,000
Site Supervision	£60,000	£60,000
Total Other Delivery Costs	***£810,300***	***£759,000***

Notes: - figures have been rounded to the nearest £100
- values are in Q4 2009 prices

2.3.5 With the exception of landscaping and land purchase, which were calculated, the other delivery costs have been derived using standard applied measures on the total infrastructure costs based on known rates for similar schemes. The total costs for these elements are between £759,000 and £810,300 (at 2009 prices) depending on the number of parking spaces. Of these costs, contractors' preliminaries contribute almost half in both scenarios.

2.3.6 Table 2.3 overleaf shows the Base Cost, which is the combined infrastructure and other delivery costs. This gives a value of circa £2,650,400 at 2009 prices for the 458 spaces design, and approximately £2,342,400 at 2009 prices for the 350 spaces layout. Contingency costs have then been applied using a standard rate of 15%. The original allowance for contingency was 20% but this was for an outline design. Since the new proposals have been taken forward to a more detailed design level, it is normal to reduce

[6] 26,950sqm at a value of £1.15, sourced from the Valuation Office Agency Property Market Report (July 2009) & Bank of Scotland Press Release (http://www.lloydsbankinggroup.com/media/pdfs/bos/Agricultural_Land_Price_Index_2007_Scotland.pdf)

the contingency to 15%. This gives an estimated contingency of £397,600 at 2009 prices for the 458 spaces design and circa £351,300 at 2009 prices for the 350 spaces layout.

Table 2.3 – Base Capital Costs

Component	Cost Estimate	
	458 spaces	350 spaces
Infrastructure Costs	£1,840,100	£1,583,400
Other Delivery Costs	£810,300	£759,000
Base Cost	£2,650,400	£2,342,400
Contingencies (at 15%)	£397,600	£351,400
Total Base Capital Cost	***£3,048,000***	***£2,693,800***

Notes:
- figures have been rounded to the nearest £100
- values are in Q4 2009 prices

2.3.7 The addition of contingency costs to both infrastructure and other delivery costs gives a Total Base Capital Cost estimate of circa £3.05m at 2009 prices for the 458 space design and approximately £2.69m at 2009 prices for the 350 space layout, as shown in Table 2.3 above. These figures have been used in the subsequent economic evaluations.

2.4 Operating, Maintenance and Renewals (OMR) Costs

Operating Costs

2.4.1 Operating costs for the proposal were obtained from the original STAG Report. Given the small overall site size, in Park-and-Ride terms, the STAG Report included a basic facilities building within the cost estimates, assuming limited allowance for staff supervision hours.

2.4.2 Table 2.4 shows the scheme operating costs obtained from the STAG Report.

Table 2.4 – Operating Costs

Item	Rate	Unit	Cost (£ per annum)
Site supervision and security	£10	Per Man Hour	£6,200
Cleaning and maintenance	£10	Per Man Hour	£4,200
Marketing	£2,000	Fixed	£2,000
Publicity materials	£4,000	Fixed	£4,000
Utilities	£8,000	Fixed	£8,000
CCTV maintenance contract	£2,000	Per Camera	£6,000
Contingencies	£9,700	Per Site	£9,700
Total Operating Cost			***£40,100***

Notes:
- figures have been rounded to the nearest £100
- values are in 2009 prices

2.4.3 The STAG Report advises that the operating costs were originally prepared based on an assumed 130 parking spaces at the site. However, the unit rates used by the consultants do not use the number of spaces in its calculations. Furthermore, the rates used are applicable to either fixed items or relate to person-hours for staff details. This suggests that the operating costs would be consistent with the size of the new proposals developed by Scott Wilson Ltd, irrespective of the numbers of parking spaces. In the absence of further information, these costs have been used in this economic appraisal.

2.4.4 Total operating costs per annum are estimated to be £40,100 at 2009 prices with the largest single element being contingencies at nearly £10,000.

Maintenance and Renewal Costs

2.4.5 Maintenance and renewal costs were assumed to be equivalent to 5% of the total capital costs of the project, which in this context include contingencies, risk and optimism bias (see Section 2.5 and 2.6 later in this Chapter).

2.4.6 For the 350 spaces scheme, proposed as the core scheme, this has been estimated to be approximately £183,600 per annum (including risk and OB) at 2009 prices. For the 458 spaces layout, the maintenance and renewal costs were estimated to be circa £202,500 per annum (including risk and OB) at 2009 prices.

2.5 Project Risks

Risk Assessment

2.5.1 Estimates of construction costs for the proposed Park-and-Ride scheme, are, as with all infrastructure projects, subject to a degree of uncertainty. This is due to changes in a number of factors including technical standards, the political environment, project interfaces, technological improvements and/or amendments required to obtain the necessary consents and approvals. Consequently, a quantified risk assessment (QRA) has been carried out on the proposals to enumerate and include the potential costs due to risk and uncertainty.

2.5.2 It should be stated at the outset that it is impossible to identify and manage all project risks. The objective of the risk assessment process is to identify and, if possible, reduce all identified financial and programme risks to a minimum level that is reasonably practical for the scheme.

2.5.3 To reduce the level of uncertainty of the proposals, the project team employed a risk management process based on current best practice guidelines and on experience with similar projects elsewhere. It is particularly important that the risk management process captures the anticipated concerns of different stakeholders. Key to this was setting up and running a risk workshop.

Risk Workshop

2.5.4 A risk workshop was conducted on 11 March 2010 with SEStran, TACTRAN, Transport Scotland, Fife Council and Dundee City Council to discuss and agree the risk register with the client group. The aim of the workshop was to identify and agree the potential risks which could impact on the construction costs of the scheme. The risk workshop did not consider other potential project risks (e.g. operations, maintenance and renewals costs) since the focus was on strengthening the capital cost estimates for use in the Business Case Analysis, which is the remit of this study.

2.5.5 The following objectives were identified for the workshop:

- inform the key stakeholders of scheme risks;
- outline the scheme costs;
- identify and assess project construction cost risks; and
- consider ways to ‘design out’ or lessen the project construction cost risks.

2.5.6 The results of these discussions were taken forward in the development of a risk register, the production of a risk mitigation plan and the calculation of the resulting monetary estimates set out in the rest of this chapter.

Risk Register

2.5.7 The Risk Register is the key tool of the risk management process. It records all identified risks (in this case, construction capital cost risks) as inputs and produces qualitative and quantitative information regarding these risks as outputs such as risk severity, mitigation processes and capital expenditure contingencies. In summary, the Risk Register provides:

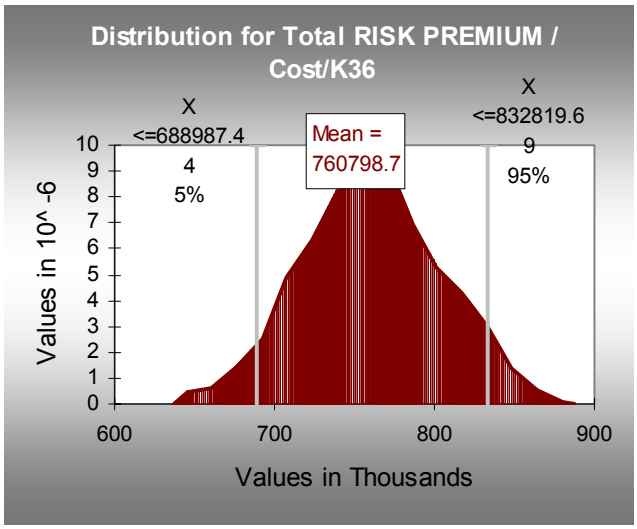
- a fully auditable track record of the identified risks;
- a central focus to the management of risks across all project workstreams;
- a management reporting tool to assist in delivering better performance of key project activities;
- motivation for all team members to assess and manage risks on a frequent and regular basis;
- assistance in facilitating purposeful action and management of threats to the delivery of key project activities as early as possible; and
- an interface with other key project reporting tools to ensure total transparency in the reporting of all identified risks.

2.5.8 The Risk Register provides the basis for risk prioritisation, mitigation action, risk control and risk reporting. As the project moves forward, it should be maintained and updated by the scheme technical advisors, and is regularly monitored by the project team. Appendix C shows the full Risk Register developed following the risk workshop.

Risk Modelling

2.5.9 A Monte Carlo simulation exercise using the @RISK computer program was undertaken on each of the categories of risks identified and highlighted in the Risk Register. This estimated the mean Risk Value, the 75th percentile estimate and gave the overall risk profile. The results of the Monte Carlo simulation are shown in Figure 2.1.

Figure 2.1 – Profile of the Value of the Identified Risks



2.5.10 The Figure shows the mean value of risk is circa £760,800 at 2009 prices. However, the Monte Carlo simulation also estimates the values of risk by percentile. In order to ensure a robust estimate, the 75th percentile was adopted as the value to insert into the final capital costs calculations, which returns a slightly higher figure of £790,300 at 2009 prices.

2.5.11 The computer modelling undertaken for the Monte Carlo Simulation also carried out a regression analysis of all the risks in the Risk Register. This has estimated a regression co-efficient (R-squared value) of 0.999 for the risks. A value of 1.0 would suggest the risk analysis is covering 100% of the potential risks, hence the value obtained suggests a very good level of representation of the potential risks.

Optimism Bias

2.5.12 To estimate Optimism Bias, the HM Treasury Optimism Bias Calculator was used. This is a software tool developed on behalf of the Government for application in economic evaluations[7]. The procedure for using the Optimism Bias Calculator is as follows:

- since the proposed Park-and-Ride scheme is a *Standard Civil Engineering* project, as defined in the HM Treasury Guidance, the Upper Boundary Level of 44% (also from HM Treasury Guidance) for Capital Costs was selected, and the Optimism Bias Calculator identified the list of risks observed to impact on construction outturn costs for *Standard Civil Engineering* projects.
- those risks already included in the Risk Register were subsequently removed from the Optimism Bias Calculator as they have already been identified and taken account of in the quantified risk assessment calculations described above. This left the risks not previously covered in the risk modelling; and
- the Optimism Bias Calculator then calculated the resultant uplift factor to apply to the construction costs. These were applied over-and-above the allowances already identified for contingency and risk and uncertainty.

2.5.13 The results of the calculation are shown in Appendix D. This resulted in a net value for Optimism Bias of approximately 8% of capital costs which was then used in the calculations. It is worth noting that the estimated uplift value of 8% is still almost three times the minimum suggested uplift factor of 3% for Standard Civil Engineering projects.

Risk Mitigation Strategy

2.5.14 An important product of the risk management process is the generation of risk mitigation procedures. These are designed to address the concerns raised by the risk assessment and to mitigate the potential impact on project costs. Risk mitigation is usually undertaken in a series of core process layers as follows:

- Stakeholder Layer;
- Corporate or Strategic Layer;
- Project Layer; and
- Team-task Layer.

[7] Optimism Bias Calculator, HM Treasury, April 2007

2.5.15 Each of these layers is responsible for a different stage of the risk mitigation process and feeds into a number of key risk management process stages. These are illustrated overleaf:

- Person-Layer Risk Identification;
- Risk Assessment;
- Risk Mitigation; and
- Risk Monitoring.

2.5.16 The result of this risk mitigation process was to identify the key risk areas and the key management stakeholder actions. These are summarised in Table 2.5.

Table 2.5 – Key Risk Areas and Risk Management Stakeholder Actions

Risk Areas	Mitigation Actions
Project Specific	• Ground investigations including trial pit surveys will be carried out to take into account ground conditions • Further scheme development/design in light of the above • Following on from the enhanced scheme design, more detailed cost estimates will be produced • Accordingly, the Risk Register will be updated and maintained throughout the above design/costing processes
Environment	• An Environmental Statement (ES) of the plans will be prepared
Public Relations	• Some stakeholder consultation has already been carried out. Further consultation will continue particularly with residents in proximity to the site

2.5.17 The risk estimation process has identified additional allowances for Risk and Uncertainty worth between 29% and 32% of the scheme base cost for the 458 and 350 space scenarios respectively.

2.5.18 This is over-and-above the original 15% of contingency included in the project cost estimates.

2.5.19 In addition, the Optimism Bias calculation process has estimated a further 8%, whereas the minimum value (Lower Boundary Level) for Optimism Bias set out in the HM Treasury Guidance is 3% for Standard Civil Engineering projects.

2.5.20 If implemented the Risk Mitigation Actions described above could potentially further reduce the level of Optimism Bias as the project goes forward through the design process. However, for the purposes of this economic evaluation, no further reductions to the Optimism Bias have been included. This allows for a more robust estimate of the economic return of the proposed scheme.

2.6 Total Scheme Costs

2.6.1 The result of the risk analysis including the development of the Risk Register, the risk modelling and the calculation of Optimism Bias is to confirm the total scheme costs. These are the values of total capital costs which have been used in the economic evaluation of the project. The estimated values are shown in Table 2.6 overleaf.

Table 2.6 – Total Scheme Costs

Element	Calculations	Cost Estimates		Comments
		458 spaces	350 spaces	
Construction Base Costs	(a)	£2,650,400	£2,342,400	- includes infrastructure and other costs (also £10,000 of sunk costs)
Contingency Costs	(b)	£397,600	£351,400	- based on a 15% allowance
Risk and Uncertainty Costs	(c)	£790,300	£790,100	- calculated from the Risk Register modelling using 75th Percentile
Sub-Total	(d) = (a) + (b) + (c)	£3,838,300	£3,484,100	
Optimism Bias (%)	(e)	8.00%	8.00%	- from the HM Treasury OB Calculator
Value of Optimism Bias to be Added	(f) = (a) * (e)	£212,000	£187,400	
Total Scheme Cost	(g) = (d) + (f)	**£4,050,300**	**£3,671,500**	- taken forward to the Business Case Analysis

Notes:
- figures have been rounded to the nearest £100
- values are in Q4 2009 prices

2.6.2 As Table 2.6 above shows, the calculated Total Scheme Costs range from £3.67m for the 350 spaces scheme design to £4.05m for the 458 spaces layout. All figures are in Q4 2009 prices. These have been taken forward into the Business Case Analysis described in Chapter 3.

3.0 TRANSPORT APPRAISAL

3.1 Introduction

3.1.1 This Chapter outlines the transport appraisal elements of the study. In particular it presents the estimates of passenger demands for the new Park-and-Ride scheme as produced in the original STAG Report, along with a summary of the assumptions underpinning the process used. This is then followed by a description of the method carried out for the Business Case Analysis, together with the assumptions used in the economic evaluation. Also outlined are the commercial, financial and management aspects of the implementation of the scheme, as well as the results of a strategic transport assessment using an appraisal summary table based on the Scottish Transport Projects Review (STPR).

3.2 Demand Forecasts

Process

3.2.1 The original demand forecasts for the proposed Park-and-Ride site are set out in the STAG Report[8]. The demand assessment was undertaken using Colin Buchanan Ltd's PRIDE model which was used in the Park-and-Ride strategy development work for TACTRAN to ensure consistency between the emerging TACTRAN Park-and-Ride Strategy and this project. The following is an extract from the STAG Report[9]:

> *"PRIDE is a demand forecasting model developed by Colin Buchanan Ltd (CB) specifically for the assessment of P+R schemes. It was developed initially for the 1993 Greater Manchester P+R Methodology Study; it has been modified and enhanced since, and has been used extensively by CB in a variety of P+R studies. The main inputs to PRIDE are: car trip demand by origin, destination, time period and/or trip purpose; car journey costs – in-vehicle time, parking search times, parking charges, and walk times from the car park; journey costs by P+R – access times to the P+R site by car, walk time at the site, wait time, fare, in-vehicle time, and walk time from the bus stop at the destination; mode choice parameters.*
>
> *Origin – destination data has been taken from the PARAMICS model of Dundee City Centre.*
>
> *Cost data is derived from time and distance skims from the model. The availability of free parking is a major constraint on the P+R market. Dundee City Council have recently undertaken a major survey of private non-residential parking (PNR) in the city centre and this has provided a valuable input to the accurate assessment of potential P+R demand.*
>
> *In the absence of direct survey information, search times have been related to the ease of parking, which itself is a function of the balance between demand and supply. Walk times from the car parks to destination zones is estimated from maps and average walking speeds.*
>
> *Model parameters (modal penalty and spread factor) represent attitudes to mode shift. These vary by area and are derived from research on P+R elsewhere in the UK."*

[8] See Chapter 9 of the Cross Tay Sustainable Transport Study, JMP Consultants, April 2009
[9] From Page 69 of the STAG Report

Assumptions

Land-Use Changes

3.2.2 The demand modelling also included forecasting work undertaken by Colin Buchanan Ltd and based on the Transport Model for Scotland (TMfS). Future year growth in trips and hence Park-and-Ride forecasts included land use changes contained within TMfS. If future year matrices reflected National Road Traffic forecasts, adjusted using the National Trip End Model (TEMPRO) for the Dundee region, the growth factors would show only small levels of growth. By using the land use changes within TMfS, the forecasts reflect localised changes in new developments and thus included the most location-specific information currently available. Using TMfS allows for a consistent appraisal with the planning scenarios used in STPR, and, with the application of local knowledge and professional scrutiny, this ensures a robust STAG appraisal.

External Trips from the South of the Tay Bridge

3.2.3 The final element of modification was the disaggregation of journeys from Fife which provided additional detail on the origins of trips in order that the impacts of modal switch to Park-and-Ride may be better understood. The disaggregation of trips within the Fife area made use of data collected from vehicles crossing the Tay Road Bridge. This data revealed the origins of users of the crossing, and thus additional zones were created for journeys from Fife enabling the disaggregation of trips in the PARAMICS model. Cost data for these movements – journey time and distance – were obtained from the AA on-line route planning software.

Modelled Years

3.2.4 Results were provided for two forecast years: 2012 and 2022. The year 2012 was assumed in the STAG Report to be the opening year of the facility, with 2022 chosen as the TMfS future year from which the growth forecasts are taken for the PARAMICS-based modelling.

