TAY ESTUARY RAIL STUDY

Core Strategy Appraisal - STAG2

Working Paper E

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1. INTRODUCTION

Context

1.1 This working paper describes the application and results of the STAG2 (Scottish Transport Appraisal Guidance[1]) appraisal for the Core Strategy, carrying forward elements from the earlier phases of the appraisal process (summarised in Working Paper D[2]).

1.2 STAG2 is the most important and detailed part of STAG, and it is required that it be completed following development of the strategy and investigation of its potential positive and negative impacts (as in STAG1). Normally, a completed STAG2 appraisal is required when final approval or funding is sought from the Scottish Executive.

1.3 The objective of this working paper is to demonstrate how the Core Strategy performs against the STAG objectives, and to form the basis for a funding bid for the strategy. It should be noted that it was originally the intention to develop a formal RPP (Rail Passenger Partnership) Bid for the strategy, but the recent announcement by the SRA freezing the RPP fund has overtaken this proposal.

Structure of Report

1.4 The next chapter describes a number of appraisal issues relevant to the application of STAG2, including the STAG2 objectives and criteria, the definition of the core strategy, estimates of capital and operating costs, estimates of demand and revenue, and key traffic impact statistics.

1.5 Chapter Three reports on the STAG2 appraisal process and results, considering all criteria under the environment, safety, economy, integration and accessibility, concluding with Parts 1a and 2 of the Appraisal Summary Table.

1.6 Chapter Four explores the merits, in terms of the additional costs and benefits, of a variant option, which would link Dundee to Montrose (instead of Perth to Arbroath). It also presents an analysis of the comparison with the central scheme.

1.7 Chapter Five sets out the key recommendations and conclusions from the report.

1.8 Appendix A illustrates the catchment used in the assessment of Planning Objective PO1 (Accessibility).

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1 Scottish Executive (2001) Scottish Transport Appraisal Guidance, A Draft Consultation Document, Volume 1, July 2001. www.scotland.gov.uk/consultations/transport/stag-00.asp

2 Working Note D: Option Appraisal (STAG1)

2. APPRAISAL ISSUES

2.1 Having defined options to be appraised, sifted them at two levels and appraised them using STAG1 in the previous appraisal stage (see *Option Appraisal - STAG1* report), this stage of appraisal consists of applying STAG2 to the Core Strategy.

2.2 A number of issues, however, merit further consideration before undertaking STAG2, and these are referred to in the following sections.

STAG Objectives

2.3 The STAG objectives have been set out in the *Option Appraisal - STAG1* report. STAG2 deals with the Government's five overarching objectives in detail, and introduces further sub-criteria (in comparison to the standard NATA appraisal guidance):

- Environment:
  - Noise and vibration;
  - Air quality – overall;
  - CO_2 – global;
  - PM_{10} – local;
  - NO_2 – local;
  - Water quality, drainage and flood defence;
  - Geology;
  - Biodiversity;
  - Visual amenity;
  - Agriculture and soils;
  - Cultural heritage; and
  - Landscape.
- Safety:
  - Accidents:
    - Change in annual personal injury accidents;
    - Change in balance of severity; and
    - Total discounted savings.
  - Security.
- Economy:
  - Transport economic efficiency:
    - User benefits:
      - Travel time savings;
      - Travel charges;
      - Vehicle operating costs;
      - Quality benefits; and
      - Reliability benefits.
    - Operator benefits:
      - Capital costs;
      - Operating and maintenance costs; and

        - Revenues.
      - Government impacts:
        - Taxation impacts; and
        - Economic Net Present Value.
    - Economic activity and location impacts:
      - Spatial level of the appraisal;
      - GDP/output changes;
      - Employment;
      - Distributional/spatial impacts by area;
      - Distributional/spatial impacts by social group; and
      - Regeneration and social inclusion.
- Integration:
  - Transport integration:
    - Services and ticketing; and
    - Infrastructure and information.
  - Land-use transport integration;
  - Policy integration:
    - Fit with key policies; and
    - Social exclusion.
- Accessibility:
  - Base accessibility:
    - Within a community;
    - Community as a whole.
  - Change in severance:
    - Number of people affected by severance;
    - Importance of severance; and
    - Level of severance.

2.4 While some of these criteria can be assessed quantitatively and even monetarily, most others can only be assessed on the basis of their qualitative impacts. The next chapter describes each impact in turn, how they are assessed and how the appraisal results are presented.

The Core Strategy

2.5 Taking on board the results from STAG1, a Core Strategy has been developed, including the following:

Service Improvements

- A new hourly service from Arbroath to Perth calling all stations;
- A comprehensive package of station enhancements at Arbroath, Montrose, Carnoustie, Dundee, Perth on the line of the new service with lesser improvements at Broughty Ferry & Monifieth sufficient to raise quality to a minimum benchmark and brand the service.
- A new station at Dundee West.

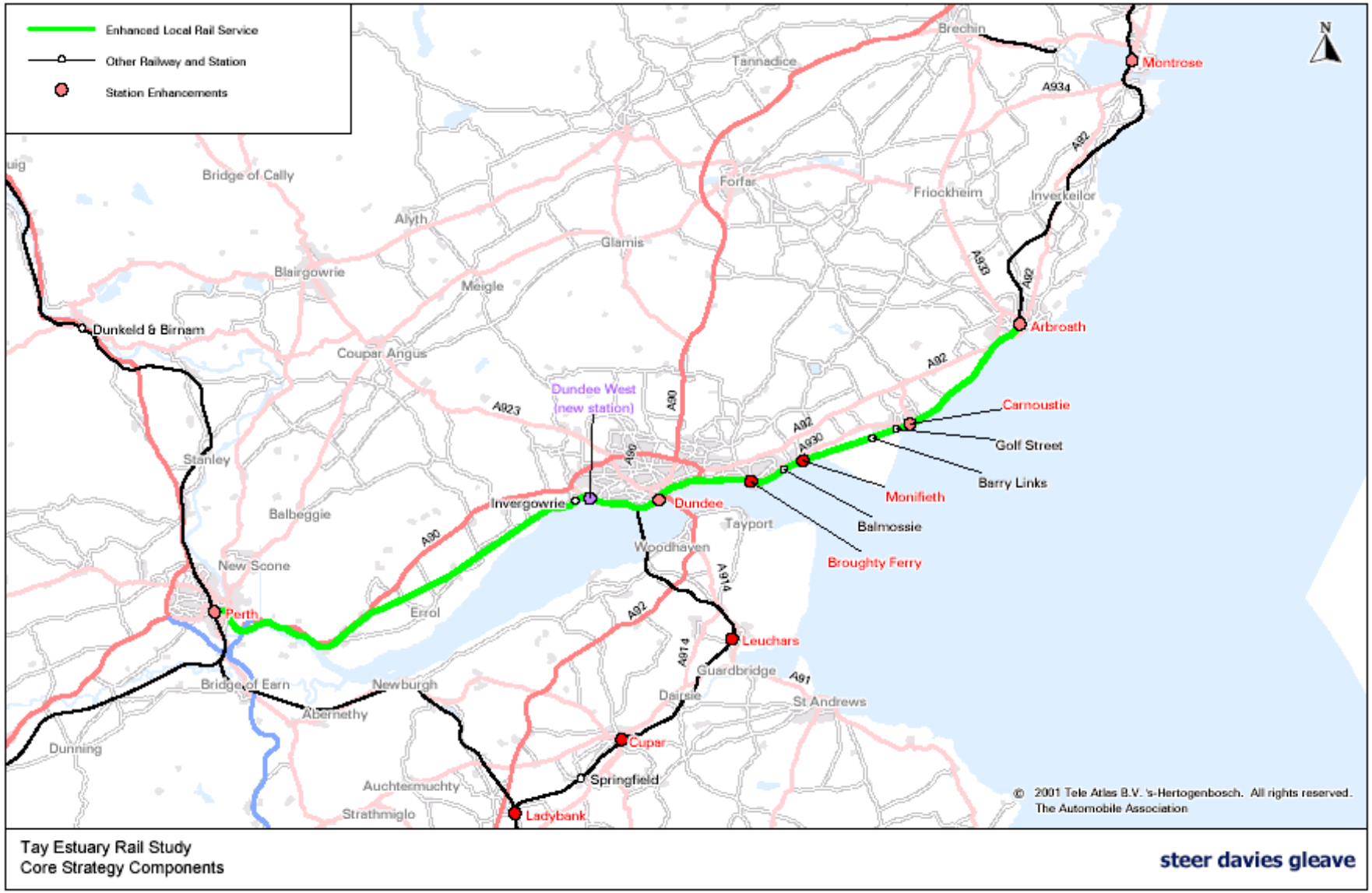
Supporting Elements

- Development of provisions for interchange at Montrose with associated station enhancements. This requires appropriate works at Montrose to create bus layby facilities;
- Improvement of Leuchars stations to enhance its role as a transport interchange hub and building on the quality bus initiative to Dundee;
- Lesser packages of improvement at other Fife stations (Cupar and Ladybank) to bring up to a similar standard as the core Dundee stations.