Demand Ramp Up

3.2.5 The 2012 opening year results indicate full demand, but general experience with P&R schemes suggests that there is likely to be a delay in the take up of a new facility. Accordingly, the demand forecasts included a ramping up period where forecast demand is factored by 50% in the first year, followed by 75% in the second year, 90% in the third year and then 100% in the fourth and subsequent years.

Other Modelling Assumptions

3.2.6 In terms of the time period adopted, demand forecasts were estimated for the AM peak period (up to 0930hrs). These results were then factored up to obtain all day results using an uplift of 35%, and these in turn were then converted to yearly flows using an annualisation factor of 312. To convert the estimates from vehicles to passengers an average vehicle occupancy of 1.25 was assumed. Additional bus revenues from passengers were estimated using an assumed average fare of £2.50 per return passenger trip.

Estimates

3.2.7 The forecasts from the STAG Report are shown in Table 3.1 overleaf for the Landfall Site.

Table 3.1 – Trip Demand Estimates

	Year	Morning Peak Period	All Day	Annual
Person trips	2012	230	310	96,749
Vehicle trips		185	249	77,820
Person trips	2022	293	396	123,566
Vehicle trips		233	315	98,327

Source: Cross Tay Sustainable Transport Study, JMP Consultants, April 2009

3.3 Economic Appraisal

The Original Process and Assumptions

3.3.1 The original economic appraisal in the STAG Report was restricted to a Transport Economic Efficiency (TEE) assessment. A Wider Economic Benefits (WEBs) assessment was not carried out. This remains the case in this analysis.

3.3.2 The appraisal in the STAG Report was expressed in 2004 prices, and an appraisal period of 60 years was assumed. As well as capital costs, annual operating costs were included in the 60-year period. However, there was no allowance for annual maintenance and renewal costs. The original assessment allowed for operating cost savings due to removing cars parking in Dundee City Centre. These savings were estimated at the same rate used for the additional costs, and were based on the assumed reduction in need for parking spaces within Dundee. The estimate for this was a notional £30,400, resulting in a net operating cost for the Landfall Site of £9,700. No details of an increase in the annual operating costs were outlined in the STAG Report.

3.3.3 Furthermore, Optimism Bias and risk and uncertainty costs were not calculated separately. A high-level factor of 25% to cover both elements was used.

The Process followed in this Study

Capital Cost Assumptions

3.3.4 The updated assumptions include an appraisal for a site layout with 350 spaces (the core case) and for a site with 458 spaces – see Chapter 2 for a description.

3.3.5 In line with the original appraisal, a 60-year appraisal period was adopted, with an annual discount rate of 3.5% applied over the first 30 years and 3% thereafter (years 31 to 60) , in accordance with the HM Treasury Guidance. However, the discount period has been rebased from 2004 to 2002 to re-align the assessment with Government appraisal guidance.

3.3.6 The capital costs have been more fully developed. The previous costs were based on a different design which used the TRBJB. The original capital cost assessment was £2.8m including Optimism Bias of 25%. The new design does not utilise the TRBJB and has a slightly different layout which is more self-contained. The costs have therefore changed and are now £3.73m for the 350 space design and £4.05m for the 458 space layout, both at 2009 prices. These are significantly higher cost estimates, which also reflect the more detailed design undertaken, the assessment of contingency, the calculation of risk and uncertainty, and the estimation of Optimism Bias as per HM Treasury Guidance.

Operations, Maintenance and Renewals (OMR) Costs

3.3.7 Annual operating costs have been adopted as per the original STAG estimates of £40,100 at 2009 prices. However, the allowance for savings in parking operation costs in Dundee City Centre has been omitted as this assumption is uncertain and this exclusion would provide a degree of robustness in the new economic evaluation. Maintenance and renewals costs have been assumed as circa 5% of the capital costs (i.e. the costs including risk and Optimism Bias). The combination of these three annual costs has provided for a measure of the project's annual operations, maintenance and renewals (OMR) costs. Furthermore, these have been assumed to increase by 0.7% per annum in line with previous experience (this equates to a compound uplift of over 50% over the appraisal period).

Demand and Benefits

3.3.8 Demand estimates for annual passengers and vehicles are as produced in the STAG Report, as are those for revenues, indirect taxation, and user benefits.

3.3.9 However, trip purpose data supplied by the client group has been used to disaggregate the estimated benefits into businesses and consumers categories, with businesses at 34.3% and consumers at 65.7%. These weighted average proportions were obtained from a roadside interview (RSI) survey supplied by Dundee City Council. To strengthen the economic evaluation further, the average annual estimates of benefits were broken down into cars, freight and public transport trips. These were obtained from ATC data from the Scottish Road Transport Database (SRTDb).

Capital Interest Charges

3.3.10 In order to test the impacts of paying for the scheme outright at the start of the construction process or using some kind of capital borrowing arrangement and paying off the loan over time, the economic appraisal was subject to two different capitalisation scenarios.

3.3.11 One was based on a lump sum availability of investment resources at the start of the appraisal period, and the other involved borrowing the capital requirements based on a 'prudential borrowing' schedule.

3.3.12 The latter assumed that 100% of the capital requirement was borrowed, and that the rates of repayment of principle and interest involved were at the Government default rates of 4% and 5.5% respectively. In addition, there is also a borrowing cost fee of 2.06% of the amount borrowed, payable at the outset of the appraisal period. The borrowing schedule was expressed in 2002 prices over a 60-year appraisal period using the same discounting values as in paragraph 3.3.5.

Value-for-Money (VfM) Results

3.3.13 The calculations of the various benefits arising from the project are set out in the STAG Report[10]. This included the estimates of time savings and vehicle operating costs (VOC) for both users and non-users of the Park-and-Ride. This Business Case Analysis has used the estimates from the STAG Report and the benefits from the scheme are assumed to be the same for the 350 parking space design as for the 458 space car park layout. The benefits are shown in Table 3.2 overleaf.

[10] See Chapter 10 of the Cross Tay Sustainable Transport Study Report, JMP Consultants, April 2009

Table 3.2 – Summary of the Benefits

Group	Benefit	Category	Present Value of Benefits (350 and/or 458 space layouts)
Users	Time	Consumers	£3.38m
		Businesses	£1.77m
	VOC	Consumers	£0.29m
		Businesses	£0.15m
Non-users	Time	Consumers	£3.05m
		Businesses	£1.59m
	VOC	Consumers	£0.13m
		Businesses	£0.07m

Notes:
- VOC = vehicle operating costs
- monetary values have been rounded to the nearest £0.01m
- values are expressed in 2002 prices

3.3.14 Table 3.2 illustrates that time savings for consumers remain the largest element of benefits for both users and non-users of the Park-and-Ride site, followed by the benefits associated with vehicle operating costs (VOC).

3.3.15 Appendix E includes printouts of the Business Case Appraisal Model. These include disaggregated results of the benefits presented in Table 3.2 above. Table 3.3 presents a summary of the economic evaluation results of the scheme.

Table 3.3 – Summary of the Economic Evaluation Results

	350 Spaces		458 Spaces	
	PV – 60 years (100% Public)	PV – 60 years (100% Borrowed)	PV – 60 years (100% Public)	PV – 60 years (100% Borrowed)
Present Value of Benefits (PVB)	£10.35m	£10.35m	£10.35m	£10.35m
Present Value of Costs (PVC)	£6.14m	£7.04m	£6.70m	£7.69m
Net Present Value (NPV)	£4.21m	£3.31m	£3.65m	£2.66m
Benefit-to-Cost Ratio (BCR)	1.69	1.47	1.54	1.35

Notes:
- 100% Public means the scheme is 100% paid by the public sector without any borrowing loans
- 100% Borrowed means the scheme is 100% paid by Prudential Borrowing
- monetary values have been rounded to the nearest £0.01m
- values are expressed in 2002 prices

3.3.16 Table 3.3 indicates that all the project options, i.e. 350 or 458 parking spaces and public versus Prudential Borrowing payment mechanism, show positive Net Present Values (NPV) and Benefit-to-Cost Ratios (BCR).

3.3.17 However, the highest BCR at 1.69 is associated with the core scheme, the site with 350 car parking spaces and with the public sector fully paying the project at the outset of the appraisal period. This is to be expected and produces an NPV of circa £4.21m expressed in 2002 prices.

3.3.18 The BCR and NPV reduce to 1.47 and £3.31m (expressed in 2002 prices) respectively, when the project is 100% commissioned through the Prudential Borrowing scheme at the start of the construction period and repaid gradually over the appraisal period.

3.3.19 The higher capital and OMR costs associated with the 458 car park spaces layout further reduce the BCR and NPV, since the benefits are assumed constant between the two design layout options but the costs increase.

3.4 Procurement, Financial and Management Case

3.4.1 The purpose of the Strategic Business Case is to provide a rationale for intervention and provide enough evidence for a project to be allowed to proceed to development. At this stage of the project, it would be inappropriate to develop detailed information on the commercial, financial and management arrangements for the proposals. However it is possible to set out expectations for the criteria of each and how these will develop over time.

Procurement Strategy

3.4.2 SEStran will be the procurement body / sponsor and will be responsible for all procurement and management for delivery of the scheme. SEStran have existing and may procure new Framework Agreements with multidisciplinary engineering and transport consultants which they intend to employ for and during the life of the project. The Framework Agreement is capable of covering all aspects of the development, design, contract preparation, CDM regulations, construction and site supervision of the scheme.

3.4.3 SEStran would therefore make full use of this framework, including obtaining services from these consultants which could be based on an Institution of Civil Engineers (ICE) 7th Edition based contract, following the traditional pattern of engineer-designed, contractor-built works with valuation by measurement that has been recently revised and updated. However, the contract basis could be on the alternative New Engineering Contracts (NEC) terms, which is a family of contracts that facilitates the implementation of sound project management principles and practices as well as defining legal relationships suitable for procuring a diverse range of works and services.

3.4.4 As the scheme proceeds towards detailed engineering and contact design, the various options for the procurement strategy will then be decided upon to deliver the scheme in accordance with best practice.

Financial Case

3.4.5 The financial performance of the scheme, that is the forecast costs and revenue implications, has a direct bearing on scheme affordability. It will confirm whether the project is affordable to the principle funding parties.

3.4.6 The demand analysis undertaken for the scheme has shown that the revenue streams from the bus companies involved with the Park-and-Ride operation will be more than sufficient to cover the operating costs of the project, should SEStran (or the relevant local authority managing the operation) charge the companies for using the site, possibly based on the numbers of bus arrivals/departures.

3.4.7 This is not a unique arrangement, as this procedure has been adopted at all Fife Bus Stations and also at Ferry Toll.

Management Case

3.4.8 The nature of the project will require clear management arrangements, including roles and responsibilities. A Project Execution Plan (PEP) will be developed to ensure that planning, cost control, change control progress measurement and status reporting is managed with agreed processes and procedures.

3.4.9 The scheme capital cost estimates include an allowance for SEStran to support a scheme project manager to ensure the successful delivery of the project, and a resident engineer to

oversee site construction. There are additional costs in the scheme budget that are included to address planning and other significant processes required for scheme delivery.

3.5 Strategic Transport Appraisal

STPR-based Appraisal

3.5.1 An appraisal of the proposal was undertaken using a simplified version of the Appraisal Summary Table (AST) for Intervention D11 (Strategic Park-and-Ride / Park-and-Choose Strategy) in Annex of Report 3 in the Strategic Transport projects review (STPR)[11].

3.5.2 The results of the STPR-based appraisal are shown in the AST in Appendix F. The AST confirms that the South Tay Park-and-Ride intervention supports the objectives to make public transport more competitive against the car, and to facilitate access to Dundee City Centre during the peak and off-peak times of day.

3.5.3 The AST in Appendix F suggests the proposal would assist in maintaining and enhancing the labour catchment areas for the city regions and would assist in reducing local CO_2-Equivalent emissions of city-wide traffic. The site is specifically situated to intercept northbound traffic from the northern parts of Fife (including traffic originating in Tayport, Newport and Wormit) to Dundee before reaching the Tay Bridge crossing.

3.5.4 However, the scheme is also likely to serve other city centre users that would otherwise use city centre parking facilities Therefore, of particular importance for Dundee, the proposed measures could assist in maintaining the number of people able to commute from north Fife to areas of economic activity, particularly sites in central Dundee.

3.5.5 The scheme returns a positive or slightly positive result to all the National Objectives specified by the STPR, bar two. These two, which are scored neutral, relate to reducing CO_2-Equivalent emissions (National Objective 9) and the promotion of the continuing reduction in accidents and their severity rates across the strategic transport network (National Objective 10). In terms of reducing CO_2-Equivalent emissions, by promoting smoother traffic flow and encouraging mode shift to public transport, the intervention could potentially lead to reduced CO_2-Equivalent emissions per person-km. This intervention would, therefore, promote carbon efficiency. However, the potential of the scheme to generate the levels required by the draft Climate Change Bill is unlikely by itself.

3.5.6 Regarding the overall impact of the measures on accidents and their severity rates, these are expected to be negligible. However, by promoting mode shift to bus, the intervention could make some contribution to accident savings.

3.5.7 It is unlikely that any untried techniques would be required when implementing any aspects of the project. However, as the design progresses through the various development stages, localised issues could arise which require increased technical capabilities to be overcome. On the other hand no adverse factors would be expected to affect the operation of this scheme over its projected life.

3.5.8 The project has not been presented to the public. However, in general, the measures are expected to meet with public approval as the intervention would improve public transport provision, encourage modal shift and reduce congestion along a busy commuter route.

[11] http://www.transportscotland.gov.uk/files/documents/reports/j10194a/j10194a-a2D11.pdf

Scheme Objectives Appraisal

3.5.9 Following from the above, we have also undertaken a qualitative appraisal of how the scheme Output Objectives defined in the STAG Report match against the STPR National Objectives.

3.5.10 The STAG assessment identified a number of scheme objectives, but most of these nest under the five general Government STAG objectives. Therefore, this appraisal draws on the scheme's three output objectives[12] that are unique to the project and which are not covered by the general STAG objectives. These are:

- reduce Single Occupancy Vehicles (SOVs) on the Tay Road Bridge;
- maximise the use of existing public transport capacity across the Tay; and
- contribute to national air quality targets.

3.5.11 These were matched up with the STPR National Objectives, of which there are 13. While the 13 STPR National Objectives are described in the AST in Appendix F, they are also summarised as follows:

- STPR National Objective 1: promote 'competitive' inter-urban journey times;
- STPR National Objective 2: reduce inter-urban journey times on public transport;
- STPR National Objective 3: promote journey time reduction on the trunk road network for prioritised vehicles and users, or provide improvements to journey time reliability;
- STPR National Objective 4: promote journey time reductions between the Central Belt and Dundee primarily to allow business to achieve an effective working day between these centres;
- STPR National Objective 5: maximise the labour catchment area in city regions;
- STPR National Objective 6: support the development and implementation of the emerging national development interventions;
- STPR National Objective 7: reduce CO_2-Equivalent emissions per person km;
- STPR National Objective 8: stabilise total CO_2-Equivalent emissions;
- STPR National Objective 9: reduce CO_2-Equivalent emissions in line with expectations from the emerging climate change bill;
- STPR National Objective 10: promote continuing reduction in accident rates and severity rates across the strategic transport network, supporting the work of the Strategic Road Safety Plan;
- STPR National Objective 11: promote seamless travel;
- STPR National Objective 12: improve the competitiveness of public transport relative to the car; and
- STPR National Objective 13: improve overall perceptions of public transport.

3.5.12 There is an element of overlap between some of the STPR National Objectives described above (for example, between objectives 7, 8 and 9, and between 1, 2 and 3).

[12] The derivation of the Scheme Output Objectives is explained in Chapter 5 of the STAG Report

3.5.13 The results of the comparison between the STAG Scheme Output Objective and the STPR National Objectives, in terms of interdependent relationships, are shown in Table 3.4 below.

Table 3.4 – Scheme Output Objectives versus STPR National Objectives

Scheme Output Objectives	STPR National Objectives												
	Obj1	Obj2	Obj3	Obj4	Obj5	Obj6	Obj7	Obj8	Obj9	Ob10	Ob11	Ob12	Ob13
STAG Output Objective 1. Reduce Single Occupancy Vehicles on the Tay Road Bridge	✓	0	0	0	0	0	✓	✓	✓	0	0	✓	✓
STAG Output Objective 2. Maximise use of existing public transport capacity across the Tay	✓	✓	✓	0	✓	0	✓	✓	✓	✓	✓	✓	✓
STAG Output Objective 3. Contribute to national air quality targets	✓	✓	✓	✓	0	0	✓	✓	✓	0	0	✓	✓

3.5.14 Table 3.4 shows that there is a relatively high degree of interrelationship between the Scheme Output Objectives and the STPR National Objectives.

3.5.15 Only STPR National Objective 6, which supports the development and implementation of the emerging national development interventions, has no direct relevance to any of the scheme's Output Objectives.

3.5.16 The greatest level of common ground exists between Scheme Output Objective 2, with 11 out of the 13 STPR National Objectives having some commonality. This suggests the project has a good fit within the STPR National Objectives.

4.0 CONCLUSIONS

4.1 Overview

4.1.1 Scott Wilson Ltd were appointed by a client group comprising SEStran, TACTRAN, Transport Scotland, Fife Council and Dundee City Council to identify outline layout options and provide preliminary engineering analysis for the South Tay Park-and-Ride (P&R) Project at the "Landfall site". This included identifying outline layout options for the P&R site, providing preliminary engineering analysis, carry out a traffic appraisal and examine environmental issues.

4.1.2 Following the development of a preferred engineering solution, Scott Wilson Ltd were then asked to prepare a Business Case Analysis for the proposed design. The Brief for this study identified the following outcomes:

- undertake Risk Analysis and estimate Optimism Bias in line with Treasury Guidelines;
- based on the demand and benefit forecasts produced in the original STAG report by JMP Consultants and the cost estimates of the preferred engineering design prepared by Scott Wilson Ltd, undertake a public-sector Business Case Analysis for the project; and
- prepare a simple analysis of how the proposed scheme meets the National Objectives as outlined in the Strategic Transport Projects Review (STPR).