2.6 It is further proposed that the potential for the Arbroath to Perth service to be extended to Montrose where capacity permits also be included in the STAG2 assessment.

2.7 Figure 2.1 illustrates the key components of the core strategy (which corresponds to Option 1b from STAG1 with additional supporting elements assumed for the strategy).

FIGURE 2.1 CORE STRATEGY: KEY COMPONENTS



Cost Estimates

2.8 The capital and operating costs will form an important part of the economic appraisal to follow in the following chapter.

2.9 In line with the estimates used in STAG1 appraisal, the total capital cost for the Core Strategy has been estimated at £8.66 million, considering the following cost components:

- Stations: £8.36 million
- Infrastructure for service improvements: £0.3 million

2.10 Annual operating costs have been estimated at £2.4 million per year, based on leasing costs for three additional units.

2.11 The costs of the additional supporting elements of the strategy, comprising station improvement works at other stations not served by the proposed local service (including Leuchars, Montrose, Cupar and Ladybank) add a further £2.12m capital cost to the figures presented in the STAG1 Appraisal.

Demand and Revenue Estimates

2.12 Demand and revenue will dictate all economic benefits from the Core Strategy. The forecasts of base year additional public transport patronage and revenue for the Core Strategy are:

- Patronage = 202,000 per year; and
- Revenue = £714,000 per year.

2.13 The opening year for the new service has been assumed as 2006/7, and for station improvements as 2004/5. The average annual growth in demand has been assumed at 1%. This is considered conservative, but consistent with SSRS, which foresaw modest growth for the Tayside area.

2.14 These forecasts have driven the estimation of most scheme benefits (e.g. travel time savings), as well as some environmental impacts (e.g. rail pollutant emissions).

Traffic Impacts

2.15 It is estimated that improvements in public transport provision will reduce car trips and the number of vehicle-km, with increase in rail trips (and veh-km). Table 2.1 summarises the number of trips saved per year, vehicle-km removed from the road network or added to the rail network and the changes in average speed for road and rail.

TABLE 2.1 TRAFFIC IMPACTS

Impact	Road	Rail
Number of person-trips saved (annual)	76,600 (saved)	202,000[1] (additional)
Number of veh-km (annual)	1,960,000 (removed)	450,000[2] (additional)
Number of pass-km (annual)	2,352,000 (removed)[3]	8,900,000 (additional)
Average speed (km/h)	No change assumed	No change assumed

Note 1) From these, 76,600 rail trips assumed to have derived from cars (assuming average occupancy rate of 1.2 people per vehicle)
2) Assumptions: Arbroath-Perth 76 miles round trip; Operation: 17 hours a day Mon-Fri, 16 hours a day Sat and 14 hours a day Sun; 50 weeks per year (allowing for public holidays). Annualised mileage 437,000 (rounded up to 450,000 to allow for workings to/from depot).

2.16 The overall traffic impacts will be a small reduction in traffic and congestion with reduction in delays. These estimates will be used in the estimates of some economic, environmental and safety impacts.

3. STAG 2 APPRAISAL

Introduction

3.1 This chapter describes how each impact has been assessed, providing also detailed appraisal results for each criterion set out under STAG2 (see *STAG Objectives* section).

Environment

3.2 The environment objective involves protecting the built and natural environments, by reducing the temporary and permanent impacts of transport infrastructure and operation.

Noise and Vibration

3.3 Traffic is one of the principal sources of urban noise and vibration. Traffic noise can have a significant effect on the environment and on the quality of life enjoyed by individuals and communities.

3.4 The operation of the new rail services will generate additional rail traffic and increase rail noise and vibration, which will constitute an adverse impact arising from the scheme as far as the properties situated along the route are concerned. However, given the relatively low frequencies in question, one additional train per hour per direction would add only marginally to the existing noise impact, and no additional quantification is thought to be necessary to demonstrate this.

3.5 As far as road traffic noise is concerned, the new service is expected to change the patterns of road traffic flows, and possibly speeds, as a result of improved public transport services and consequent modal shift. This will tend to reduce road traffic noise on some locations. However, noticeable benefits from this scheme cannot be expected (according to GoMMMS, traffic changes of less than 10% can be assumed to produce no significant change in noise).

3.6 Therefore, there will be a marginal increase in rail noise along alignment, while changes in road traffic noise will be negligible, and the overall impact can be expected to be neutral.

Air Quality – Overall

3.7 Transport is a major and ever-increasing pollutant of the environment. At the local level, air pollution can have serious impacts on human health and on the deterioration of the urban environment (e.g. through the soiling of buildings and materials). At the global level, air pollution can have serious impacts on the world's climate, through global warming.

3.8 The additional diesel engines will produce additional pollutants along the route, while the reduction in vehicle-km will partly offset these impacts with a reduction in pollutants on the road network. However, these changes are likely to be marginal, since the changes in rail and road traffic will be small.

3.9 No attempt will be made to quantify the impacts on air quality, with a qualitative assessment indicating that the overall impact will be neutral.

CO_2 – Global

3.10 The quantitative assessment of emissions (for all pollutants below) takes into account:

- The reductions in total private vehicle-km in the study area, with an increase in rail vehicle-km;
- The local road vehicle fleet distribution at the same proportion as the national average, both for the Do-Minimum and Do-Something;
- No changes in average road and rail vehicle speed (assumed at 25 km/h for road traffic as a network average);
- Diesel engines assumed as two-car Sprinter DMU; and
- Standard rates for emission at the production stage[3].

3.11 The predicted reductions in total emissions of Carbon Dioxides (CO_2), the primary greenhouse gas, produced in the network as a whole and accounting for the power station emissions, are 316 tonnes per year. Table 3.1 illustrates the breakdown of emissions by vehicle type (in the case of exhaust emissions) and by fuel (in the case of power station emissions).

TABLE 3.1 CHANGES IN TOTAL CO_2 EMISSIONS

Vehicle type	Changes in exhaust emissions (tonnes/year)	Fuel	Changes in power station emissions (tonnes per year)
Car	-481.1	Petrol	-46.2
Bus	0.0	Diesel	+3.5
Rail	+207.5	Electricity	0
Total	**-273.6**	**Total**	**-42.7**

3.12 Thus, despite an increase in rail exhaust emissions, the overall effect is slight beneficial.

PM_{10} – Local

3.13 Using the same assumptions as above, the predicted reduction in the overall emissions of Particulate Matter (PM_{10}) is 51 kg per year. However, this estimate includes a reduction in power station emissions of approximately 11 kg/year, and considering that this indicator concerns local emissions, the result of changes in exhaust emissions is a 40 kg/year reduction. The overall impact can be considered slight beneficial.

[3] ETSU (1997), Fuel and Energy Production Emission, UK values, Petrol: Table 2.10, Diesel: Table 2.11, Electricity: Table 4.6.

NO_2 – Local

3.14 Compared to the pollutants analysed above, the trend is somehow different for Nitrogen Dioxides (NO_2), as an overall increase in emissions by 6,400 kg (6.4 tonnes) per year can be verified. Excluding a reduction in power station emissions of some 190 kg/year, the total increase in exhaust emissions (local) have been estimated at 6,590 kg/year. This figure is driven by an increase in rail exhaust emissions by approximately 8,620 kg/year. The overall impact is slight adverse.

Water Quality, Drainage and Flood Defence

3.15 These impacts include any changes that could occur to the existing quality of water courses, rivers, underground water, ponds, lakes or wetlands, as well as any implications to drainage and flood defence.

3.16 Because the scheme will operate on existing infrastructure, it imposes no danger for increasing run-offs to nearby rivers or contaminating groundwater, and the overall impact will be neutral.

Geology

3.17 As the scheme will largely operate on existing infrastructure (other than Dundee West for which precise location is yet to be defined but for which any potential negative impacts will need to be mitigated within the designs), it will have no impact on the local geology and the overall impact is neutral.

Biodiversity

3.18 The assessment of bio-diversity impacts relates to the protection of all established wildlife species of fauna and flora and their habitats. This will include any organism or sensitive areas (e.g. wetlands and breeding sites for birds), which may be disturbed or lost as a result of the implementation of proposed schemes.

3.19 As for other environmental impacts described above, the impact on bio-diversity is expected to be neutral.

Visual Amenity

3.20 Any visual impacts from new trackwork will be minimal. The effects of the new Dundee West station cannot be assessed in detail but it is assumed that the location of platforms and access ramps would be possible without loss of visual amenity. Other station improvements will be designed to enhance the local area visually, and the overall impact is estimated to be neutral.

Agriculture and Soils

3.21 No significant impact can be expected on agriculture and soils, other than, perhaps, changes in acid rain as a result of changes in emissions (see *Air Quality* above). Thus, the overall impact is neutral.

Cultural Heritage

3.22 The purpose of assessing the heritage impacts of transport schemes is to protect buildings of architectural or historical heritage and areas of archaeological importance. The assessment of heritage impacts relates to historical sites, such as architectural conservation areas, ancient monuments, ancient woodlands, listed buildings, archaeological sites, geological sites, and other places of special architectural or historical interest.

3.23 The scheme proposed will not impact on cultural heritage, with the overall impact being neutral.

Landscape

3.24 The landscape character of a place is derived from the underlying geology, natural processes and human activity on the land over the centuries. This natural and cultural inheritance is widely appreciated and is recognised as a resource of value for future generations.

3.25 No changes in the landscape character can be expected from the running of new rail vehicles or improvement to stations, but local townscape character around improved stations could improve, this improvement depending on the nature and extent of the new features. Overall, although there is potential for station improvements to enhance local townscape features, it is not clear their extent, and the overall landscape impacts will be considered neutral.

Summary

3.26 A summary of the assessment of the environmental impacts is given in Table 3.2.

TABLE 3.2 ENVIRONMENTAL IMPACTS

Impact	Qualitative	Quantitative	Expected Impacts
Noise and Vibration	Marginal additional rail noise and vibration, with negligible in road noise on some locations.		Neutral
Air Quality – Overall	Additional diesel rail engines will produce more pollutants, but these will be partly offset by the reduction in road emissions.		Neutral
CO_2 – Global		Reduction: 316 tonnes/year	Slight beneficial
PM_{10} – Local		Reduction: 40 kg/year	Slight beneficial
NO_2 – Local		Increase: 6,590 kg/year	Slight adverse
Water Quality, Drainage and Flood Defence	Scheme will operate on existing infrastructure		Neutral

Impact	Qualitative	Quantitative	Expected Impacts
Geology	Scheme will operate on existing infrastructure		Neutral
Biodiversity	Scheme will operate on existing infrastructure		Neutral
Visual Amenity	Possible townscape improvements and new Dundee West station		Neutral
Agriculture and Soils	Scheme will operate on existing infrastructure		Neutral
Cultural Heritage	Scheme will operate on existing infrastructure		Neutral
Landscape	Possible townscape improvements		Neutral

Safety

3.27 The safety objective aims to improve safety for all road users, by reducing the loss of life, injuries and damage to property resulting from transport accidents and crime.

Accidents

Change in annual personal injury accidents

3.28 The assessment of the changes in the number of road accidents has been made quantitatively, considering the changes in total private transport travel (based on the presumption that, the lower number of vehicle-km, the lower the number of accidents expected). The estimate was based on standard rates of accident per vehicle-km. A marginal reduction in private vehicle accidents can be expected, however, from modest reductions in private vehicle-km.

3.29 The estimated number of accident savings per year in the road network is approximately 1.5, considering all severity levels (most of which are slight accidents – see balance of severity below). This can be considered a small benefit, and the overall impact has been assumed slight beneficial.

Change in balance of severity

3.30 The change in the balance of levels of severity is best represented when input data is available for the total vehicle-km removed from the road network classified according to different road types. For the purposes of this study an assumption has been made considering that the total vehicle-km removed from the road network is proportional for all road types, so that the severity balance is kept. The estimated number of accident savings per severity level is shown in Table 3.3.

TABLE 3.3 NUMBER OF ACCIDENTS PER SEVERITY LEVEL

Severity	Change (per year)
Slight	1.25
Severe	0.19
Fatal	0.02
Total	**1.46**

3.31 The magnitude of accident savings, reflected by the number of vehicle-km removed from the road network, is relatively small, with a negligible number of fatal and severe accidents. The overall impact is assumed neutral.

Total discounted savings

3.32 Using the accident valuation shown below, the undiscounted monetary valuation of annual accident savings can be calculated as shown in Table 3.4.

TABLE 3.4 VALUATION OF ACCIDENT SAVINGS

Severity	Valuation per accident [1] (£)	Change in accidents	Total valuation (£)
Slight	£9,070	1.25	11,295
Severe	£117,670	0.19	22,932
Fatal	£1,047,240	0.02	17,315
Total		**1.46**	**51,541**

Note: 1) Monetary Values from DMRB March 2001 (1998 prices and values)

3.33 The total savings as a result of reduced traffic on the road network has been calculated at £ 0.05 million per year. Feeding this valuation through the economic framework, the present value of these savings represent £0.7 million (NPV), considering the project life-time accident benefits (i.e. discounted valuation).

Security

3.34 Most modern public transport facilities include passenger security devices (e.g. surveillance, lighting, design) as standard. The assessment of security was made qualitatively, considering the extent to which stations improvements would provide, directly or indirectly, increased safety for rail travellers (both existing and new users), according to the guidance in GoMMMS. The station improvements within the recommended strategy envisage significant investment to improve passenger security, building on the facilities already present in some locations.

3.35 Table 3.5 summarises the overall (network-wide) appreciation of the security impacts from station improvements for each indicator, considering the changes in conditions (poor, moderate, high) between the existing and after implementation scenarios. It should be noted that this is intended to reflect the overall change across the study area.

TABLE 3.5 SECURITY IMPACTS

Indicator	Impact
Site perimeters, entrance and exists	Moderate : improved signage and fencing.
Formal surveillance	Moderate: Provision of new CCTV facilities at stations not currently provided with this. No additional staff surveillance.
Informal surveillance	Neutral : No change to proximity of stations to retailers and other activities which could assist informal surveillance.
Landscaping	Slight: positive use of landscaping features with good visibility.
Lighting and visibility	Moderate: good lighting and design, also on signing.

3.36 The overall impact is considered moderate beneficial.

Summary

3.37 Table 3.6 summarises the assessment of the safety impacts.

TABLE 3.6 SAFETY IMPACTS

Impact	Qualitative	Quantitative	Expected Impacts
Change in annual personal injury accidents		Number of accident savings per year: 1.5	Slight beneficial
Change in balance of severity		Negligible number of fatal and severe accidents.	Neutral
Total discounted savings		Undiscounted: £0.05m/year. NPV: £0.7m	
Security	Station improvements, with improved lighting, visibility, surveillance and perceived security.		Moderate beneficial

Economy

3.38 The economy objective aims at supporting sustainable economic activities in appropriate locations and getting good value for money, by improving the economic efficiency of transport and the efficiency of economic activities.

Transport Economic Efficiency

3.39 The assessment of transport economic efficiency is based on the GoMMMS Transport Economic Efficiency (TEE) table. Quantification of a range of cost and benefits (accruing to users, private providers, public providers and other Governmental organisations) is required for each transport mode.

3.40 The user benefit indicators are:

- Travel time savings;
- Travel charges (fare and parking charges - when applicable);
- Vehicle operating costs;
- Quality benefits; and
- Reliability benefits.

3.41 The operator benefits, already described elsewhere in the report, include:

- Capital costs;
- Operating and maintenance costs; and
- Revenue.

3.42 The Government impacts are:

- Taxation impacts; and
- The economic Net Present Value (NPV).

3.43 For the production of a TEE table, all cost and benefit components have been estimated and run through a 'cash-flow' framework, using the following assumptions:

- Discount rate of 6% per annum;
- Project operating period of 30 years;
- Growth factors for rail demand of 1% per annum (which is deliberately conservative and reflects the growth factors used in the SSRS); and
- A phasing system assuming that:
  - The hourly services between Arbroath to Perth and the new station at Dundee West are implemented in 2006; and
  - All station upgrades are implemented in 2004.