4.1.3 This Chapter summarises the conclusions from the analysis in this report.

4.2 Concluding Remarks

4.2.1 The conclusions from this analysis are as follows:

- following the detailed engineering design, a car park layout including 458 spaces was developed. A 350 space option was also tested as an alternative and less costly option based on the original findings from a previous study that daily usage of the facility in 2022 would be approximately 315 cars;
- the construction costs of the proposed scheme were calculated, which included infrastructure costs, other delivery costs and additional contingencies. This led to base capital costs of £3.05m and £2.69m in 2009 prices for the 458 space and 350 space options. Operating costs for the P&R site were obtained from the original STAG Report and renewal costs were assumed to be equivalent to 5% of the total capital costs of the project;
- a quantified risk assessment was carried out on the proposals, which formed the basis of estimating the monetary value of Risks and the level of Optimism Bias that should be included in the cost projections. To reduce the level of risks, a detailed soil survey was undertaken.; The resulting monetary value of risk was estimated at £790,300 and the level of Optimism Bias (based on HM Treasury Guidance)was estimated at approximately 8% of capital costs;

- the results of the risk analysis and optimism bias estimates were taken into account to calculate the total scheme costs, leading to estimated values (in Q4 2009 prices) of £4.05m and £3.67m, respectively, for the 458 space and 350 space options;
- the economic appraisal was based on two different funding scenarios: One scenario was based on 100% of public funds being available at the start of the appraisal period, which showed that the 350 space design returned the highest Benefits-to-Cost Ratio (BCR) of 1.69, compared with 1.54 for the 458 space option. The other scenario assumed borrowing 100% of the capital requirements based on a 'prudential borrowing' schedule, resulting in slightly lower BCR values of 1.47 and 1.35;
- an appraisal of the proposal was undertaken using a simplified Appraisal Summary Table (AST); The results confirm that the South Tay P&R intervention supports the objectives to make public transport more competitive against the car, and to facilitate access to Dundee City Centre. The proposal would assist in enhancing the labour catchment areas for the city regions and in reducing local CO2-Equivalent emissions of city-wide traffic; and
- comparison between the STAG Output Objectives and the STPR national objectives showed that there is a relatively high degree of interrelationship between the two, suggesting that the project has a good fit within the STPR National Objectives.

Appendix A

South Tay Park & Ride Scheme Outlay

Revision Details	By / Check	Date	Suffix

Drawing Status: INFORMATION

Job Title: SOUTH TAY PARK AND RIDE

Drawing Title: OPTION 3C CAR PARK LAYOUT DRAINAGE STRATEGY

Scale at A1		
1:500		
Drawn	Checked	Approved
IMACP/AF	TAT	
Date	Date	Date
05/01/10	05/01/10	

THIS DRAWING MAY BE USED ONLY FOR THE PURPOSE INTENDED AND ONLY WRITTEN DIMENSIONS SHALL BE USED

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Drawing Number: S106888/SK/011
Rev: -

Plot Date :
AutoCAD File Name :
DB1H

Appendix B

Detailed Cost Table

South Tay Park-and-Ride Project Detailed Cost Table

Item	Measure	Unit	Unit Rate	Cost Estimate
ACCESS ROAD				
Site Clearance		Allow	Sum	£3,500.00
Earthworks (rock)	4,065	m³	£45.00	£182,938.50
Earthworks (non rock including offsite disposal)	9,486	m³	£17.50	£165,999.75
Capping	1,110	m²	£7.84	£8,702.40
Sub-base	1,586	m²	£3.10	£4,916.60
Base course	1,586	m²	£10.12	£16,050.32
Binder course	1,586	m²	£8.49	£13,465.14
Surface course	1,586	m²	£9.33	£14,797.38
Friction Surfacing	500	m²	£5.00	£2,500.00
Kerbing & Traffic islands		Allow	Sum	£5,000.00
Road marking & signage		Allow	Sum	£10,000.00
Drainage	1,586	m²	£7.47	£11,847.42
Footways	384.4	m²	£21.50	£8,264.60
Fencing and street furniture		Allow	Sum	£5,000.00
Street lighting	1,586	m²	£5.00	£7,930.00
Utilities diversions/protection		Allow	Sum	£10,000.00
Reinstatement		Allow	Sum	£1,500.00
Traffic Management		Allow	Sum	£9,000.00
ACCESS ROAD SUB TOTAL				**£481,412.11**
CAR PARK				
Site clearance		Allow	Sum	£5,000.00
Earthworks (Topsoil)	4,704	m³	£1.10	£5,174.40
Earthworks (non rock including offsite disposal)	15,477	m³	£17.50	£270,847.50
Capping (Internal roads)	13,442	m²	£7.84	£105,385.28
Sub-base (Internal roads)	6,137	m²	£3.10	£19,024.70
Base course (Internal roads)	6,137	m²	£10.12	£62,106.44
Binder course (Internal roads)	6,137	m²	£8.49	£52,103.13
Surface course (Internal roads)	6,137	m²	£9.33	£57,258.21
Impermeable Membrane (Permeable paving)	7,304	m²	£3.53	£25,783.12
Crushed Rock (Permeable paving)	7,304	m²	£7.34	£53,611.36
Non-woven Textile (Permeable paving)	7,304	m²	£1.31	£9,568.24
Laying course & paving (Permeable paving)	7,304	m²	£20.49	£149,658.96
Topsoiling		Allow	Sum	£3,500.00
Kerbing & Traffic islands		Allow	Sum	£30,000.00
Drainage (Pipes and Chambers)	12,467	m²	£7.47	£93,128.49
Drainage (Attenuation Works)	12,467	m²	£7.03	£87,643.01
Drainage (Ditches and surface features)	12,467	m²	£0.32	£3,989.44
Footways	573.41	m²	£21.50	£12,328.32
Fencing	600	m	£87.48	£52,488.00
Road marking & signage		Allow	Sum	£10,000.00
Street lighting	11,023	m²	£5.00	£55,115.00
Existing Utilities protection		Allow	Sum	£10,000.00
Utilities ducting		Allow	Sum	£35,000.00
CCTV Ducting & ancillary works		Allow	Sum	£75,000.00
CAR PARK SUB TOTAL				**£1,283,713.60**
TERMINAL BUILDING				
Budget Cost				£75,000.00
Infrastructure Costs Subtotal				**£1,840,125.71**
OTHER COSTS				
Land Purchase				£30,988.00
Landscaping				£51,266.00
Allow Contractors Prelims	20%			£368,025.14
Management, Contract & Design costs		Allow	Sum	£150,000.00
Site Investigations		Allow	Sum	£30,000.00
Client cost & Planning Process		Allow	Sum	£120,000.00
Site Supervision		Allow	Sum	£60,000.00
Contingency	15%			£397,561
TOTAL BASE COST + CONTINGENCY				**£3,047,965.57**

Appendix C

Risk Register

Outline Risk Register		Probability of occurance H/M/L	Value H/M/L	Result	Values L £'000	Values M £'000	Values H £'000	Comments
1. Ground Conditions								
1.1	Substrate conditions (rock excavation)	M	M	M	25	75	125	Trial Pits surveys have identified rock on site, may require rock bolting (however only part of site)
1.2	Made ground (soft & weak silty/gravelly material)	H	M	M	10	30	50	Soil conditions have been identified from Trial Pits
1.3	Excessive moisture drainage	H	M	M	10	30	50	Soil may need draining
1.4	Ground contamination	L	M	L	5	15	25	GI surveys have identified a low risk
2. Land								
2.1	Land take and trying to accommodate SUDS	M	M	M	10	30	50	
2.2	Public access right of way	L	L	L	10	30	50	Overall access is likely to increase
2.3	Land lease	L	L	L	50	60	70	Raised & agreed for inclusion by stakeholders
2.4	Land boundaries	L	L	L	20	30	40	Raised & agreed for inclusion by stakeholders
3. Environment								
3.1	Landscaping mitigation	M	L	M	10	30	50	
3.2	Public relations	L	L	L	10	20	30	Base on already being included in the LP process
3.3	Endangered species	L	L	L	10	20	30	
3.4	Invasive species	L	L	L	10	20	30	
3.5	ES process	H	H	H	50	75	100	
4. Engineering Specific								
4.1	Design complexity	L	L	L	75	150	225	
4.2	Degree of innovation	L	L	L	75	150	225	
4.3	Utility diversions	L	M	L	50	75	100	
5. Construction / contractual								
5.1	Dispute & claims occurred	M	H	H	75	150	225	
5.2	Construction consent	L	M	L	50	75	100	
5.3	Permits / Consents / Approvals	M	M	M	10	30	50	Assumed to be additional to the ES process
5.4	Late contractor involvement in design	L	L	L	75	150	225	
5.5	Poor contractor capabilities	L	M	L	50	75	100	
5.6	Information management	L	M	L	50	75	100	Relates to the accuracy of information available
5.7	Construction escalation costs	L	H	M	100	150	200	
5.8	Weather impacts to construction	L	L	L	20	30	40	Raised & agreed for inclusion by stakeholders
5.9	Archaeological finds	L	H	M	50	75	100	Raised & agreed for inclusion by stakeholders
6. External influences								
6.1	Economy	M	M	M	75	150	225	
6.2	Higher standards demanded from key stakeholders	M	M	M	75	150	225	
6.3	Impacts to business case	L	L	L	10	30	50	
7. Client specification								
7.1	Funding availability	H	H	H	100	150	200	Assumes already partly covered in economy risk category
7.2	Large number of stakeholders	M	M	M	10	30	50	
7.3	Project management team	L	M	L	50	75	100	
7.4	Poor project intelligence	L	L	L	50	75	100	

Appendix D

HM Treasury Optimism Bias Calculator

MMD Optimism Bias Estimator: Civil Engineering Projects

- (•) Standard Civil Engineering
- ( ) Non Standard Civil Engineering
- ( ) Both Standard & Non-Standard

			Non-Standard Civil Engineering		Standard Civil Engineering	
Upper Bound Optimism Bias			25	66	20	44
			Works Duration	Capital Exp'ture	Works Duration	Capital Exp'ture
Risk Area Contribution			Non-Standard Civil En'g		Standard Civil Engineering	
Procurement	***Mitigation of OB ****					
☑ Complexity of Contract Structure		0%			0	0
☐ Late Contractor Involvement in Design					0	3
☐ Poor Contractor Capabilities					16	0
☑ Government Guidelines		0%			0	0
☐ Dispute & Claims Occurred					0	21
☐ Information Management					0	0
☑ Other		0%			0	0
Project Specific						
☐ Design Complexity					0	0
☐ Degree of Innovation					0	0
☐ Environmental Impact					46	22
☑ Other		0%			0	18
Client Specification						
☐ Inadequacy of the Business Case					8	10
☐ Large No. of Stakeholders					0	0
☐ Funding Availability					6	0
☐ Project Management Team					0	0
☐ Poor Project Intelligence					14	7
☑ Other		0%			0	0
Environment						
☐ Public Relations					0	9
☐ Site Characteristics					10	3
☐ Permits / Consents / Approvals					0	0
☑ Other		0%			0	0
External Influences						
☐ Political					0	0
☐ Economic					0	7
☑ Legislation / Regulations		0%			0	0
☑ Technology		0%			0	0
☑ Other		0%			0	0

** At 100% the OB has been fully Mitigated, at 0%, or if unselected, all OB remains Unmitigated*

	Non-Standard Civil En'g		Standard Civil En'g	
Unmitigated Optimism Bias	Duration	Capex	Duration	Capex
			0%	8%

Appendix E

Outputs from the Economic Evaluation Model

South Tay P&R Study - Business Case Model

Data Inputs to Cost/Benefit Analysis

GENERAL										
Title of Do-Min Proposal	Do-Minimum Scenario									
Title of Do-Some Proposal	New P&R Site at A92/B946 - 458 Spaces Scheme									
Annual Adjustment Factor	0.0%	2020	0.0%	2030	0.0%	2040	0.0%	2050	0.0%	2070
Annual Growth in OMR Costs	0.7%	2020	0.7%	2030	0.7%	2040	0.7%	2050	0.7%	2075
Annual discount rate	3.5%	2045	3.0%	2075						

Capital, Operations, Maintenance and Renewals (COMR) Costs @ 2009 prices

			Sources/Comments
Capital Costs (including R, C & OB)	£4,050,324		Base Cost from SW Technical Note, Chapter 2, and R & OB from Risk Modelling by SW
CapEx Spend Year -2	2013	40%	Assumed 2 year construction programme
CapEx Spend Year -1	2014	60%	Assumed 2 year construction programme
Total Spend profile		***100%***	
RPI - 2002 (Q3)	176.60		From DfT_EconAppr_504864.doc
RPI - 2009 (Q4)	216.90		Derived from ONS data
Revenues Adjustment Factor (2009 to 2002)	0.933		Based on 1% per annum growth in Real Fares (i.e. RPI + 1% pa)
RPF	1.00		When a cost estimate relates to a period subsequent to the latest RPF, the latest RPF has been used which was 1.00 to adjust works costs (From DfT_EconAppr_504864.doc)
M & R Costs Assumption	5%		Assumes Annual Maintenance & Renewals are circa 5% of Capital Costs
Opening Year of P&R	2015		From SW Technical Note, Chapter 2
Operating Costs	£40,100		From STAG Report, JMP Consultants
Maintenance Costs	£101,258		Assumed %age of total CapEx costs
Renewals Costs	£101,258		Assumed %age of total CapEx costs
Total OMR Costs	***£242,616***		
Optimism Bias Uplift Factors (at start of appraisal period)			
Operating Costs	1		
Maintenance Costs	1		
Renewals Costs	1		

Adjusted Costs @ 2002 prices

Capital Costs (including OB)	£3,297,774	
Operating Costs (including OB)	£32,649	2002 prices
Maintenance Costs (including OB)	£82,444	2002 prices
Renewals Costs (including OB)	£82,444	2002 prices
Total OMR Costs (including OB)	***£197,538***	

Demand and Benefits

Demand Estimates	***Annual (Pax)***	***Day (Pax)***	***Factor (Pax)***	***Annual (Veh)***	***Day (Veh)***	***Factor (Veh)***	***Occ Rate***	***Sources/Comments***
2015	96,749	310	312.09	77,820	249	312.53	1.24	From STAG Report, JMP Consultants
2025	123,566	396	312.04	98,327	315	312.15	1.26	From STAG Report, JMP Consultants

Distances Saved			***Sources/Comments***
2015	**3.9**	**km per Trip**	From P&R Site to Central Dundee (The Overgate)
2025	**3.9**	**km per Trip**	From P&R Site to Central Dundee (The Overgate)

Benefits Estimates	***Values***	***Sources/Comments***			***Sources/Comments***
PV Revenue @ P&R Site	£5,780,000	From STAG Report, JMP Consultants	RPI - 2002 (Q3)	176.60	From DfT_EconAppr_504864.doc
PV Revenue @ Dundee CC	-£5,341,000	From STAG Report, JMP Consultants	RPI - 2004 (Q3)	187.40	Derived from ONS data
Indirect Taxation	-£520,000	From STAG Report, JMP Consultants	RPI	1.00	From DfT_EconAppr_504864.doc
PV User Benefits	£5,938,000	From STAG Report, JMP Consultants			
PV Non-User Benefits	£2,206,000	From STAG Report, JMP Consultants			

Proportions of Travel Patterns

			Sources/Comments
Trip Purposes	Business	34.3%	Weighted Average Proportions from RSI Survey supplied by Dundee City Council
	Consumer	65.7%	Weighted Average Proportions from RSI Survey supplied by Dundee City Council
		100.0%	

AADT Traffic Compositions		North	South	2way	***Sources/Comments***
	Cars	88.5%	89.6%	89.0%	from ATC Data obtained from the SRTDb
	Freight	10.5%	9.4%	10.0%	from ATC Data obtained from the SRTDb
	PT	1.0%	0.9%	1.0%	from ATC Data obtained from the SRTDb
	Totals	100.0%	100.0%	100.0%	

Zone-to-Zone P&R Catchment Area	246%	from Buchanan's P&R Model and Dundee City Council's PARAMICS Model
Percentage of VOC Taxation	77%	from WebTAG Unit 3
Percentage of VOC Users	70%	rounded off and based on data from STAG Report, JMP

South Tay P&R Study - Business Case Model

Results of Cost/Benefit Analysis

Proposal: New P&R Site at A92/B946 - 458 Spaces Scheme ***versus*** Do-Minimum Scenario

60 Year Analysis Period | Annual discount rate 3.5% | 0-30 years and thereafter 3.0%

Economic Benefits Appraisal

BENEFITS

			Cars	Freight	PT	Totals		
USERS	Consumer Benefits	Time	£3,012,459	£338,149	£32,642	£3,383,250		
	Business Benefits		£1,573,393	£176,614	£17,049	£1,767,055		
						£5,150,305		
	Consumer Benefits	VOC	£260,567	£29,249	£2,823	£292,639		
	Business Benefits		£136,093	£15,276	£1,475	£152,844		
						£445,484		
							Total PV User Benefits =	£5,595,789 PV3
			Cars	**Freight**	**PT**	**Totals**		
NON-USERS	Consumer Benefits	Time	£2,716,518	£304,930	£29,435	£3,050,883		
	Business Benefits		£1,418,825	£159,263	£15,374	£1,593,462		
						£4,644,345		
	Consumer Benefits	VOC	£111,672	£12,535	£1,210	£125,417		
	Business Benefits		£58,326	£6,547	£632	£65,505		
						£190,922		
							Total PV Non-User Benefits=	£4,835,266 PV4

Transport Economic Efficiency (TEE) Table

BENEFITS		**Ref**	**PVB-60 (100% Public)**	**PVB-60 (100% Borrowed)**		**Comments**
PV Revenue @ P&R Site	Aggregate P&R Revenues (Buses Only)		£5,446,894	£5,446,894	(X)	Calculated from Demand Estimates in STAG Report, JMP Consultants
PV Revenue @ Dundee CC	Impacts on City Centre Revenues		-£5,033,194	-£5,033,194	(Y)	Loss of City Centre Parking Income from P&R users
	Net Revenues	PV1	£413,700	£413,700	(a)	= (X) + (Y)
Indirect Taxation	Tax Transfer from VOC	PV2	-£490,032	-£490,032	(b)	Due to HM Treasury losses from Vehicle Operating Costs (VOCs) savings
PV User Benefits	Aggregate P&R Benefits (Buses Only)	PV3	£5,595,789	£5,595,789	(c)	Includes time and VOC benefits
PV Non-User Benefits	Aggregate P&R Benefits (Other Hwy Users)	PV4	£4,835,266	£4,835,266	(d)	Includes time and VOC benefits
Net PV Benefits	*Sub-Total*	PVB	*£10,354,723*	*£10,354,723*		= (a) + (b) + (c) + (d)
COSTS		**Ref**	**PVB-60**	**PVB-60**		**Comments**
Public Sector Impacts	Investment Costs	PV5	£2,561,325	£3,551,382	(e)	Assumes either Government pays all infrastructure costs or 100% borrowed
	Operations, Maintenance & Renewals Costs	PV6	£4,141,513	£4,141,513	(f)	Three elements make up the OMR costs
	Tax Transfer from VOC		Included above	Included above	(g)	
Grant/Subsidy	Grant/Subsidy from Public Sector	PV7	£0	£0	(h)	Revenues cover OMR costs over appraisal period
Net PV Costs	*Sub-Total*	PVC	*£6,702,838*	*£7,692,896*		= (e) + (f) + (g) + (h)
IMPACTS						
	Veh-Kms Saved	2015	303,498	303,498	V.KM	
		2025	383,475	383,475	V.KM	
	Net Present Value (NPV)		£3,651,885	£2,661,828		
	NPV/K Ratio		1.43	0.75		
	Benefit-to-Cost Ratio (BCR)		1.54	1.35		

Capital, Operations, Maintenance and Renewals Costs

							Capital Costs (including R, C & OB)			Operating Costs			Maintenance Costs			Renewals Costs		
Year	N	N (Project)	Disc Rate	Discount	OMR Costs Rate	OMR Costs Growth	Profile	CapCosts	DisCapCosts	Profile	OpsCosts	DisOpsCosts	Profile	MaintCosts	DisMaintCosts	Profile	RenCosts	DisRenCosts
2000	0	0	3.5%	1	0.7%	1	0	£0	£0	0	£0	£0	0	£0	£0	0	£0	£0
2001	0	0	3.5%	1	0.7%	1	0	£0	£0	0	£0	£0	0	£0	£0	0	£0	£0
2002	0	0	3.5%	1	0.7%	1	0	£0	£0	0	£0	£0	0	£0	£0	0	£0	£0
2003	1	0	3.5%	0.966183575	0.7%	1.007	0	£0	£0	0	£0	£0	0	£0	£0	0	£0	£0
2004	2	0	3.5%	0.9335107	0.7%	1.014049	0	£0	£0	0	£0	£0	0	£0	£0	0	£0	£0
2005	3	0	3.5%	0.901942706	0.7%	1.021147343	0	£0	£0	0	£0	£0	0	£0	£0	0	£0	£0
2006	4	0	3.5%	0.871442228	0.7%	1.028295374	0	£0	£0	0	£0	£0	0	£0	£0	0	£0	£0
2007	5	0	3.5%	0.841973167	0.7%	1.035493442	0	£0	£0	0	£0	£0	0	£0	£0	0	£0	£0
2008	6	0	3.5%	0.813500644	0.7%	1.042741896	0	£0	£0	0	£0	£0	0	£0	£0	0	£0	£0
2009	7	0	3.5%	0.785990961	0.7%	1.050041089	0	£0	£0	0	£0	£0	0	£0	£0	0	£0	£0
2010	8	0	3.5%	0.759411556	0.7%	1.057391377	0	£0	£0	0	£0	£0	0	£0	£0	0	£0	£0
2011	9	0	3.5%	0.733730972	0.7%	1.064793117	0	£0	£0	0	£0	£0	0	£0	£0	0	£0	£0
2012	10	0	3.5%	0.708918814	0.7%	1.072246668	0	£0	£0	0	£0	£0	0	£0	£0	0	£0	£0
2013	11	0	3.5%	0.684945714	0.7%	1.079752395	1	£1,620,130	£1,109,701	0	£0	£0	0	£0	£0	0	£0	£0
2014	12	0	3.5%	0.661783298	0.7%	1.087310662	1	£2,430,194	£1,608,262	0	£0	£0	0	£0	£0	0	£0	£0
2015	13	1	3.5%	0.639404153	0.7%	1.094921837	0	£0	£0	1	£35,749	£22,858	1	£90,270	£57,719	1	£90,270	£57,719
2016	14	2	3.5%	0.61778179	0.7%	1.102586289	0	£0	£0	1	£35,999	£22,239	1	£90,902	£56,158	1	£90,902	£56,158
2017	15	3	3.5%	0.596890619	0.7%	1.110304393	0	£0	£0	1	£36,251	£21,638	1	£91,538	£54,638	1	£91,538	£54,638
2018	16	4	3.5%	0.576705912	0.7%	1.118076524	0	£0	£0	1	£36,505	£21,052	1	£92,179	£53,160	1	£92,179	£53,160
2019	17	5	3.5%	0.557203779	0.7%	1.12590306	0	£0	£0	1	£36,760	£20,483	1	£92,824	£51,722	1	£92,824	£51,722
2020	18	6	3.5%	0.53836114	0.7%	1.133784381	0	£0	£0	1	£37,017	£19,929	1	£93,474	£50,323	1	£93,474	£50,323
2021	19	7	3.5%	0.52015569	0.7%	1.141720872	0	£0	£0	1	£37,277	£19,390	1	£94,128	£48,961	1	£94,128	£48,961
2022	20	8	3.5%	0.502565884	0.7%	1.149712918	0	£0	£0	1	£37,537	£18,865	1	£94,787	£47,637	1	£94,787	£47,637
2023	21	9	3.5%	0.485570903	0.7%	1.157760908	0	£0	£0	1	£37,800	£18,355	1	£95,451	£46,348	1	£95,451	£46,348
2024	22	10	3.5%	0.469150631	0.7%	1.165865235	0	£0	£0	1	£38,065	£17,858	1	£96,119	£45,094	1	£96,119	£45,094
2025	23	11	3.5%	0.453285634	0.7%	1.174026291	0	£0	£0	1	£38,331	£17,375	1	£96,792	£43,874	1	£96,792	£43,874
2026	24	12	3.5%	0.437957134	0.7%	1.182244476	0	£0	£0	1	£38,600	£16,905	1	£97,469	£42,687	1	£97,469	£42,687
2027	25	13	3.5%	0.423146989	0.7%	1.190520187	0	£0	£0	1	£38,870	£16,448	1	£98,152	£41,533	1	£98,152	£41,533
2028	26	14	3.5%	0.40883767	0.7%	1.198853828	0	£0	£0	1	£39,142	£16,003	1	£98,839	£40,409	1	£98,839	£40,409
2029	27	15	3.5%	0.395012242	0.7%	1.207245805	0	£0	£0	1	£39,416	£15,570	1	£99,531	£39,316	1	£99,531	£39,316
2030	28	16	3.5%	0.38165434	0.7%	1.215696526	0	£0	£0	1	£39,692	£15,149	1	£100,227	£38,252	1	£100,227	£38,252
2031	29	17	3.5%	0.368748155	0.7%	1.224206401	0	£0	£0	1	£39,970	£14,739	1	£100,929	£37,217	1	£100,929	£37,217
2032	30	18	3.5%	0.356278411	0.7%	1.232775846	0	£0	£0	1	£40,249	£14,340	1	£101,635	£36,211	1	£101,635	£36,211
2033	31	19	3.5%	0.344230348	0.7%	1.241405277	0	£0	£0	1	£40,531	£13,952	1	£102,347	£35,231	1	£102,347	£35,231
2034	32	20	3.5%	0.332589709	0.7%	1.250095114	0	£0	£0	1	£40,815	£13,575	1	£103,063	£34,278	1	£103,063	£34,278
2035	33	21	3.5%	0.321342714	0.7%	1.25884578	0	£0	£0	1	£41,101	£13,207	1	£103,785	£33,350	1	£103,785	£33,350
2036	34	22	3.5%	0.310476052	0.7%	1.2676577	0	£0	£0	1	£41,388	£12,850	1	£104,511	£32,448	1	£104,511	£32,448
2037	35	23	3.5%	0.299976862	0.7%	1.276531304	0	£0	£0	1	£41,678	£12,502	1	£105,243	£31,570	1	£105,243	£31,570
2038	36	24	3.5%	0.289832717	0.7%	1.285467023	0	£0	£0	1	£41,970	£12,164	1	£105,980	£30,716	1	£105,980	£30,716
2039	37	25	3.5%	0.28003161	0.7%	1.294465292	0	£0	£0	1	£42,264	£11,835	1	£106,721	£29,885	1	£106,721	£29,885
2040	38	26	3.5%	0.270561942	0.7%	1.303526549	0	£0	£0	1	£42,559	£11,515	1	£107,468	£29,077	1	£107,468	£29,077
2041	39	27	3.5%	0.261412505	0.7%	1.312651235	0	£0	£0	1	£42,857	£11,203	1	£108,221	£28,290	1	£108,221	£28,290
2042	40	28	3.5%	0.252572468	0.7%	1.321839794	0	£0	£0	1	£43,157	£10,900	1	£108,978	£27,525	1	£108,978	£27,525
2043	41	29	3.5%	0.24403137	0.7%	1.331092672	0	£0	£0	1	£43,459	£10,605	1	£109,741	£26,780	1	£109,741	£26,780
2044	42	30	3.5%	0.235779102	0.7%	1.340410321	0	£0	£0	1	£43,764	£10,319	1	£110,509	£26,056	1	£110,509	£26,056
2045	43	31	3.0%	0.228911749	0.7%	1.349793193	0	£0	£0	1	£44,070	£10,088	1	£111,283	£25,474	1	£111,283	£25,474
2046	44	32	3.0%	0.222244417	0.7%	1.359241746	0	£0	£0	1	£44,378	£9,863	1	£112,062	£24,905	1	£112,062	£24,905
2047	45	33	3.0%	0.215771278	0.7%	1.368756438	0	£0	£0	1	£44,689	£9,643	1	£112,846	£24,349	1	£112,846	£24,349
2048	46	34	3.0%	0.209486678	0.7%	1.378337733	0	£0	£0	1	£45,002	£9,427	1	£113,636	£23,805	1	£113,636	£23,805
2049	47	35	3.0%	0.203385124	0.7%	1.387986097	0	£0	£0	1	£45,317	£9,217	1	£114,432	£23,274	1	£114,432	£23,274
2050	48	36	3.0%	0.197461286	0.7%	1.397702	0	£0	£0	1	£45,634	£9,011	1	£115,233	£22,754	1	£115,233	£22,754
2051	49	37	3.0%	0.191709986	0.7%	1.407485914	0	£0	£0	1	£45,954	£8,810	1	£116,039	£22,246	1	£116,039	£22,246
2052	50	38	3.0%	0.1861262	0.7%	1.417338315	0	£0	£0	1	£46,275	£8,613	1	£116,852	£21,749	1	£116,852	£21,749
2053	51	39	3.0%	0.180705049	0.7%	1.427259683	0	£0	£0	1	£46,599	£8,421	1	£117,670	£21,263	1	£117,670	£21,263
2054	52	40	3.0%	0.175441795	0.7%	1.437250501	0	£0	£0	1	£46,925	£8,233	1	£118,493	£20,789	1	£118,493	£20,789
2055	53	41	3.0%	0.17033184	0.7%	1.447311255	0	£0	£0	1	£47,254	£8,049	1	£119,323	£20,324	1	£119,323	£20,324
2056	54	42	3.0%	0.165370718	0.7%	1.457442434	0	£0	£0	1	£47,585	£7,869	1	£120,158	£19,871	1	£120,158	£19,871
2057	55	43	3.0%	0.160554095	0.7%	1.467644531	0	£0	£0	1	£47,918	£7,693	1	£120,999	£19,427	1	£120,999	£19,427
2058	56	44	3.0%	0.155877762	0.7%	1.477918042	0	£0	£0	1	£48,253	£7,522	1	£121,846	£18,993	1	£121,846	£18,993
2059	57	45	3.0%	0.151337633	0.7%	1.488263469	0	£0	£0	1	£48,591	£7,354	1	£122,699	£18,569	1	£122,699	£18,569
2060	58	46	3.0%	0.146929741	0.7%	1.498681313	0	£0	£0	1	£48,931	£7,189	1	£123,558	£18,154	1	£123,558	£18,154
2061	59	47	3.0%	0.142650234	0.7%	1.509172082	0	£0	£0	1	£49,274	£7,029	1	£124,423	£17,749	1	£124,423	£17,749
2062	60	48	3.0%	0.138495373	0.7%	1.519736287	0	£0	£0	1	£49,619	£6,872	1	£125,294	£17,353	1	£125,294	£17,353
2063	61	49	3.0%	0.134461527	0.7%	1.530374441	0	£0	£0	1	£49,966	£6,718	1	£126,171	£16,965	1	£126,171	£16,965
2064	62	50	3.0%	0.130545172	0.7%	1.541087062	0	£0	£0	1	£50,316	£6,568	1	£127,054	£16,586	1	£127,054	£16,586
2065	63	51	3.0%	0.126742885	0.7%	1.551874671	0	£0	£0	1	£50,668	£6,422	1	£127,943	£16,216	1	£127,943	£16,216
2066	64	52	3.0%	0.123051345	0.7%	1.562737794	0	£0	£0	1	£51,022	£6,278	1	£128,839	£15,854	1	£128,839	£15,854
2067	65	53	3.0%	0.119467325	0.7%	1.573676958	0	£0	£0	1	£51,380	£6,138	1	£129,741	£15,500	1	£129,741	£15,500
2068	66	54	3.0%	0.115987694	0.7%	1.584692697	0	£0	£0	1	£51,739	£6,001	1	£130,649	£15,154	1	£130,649	£15,154
2069	67	55	3.0%	0.112609412	0.7%	1.595785546	0	£0	£0	1	£52,101	£5,867	1	£131,564	£14,815	1	£131,564	£14,815
2070	68	56	3.0%	0.109329526	0.7%	1.606956045	0	£0	£0	1	£52,466	£5,736	1	£132,484	£14,484	1	£132,484	£14,484
2071	69	57	3.0%	0.106145171	0.7%	1.618204737	0	£0	£0	1	£52,833	£5,608	1	£133,412	£14,161	1	£133,412	£14,161
2072	70	58	3.0%	0.103053564	0.7%	1.62953217	0	£0	£0	1	£53,203	£5,483	1	£134,346	£13,845	1	£134,346	£13,845
2073	71	59	3.0%	0.100052004	0.7%	1.640938896	0	£0	£0	1	£53,576	£5,360	1	£135,286	£13,536	1	£135,286	£13,536
2074	72	60	3.0%	0.097137868	0.7%	1.652425468	0	£0	£0	1	£53,951	£5,241	1	£136,233	£13,233	1	£136,233	£13,233
2075	73	61	0.0%	0.097137868	0.0%	1.652425468	0	£0	£0	1	£53,951	£5,241	1	£136,233	£13,233	1	£136,233	£13,233
						Totals		**£4,050,324**	**£2,717,963**		**£2,708,212**	**£701,386**		**£6,838,613**	**£1,771,098**		**£6,838,613**	**£1,771,098**

Capital Costs (including R, C & OB)		Operating Costs		Maintenance Costs		Renewals Costs	
PVC-30 =	£2,717,963	PVC-30 =	£483,911	PVC-30 =	£1,221,942	PVC-30 =	£1,221,942
PVC-60 =	£2,717,963	PVC-60 =	£701,386	PVC-60 =	£1,771,098	PVC-60 =	£1,771,098

30-year and 60-year Analysis

Annual discount rates = 3.5% 0-30 years and 3.0% 31-60 years

PVC-30 = £5,645,757 [£5.65 million]

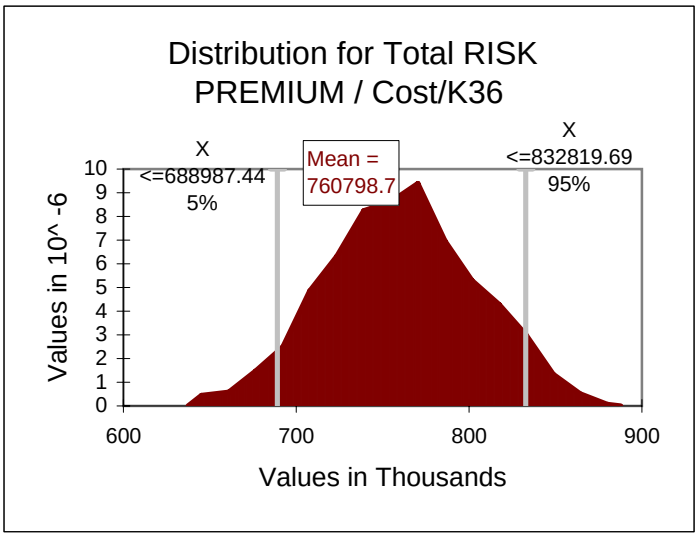
PVC-60 = £6,961,546 [£6.96 million]