3.44 The aggregate estimation of benefits to non-users (road users who remain so following introduction of the new service and benefit from lower traffic levels) has been made using a standard value of 25 pence per vehicle-km removed, this estimate including the accident, vehicle operating costs and travel time benefits for the non-users of the scheme.

Travel time savings

3.45 Consistent with the elasticity-based forecasting approach used for this study, user travel time savings following introduction of the scheme proposed have been estimated using a rule-of-thumb. User benefits have been assumed to be twice as high as the non-user benefits. The user benefits promoted by the scheme has been estimated at around 1.09 million per year, with a PV of £16.4m. Of this, the majority can be attributed to travel time savings, which have been estimated at £14.4m PV.

Travel charges

3.46 Changes in travel charges include any additional public transport fares payable as a result of additional PT trips (user cost) and any savings due to parking charges or tolls no longer paid by car users transferring to rail (user benefit).

3.47 The changes in user travel charges as far as fares are concerned correspond to the amount of additional public transport revenues. The total annual additional PT fares has been estimated at £714,000, with a PV value of 9.9 million.

3.48 Following a STAG (and therefore GoMMMS) framework, fares would normally cancel out any revenue effect in the TEE table, as they are considered to be an internal transfer of resources between users and operators. However, for the purposes of an RPP bid, the effect of revenue losses to competing modes (both bus/coach and rail operators) is not taken into account, with revenues representing an actual benefit in the cost/benefit analysis, and this has been the approach employed here.

Vehicle operating costs

3.49 No specific calculation has been carried out for the vehicle operating cost savings accruing to rail users transferring from car. Such savings have been assumed to be accounted for in the calculation of the user benefits, and in PV terms, it represents some £1.8m PV.

Quality benefits

3.50 Station improvements (facilities, information system, etc.) have an appreciable scope for enhancing the quality of public transport journeys (as described elsewhere in the report), and the overall benefit can be considered moderate.

Reliability benefits

3.51 Additional services together with passenger information facilities will contribute to improve reliability, and the overall benefits can be considered moderate.

Capital costs

3.52 As reported previously, these have been estimated at £8.7 million for the core strategy, plus £2.12m for the supporting station improvements, with a NPV of £9.9 million.

Operating and maintenance costs

3.53 As reported previously, these have been estimated at £2.4 million per year. The corresponding NPV is £26.2 million.

Revenues

3.54 As reported previously, these have been estimated at £714,000 million per year, or the equivalent to £9.9 million NPV. Revenues arising from passenger transfers from bus to rail are included within the revenue estimates but have not been separately identified for the appraisal (see paragraph 3.48 above).

Taxation impacts

3.55 Taxation impacts would be the marginal foregone revenue to the Government as a result, for instance, of lower fuel taxes from lower private vehicle fuel consumption (from car users transferring to rail). This impact can be expected to be very modest.

Economic Net Present Value

3.56 Table 3.7 summarises the costs and benefits of the proposed corridor options, in the form of a Transport Economic Efficiency Table (in Net Present Value terms).

TABLE 3.7 TRANSPORT ECONOMIC EFFICIENCY

Impact	Total	Net Present Value (£ million)	
		Road	Rail
Personal Travel			
Travel time	£22.8	£6.4	£14.4
Vehicle operating costs	£1.8	£2.3	£1.8
Accidents	£0.7	£0.5	£0.7
Net impact	*£25.4*		
PT Provider Impacts			
Revenue	£9.9		£9.9
Operating costs	-£26.2		-£26.2
Grant/subsidy	£16.4		£16.4
Net impact	*£0.0*		
Government Impacts			
Infrastructure costs	-£9.9		-£9.9
Grant/subsidy payments	-£16.4		-£16.4
Net impact	*-£26.2*		
Net Present Value NPV	-£0.8		
Present Value of Costs PVC	-£36.1		
Present Value of Cost to Government	-£26.2		
Benefit/Cost ratio BCR	**0.98:1**		
Value/Cost to Government ratio	0.0:1		
Operating Ratio for scheme	0.4:1		

Notes: No effect from revenue losses to other operators taken into account (see para. 3.48)
Totals may not sum due to rounding
Present Values discounted to 2003 in 2003 prices

3.57 It can be seen that travel time benefits for both users and non-users can be achieved, particularly for the longer distance rail services. Rail revenues would naturally increase, but at the expense of higher operating costs. The overall Benefit/Cost ratio for the full scheme has been estimated at 0.98.

Economic Activity and Location Impacts

3.58 Increased accessibility levels would lead to facilitating connections to jobs, education and other economic activities (such as shopping, services, leisure). Improvements in economic activity and employment can reflect in benefits for the society as a whole.

3.59 The aim of the Economic Activity and Location Impacts (EALI) is to describe the economic impacts of a project on income and employment (at the local and regional levels), possibly including their geographical and social distribution. This effect is not captured in the TEE approach.

3.60 STAG states the "*a detailed examination of EALIs might not be required in all cases, specially for small proposals*". It seems appropriate to suggest that the measures included in this study will be unlikely to have appreciable benefits to the economic activity, due to the scale of the project, but any impacts would be likely to be positive.

Spatial level of the appraisal

3.61 Even if it were possible to claim employment benefits as a result of accessibility benefits, most of these would occur as the expense of disbenefits elsewhere. However, as far as income is concerned, it can be assumed that most changes in employment due to the scheme would result in greater levels of disposable income (it can be expected that the main reasons to change jobs are the availability of higher earning positions elsewhere and the reduction in travel costs). The overall impact could be a slight benefit.

GDP/output changes

3.62 Significant changes in GDP are most unlikely as a consequence of the proposed scheme, even when considering the medium to long terms and the potential cumulative effects on the economy. The overall impact can be expected to be neutral.

Employment

3.63 The scheme could at best improve employment marginally, thus no formal estimation will be carried out in the scope of this study. The overall impact is expected to be neutral, although there may be specific local benefits to the employment areas close to the proposed Dundee West station.

Distributional/spatial impacts by area

3.64 The spatial groups in society most likely to be benefited are the potential rail users living, working, shopping and/or studying along the proposed alignment. This does not necessarily coincide with the regional areas of greatest social deprivation, in need of regeneration or where income levels are lowest. The overall impact is neutral.

Distributional/spatial impacts by social group

3.65 This public transport scheme can benefit a range of people in the community, in particular non-car owners, lower income groups and possibly the elderly. It can be said that the overall impact is moderate beneficial, in favour of least economically advantageous social groups.

Regeneration & social inclusion

3.66 The scheme provides an enhanced public transport link between town centres for an area where car ownership varies considerably. It provides all segments in society with better accessibility conditions, leading to better prospects for regeneration and employment. The overall impacts is moderate beneficial.

Summary

3.67 Table 3.8 summarises the assessment of the economy impacts.

TABLE 3.8 ECONOMY IMPACTS

Impacts	Qualitative	Quantitative	Expected Impacts
Travel time savings		Calculated based on user benefits estimates, at £16.4m PV and non-user benefits of £6.4m PV	
Travel charges		Not taken into account in the TEE	
Vehicle operating costs		Calculated based on user benefits estimates, at £1.8m PV.	
Quality benefits	Station improvements have appreciable scope for enhancing the quality of public transport journeys.		Moderate beneficial
Reliability benefits	Additional services and passenger information facilities will contribute to improve reliability.		Moderate beneficial
Capital costs		Total cost: £10.8 million. PV: £9.9 million	
Operating and maintenance costs		£2.4 million per year. PV: £26.2 million	
Revenues		£714,000 million per year. PV: £9.9 million	
Taxation impacts	Unaccounted for.		
Economic Net Present Value		NPV: -£0.8 million BCR = 0.98	
Spatial level of the appraisal	Most employment benefits as a result of accessibility benefits would occur as the expense of disbenefits elsewhere, but most changes in employment would result in greater levels of disposable income.		Slight beneficial.
GDP/output changes	Significant changes in GDP are unlikely.		Neutral.
Employment	Only marginal employment improvements can be expected.		Neutral.

Impacts	Qualitative	Quantitative	Expected Impacts
Distributional/spatial impacts by area	The scheme does not necessarily coincide with the regional areas of greatest social deprivation, in need of regeneration or where income levels are lowest.		Neutral.
Distributional/spatial impacts by social group	The scheme favours the least economically advantageous social groups.		Moderate beneficial.
Regeneration and social inclusion	The scheme provides all segments in society with better accessibility conditions, leading to better prospects for regeneration and employment.		Moderate beneficial.