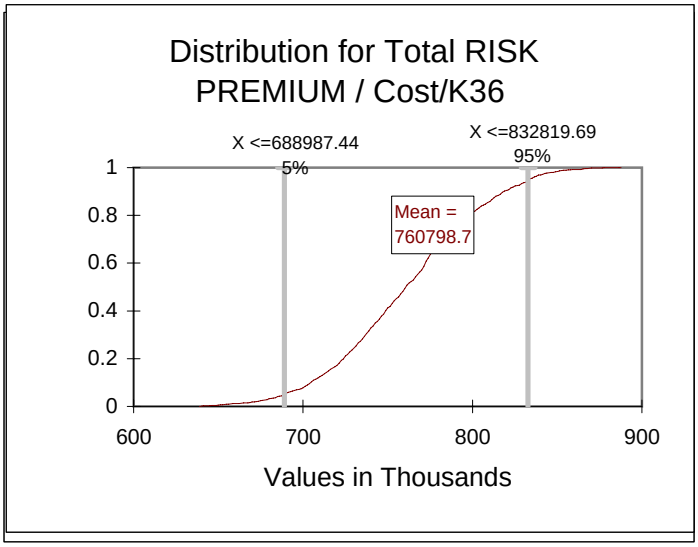
(for info only, not used in calcs)

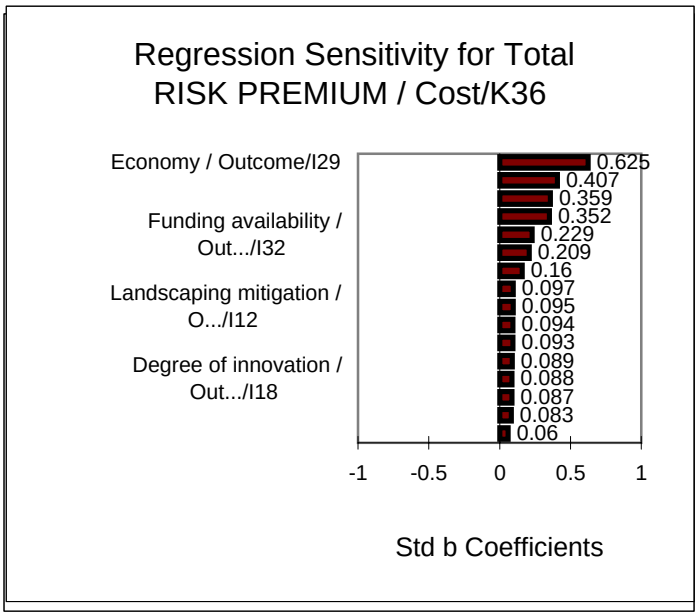
South Tay Park-and-Ride Project

Item	Measure	Unit	Unit Rate	Cost Estimate
ACCESS ROAD				
Site Clearance		Allow	Sum	£3,500.00
Earthworks (rock)	4,065	m³	£45.00	£182,938.50
Earthworks (non rock including offsite disposal)	9,486	m³	£17.50	£165,999.75
Capping	1,110	m²	£7.84	£8,702.40
Sub-base	1,586	m²	£3.10	£4,916.60
Base course	1,586	m²	£10.12	£16,050.32
Binder course	1,586	m²	£8.49	£13,465.14
Surface course	1,586	m²	£9.33	£14,797.38
Friction Surfacing	500	m²	£5.00	£2,500.00
Kerbing & Traffic islands		Allow	Sum	£5,000.00
Road marking & signage		Allow	Sum	£10,000.00
Drainage	1,586	m²	£7.47	£11,847.42
Footways	384.4	m²	£21.50	£8,264.60
Fencing and street furniture		Allow	Sum	£5,000.00
Street lighting	1,586	m²	£5.00	£7,930.00
Utilities diversions/protection		Allow	Sum	£10,000.00
Reinstatement		Allow	Sum	£1,500.00
Traffic Management		Allow	Sum	£9,000.00
ACCESS ROAD SUB TOTAL				**£481,412.11**
CAR PARK				
Site clearance		Allow	Sum	£5,000.00
Earthworks (Topsoil)	4,704	m³	£1.10	£5,174.40
Earthworks (non rock including offsite disposal)	15,477	m³	£17.50	£270,847.50
Capping (Internal roads)	13,442	m²	£7.84	£105,385.28
Sub-base (Internal roads)	6,137	m²	£3.10	£19,024.70
Base course (Internal roads)	6,137	m²	£10.12	£62,106.44
Binder course (Internal roads)	6,137	m²	£8.49	£52,103.13
Surface course (Internal roads)	6,137	m²	£9.33	£57,258.21
Impermeable Membrane (Permeable paving)	7,304	m²	£3.53	£25,783.12
Crushed Rock (Permeable paving)	7,304	m²	£7.34	£53,611.36
Non-woven Textile (Permeable paving)	7,304	m²	£1.31	£9,568.24
Laying course & paving (Permeable paving)	7,304	m²	£20.49	£149,658.96
Topsoiling		Allow	Sum	£3,500.00
Kerbing & Traffic islands		Allow	Sum	£30,000.00
Drainage (Pipes and Chambers)	12,467	m²	£7.47	£93,128.49
Drainage (Attenuation Works)	12,467	m²	£7.03	£87,643.01
Drainage (Ditches and surface features)	12,467	m²	£0.32	£3,989.44
Footways	573.41	m²	£21.50	£12,328.32
Fencing	600	m	£87.48	£52,488.00
Road marking & signage		Allow	Sum	£10,000.00
Street lighting	11,023	m²	£5.00	£55,115.00
Existing Utilities protection		Allow	Sum	£10,000.00
Utilities ducting		Allow	Sum	£35,000.00
CCTV Ducting & ancillary works		Allow	Sum	£75,000.00
CAR PARK SUB TOTAL				**£1,283,713.60**
TERMINAL BUILDING				
Budget Cost				£75,000.00
Infrastructure Costs Subtotal				**£1,840,125.71**
OTHER COSTS				
Land Purchase				£30,988.00
Landscaping				£51,266.00
Allow Contractors Prelims	20%			£368,025.14
Management, Contract & Design costs		Allow	Sum	£150,000.00
Site Investigations		Allow	Sum	£30,000.00
Client cost & Planning Process		Allow	Sum	£120,000.00
Site Supervision		Allow	Sum	£60,000.00
Contingency	15%			£397,561
TOTAL BASE COST + CONTINGENCY				**£3,047,965.57**

Simulation Results for
Total RISK PREMIUM / Cost / K36







Summary Information	
Workbook Name	Tay Park & Ride Risk 19 M
Number of Simulations	1
Number of Iterations	1000
Number of Inputs	64
Number of Outputs	1
Sampling Type	Monte Carlo
Simulation Start Time	19/05/2010 09:26
Simulation Stop Time	19/05/2010 09:26
Simulation Duration	00:00:02
Random Seed	960008604

Summary Statistics			
Statistic	Value	%tile	Value
Minimum	637,386	5%	688,987
Maximum	887,799	10%	704,557
Mean	760,799	15%	715,047
Std Dev	43,525	20%	724,018
Variance	1894429437	25%	731,124
Skewness	-0.009206143	30%	737,051
Kurtosis	2.731093325	35%	742,729
Median	760,673	40%	748,243
Mode	747,977	45%	754,982
Left X	688,987	50%	760,673
Left P	5%	55%	767,011
Right X	832,820	60%	772,172
Right P	95%	65%	776,493
Diff X	143,832	70%	782,486
Diff P	90%	75%	790,326
#Errors	0	80%	798,331
Filter Min		85%	808,533
Filter Max		90%	818,121
#Filtered	0	95%	832,820

Sensitivity			
Rank	Name	Regr	Corr
#1	Economy / Outc	0.625	0.608
#2	Substrate condit	0.407	0.396
#3	Dispute & claims	0.359	0.380
#4	Higher standard	0.352	0.337
#5	Funding availab	0.229	0.196
#6	ES process / Ou	0.209	0.201
#7	Made ground (s	0.160	0.145
#8	Large number o	0.097	0.138
#9	Landscaping mi	0.095	0.120
#10	Permits / Conse	0.094	0.069
#11	Land take and t	0.093	0.095
#12	Design complex	0.089	0.023
#13	Degree of innov	0.088	0.072
#14	Late contractor i	0.087	0.076
#15	Excessive moist	0.083	0.089
#16	Construction es	0.060	0.042

Capital Cost Adjustments

	Calculations		Comments
Construction Base Costs	(a)	£2,650,405	- includes main infrastructure plus contractor prelims and landscaping and includes £10k of sunk costs
Contingency Costs	(b)	£397,561	- based on a 15% allowance
Risk & Uncertainty Costs	(c)	£790,326	- calculated from the Risk Register modelling using 75th Percentile
Sub-Total	(d) = (a) + (b) + (c)	**£3,838,292**	
Optimism Bias (%)	(e)	8.00%	- from HM Treasury OB Calculator
Value of Optimism Bias to be Added	(f) = (a) * (e)	£212,032	
Grand Total (for Appraisal)	(g) = (d) + (f)	**£4,050,324**	**- Calculated Total Scheme Cost for Business Case**

Prudential Borrowing Schedule

Principal borrowed = £4,050,324

Assumed public sector borrowed = 100%

Borrowing cost fee = 2.06%

Repayment Charge = 4.00%

Interest Rate = 5.50%

Year	N	N (Project)	Disc Rate	Discount	Financial Repayments				
					Prinicpal Repayment	Interest Repayment	Total Repayment	Outstanding balance	Discounted Repayment
2002	0	0	3.5%	1					
2003	1	0	3.5%	0.9662					
2004	2	0	3.5%	0.9335					
2005	3	0	3.5%	0.9019					
2006	4	0	3.5%	0.8714					
2007	5	0	3.5%	0.8420					
2008	6	0	3.5%	0.8135					
2009	7	0	3.5%	0.7860					
2010	8	0	3.5%	0.7594					
2011	9	0	3.5%	0.7337					
2012	10	0	3.5%	0.7089					
2013	11	0	3.5%	0.6849			£83,538	£4,050,324	£57,219
2014	12	0	3.5%	0.6618	£162,013	£222,768	£384,781	£3,888,311	£254,642
2015	13	1	3.5%	0.6394	£155,532	£213,857	£369,390	£3,732,779	£236,189
2016	14	2	3.5%	0.6178	£149,311	£205,303	£354,614	£3,583,468	£219,074
2017	15	3	3.5%	0.5969	£143,339	£197,091	£340,429	£3,440,129	£203,199
2018	16	4	3.5%	0.5767	£137,605	£189,207	£326,812	£3,302,524	£188,475
2019	17	5	3.5%	0.5572	£132,101	£181,639	£313,740	£3,170,423	£174,817
2020	18	6	3.5%	0.5384	£126,817	£174,373	£301,190	£3,043,606	£162,149
2021	19	7	3.5%	0.5202	£121,744	£167,398	£289,143	£2,921,862	£150,399
2022	20	8	3.5%	0.5026	£116,874	£160,702	£277,577	£2,804,987	£139,501
2023	21	9	3.5%	0.4856	£112,199	£154,274	£266,474	£2,692,788	£129,392
2024	22	10	3.5%	0.4692	£107,712	£148,103	£255,815	£2,585,076	£120,016
2025	23	11	3.5%	0.4533	£103,403	£142,179	£245,582	£2,481,673	£111,319
2026	24	12	3.5%	0.4380	£99,267	£136,492	£235,759	£2,382,406	£103,252
2027	25	13	3.5%	0.4231	£95,296	£131,032	£226,329	£2,287,110	£95,770
2028	26	14	3.5%	0.4088	£91,484	£125,791	£217,275	£2,195,626	£88,830
2029	27	15	3.5%	0.3950	£87,825	£120,759	£208,584	£2,107,801	£82,393
2030	28	16	3.5%	0.3817	£84,312	£115,929	£200,241	£2,023,489	£76,423
2031	29	17	3.5%	0.3687	£80,940	£111,292	£192,231	£1,942,549	£70,885
2032	30	18	3.5%	0.3563	£77,702	£106,840	£184,542	£1,864,847	£65,748
2033	31	19	3.5%	0.3442	£74,594	£102,567	£177,160	£1,790,253	£60,984
2034	32	20	3.5%	0.3326	£71,610	£98,464	£170,074	£1,718,643	£56,565
2035	33	21	3.5%	0.3213	£68,746	£94,525	£163,271	£1,649,897	£52,466
2036	34	22	3.5%	0.3105	£65,996	£90,744	£156,740	£1,583,901	£48,664
2037	35	23	3.5%	0.3000	£63,356	£87,115	£150,471	£1,520,545	£45,138
2038	36	24	3.5%	0.2898	£60,822	£83,630	£144,452	£1,459,724	£41,867
2039	37	25	3.5%	0.2800	£58,389	£80,285	£138,674	£1,401,335	£38,833
2040	38	26	3.5%	0.2706	£56,053	£77,073	£133,127	£1,345,281	£36,019
2041	39	27	3.5%	0.2614	£53,811	£73,990	£127,802	£1,291,470	£33,409
2042	40	28	3.5%	0.2526	£51,659	£71,031	£122,690	£1,239,811	£30,988
2043	41	29	3.5%	0.2440	£49,592	£68,190	£117,782	£1,190,219	£28,743
2044	42	30	3.5%	0.2358	£47,609	£65,462	£113,071	£1,142,610	£26,660
2045	43	31	3.0%	0.2289	£45,704	£62,844	£108,548	£1,096,906	£24,848
2046	44	32	3.0%	0.2222	£43,876	£60,330	£104,206	£1,053,029	£23,159
2047	45	33	3.0%	0.2158	£42,121	£57,917	£100,038	£1,010,908	£21,585
2048	46	34	3.0%	0.2095	£40,436	£55,600	£96,036	£970,472	£20,118
2049	47	35	3.0%	0.2034	£38,819	£53,376	£92,195	£931,653	£18,751
2050	48	36	3.0%	0.1975	£37,266	£51,241	£88,507	£894,387	£17,477
2051	49	37	3.0%	0.1917	£35,775	£49,191	£84,967	£858,611	£16,289
2052	50	38	3.0%	0.1861	£34,344	£47,224	£81,568	£824,267	£15,182
2053	51	39	3.0%	0.1807	£32,971	£45,335	£78,305	£791,296	£14,150
2054	52	40	3.0%	0.1754	£31,652	£43,521	£75,173	£759,644	£13,189
2055	53	41	3.0%	0.1703	£30,386	£41,780	£72,166	£729,259	£12,292
2056	54	42	3.0%	0.1654	£29,170	£40,109	£69,280	£700,088	£11,457
2057	55	43	3.0%	0.1606	£28,004	£38,505	£66,508	£672,085	£10,678
2058	56	44	3.0%	0.1559	£26,883	£36,965	£63,848	£645,201	£9,952
2059	57	45	3.0%	0.1513	£25,808	£35,486	£61,294	£619,393	£9,276
2060	58	46	3.0%	0.1469	£24,776	£34,067	£58,842	£594,618	£8,646
2061	59	47	3.0%	0.1427	£23,785	£32,704	£56,489	£570,833	£8,058
2062	60	48	3.0%	0.1385	£22,833	£31,396	£54,229	£548,000	£7,510
2063	61	49	3.0%	0.1345	£21,920	£30,140	£52,060	£526,080	£7,000
2064	62	50	3.0%	0.1305	£21,043	£28,934	£49,978	£505,036	£6,524
2065	63	51	3.0%	0.1267	£20,201	£27,777	£47,978	£484,835	£6,081
2066	64	52	3.0%	0.1231	£19,393	£26,666	£46,059	£465,442	£5,668
2067	65	53	3.0%	0.1195	£18,618	£25,599	£44,217	£446,824	£5,282
2068	66	54	3.0%	0.1160	£17,873	£24,575	£42,448	£428,951	£4,923
2069	67	55	3.0%	0.1126	£17,158	£23,592	£40,750	£411,793	£4,589
2070	68	56	3.0%	0.1093	£16,472	£22,649	£39,120	£395,321	£4,277
2071	69	57	3.0%	0.1061	£15,813	£21,743	£37,556	£379,508	£3,986
2072	70	58	3.0%	0.1031	£15,180	£20,873	£36,053	£364,328	£3,715
2073	71	59	3.0%	0.1001	£14,573	£20,038	£34,611	£349,755	£3,463

South Tay P&R Study - Business Case Model

Data Inputs to Cost/Benefit Analysis

GENERAL										
Title of Do-Min Proposal	Do-Minimum Scenario									
Title of Do-Some Proposal	New P&R Site at A92/B946 - 350 Spaces Scheme									
Annual Adjustment Factor	0.0%	2020	0.0%	2030	0.0%	2040	0.0%	2050	0.0%	2070
Annual Growth in OMR Costs	0.7%	2020	0.7%	2030	0.7%	2040	0.7%	2050	0.7%	2075
Annual discount rate	3.5%	2045	3.0%	2075						

Capital, Operations, Maintenance and Renewals (COMR) Costs @ 2009 prices

			Sources/Comments
Capital Costs (including R, C & OB)	£3,671,446		Base Cost from SW Technical Note, Chapter 2, and R & OB from Risk Modelling by SW
CapEx Spend Year -2	2013	40%	Assumed 2 year construction programme
CapEx Spend Year -1	2014	60%	Assumed 2 year construction programme
Total Spend profile		***100%***	
RPI - 2002 (Q3)	176.60		From DfT_EconAppr_504864.doc
RPI - 2009 (Q4)	216.90		Derived from ONS data
Revenues Adjustment Factor (2009 to 2002)	0.933		Based on 1% per annum growth in Real Fares (i.e. RPI + 1% pa)
RPF	1.00		When a cost estimate relates to a period subsequent to the latest RPF, the latest RPF has been used which was 1.00 to adjust works costs (From DfT_EconAppr_504864.doc)
M & R Costs Assumption	5%		Assumes Annual Maintenance & Renewals are circa 5% of Capital Costs
Opening Year of P&R	2015		From SW Technical Note, Chapter 2
Operating Costs	£40,100		From STAG Report, JMP Consultants
Maintenance Costs	£91,786		Assumed %age of total CapEx costs
Renewals Costs	£91,786		Assumed %age of total CapEx costs
Total OMR Costs	***£223,672***		
Optimism Bias Uplift Factors (at start of appraisal period)			
Operating Costs	1		
Maintenance Costs	1		
Renewals Costs	1		