Integration

3.68 Integration is an important political and social objective and would be likely to play a role in the local and regional transportation policy. The integration objective aims to ensure that all decisions are taken in the context of an integrated transport policy, encompassing integration within different transport modes, with the environment, between transport and land use and other policies beyond transport.

Transport Integration

3.69 The proposed service would provide people living or working near the corridor with a local rail service between Perth and Arbroath, with a more efficient long distance service provision, and hence a connection to a range of local, regional and national rail services.

3.70 Thus, additional local service together with station improvements will provide integration benefits, with increased opportunities for interchange with other rail and existing bus services, possibly with integrated ticketing and passenger information. Some of the station improvement measures will contribute to make interchanges more efficient and pleasant, both with other rail services and other modes.

Services and ticketing

3.71 Co-ordinated and integrated public transport services, as well as convenient and simplified ticketing, can contribute to more "seamless" journeys (this benefit is additional to the economic benefits captured elsewhere in the appraisal).

3.72 The proposed scheme will improve services station facilities, but the scope for improvement to ticketing integration is quite limited. The proposed improvements to interchange facilities at Leuchars and Montrose will contribute to an improved position. The resulting impact is likely to be slight beneficial.

Infrastructure and information

3.73 The existence and quality of facilities (e.g. seating area, weather protection, amenities. Level boarding) and passenger information (e.g. real-time) at interchanges and in-vehicle can enhance the attractiveness of public transport systems.

3.74 Station improvements can contribute to better infrastructure and information, the extent to which depends on the precise measures to be implemented. The scheme has the potential for moderate benefits.

Land-Use Transport Integration

3.75 Recent developments in the UK and Scottish Government policy have provided a clear framework for the integration of land use and transport planning with a focus on sustainability and reducing the need to travel.

3.76 To the extent to which the proposed scheme induces changes in modal share, it could contribute to:

- Sustainable travel (more rail trips and less car trips); and
- Improving access to local facilities by public transport (and walking).

3.77 This criterion investigates whether:

- Any land required for the proposal is preserved for uses which are incompatible with transport (e.g. protected or conservation areas);
- The proposal fits with the general policies of authorities at all levels concerning transport and land use; and
- The proposal conflicts with any other existing or planned development.

3.78 Thus, there is a requirement for the identification of the land use policies or proposals conflicting with statutory planning documents at the local, regional and national levels.

3.79 The National Planning Policy Guidelines set out the policies on land use and sustainable transport. The scheme supports a range of land use policy objectives at all levels. National policies supported include:

- Planning Policy Guidance on Transport (PPG 13): the scheme supports policies on:
  - Improving public transport by establishing "a high quality, safe, secure and reliable network of routes, with good interchanges, which matches the pattern of travel demand in order to maximise usage of public transport" (paragraph 72); and
  - Interchanges - paragraph 48 urges local authorities to "promote more sustainable travel choices, by ensuring that interchange points are well related to travel generating uses, and that the design, layout and access arrangements of … interchanges are safe and convenient so as to maximise the walking and cycling catchment population for public transport services".

- Planning Policy Guidance on Housing (PPG 3): this calls on local authorities to "seek to ensure that all housing developments are accessible by a range of non-car modes" (paragraph 47);
- Planning Policy Guidance on Town Centres and Retail Vitality (PPG 6); paragraph 2.28 cites the following key issues in relation to town centre access:
  - To promote improvement in the quality and convenience of less environmentally-harmful means of transport so that they provide a realist alternative to the car; and
  - To meet the access and mobility needs of disabled people.

3.80 The regional policies supported include:

- The Regional Planning Guidance (RPG) in relation to economic prosperity, regeneration, ensuring quality of life and choices of opportunities for all; and
- The overall development principles of the RPG, together with the specific objectives which it defines in relation to transport and regeneration.

3.81 In the Local Transport Strategies for the Tay area authorities, there are a number of common aims focusing on the theme of sustainable transport and promoting travel choices. Key objectives include

- To improve safety for all road and transport users;
- To reduce the environmental impacts of travel;
- To support the local economy;
- To promote better health and fitness;
- To reduce social exclusion; and
- To ensure that transport meets the needs of all in society, including those with reduced mobility.

3.82 Improvements in public transport will support wider Government policy and are in line with wider national policy on sustainable development. The scheme will support most local, regional and national objectives, in particular those related to sustainability and increasing the use of public transport, and the overall assessment can therefore be considered moderate beneficial.

Policy Integration

3.83 The White Paper, *Travel Choices for Scotland*[4], quotes education, health and wealth creation as key areas of concern when planning transport, recognising that transport decisions have wide impacts upon communities.

[4] The Stationery Office (1998) *Travel Choices for Scotland*, The Scottish Integrated Transport White Paper, Presented to Parliament by the Secretary of State for Scotland, http://www.archive.official-documents.co.uk/document/cm40/4010/4010.htm

Fit with key policies

3.84 This criterion examines whether the proposed scheme contributes to and is consistent with other Government policies and legislation beyond transport, in respect of:

- Disability – whether there are noticeable accessibility improvements for the mobility impaired (both at station and in-vehicle);
- Health – whether the scheme provides the opportunity for reduced car use and/or increased walking and cycling trips, with also the prospect of a reduction in emissions; and
- Rural affairs – whether the scheme contributes to strengthening or retaining rural communities, as set out in current policy for rural Scotland.

3.85 Like the existing services, the proposed scheme will continue providing access to wheel and push chairs, facilitating thus the access for the elderly and mobility impaired. The expected modal shift from car to public transport for journeys by local residents, and others travelling to local employment and recreational facilities will have an indirect and marginal, but positive, effect on health, from the reduction of the adverse environmental impacts of traffic. There is also an increased likelihood for local residents to walk or cycle to reach the train stops. The scheme could contribute to improve rural affairs if rural accessibility is improved, by encouraging a retention of the rural population. The overall impact is moderate beneficial.

Social exclusion

3.86 Social exclusion focuses on the impacts of the scheme for particular disadvantaged groups in society, such as the unemployed and those on low-income or with no car available.

3.87 The scheme will promote social inclusion by providing an enhanced public transport link connecting various towns along the route, particularly for non-car users. The overall impact is considered moderate beneficial.

Summary

3.88 Table 3.9 summarises the assessment of the integration impacts.

TABLE 3.9 INTEGRATION IMPACTS

Impacts	Qualitative	Quantitative	Expected Impacts
Services and ticketing	The scope for improvement is limited, but improved interchange facilities to be provided at Montrose and Leuchars.		Slight beneficial.
Infrastructure and information	Station improvements can contribute to better infrastructure and information.		Moderate beneficial.

Impacts	Qualitative	Quantitative	Expected Impacts
Transport – land use integration	Improvements in public transport will support wider Government policy and are in line with national policy on sustainable development, in particular related to increasing the use of public transport.		Moderate beneficial.
Fit with key policies	The scheme will be accessible by elderly and mobility impaired, have an indirect benefit on health and contribute to a retention of the rural population.		Moderate beneficial.
Social exclusion	The scheme will promote social inclusion, particularly for non-car users.		Moderate beneficial.

Accessibility

3.89 The accessibility objective aims at improving the ease of access to everyday facilities, particularly for those without a car, and reducing community severance, by increasing the ability with which people in different locations, and with different availability of transport, can reach different types of facility and destinations.

3.90 Increased accessibility levels can be measured in different ways, e.g. in terms of increased destination options within a study area, journey time reductions, changes in the number of people with walking access to public transport or number of people with access to certain destinations (e.g. employment). Transport models and GIS capability can be used as mechanisms for the measurement of changes in accessibility conditions.

3.91 As an indicator of the potential effect of the preferred service option on accessibility it was agreed (see Working Paper A[5]) that an appropriate indicator would be the changes in the number of local residents who are brought within a 45-minute travel time boundary of specified destinations as a result of the implementation of the Core Strategy. This was assessed qualitatively in the STAG1 assessment but here has been quantified using 1991 census population information.

3.92 The specified destinations considered were:

- Arbroath;
- Cupar;
- Dundee Central;

[5] Working Paper A: Planning Objectives and Appraisal Framework

- Monifieth;
- Dundee West (both University and Nine Wells areas); and
- Perth.

3.93 The population catchment with access to each of these rail stations was defined as:

- Rail: 800-metre radius from each station; and
- Bus: 400-metre boundary along the existing bus routes.

3.94 In practice, catchments could be significantly wider than this but it is considered that this provides a useful indicator of the relative impacts on different key destinations.

3.95 The journeys considered include those by rail, bus, or a combination of bus and rail. Regarding transfers, the following assumptions have been made:

- A maximum of one transfer allowed; and
- Transfer penalty = 10 minutes.

3.96 This analysis has been carried out using GIS, with the public transport networks and services geographically captured, together with Census 1991[6] population density data within the established catchment boundaries.

3.97 The results of the accessibility analysis are summarised in Table 3.10, in terms of the change in population with access to each destination within 45 minutes journey time by public transport.

TABLE 3.10 CHANGES IN POPULATION WITH ACCESS TO KEY DESTINATIONS

Station	Base	Core Strategy	Change	% change
Arbroath	37,511	38,370	859	2%
Cupar	23,401	25,832	2,431	10%
Dundee Central	44,315	45,161	846	2%
Monifieth	35,499	40,325	4,826	14%
Dundee West	28,031	39,349	11,318	40%
Perth	25,898	27,970	2,072	8%
Grand Total	**194,655**	**217,007**	**22,352**	**11%**

3.98 The results indicate that the proposed scheme could offer variable benefits in terms of changes in accessibility – changes in population with access to stations within 45 minutes varies between 2% and 40%, depending on the station. Dundee Central and Arbroath already have good rail services, so the benefits promoted by the scheme are the lowest. On the other hand, accessibility to Dundee West is likely to be increased most, since there is no rail service at this station in the Base scenario. A series of maps have been produced to illustrate these results (for each of the six rail stations) – these

6 Census 2001 data at ward level was not available at the time of the analysis.

are given in Appendix A. The total change in population with public transport access to these six rail stations has been estimated at 11%, and the overall impact is considered slight beneficial

Change in Severance

3.99 Severance deals with the ability of people to move locally on foot or by bicycle, in particular if constrained by barriers such as infrastructure, motorway or rail links. Current transport modelling techniques normally lack the degree of detail necessary to represent the impact of transport schemes upon trips made by non-motorised modes.

3.100 Severance changes can be an important impact where rail and road traffic characteristics change most and where new barriers to pedestrian movements are created. However, additional frequency would not tend to cause additional severance effects along the route, since pedestrians and cyclists are already exposed to the adverse effects of the rail line.

Number of people affected

3.101 No additional people are expected to be affected by the scheme in terms of rail severance. The impact is neutral.

Importance of severance

3.102 The magnitude of severance is likely to be negligible, since new services will not create any new barrier to pedestrian/cyclist movement. The impact is, again, neutral.

Level of severance

3.103 STAG suggests that if the implementation of the project is likely to change the length of walk trips by less than one minute, the level of severance should be considered low. No appreciable increases in the length of walk trips can be expected as a result of the proposed scheme. Therefore, the impact is neutral.

Summary

3.104 Table 3.12 summarises the assessment of the accessibility impacts.

TABLE 3.11 ASSESSIBILITY IMPACTS

Impacts	Qualitative	Quantitative	Expected Impacts
Accessibility	Measured by the changes in the population who can access rail stations within a 45-minute travel time boundary.	Accessibility changes vary between 2% and 40%, depending on the station. The total change has been estimated at 11%.	Slight beneficial.
Number of people affected by severance	No additional people are expected to be affected.		Neutral.
Importance of severance	The magnitude of severance is likely to be negligible.		Neutral.
Level of severance	No increases in length of walk trips can be expected.		Neutral.

Appraisal Summary Table

3.105 Table 3.13 presents Part 1a of the Appraisal Summary Table, which effectively is as in STAG1 for Option 1b (see *Option Appraisal – STAG1 report*).

TABLE 3.12 APPRAISAL SUMMARY TABLE FOR CORE STRATEGY: PART 1A

Proposal details			
Name and address of authority promoting the proposal		Dundee City Council	
Proposal name	1.b] Arbroath – Perth	*Name of planner*	Ian Sheriff (Roads and Transportation Manager)
Proposal description	Rail service improvement on Arbroath – Perth with new station at Dundee West and station improvements at Carnoustie, Arbroath, Perth, Montrose, Ladybank, Cupar , Leuchars and Dundee.	*Costs* ▪ *Capital* ▪ *Annual*	 £10.8m £2.4m/year
Funding sought from	N/A	*Amount of application*	N/A

Proposal background	
Planning objectives	Accessibility levels to seven most significant locations; Efficiency and effectiveness, in terms of the number of new users in the system; Quality of public transport, referring mainly to station improvements; and Integration, also with strong reference to station improvements.
Performance against planning objectives	Varying levels of accessibility improvements, depending on location, with overall moderate beneficial impact. Patronage: 202,000 per year: moderate benefits. Quality of public transport: moderate benefits. Integration: slight beneficial.
Alternatives to proposal considered	Carnoustie – Perth and Montrose – Perth
Comment on performance of alternatives	Half-hourly service to Carnoustie requires new loop, with potential problems. Does not work as a means of enabling the creation of a two-tier service and makes little sense in its own right as operates over too short distance. Option for reinstate Montrose has prohibitive capital costs and a through service requires doubling of Usan single section.
Rationale for selection of proposal	The selected option has a stronger economic performance.

Spatial and social information	
Area context: general	Local rail service between Arbroath – Perth, with connection at Dundee.
Economic performance	BCR = 0.98
Deprivation/social inclusion	The rail link will enable non-car owners and other socially excluded increased access to the public transport network; hence to job, education, shopping and leisure destinations.
Planning and environment	
Spatial level of appraisal	

Implementability appraisal	
Transport land-use integration	To the extent to which the proposal provides changes in modal share, it could contribute to: - sustainable travel (more rail trips and less car trips); and - improving access to local facilities by public transport (and walking). The National Planning Policy Guidelines set out the policies on land use and sustainable transport (see respective section above).
Policy integration	The proposal is in line with other local and national planning policies on regeneration and social inclusion.
Distribution impacts	The groups in society most benefited are the potential public transport users living, working, shopping and/or studying within the catchment of the proposed alignment. Very few would lose with the marginal increase in environmental impacts along the route.
Technical feasibility	Proposal requires additional loops and Intermediate Block Section.
Operational feasibility	Pathing constraints create a 10-minute layover in Arbroath - Dundee direction. Major problems with providing service at peak times.
Technical risks	
Other risks	
Affordability	Not yet at funding stage.
Financial sustainability	Operating ratio = 0.4:1
Public acceptability	Improvements in public transport usually have a high degree of public acceptability. Local people will, at some stations, benefit from a reduction in commuter parking on residential streets, thus minimising local objections.

Objective	Assessment summary	Supporting information
Transport	Reduction in car trips and veh-km, with increase in rail trips (and veh-km). Assessment: ++	Small reduction in traffic and congestion with reduction in delays.
Environment	See AST Part 2 below	
Safety	See AST Part 2 below	
Economy	See AST Part 2 below	
Economic activity	See AST Part 2 below	
Accessibility	See AST Part 2 below	
Transport integration	See AST Part 2 below	
Policy integration	See AST Part 2 below	

3.106 Table 3.14 summarises the appraisal of the various impacts under STAG2, as described in the previous chapter. It corresponds to Part 2 of the Appraisal Summary Table in STAG2.

TABLE 3.13 APPRAISAL SUMMARY TABLE FOR CORE STRATEGY: PART 2

Profile Statements	
Opening Year	2007/8 (services and new stations) and 2004/5 (station upgrades)

Environment

Sub-objective	**Qualitative information**	**Quantitative information**	**Magnitude of effect**	**Significance of impact**
Noise and vibration	Marginal additional rail noise and vibration, with marginal reduction in road noise on some locations.		Marginal	Neutral
Air quality — overall	Additional rail engines will produce more pollutants, but these will be partly offset by the reduction in road emissions.		Marginal	Neutral
Air quality CO_2 — global		Reduction: 316 tonnes/year	Small	Slight beneficial
PM_{10} — local		Reduction: 40 kg/year	Small	Slight beneficial
NO_2 — local		Increase: 6,590 kg/year	Small	Slight adverse
Water quality, drainage and flood defence	Scheme will operate on existing infrastructure		None	Neutral
Geology	Scheme will operate on existing infrastructure		None	Neutral
Biodiversity	Scheme will operate on existing infrastructure		None	Neutral
Visual amenity	Possible townscape improvements		None	Neutral
Agriculture and soils	Scheme will operate on existing infrastructure		None	Neutral
Cultural heritage	Scheme will operate on existing infrastructure		None	Neutral
Landscape	Possible townscape improvements		None	Neutral

Safety

Sub-objective	**Item**	**Qualitative information statement**	**Quantitative information**
Accidents	Change in annual personal injury accidents	DMRB method, based on standard accident rates for different road types, dependent on reduction on veh-km.	Number of accident savings per year: 1.5
	Change in balance of severity	DMRB method, based on standard accident rates for different road types, dependent on reduction on veh-km.	Negligible number of fatal and severe accidents.