Adjusted Costs @ 2002 prices

Capital Costs (including OB)	£2,989,291	
Operating Costs (including OB)	£32,649	2002 prices
Maintenance Costs (including OB)	£74,732	2002 prices
Renewals Costs (including OB)	£74,732	2002 prices
Total OMR Costs (including OB)	***£182,114***	

Demand and Benefits

Demand Estimates	***Annual (Pax)***	***Day (Pax)***	***Factor (Pax)***	***Annual (Veh)***	***Day (Veh)***	***Factor (Veh)***	***Occ Rate***	***Sources/Comments***
2015	96,749	310	312.09	77,820	249	312.53	1.24	From STAG Report, JMP Consultants
2025	123,566	396	312.04	98,327	315	312.15	1.26	From STAG Report, JMP Consultants

Distances Saved			***Sources/Comments***
2015	**3.9**	**km per Trip**	From P&R Site to Central Dundee (The Overgate)
2025	**3.9**	**km per Trip**	From P&R Site to Central Dundee (The Overgate)

Benefits Estimates	***Values***	***Sources/Comments***			***Sources/Comments***
PV Revenue @ P&R Site	£5,780,000	From STAG Report, JMP Consultants	RPI - 2002 (Q3)	176.60	From DfT_EconAppr_504864.doc
PV Revenue @ Dundee CC	-£5,341,000	From STAG Report, JMP Consultants	RPI - 2004 (Q3)	187.40	Derived from ONS data
Indirect Taxation	-£520,000	From STAG Report, JMP Consultants	RPI	1.00	From DfT_EconAppr_504864.doc
PV User Benefits	£5,938,000	From STAG Report, JMP Consultants			
PV Non-User Benefits	£2,206,000	From STAG Report, JMP Consultants			

Proportions of Travel Patterns

			Sources/Comments
Trip Purposes	Business	34.3%	Weighted Average Proportions from RSI Survey supplied by Dundee City Council
	Consumer	65.7%	Weighted Average Proportions from RSI Survey supplied by Dundee City Council
		100.0%	

AADT Traffic Compositions		North	South	2way	***Sources/Comments***
	Cars	88.5%	89.6%	89.0%	from ATC Data obtained from the SRTDb
	0	10.5%	9.4%	10.0%	from ATC Data obtained from the SRTDb
	PT	1.0%	0.9%	1.0%	from ATC Data obtained from the SRTDb
	Totals	100.0%	100.0%	100.0%	

Zone-to-Zone P&R Catchment Area	246%	from Buchanan's P&R Model and Dundee City Council's PARAMICS Model
Percentage of VOC Taxation	77%	from WebTAG Unit 3
Percentage of VOC Users	70%	rounded off and based on data from STAG Report, JMP

South Tay P&R Study - Business Case Model

Results of Cost/Benefit Analysis

Proposal: New P&R Site at A92/B946 - 350 Spaces Scheme ***versus*** Do-Minimum Scenario

60 Year Analysis Period | Annual discount rate 3.5% | 0-30 years and thereafter 3.0%

Economic Benefits Appraisal

BENEFITS

			Cars	Freight	PT	Totals		
USERS	Consumer Benefits	Time	£3,012,459	£338,149	£32,642	£3,383,250		
	Business Benefits		£1,573,393	£176,614	£17,049	£1,767,055		
						£5,150,305		
	Consumer Benefits	VOC	£260,567	£29,249	£2,823	£292,639		
	Business Benefits		£136,093	£15,276	£1,475	£152,844		
						£445,484		
							Total PV User Benefits =	£5,595,789 PV3

			Cars	Freight	PT	Totals		
NON-USERS	Consumer Benefits	Time	£2,716,518	£304,930	£29,435	£3,050,883		
	Business Benefits		£1,418,825	£159,263	£15,374	£1,593,462		
						£4,644,345		
	Consumer Benefits	VOC	£111,672	£12,535	£1,210	£125,417		
	Business Benefits		£58,326	£6,547	£632	£65,505		
						£190,922		
							Total PV Non-User Benefits=	£4,835,266 PV4

Transport Economic Efficiency (TEE) Table

BENEFITS		Ref	PVB-60 (100% Public)	PVB-60 (100% Borrowed)		Comments
PV Revenue @ P&R Site	Aggregate P&R Revenues (Buses Only)		£5,446,894	£5,446,894	(X)	Calculated from Demand Estimates in STAG Report, JMP Consultants
PV Revenue @ Dundee CC	Impacts on City Centre Revenues		-£5,033,194	-£5,033,194	(Y)	Loss of City Centre Parking Income from P&R users
	Net Revenues	PV1	£413,700	£413,700	(a)	= (X) + (Y)
Indirect Taxation	Tax Transfer from VOC	PV2	-£490,032	-£490,032	(b)	Due to HM Treasury losses from Vehicle Operating Costs (VOCs) savings
PV User Benefits	Aggregate P&R Benefits (Buses Only)	PV3	£5,595,789	£5,595,789	(c)	Includes time and VOC benefits
PV Non-User Benefits	Aggregate P&R Benefits (Other Hwy Users)	PV4	£4,835,266	£4,835,266	(d)	Includes time and VOC benefits
Net PV Benefits	*Sub-Total*	PVB	*£10,354,723*	*£10,354,723*		= (a) + (b) + (c) + (d)

COSTS		Ref	PVB-60	PVB-60		Comments
Public Sector Impacts	Investment Costs	PV5	£2,321,731	£3,219,176	(e)	Assumes either Government pays all infrastructure costs or 100% borrowed
	Operations, Maintenance & Renewals Costs	PV6	£3,819,714	£3,819,714	(f)	Three elements make up the OMR costs
	Tax Transfer from VOC		Included above	Included above	(g)	
Grant/Subsidy	Grant/Subsidy from Public Sector	PV7	£0	£0	(h)	Revenues cover OMR costs over appraisal period
Net PV Costs	*Sub-Total*	PVC	*£6,141,446*	*£7,038,891*		= (e) + (f) + (g) + (h)
	0					

IMPACTS					
	Veh-Kms Saved	2015	303,498	303,498	V.KM
		2025	383,475	383,475	V.KM
	Net Present Value (NPV)		£4,213,278	£3,315,833	
	NPV/K Ratio		1.81	1.03	
	Benefit-to-Cost Ratio (BCR)		1.69	1.47	

Capital, Operations, Maintenance and Renewals Costs

							Capital Costs (including R, C & OB)			Operating Costs			Maintenance Costs			Renewals Costs		
Year	N	N (Project)	Disc Rate	Discount	OMR Costs Rate	OMR Costs Growth	Profile	CapCosts	DisCapCosts	Profile	OpsCosts	DisOpsCosts	Profile	MaintCosts	DisMaintCosts	Profile	RenCosts	DisRenCosts
2000	0	0	3.5%	1	0.7%	1	0	£0	£0	0	£0	£0	0	£0	£0	0	£0	£0
2001	0	0	3.5%	1	0.7%	1	0	£0	£0	0	£0	£0	0	£0	£0	0	£0	£0
2002	0	0	3.5%	1	0.7%	1	0	£0	£0	0	£0	£0	0	£0	£0	0	£0	£0
2003	1	0	3.5%	0.966183575	0.7%	1.007	0	£0	£0	0	£0	£0	0	£0	£0	0	£0	£0
2004	2	0	3.5%	0.9335107	0.7%	1.014049	0	£0	£0	0	£0	£0	0	£0	£0	0	£0	£0
2005	3	0	3.5%	0.901942706	0.7%	1.021147343	0	£0	£0	0	£0	£0	0	£0	£0	0	£0	£0
2006	4	0	3.5%	0.871442228	0.7%	1.028295374	0	£0	£0	0	£0	£0	0	£0	£0	0	£0	£0
2007	5	0	3.5%	0.841973167	0.7%	1.035493442	0	£0	£0	0	£0	£0	0	£0	£0	0	£0	£0
2008	6	0	3.5%	0.813500644	0.7%	1.042741896	0	£0	£0	0	£0	£0	0	£0	£0	0	£0	£0
2009	7	0	3.5%	0.785990961	0.7%	1.050041089	0	£0	£0	0	£0	£0	0	£0	£0	0	£0	£0
2010	8	0	3.5%	0.759411556	0.7%	1.057391377	0	£0	£0	0	£0	£0	0	£0	£0	0	£0	£0
2011	9	0	3.5%	0.733730972	0.7%	1.064793117	0	£0	£0	0	£0	£0	0	£0	£0	0	£0	£0
2012	10	0	3.5%	0.708918814	0.7%	1.072246668	0	£0	£0	0	£0	£0	0	£0	£0	0	£0	£0
2013	11	0	3.5%	0.684945714	0.7%	1.079752395	1	£1,468,578	£1,005,896	0	£0	£0	0	£0	£0	0	£0	£0
2014	12	0	3.5%	0.661783298	0.7%	1.087310662	1	£2,202,867	£1,457,821	0	£0	£0	0	£0	£0	0	£0	£0
2015	13	1	3.5%	0.639404153	0.7%	1.094921837	0	£0	£0	1	£35,749	£22,858	1	£81,826	£52,320	1	£81,826	£52,320
2016	14	2	3.5%	0.61778179	0.7%	1.102586289	0	£0	£0	1	£35,999	£22,239	1	£82,399	£50,904	1	£82,399	£50,904
2017	15	3	3.5%	0.596890619	0.7%	1.110304393	0	£0	£0	1	£36,251	£21,638	1	£82,976	£49,527	1	£82,976	£49,527
2018	16	4	3.5%	0.576705912	0.7%	1.118076524	0	£0	£0	1	£36,505	£21,052	1	£83,556	£48,187	1	£83,556	£48,187
2019	17	5	3.5%	0.557203779	0.7%	1.12590306	0	£0	£0	1	£36,760	£20,483	1	£84,141	£46,884	1	£84,141	£46,884
2020	18	6	3.5%	0.53836114	0.7%	1.133784381	0	£0	£0	1	£37,017	£19,929	1	£84,730	£45,615	1	£84,730	£45,615
2021	19	7	3.5%	0.52015569	0.7%	1.141720872	0	£0	£0	1	£37,277	£19,390	1	£85,323	£44,381	1	£85,323	£44,381
2022	20	8	3.5%	0.502565884	0.7%	1.149712918	0	£0	£0	1	£37,537	£18,865	1	£85,921	£43,181	1	£85,921	£43,181
2023	21	9	3.5%	0.485570903	0.7%	1.157760908	0	£0	£0	1	£37,800	£18,355	1	£86,522	£42,013	1	£86,522	£42,013
2024	22	10	3.5%	0.469150631	0.7%	1.165865235	0	£0	£0	1	£38,065	£17,858	1	£87,128	£40,876	1	£87,128	£40,876
2025	23	11	3.5%	0.453285634	0.7%	1.174026291	0	£0	£0	1	£38,331	£17,375	1	£87,738	£39,770	1	£87,738	£39,770
2026	24	12	3.5%	0.437957134	0.7%	1.182244476	0	£0	£0	1	£38,600	£16,905	1	£88,352	£38,694	1	£88,352	£38,694
2027	25	13	3.5%	0.423146989	0.7%	1.190520187	0	£0	£0	1	£38,870	£16,448	1	£88,970	£37,648	1	£88,970	£37,648
2028	26	14	3.5%	0.40883767	0.7%	1.198853828	0	£0	£0	1	£39,142	£16,003	1	£89,593	£36,629	1	£89,593	£36,629
2029	27	15	3.5%	0.395012242	0.7%	1.207245805	0	£0	£0	1	£39,416	£15,570	1	£90,220	£35,638	1	£90,220	£35,638
2030	28	16	3.5%	0.38165434	0.7%	1.215696526	0	£0	£0	1	£39,692	£15,149	1	£90,852	£34,674	1	£90,852	£34,674
2031	29	17	3.5%	0.368748155	0.7%	1.224206401	0	£0	£0	1	£39,970	£14,739	1	£91,488	£33,736	1	£91,488	£33,736
2032	30	18	3.5%	0.356278411	0.7%	1.232775846	0	£0	£0	1	£40,249	£14,340	1	£92,128	£32,823	1	£92,128	£32,823
2033	31	19	3.5%	0.344230348	0.7%	1.241405277	0	£0	£0	1	£40,531	£13,952	1	£92,773	£31,935	1	£92,773	£31,935
2034	32	20	3.5%	0.332589709	0.7%	1.250095114	0	£0	£0	1	£40,815	£13,575	1	£93,422	£31,071	1	£93,422	£31,071
2035	33	21	3.5%	0.321342714	0.7%	1.25884578	0	£0	£0	1	£41,101	£13,207	1	£94,076	£30,231	1	£94,076	£30,231
2036	34	22	3.5%	0.310476052	0.7%	1.2676577	0	£0	£0	1	£41,388	£12,850	1	£94,735	£29,413	1	£94,735	£29,413
2037	35	23	3.5%	0.299976862	0.7%	1.276531304	0	£0	£0	1	£41,678	£12,502	1	£95,398	£28,617	1	£95,398	£28,617
2038	36	24	3.5%	0.289832717	0.7%	1.285467023	0	£0	£0	1	£41,970	£12,164	1	£96,066	£27,843	1	£96,066	£27,843
2039	37	25	3.5%	0.28003161	0.7%	1.294465292	0	£0	£0	1	£42,264	£11,835	1	£96,738	£27,090	1	£96,738	£27,090
2040	38	26	3.5%	0.270561942	0.7%	1.303526549	0	£0	£0	1	£42,559	£11,515	1	£97,416	£26,357	1	£97,416	£26,357
2041	39	27	3.5%	0.261412505	0.7%	1.312651235	0	£0	£0	1	£42,857	£11,203	1	£98,097	£25,644	1	£98,097	£25,644
2042	40	28	3.5%	0.252572468	0.7%	1.321839794	0	£0	£0	1	£43,157	£10,900	1	£98,784	£24,950	1	£98,784	£24,950
2043	41	29	3.5%	0.24403137	0.7%	1.331092672	0	£0	£0	1	£43,459	£10,605	1	£99,476	£24,275	1	£99,476	£24,275
2044	42	30	3.5%	0.235779102	0.7%	1.340410321	0	£0	£0	1	£43,764	£10,319	1	£100,172	£23,618	1	£100,172	£23,618
2045	43	31	3.0%	0.228911749	0.7%	1.349793193	0	£0	£0	1	£44,070	£10,088	1	£100,873	£23,091	1	£100,873	£23,091
2046	44	32	3.0%	0.222244417	0.7%	1.359241746	0	£0	£0	1	£44,378	£9,863	1	£101,579	£22,575	1	£101,579	£22,575
2047	45	33	3.0%	0.215771278	0.7%	1.368756438	0	£0	£0	1	£44,689	£9,643	1	£102,290	£22,071	1	£102,290	£22,071
2048	46	34	3.0%	0.209486678	0.7%	1.378337733	0	£0	£0	1	£45,002	£9,427	1	£103,006	£21,578	1	£103,006	£21,578
2049	47	35	3.0%	0.203385124	0.7%	1.387986097	0	£0	£0	1	£45,317	£9,217	1	£103,727	£21,097	1	£103,727	£21,097
2050	48	36	3.0%	0.197461286	0.7%	1.397702	0	£0	£0	1	£45,634	£9,011	1	£104,453	£20,626	1	£104,453	£20,626
2051	49	37	3.0%	0.191709986	0.7%	1.407485914	0	£0	£0	1	£45,954	£8,810	1	£105,185	£20,165	1	£105,185	£20,165
2052	50	38	3.0%	0.1861262	0.7%	1.417338315	0	£0	£0	1	£46,275	£8,613	1	£105,921	£19,715	1	£105,921	£19,715
2053	51	39	3.0%	0.180705049	0.7%	1.427259683	0	£0	£0	1	£46,599	£8,421	1	£106,662	£19,274	1	£106,662	£19,274
2054	52	40	3.0%	0.175441795	0.7%	1.437250501	0	£0	£0	1	£46,925	£8,233	1	£107,409	£18,844	1	£107,409	£18,844
2055	53	41	3.0%	0.1703184	0.7%	1.447311255	0	£0	£0	1	£47,254	£8,049	1	£108,161	£18,423	1	£108,161	£18,423
2056	54	42	3.0%	0.165370718	0.7%	1.457442434	0	£0	£0	1	£47,585	£7,869	1	£108,918	£18,012	1	£108,918	£18,012
2057	55	43	3.0%	0.160554095	0.7%	1.467644531	0	£0	£0	1	£47,918	£7,693	1	£109,680	£17,610	1	£109,680	£17,610
2058	56	44	3.0%	0.155877762	0.7%	1.477918042	0	£0	£0	1	£48,253	£7,522	1	£110,448	£17,216	1	£110,448	£17,216
2059	57	45	3.0%	0.151337633	0.7%	1.488263469	0	£0	£0	1	£48,591	£7,354	1	£111,221	£16,832	1	£111,221	£16,832
2060	58	46	3.0%	0.146929741	0.7%	1.498681313	0	£0	£0	1	£48,931	£7,189	1	£112,000	£16,456	1	£112,000	£16,456
2061	59	47	3.0%	0.142650234	0.7%	1.509172082	0	£0	£0	1	£49,274	£7,029	1	£112,784	£16,089	1	£112,784	£16,089
2062	60	48	3.0%	0.138495373	0.7%	1.519736287	0	£0	£0	1	£49,619	£6,872	1	£113,573	£15,729	1	£113,573	£15,729
2063	61	49	3.0%	0.134461527	0.7%	1.530374441	0	£0	£0	1	£49,966	£6,718	1	£114,368	£15,378	1	£114,368	£15,378
2064	62	50	3.0%	0.130545172	0.7%	1.541087062	0	£0	£0	1	£50,316	£6,568	1	£115,169	£15,035	1	£115,169	£15,035
2065	63	51	3.0%	0.126742885	0.7%	1.551874671	0	£0	£0	1	£50,668	£6,422	1	£115,975	£14,699	1	£115,975	£14,699
2066	64	52	3.0%	0.123051345	0.7%	1.562737794	0	£0	£0	1	£51,022	£6,278	1	£116,787	£14,371	1	£116,787	£14,371
2067	65	53	3.0%	0.119467325	0.7%	1.573676958	0	£0	£0	1	£51,380	£6,138	1	£117,604	£14,050	1	£117,604	£14,050
2068	66	54	3.0%	0.115987694	0.7%	1.584692697	0	£0	£0	1	£51,739	£6,001	1	£118,428	£13,736	1	£118,428	£13,736
2069	67	55	3.0%	0.112609412	0.7%	1.595785346	0	£0	£0	1	£52,101	£5,867	1	£119,257	£13,429	1	£119,257	£13,429
2070	68	56	3.0%	0.109329526	0.7%	1.606956045	0	£0	£0	1	£52,466	£5,736	1	£120,091	£13,130	1	£120,091	£13,130
2071	69	57	3.0%	0.106145171	0.7%	1.618204737	0	£0	£0	1	£52,833	£5,608	1	£120,932	£12,836	1	£120,932	£12,836
2072	0	58	3.0%	0.103053564	0.7%	1.62953217	0	£0	£0	1	£53,203	£5,483	1	£121,779	£12,550	1	£121,779	£12,550
2073	1	59	3.0%	0.100052004	0.7%	1.640938896	0	£0	£0	1	£53,576	£5,360	1	£122,631	£12,269	1	£122,631	£12,269
2074	2	60	3.0%	0.097137868	0.7%	1.652425468	0	£0	£0	1	£53,951	£5,241	1	£123,490	£11,996	1	£123,490	£11,996
2075	3	61	0.0%	0.097137868	0.0%	1.652425468	0	£0	£0	1	£53,951	£5,241	1	£123,490	£11,996	1	£123,490	£11,996
						Totals		**£3,671,446**	**£2,463,717**		**£2,708,212**	**£701,386**		**£6,198,911**	**£1,605,425**		**£6,198,911**	**£1,605,425**

Capital Costs (including R, C & OB)		Operating Costs		Maintenance Costs		Renewals Costs	
PVC-30 =	£2,463,717	PVC-30 =	£483,911	PVC-30 =	£1,107,638	PVC-30 =	£1,107,638
PVC-60 =	£2,463,717	PVC-60 =	£701,386	PVC-60 =	£1,605,425	PVC-60 =	£1,605,425

30-year and 60-year Analysis

Annual discount rates = 3.5% 0-30 years and 3.0% 31-60 years

PVC-30 = £5,162,904 [£5.16 million]

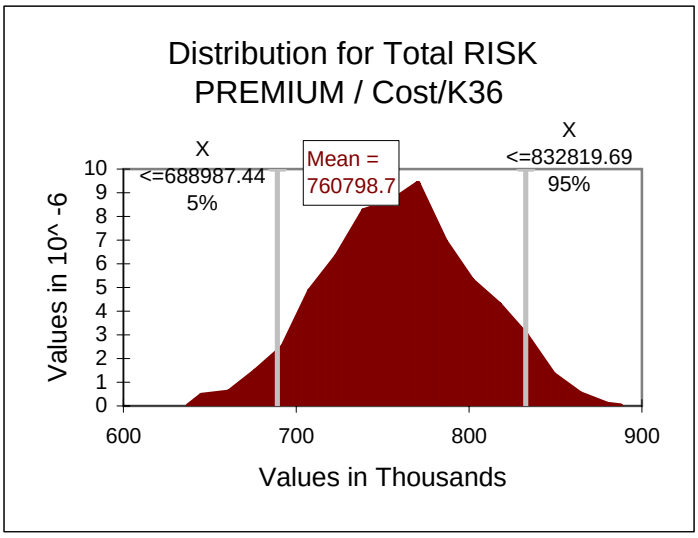
PVC-60 = £6,375,953 [£6.38 million]

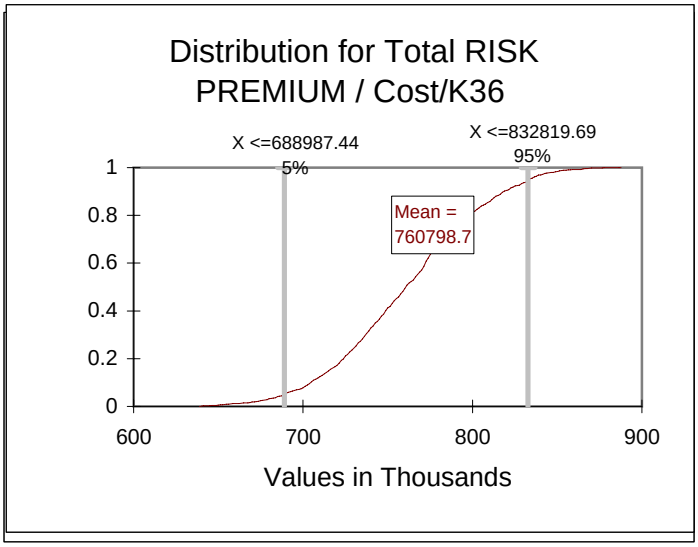
(for info only, not used in calcs)

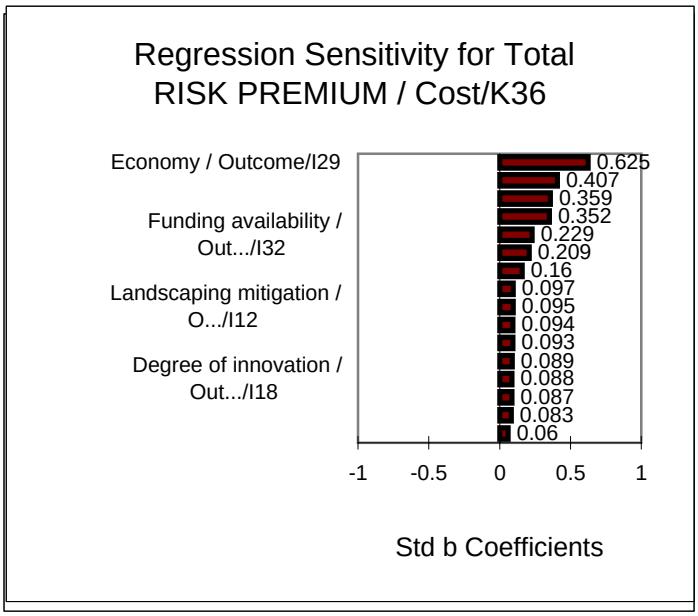
South Tay Park-and-Ride Project

Item	Measure	Unit	Unit Rate	Cost Estimate
ACCESS ROAD				
Site Clearance		Allow	Sum	£3,500.00
Earthworks (rock)	4,065	m³	£45.00	£182,938.50
Earthworks (non rock including offsite disposal)	9,486	m³	£17.50	£165,999.75
Capping	1,110	m²	£7.84	£8,702.40
Sub-base	1,586	m²	£3.10	£4,916.60
Base course	1,586	m²	£10.12	£16,050.32
Binder course	1,586	m²	£8.49	£13,465.14
Surface course	1,586	m²	£9.33	£14,797.38
Friction Surfacing	500	m²	£5.00	£2,500.00
Kerbing & Traffic islands		Allow	Sum	£5,000.00
Road marking & signage		Allow	Sum	£10,000.00
Drainage	1,586	m²	£7.47	£11,847.42
Footways	384.4	m²	£21.50	£8,264.60
Fencing and street furniture		Allow	Sum	£5,000.00
Street lighting	1,586	m²	£5.00	£7,930.00
Utilities diversions/protection		Allow	Sum	£10,000.00
Reinstatement		Allow	Sum	£1,500.00
Traffic Management		Allow	Sum	£9,000.00
ACCESS ROAD SUB TOTAL				**£481,412.11**
CAR PARK				
Site clearance		Allow	Sum	£5,000.00
Earthworks (Topsoil)	4,704	m³	£1.10	£5,174.40
Earthworks (non rock including offsite disposal)	15,477	m³	£17.50	£270,847.50
Capping (Internal roads)	13,442	m²	£7.84	£105,385.28
Sub-base (Internal roads)	6,137	m²	£3.10	£19,024.70
Base course (Internal roads)	6,137	m²	£10.12	£62,106.44
Binder course (Internal roads)	6,137	m²	£8.49	£52,103.13
Surface course (Internal roads)	6,137	m²	£9.33	£57,258.21
Impermeable Membrane (Permeable paving)	7,304	m²	£3.53	£25,783.12
Crushed Rock (Permeable paving)	7,304	m²	£7.34	£53,611.36
Non-woven Textile (Permeable paving)	7,304	m²	£1.31	£9,568.24
Laying course & paving (Permeable paving)	7,304	m²	£20.49	£149,658.96
Topsoiling		Allow	Sum	£3,500.00
Kerbing & Traffic islands		Allow	Sum	£30,000.00
Drainage (Pipes and Chambers)	12,467	m²	£7.47	£93,128.49
Drainage (Attenuation Works)	12,467	m²	£7.03	£87,643.01
Drainage (Ditches and surface features)	12,467	m²	£0.32	£3,989.44
Footways	573.41	m²	£21.50	£12,328.32
Fencing	600	m	£87.48	£52,488.00
Road marking & signage		Allow	Sum	£10,000.00
Street lighting	11,023	m²	£5.00	£55,115.00
Existing Utilities protection		Allow	Sum	£10,000.00
Utilities ducting		Allow	Sum	£35,000.00
CCTV Ducting & ancillary works		Allow	Sum	£75,000.00
CAR PARK SUB TOTAL				**£1,283,713.60**
TERMINAL BUILDING				
Budget Cost				£75,000.00
Infrastructure Costs Subtotal				**£1,840,125.71**
OTHER COSTS				
Land Purchase				£30,988.00
Landscaping				£51,266.00
Allow Contractors Prelims	20%			£368,025.14
Management, Contract & Design costs		Allow	Sum	£150,000.00
Site Investigations		Allow	Sum	£30,000.00
Client cost & Planning Process		Allow	Sum	£120,000.00
Site Supervision		Allow	Sum	£60,000.00
Contingency	15%			£397,561
TOTAL BASE COST + CONTINGENCY				**£3,047,965.57**

Simulation Results for
Total RISK PREMIUM / Cost / K36







Summary Information	
Workbook Name	Tay Park & Ride Risk 19 M
Number of Simulations	1
Number of Iterations	1000
Number of Inputs	64
Number of Outputs	1
Sampling Type	Monte Carlo
Simulation Start Time	19/05/2010 09:26
Simulation Stop Time	19/05/2010 09:26
Simulation Duration	00:00:02
Random Seed	960008604

Summary Statistics			
Statistic	Value	%tile	Value
Minimum	637,386	5%	688,987
Maximum	887,799	10%	704,557
Mean	760,799	15%	715,047
Std Dev	43,525	20%	724,018
Variance	1894429437	25%	731,124
Skewness	-0.009206143	30%	737,051
Kurtosis	2.731093325	35%	742,729
Median	760,673	40%	748,243
Mode	747,977	45%	754,982
Left X	688,987	50%	760,673
Left P	5%	55%	767,011
Right X	832,820	60%	772,172
Right P	95%	65%	776,493
Diff X	143,832	70%	782,486
Diff P	90%	75%	790,326
#Errors	0	80%	798,331
Filter Min		85%	808,533
Filter Max		90%	818,121
#Filtered	0	95%	832,820

Sensitivity			
Rank	Name	Regr	Corr
#1	Economy / Outc	0.625	0.608
#2	Substrate condit	0.407	0.396
#3	Dispute & claims	0.359	0.380
#4	Higher standard	0.352	0.337
#5	Funding availab	0.229	0.196
#6	ES process / Ou	0.209	0.201
#7	Made ground (s	0.160	0.145
#8	Large number o	0.097	0.138
#9	Landscaping mi	0.095	0.120
#10	Permits / Conse	0.094	0.069
#11	Land take and t	0.093	0.095
#12	Design complex	0.089	0.023
#13	Degree of innov	0.088	0.072
#14	Late contractor i	0.087	0.076
#15	Excessive moist	0.083	0.089
#16	Construction es	0.060	0.042

Capital Cost Adjustments

	Calculations		Comments
Construction Base Costs	(a)	£2,342,373	- includes main infrastructure plus contractor prelims and landscaping and includes £10k of sunk costs
Contingency Costs	(b)	£351,356	- based on a 15% allowance
Risk & Uncertainty Costs	(c)	£790,326	- calculated from the Risk Register modelling using 75th Percentile
Sub-Total	(d) = (a) + (b) + (c)	**£3,484,056**	
Optimism Bias (%)	(e)	8.00%	- from HM Treasury OB Calculator
Value of Optimism Bias to be Added	(f) = (a) * (e)	£187,390	
Grand Total (for Appraisal)	(g) = (d) + (f)	**£3,671,446**	**- Calculated Total Scheme Cost for Business Case**

Prudential Borrowing Schedule

Principal borrowed = £3,671,446

Assumed public sector borrowed = 100%

Borrowing cost fee = 2.06%

Repayment Charge = 4.00%

Interest Rate = 5.50%

Year	N	N (Project)	Disc Rate	Discount	Financial Repayments				
					Prinicpal Repayment	Interest Repayment	Total Repayment	Outstanding balance	Discounted Repayment
2002	0	0	3.5%	1					
2003	1	0	3.5%	0.9662					
2004	2	0	3.5%	0.9335					
2005	3	0	3.5%	0.9019					
2006	4	0	3.5%	0.8714					
2007	5	0	3.5%	0.8420					
2008	6	0	3.5%	0.8135					
2009	7	0	3.5%	0.7860					
2010	8	0	3.5%	0.7594					
2011	9	0	3.5%	0.7337					
2012	10	0	3.5%	0.7089					
2013	11	0	3.5%	0.6849			£75,724	£3,671,446	£51,867
2014	12	0	3.5%	0.6618	£146,858	£201,930	£348,787	£3,524,588	£230,822
2015	13	1	3.5%	0.6394	£140,984	£193,852	£334,836	£3,383,604	£214,095
2016	14	2	3.5%	0.6178	£135,344	£186,098	£321,442	£3,248,260	£198,581
2017	15	3	3.5%	0.5969	£129,930	£178,654	£308,585	£3,118,330	£184,191
2018	16	4	3.5%	0.5767	£124,733	£171,508	£296,241	£2,993,597	£170,844
2019	17	5	3.5%	0.5572	£119,744	£164,648	£284,392	£2,873,853	£158,464
2020	18	6	3.5%	0.5384	£114,954	£158,062	£273,016	£2,758,899	£146,981
2021	19	7	3.5%	0.5202	£110,356	£151,739	£262,095	£2,648,543	£136,330
2022	20	8	3.5%	0.5026	£105,942	£145,670	£251,612	£2,542,601	£126,451
2023	21	9	3.5%	0.4856	£101,704	£139,843	£241,547	£2,440,897	£117,288
2024	22	10	3.5%	0.4692	£97,636	£134,249	£231,885	£2,343,261	£108,789
2025	23	11	3.5%	0.4533	£93,730	£128,879	£222,610	£2,249,531	£100,906
2026	24	12	3.5%	0.4380	£89,981	£123,724	£213,705	£2,159,549	£93,594
2027	25	13	3.5%	0.4231	£86,382	£118,775	£205,157	£2,073,167	£86,812
2028	26	14	3.5%	0.4088	£82,927	£114,024	£196,951	£1,990,241	£80,521
2029	27	15	3.5%	0.3950	£79,610	£109,463	£189,073	£1,910,631	£74,686
2030	28	16	3.5%	0.3817	£76,425	£105,085	£181,510	£1,834,206	£69,274
2031	29	17	3.5%	0.3687	£73,368	£100,881	£174,250	£1,760,838	£64,254
2032	30	18	3.5%	0.3563	£70,434	£96,846	£167,280	£1,690,404	£59,598
2033	31	19	3.5%	0.3442	£67,616	£92,972	£160,588	£1,622,788	£55,279
2034	32	20	3.5%	0.3326	£64,912	£89,253	£154,165	£1,557,876	£51,274
2035	33	21	3.5%	0.3213	£62,315	£85,683	£147,998	£1,495,561	£47,558
2036	34	22	3.5%	0.3105	£59,822	£82,256	£142,078	£1,435,739	£44,112
2037	35	23	3.5%	0.3000	£57,430	£78,966	£136,395	£1,378,309	£40,915
2038	36	24	3.5%	0.2898	£55,132	£75,807	£130,939	£1,323,177	£37,951
2039	37	25	3.5%	0.2800	£52,927	£72,775	£125,702	£1,270,250	£35,200
2040	38	26	3.5%	0.2706	£50,810	£69,864	£120,674	£1,219,440	£32,650
2041	39	27	3.5%	0.2614	£48,778	£67,069	£115,847	£1,170,662	£30,284
2042	40	28	3.5%	0.2526	£46,826	£64,386	£111,213	£1,123,836	£28,089
2043	41	29	3.5%	0.2440	£44,953	£61,811	£106,764	£1,078,882	£26,054
2044	42	30	3.5%	0.2358	£43,155	£59,339	£102,494	£1,035,727	£24,166
2045	43	31	3.0%	0.2289	£41,429	£56,965	£98,394	£994,298	£22,524
2046	44	32	3.0%	0.2222	£39,772	£54,686	£94,458	£954,526	£20,993
2047	45	33	3.0%	0.2158	£38,181	£52,499	£90,680	£916,345	£19,566
2048	46	34	3.0%	0.2095	£36,654	£50,399	£87,053	£879,691	£18,236
2049	47	35	3.0%	0.2034	£35,188	£48,383	£83,571	£844,504	£16,997
2050	48	36	3.0%	0.1975	£33,780	£46,448	£80,228	£810,723	£15,842
2051	49	37	3.0%	0.1917	£32,429	£44,590	£77,019	£778,295	£14,765
2052	50	38	3.0%	0.1861	£31,132	£42,806	£73,938	£747,163	£13,762
2053	51	39	3.0%	0.1807	£29,887	£41,094	£70,980	£717,276	£12,827
2054	52	40	3.0%	0.1754	£28,691	£39,450	£68,141	£688,585	£11,955
2055	53	41	3.0%	0.1703	£27,543	£37,872	£65,416	£661,042	£11,142
2056	54	42	3.0%	0.1654	£26,442	£36,357	£62,799	£634,600	£10,385
2057	55	43	3.0%	0.1606	£25,384	£34,903	£60,287	£609,216	£9,679
2058	56	44	3.0%	0.1559	£24,369	£33,507	£57,876	£584,847	£9,022
2059	57	45	3.0%	0.1513	£23,394	£32,167	£55,561	£561,454	£8,408
2060	58	46	3.0%	0.1469	£22,458	£30,880	£53,338	£538,995	£7,837
2061	59	47	3.0%	0.1427	£21,560	£29,645	£51,205	£517,436	£7,304
2062	60	48	3.0%	0.1385	£20,697	£28,459	£49,156	£496,738	£6,808
2063	61	49	3.0%	0.1345	£19,870	£27,321	£47,190	£476,869	£6,345
2064	0.22	50	3.0%	0.1305	£19,075	£26,228	£45,303	£457,794	£5,914
2065	1.22	51	3.0%	0.1267	£18,312	£25,179	£43,490	£439,482	£5,512
2066	2.22	52	3.0%	0.1231	£17,579	£24,172	£41,751	£421,903	£5,137
2067	3.22	53	3.0%	0.1195	£16,876	£23,205	£40,081	£405,027	£4,788
2068	4.22	54	3.0%	0.1160	£16,201	£22,276	£38,478	£388,826	£4,463
2069	5.22	55	3.0%	0.1126	£15,553	£21,385	£36,938	£373,273	£4,160
2070	6.22	56	3.0%	0.1093	£14,931	£20,530	£35,461	£358,342	£3,877
2071	7.22	57	3.0%	0.1061	£14,334	£19,709	£34,042	£344,008	£3,613
2072	8.22	58	3.0%	0.1031	£13,760	£18,920	£32,681	£330,248	£3,368
2073	9.22	59	3.0%	0.1001	£13,210	£18,164	£31,374	£317,038	£3,139