	Total discounted savings		Jndiscounted: £0.05m/year. NPV: £0.7m
Security		Station improvements, with improved lighting, visibility, surveillance and perceived security.	Moderate beneficial

Economy

Sub-objective	Item	Qualitative information	Quantitative information
Economic activity and location impacts	Spatial level of the appraisal	Most employment benefits as a result of accessibility benefits would occur as the expense of disbenefits elsewhere, but most changes in employment would result in greater levels of disposable income.	
	GDP/output changes	Significant changes in GDP are unlikely.	Neutral
	Employment	Only marginal employment improvements can be expected.	Neutral
	Distributional / spatial impacts — by area	The scheme does not necessarily coincide with the regional areas of greatest social deprivation, in need of regeneration or where income levels are lowest.	Probably negligible gross employment changes in area
	Distributional / spatial impacts — by social group	The scheme favours the least economically advantageous social groups.	Moderate beneficial.
	Regeneration & social inclusion impacts	The scheme provides all segments in society with better accessibility conditions, leading to better prospects for regeneration and employment.	Moderate beneficial.

Integration

Sub-objective	Item	Qualitative information	Quantitative information
Transport interchanges	Services & ticketing	The scope for improvement is limited, but improved interchange facilities to be provided at Montrose and Leuchars.	Slight beneficial.
	Infrastructure & information	Station improvements can contribute to better infrastructure and information.	Moderate beneficial.
Land-use transport integration	Transport assessment	Improvements in public transport will support wider Government policy and are in line with national policy on sustainable development, in particular related to increasing the use of public transport.	Moderate beneficial.
Policy integration	Fit with key policies	The scheme will be accessible by elderly and mobility impaired, have an indirect benefit on health and contribute to a retention of the rural population.	Moderate beneficial.

	Social exclusion impacts	The scheme will promote social inclusion, particularly for non-car users.	Slight beneficial.

Accessibility			
Sub-objective	**Item**	**Qualitative information statement**	**Quantitative information**
Base accessibility	Within a community	Measured by the changes in the population who can access rail stations within a 45-minute travel time boundary.	Accessibility changes vary between 2% and 40%, depending on the station. The total change has been estimated at 11%. Slight beneficial.
	Community as a whole	Changes in access time to key destinations as per Planning Objective 1 (with mapping)	Moderate beneficial.
Change in severance	Number of people affected	No additional people are expected to be affected.	Neutral.
	Importance of severance	The magnitude of severance is likely to be negligible.	Neutral.
	Level of severance	No increases in length of walk trips can be expected.	Neutral.

3.107 The results of the AST indicate a BCR of 0.98, a NPV of –£0.8m at a 6% discount rate.

4. VARIANT OPTION

Introduction

4.1 This chapter sets out a summary descriptive assessment of an alternative service option which would extend the Arbroath – Perth service beyond Arbroath to serve Montrose at certain times of the day.

4.2 The constraints relating to operation of the new local service beyond Arbroath to Montrose relate principally to the single-track section at Usan: the impact of this on minimum service headways has been outlined in Working Papers B and C. Whilst these constraints impede any day-long service extending to Montrose, there are a number of periods within the day when the service could in fact be operated beyond Arbroath within the base timetable.

4.3 Analysis undertaken by Babtie indicates that it would be possible to operate and additional hourly service to Montrose in 12 hours out of the 18-hour operating day. These hours are not, however, currently contiguous, and are limited to before the morning peak, morning interpeak and a number of hours in the afternoon including the 1600-1800 period.

Options Assessed

4.4 Options that have been assessed to make use of these potential paths include the following:

A) Extension of the Perth to Arbroath service through to Montrose at specific times of the day;

B) Operation of a mixed service connecting Perth and Arbroath only where capacity constraints do not permit operation to Montrose, and a Dundee West to Montrose service where these constraints do not apply.

4.5 These options have different implications on scheme costs over and above the preferred option– they have also different implications on the branding and potential local perceptions of the new service.

TABLE 4.1 OPTIONS FOR EXTENSION OF THE LOCAL SERVICE TO MONTROSE

Option	Operating Costs	Capital Costs	Branding/ Public Perceptions
A) Extension of specific services beyond Arbroath to Montrose where capacity permits	Additional unit required (£0.75 additional operating costs per annum)	None	Neutral - core service between Arbroath and Perth would always run
B) Mixed service Perth – Arbroath and Dundee West – Montrose	No additional unit required, marginal/neutral impact on operating costs	Additional crossover/ turnback at Dundee West (estimated at £2m)	Potentially negative: irregular service is difficult to brand and runs counter to objectives of local service

4.6 The long-term additional operating cost implications of Option A represent a significantly greater long-run cost than the alternative envisaged in Option B of providing a cross-over at Dundee West. The comparative additional discounted Present Values of costs (over the preferred option discounted capital and operating cost of £36.1m PV) can be calculated at £8.3m PV for Option A and £1.6m PV for Option B over the appraisal period.

4.7 The revenue impacts will depend heavily upon the precise timetable slots which can be operated to Montrose and in particular how they may complement or compete with re-cast strategic services: on this basis no attempt at quantification has been made. However it should be noted that the success of the new local service is likely to depend strongly on the promotion of the regular-interval timetable: this represents a distinct break with current service timetabling in the area and could provide the basis for an effective marketing campaign.

4.8 The dilution of the regularity of the timetable by cutting back certain Perth services to Dundee West, and extending these eastwards to Montrose (as envisaged in Option B) could put this benefit at risk. Nonetheless, the potential for a crossover at Dundee West or Invergowrie to permit short running or reversal should not be ruled out at this stage.

5. NEXT STEPS

5.1 This working paper sets out the detailed impacts of the recommended scheme according to the STAG framework and is intended to form the basis for any future application for public funding, although the mechanism for delivering this funding is not currently clear. In summary, this scheme consists of the following elements:

TABLE 5.1 SUMMARY OF PREFERRED OPTION

Station Enhancements				
	Service Level	Accessibility	Security	Station Facilities
Arbroath	X	X	X	X
Broughty Ferry	X	X	X	X
Carnoustie	X		X	X
Cupar		X		X
Dundee	X		X	X
Ladybank		X		
Leuchars				X
Monifieth	X		X	X
Montrose			X	X
Perth	X	X	X	X
New Station				
Dundee West				
Track and Signalling Works				
New up-line Loop at Carnoustie (requires land outside current rail boundary) and CCTV tail light camera adjacent to the Up Outer Home signal				
Service Enhancements				
New hourly service between Arbroath and Perth, stopping hourly at Perth, Dundee West, Dundee, Broughty Ferry, Monifieth, Carnoustie & Arbroath. It is currently envisaged that service levels at Invergowrie, Balmossie, Barry Links and Golf Street would remain at 2002/3 levels.				
New Rolling Stock				
Three additional diesel multiple-units required				

5.2 The analysis reported here indicates that a new local service connecting Perth and Arbroath, combined with significant improvements to local stations on this route and elsewhere, shows potential to contribute towards the objectives set out in STAG and the local planning objectives set for the scheme.

5.3 The preferred option is deliverable with only very minor modifications to existing track and signalling systems and would provide the Tay Estuary area with a regular-interval service at local stations.