Appendix F

STPR-based Appraisal Summary Table

Detailed Appraisal Intervention		**D11: South Tay Park and Ride Business Case**						
Estimated total Public Sector Funding Requirement:		*Capital Costs*	£3.5 million - £4.5 million					
		Annual Revenue Support Present	-					
		Value of Cost to Government	£3.5 million - £4.5 million					
		BCR	1.48 – 1.60					
Summary Impact on STAG Criteria		— — —	— —	—	*o*	+	++	+++
	Environment							
	Safety							
	Economy							
	Integration							
	Accessibility and Social Inclusion							
		(Judgement based on available information against a 7 – point scale)						

Intervention Description:

The South Tay Park and Ride intervention supports the objectives to make public transport more competitive against the car, and to facilitate access to Dundee City Centre during the peak and off-peak times of day. Located on a major commuting and access route to Dundee, this site would assist in maintaining and enhancing the labour catchment areas for the city regions and would assist in reducing CO^2Eqv emissions of city-wide traffic. The site is specifically situated to intercept northbound traffic from the northern parts of Fife to Dundee before reaching the Tay Bridge crossing. However, is also likely to serve other city centre users that would otherwise use city centre parking facilities. The park and ride service would interface with existing urban bus priority measures.

Summary Rationale for Selection

This intervention would help to keep Dundee city centre moving by reducing road congestion in the peak periods. It would also assist in maintaining the city's labour catchment areas and reducing emissions. Of particular importance for Dundee, the proposed measures would maintain the number of people able to commute from north Fife to areas of economic activity, particularly sites in central Dundee.

Table D11.1.1 STPR Objectives

STPR Objectives	
National Objective 1: To promote 'competitive' inter-urban journey times.	**1: Positive - I**ncorporating bus Park-&-Ride measures in this location would reduce peak hour traffic along some of the most congested sections of the local and strategic network. These decongestion benefits would be achieved primarily through a mode shift to public transport services. Travellers using the network for both local and strategic trips, including inter-urban journeys, would experience decongestion benefits.
National Objective 2: To reduce inter-urban journey times on public transport.	**2: Positive -** Congestion is expected to increase both within the urban road network and on parts of the strategic network. The development of the Park-&-Ride site at the Landfall location will offer car drivers a viable alternative to driving into the most congested parts of the city and surrounding road network.
National Objective 3: Promote journey time reduction on the trunk road network for prioritised vehicles and users (e.g. HOV, freight, bus) or provide improvements to journey time reliability.	**3: Positive -** Forecast journey time savings for priority vehicles (e.g. freight, bus) as a result of the creation of the Park-&-Ride site are significant for both bridge and non-bridge traffic.
National Objective 4: To promote journey time reductions between the Central Belt and Dundee primarily to allow business to achieve an effective working day between these centres.	**4: Slight Positive -** By providing Park-&-Ride, this intervention would be effective in removing car trips from the Tay Bridge. Overall, the intervention is expected to generate significant journey time benefits for business trips over the Tay Bridge and into Dundee, particularly during peak hours.
National Objective 5: Maximise the labour catchment area in city regions (favouring PT and balancing with other policy measures that promote sustainable travel).	**5: Slight Positive -** Peak hour journey times into Dundee would reduce from the measures taken forward in this intervention. This intervention would assist in maximising the size of the 60 minute commutable labour catchment accessible by public transport.
National Objective 6: Support the development and implementation of the emerging national development interventions.	**6: Positive -** This intervention proposes the construction of a Park-&-Ride site south of the Tay Bridge, serving journeys from the south and north into Dundee. These proposals could reduce the number of car trips crossing the Tay Bridge, thereby improving the operation on the bridge at the busiest times. Public transport access to Dundee Airport could also be improved, depending on the service pattern of buses using these facilities.
National Objective 7: Reduce CO^2Eq emissions per person km.	**7: Slight positive –** This intervention is forecast to transfer some journeys from private car to public transport.. Experience from other similar schemes indicates that there might be a slight increase in traffic to the specified new Park-&-Ride site. Assuming any increases are not too large, there is likely to be a decrease in CO^2Eq emissions in the city centre served by the Park-&-Ride scheme.

National Objective 8: Stabilise total CO^2Eqv emissions.	**8: Slight positive –** As No 7.
National Objective 9: Reduce CO^2Eq emissions in line with expectations from the emerging climate change bill.	**9: Neutral -** By the year 2050, the draft Climate Change Bill requires a reduction, in the total amount of CO^2Eq emitted, of 60 per cent in comparison with the 1990 baseline. By promoting smoother traffic flow and encouraging mode shift to public transport, the intervention could potentially lead to reduced CO^2Eqv emissions per person km. This intervention would therefore promote carbon efficiency; however the potential of the scheme to generate the levels required by the Bill is unlikely by itself.
National Objective 10: To promote continuing reduction in accident rates and severity rates across the strategic transport network, supporting the work of the Strategic Road Safety Plan.	**10: Neutral -** The overall impact of the measures on accident rates and severity rates could be negligible. However, by promoting mode shift to bus, the intervention could make some contribution to accident savings.
National Objective 11: To promote seamless travel.	**11: Positive -** Park-&-Ride sites improve transport integration, by providing seamless connections between the car and bus services. In addition to facilitating transfer between modes, this also facilitates transfer from strategic to urban networks. Overall, the intervention is expected to generate a positive impact on this objective.
National Objective 12: Improve the competitiveness of public transport relative to the car.	**12: Positive** – The P&R scheme would allow car travellers to avoid entering the congested streets in Dundee and encourage additional passengers on the bus. In addition, reducing car trips into the city centre will ease congestion for other bus services.
National Objective 13: To improve overall perceptions of public transport.	**13: Positive –** This intervention envisages consistent branding and information at all Park-&-Ride site and on bus services. Vehicle branding and high quality passenger information are powerful tools in raising public perception of bus services, and these benefits could extend to the overall perception of public transport.

IN ADDITION TO THE NATIONAL OBJECTIVES ABOVE, THIS INTERVENTION WOULD ALSO POSITIVELY CONTRIBUTE TO THE FOLLOWING SELECTED URBAN NETWORK AND CORRIDOR OBJECTIVES:

STPR Objective Aberdeen 1: To improve accessibility, primarily by public transport, to and between the city centre, Dyce, the airport and south east Aberdeen.	**Not applicable.**
STPR Objective Dundee 1: To reduce the conflict between long distance and local traffic.	**D1: Positive** - Providing a network of Park-&-Ride sites on the key radial routes surrounding Dundee, with associated bus priority measures, could encourage a modal shift from the car to Park-&-Ride. These measures are primarily aimed at commuters and other trips into the city from the surrounding city region, and would remove local trips from the strategic network, particularly during peak hours, thus generating more reliable journey times for strategic users of the network and reducing conflict between

	long distance and local traffic.
STPR Objective Dundee 3: To improve the public transport accessibility and competitiveness to Dundee West.	**D3: Positive –** Provision of Park-&-Ride on key routes into Dundee would increase the competitiveness of public transport and improve accessibility throughout the urban area. Priority measures on the route to Invergowrie Park-&-Ride, in particular, would benefit public transport accessibility to Dundee West.
STPR Objective Edinburgh 1: To maintain the 60-minute commutable labour market area at the current level, with a particular focus on linking the areas of economic activity.	**Not applicable.**
STPR Objective Edinburgh 3: To increase public transport capacity and frequency between Fife and Edinburgh.	**Not applicable.**
STPR Objective Glasgow 1: To increase the public transport access to and between areas of economic activity and regeneration with minimal need for interchange.	**Not applicable.**
STPR Objective Glasgow 2: To improve the efficiency of the M8 motorway during periods of peak demand with a focus on reducing the conflict between longer distance and local traffic, increasing the people carrying capacity and freight carrying capacity of existing road, and demand management.	**Not applicable.**
STPR Objective Glasgow 6: To promote efficient and effective transport links to support the development and implementation of the proposed national development at Glasgow Airport identified in the NPF2. *[This objective is also relevant to Corridor 18 (Glasgow to northwest England).]*	**Not applicable.**
STPR Objective 4.2 (Aberdeen to Inverness): To improve journey time and increase opportunities to travel, particularly by public transport, between Aberdeen and Inverness.	**Not applicable.**
STPR Objective 9.1 (Glasgow to Perth): To address current and forecast rail overcrowding into Glasgow.	**Not applicable.**

STPR Objective 9.2 (Glasgow to Perth): To improve the efficiency and reliability of the operation of the southern sections of the M80 on approach to Glasgow, particularly. for priority vehicles.	**Not applicable.**
STPR Objective 10.2 (Edinburgh to Perth): To address shortfalls in the provision of public transport to and from Edinburgh and increase public transport modal share	**Not applicable.**
STPR Objective 13.1 (Edinburgh to Glasgow): To increase public transport capacity and reduce journey time between Edinburgh and Glasgow.	**Not applicable.**
STPR Objective 14.6 (Edinburgh to Dundee): To improve the efficiency of the M90/A90 during periods of peak demand with a focus on reducing the conflict between longer distance and local traffic.	**Not applicable.**
STPR Objective 18.1 (Glasgow to northwest England): To increase capacity and reduce journey times by public transport between Glasgow and Inverclyde.	**Not applicable.**
STPR Objective 18.3 (Glasgow to northwest England): To improve the efficiency of the A8/M8 during periods of peak demand with a focus on reducing the conflict between longer distance and local traffic	**Not applicable.**

Table D11.1.2 STAG Criteria

Table D11.1.2 STAG Criteria		
Environment:	Minor Benefit / Neutral Impact	There is a reduction in the vehicle mileage and hence a reduction in vehicle emissions is forecast, although there may be some increase in mileage from new trips generated or from existing bus users transferring to P&R. Noise and vibration impacts are minimal; the site is remote from residential developments. Although an SAC covers the Tay Estuary area, close to the site, in terms of landscape quality, new landscaping measures have been designed to mitigate this impact.
Safety:	Neutral	By promoting modal shift the improvements should make some contribution to accident savings. However, the overall impact of the measures on accident rates and severity rates would be small. In order to maintain personal and property security within the car park site compared with the Do Minimum scenario of driving & parking in Dundee, suitable lighting levels along with a CCTV system would be implemented. No net change in security, from the Do Minimum, is thus forecast.
Economy:	Minor to Moderate Benefit	The economic appraisal of the new proposals has shown a positive return with a BCR of up to 1.60 (depending on funding scenarios). Since the scheme is targeted to reduce congestion on a busy corridor of the network, it is reasonable to assume the project has a high potential to generate efficiency benefits in terms of time savings, journey reliability and VOCs for both users and non-users as cars are removed off the road through modal shift.
Integration:	Minor Benefit	**Transport Interchanges**: *Servicing & ticketing* – The P+R site provides a new interchange, primarily for transfer from car to existing bus services and ticketing systems will be expected to be provided by existing bus operations. *Infrastructure & information* **–** the primary infrastructure benefits and costs have been covered in economic evaluation, however, it is also possible to provide cycle parking facilities for users wishing to access the site by bike and continue the journey by bus. Users could also be permitted to park at the site and complete their journey by bike and thus secure cycle parking facilities could be provided for those wishing to leave their bike at the P+R site overnight. **Land-use Transport Integration**: A high level of consistency with land-use planning policies, specifically minimising emissions and consumption of resources and energy through modal shift from cars. This scheme also aims to maximise the efficient use of the Tay crossing. **Policy Integration:** This proposal fits with disability policies through the provision of specific disabled parking areas. Health policies are also assisted through opportunities to cycle to/from the site, though social inclusion impacts could be mixed as the site primarily caters for car owners.
Accessibility and Social	Minor Benefit	**Community Accessibility**: *Public transport network coverage* – the network coverage is not

Inclusion:		directly affected as bus routes remain unchanged, but catchments are effectively increased as car drivers are able to access public transport services from the P+R site. *Access to other local services* – This scheme is favourable with respect to access by walking and cycling – being close to the existing residential areas of Newport-on-Tay and Woodhaven. **Comparative Accessibility**: *Distribution/spatial impacts by social group* – the P+R facility is of primary benefit to car drivers and thus likely to benefit higher socio-economic groups. Accessibility of this site by walk/cycle goes some way to spreading the benefits to other socio-economic groups. *Distribution/spatial impacts by area* – the P+R site enables access to public transport services by car owners in rural areas who are not directly served by buses.

Table D11.1.3 Key Strategic Outcomes

Table D11.1.3 Key Strategic Outcomes (KSOs)		
Objective:	Assessment Summary:	Supporting Information:
Improve Journey Times and Connections:	Moderate Benefit	This intervention would deliver journey time improvements for non-users both on the Tay Bridge route and in the wider Dundee catchment area. The scheme would promote modal shift along the major commuter corridors and some benefits in terms of journey time reductions and improved journey time reliability. The measures proposed in this intervention are targeted at the Tay Bridge corridor which would be expected to promote on urban peripheries, promoting good connections for businesses.
Reduce Emissions:	Minor Benefit	The city of Dundee currently experiences problems from traffic congestion and associated air quality issues, reflected in the designation of an Air Quality Management Area. The introduction and enhancement of Park-and-Ride is envisaged to encourage modal shift to public transport which would reduce the number of cars on city centre roads and potentially contribute to an improvement in local air quality within the city. The expected increase in vehicular movements travelling to the new and enhanced Park-and-Ride site could contribute to increased CO^2Eq emissions; however, this is likely to be offset by an associated decrease in the level of emissions from the city centre.
Improve Quality, Accessibility and Affordability:	Minor Benefit	This intervention would improve the quality of the journey into Dundee by reducing congestion and promoting reliable and fast journey times. The use of consistent branding and information in implementing Park-&-Ride would enhance the quality and image of public transport services. The increased catchment by the new P&R for the buses would improve accessibility. However, these would mainly benefit Park-&-Ride users, and would not directly result in accessibility improvements for those who do not own a car. This intervention would not impact on affordability.

Table D11.1.4 Scottish Government Strategic Objectives

Scottish Government Strategic Objectives		
Objective:	Assessment Summary:	Supporting Information:
Safer and Stronger:	Minor Benefit	This intervention would remove cars from the road by promoting modal shift and improving the quality and accessibility of public transport. It would result in some reduction in accident rates as public transport is considered to be safer than the car. However, the intervention does not contain measures specifically targeted at improving safety and these benefits would therefore remain limited. Although the intervention would not directly improve accessibility to employment opportunities for those without the use of a car, the proposed Park-&-Ride scheme would open urban economic opportunities to a wider catchment.
Smarter:	Minor Benefit	This intervention would increase access to schools, colleges and universities for those living along the various strategic corridors.
Wealthier and Fairer:	Minor Benefit	Transport modelling has predicted overall growth in Park-&-Ride usage by 2022, in comparison with the baseline. This intervention would reduce journey times and enhance journey time reliability for all road users. Measures are targeted at the Tay Bridge corridor and would result in significantly improved accessibility to employment.
Greener:	Minor Benefit	This intervention promotes the use of public transport encouraging a modal shift away from the car.
Healthier:	Neutral	The measures promoted in this intervention would encourage a modal shift from the car to buses. However, the intervention is primarily focused to enhance the provision of Park-&-Ride services that are accessed by the car. This intervention would therefore not result in an increased uptake of active modes of travel, i.e. walking and cycling and the benefits to health services would remain limited.

Table D11.1.5 Implementability Appraisal

Implementatibility Appraisal	
Technical:	It is unlikely that any untried techniques would be required when implementing any aspects of this intervention, however as the design stages progress, localised issues could arise which require increased technical capabilities to overcome.
Operational:	No adverse factors would be expected to affect the operation of this intervention over its projected life.
Public:	The intervention has not been presented to the public. However, in general the measures are expected to meet with public approval as they would improve public transport provision, encourage modal shift and reduce congestion along a busy commuter route.

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