5.4 In taking forward the proposals to implementation, there are a number of areas where additional work may be justified. In particular, this includes

i. Further clarification from the SRA and Scottish Executive regarding the potential funding mechanisms for the recommended strategy;

ii. Development of a fuller understanding of the potential synergy of the recommended strategy with proposals for recasting of the intercity timetable and particularly Glasgow/Edinburgh to Aberdeen services. This includes the proposals for service changes (if any) at stations not included in the recommended new local service, including Cupar, Leuchars, Ladybank and Montrose. It also requires an understanding of the potential connecting times between the local and intercity services at Perth, Dundee and Arbroath to encompass the requirements of journeys between the TERS study area and further afield;

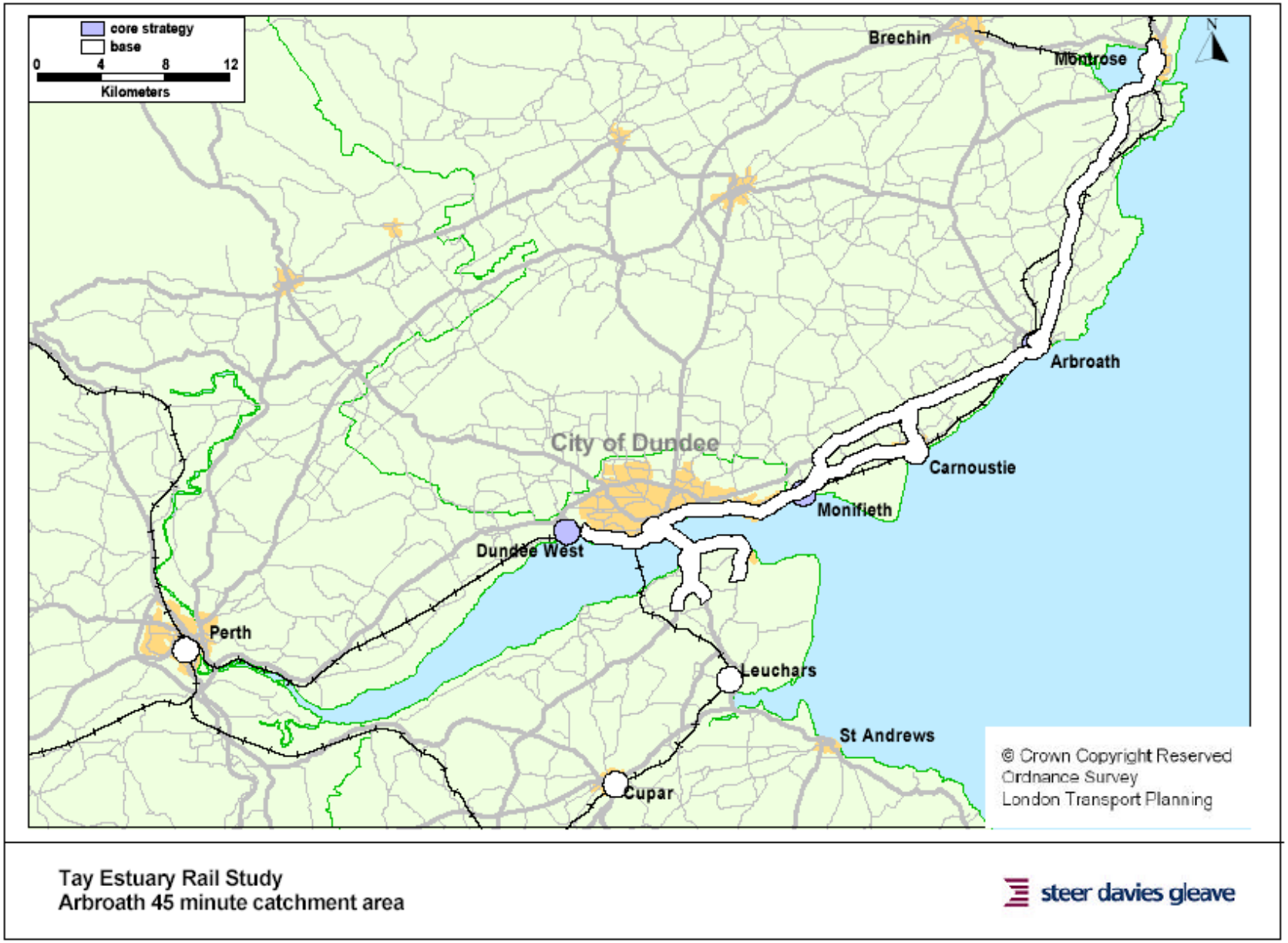
iii. Discussion of the range of options identified by Babtie for the loop facility at Carnoustie with relevant bodies to ensure agreement regarding the proposed solution;

iv. Further assessment of the potential for complementary non-rail based improvements to build on the proposed improvements to interchange at Leuchars, Montrose and Dundee in particular;

v. A further discussion with stakeholders as to the options for stations not proposed for significant improvement here, including Golf Street, Barry Links, Invergowrie and Balmossie, and Springfield.

APPENDIX A

Results from Appraisal of Accessibility Benefits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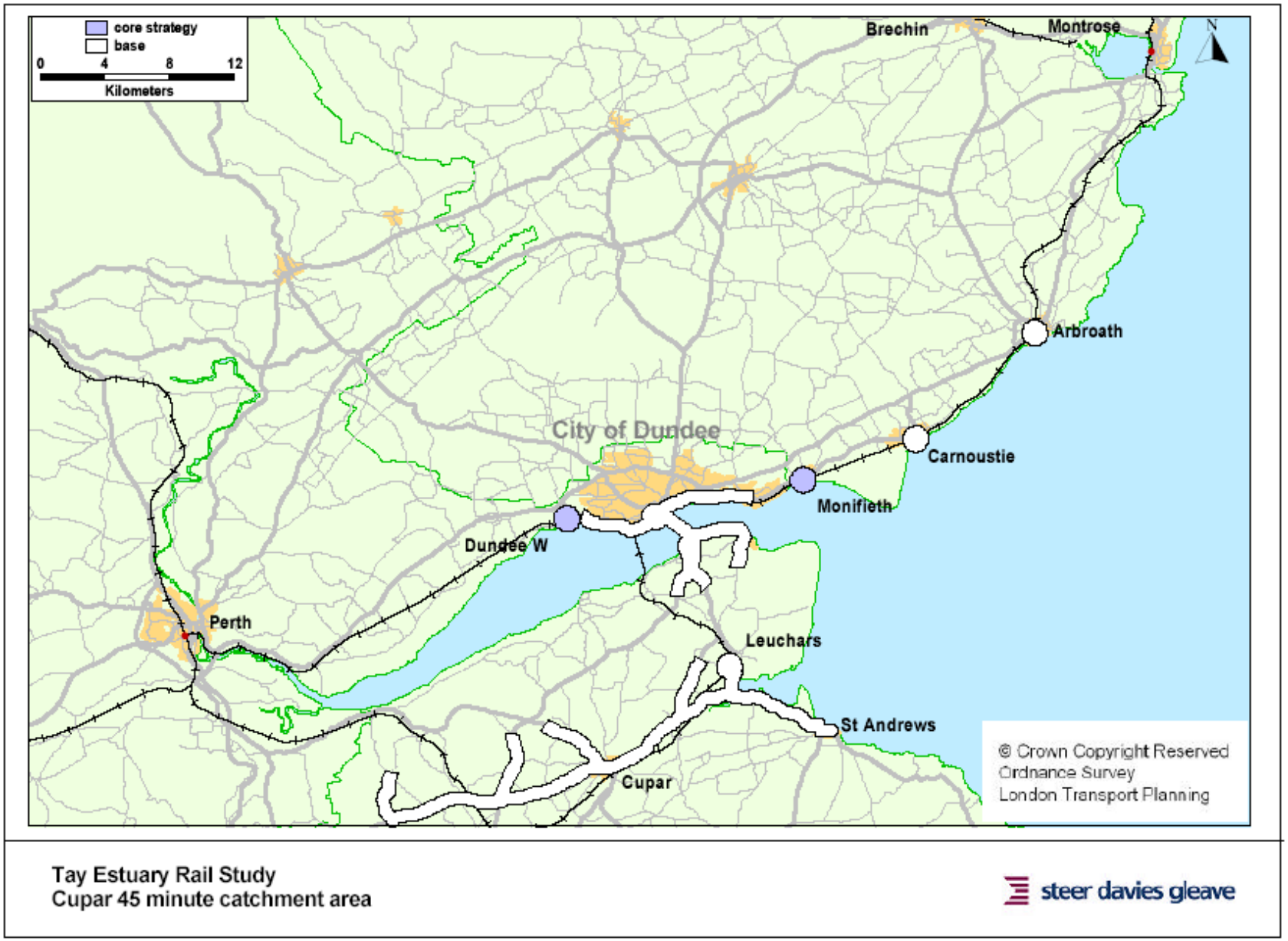
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London Transport Planning
Tay Estuary Rail Study
Cupar 45 minute catchment area
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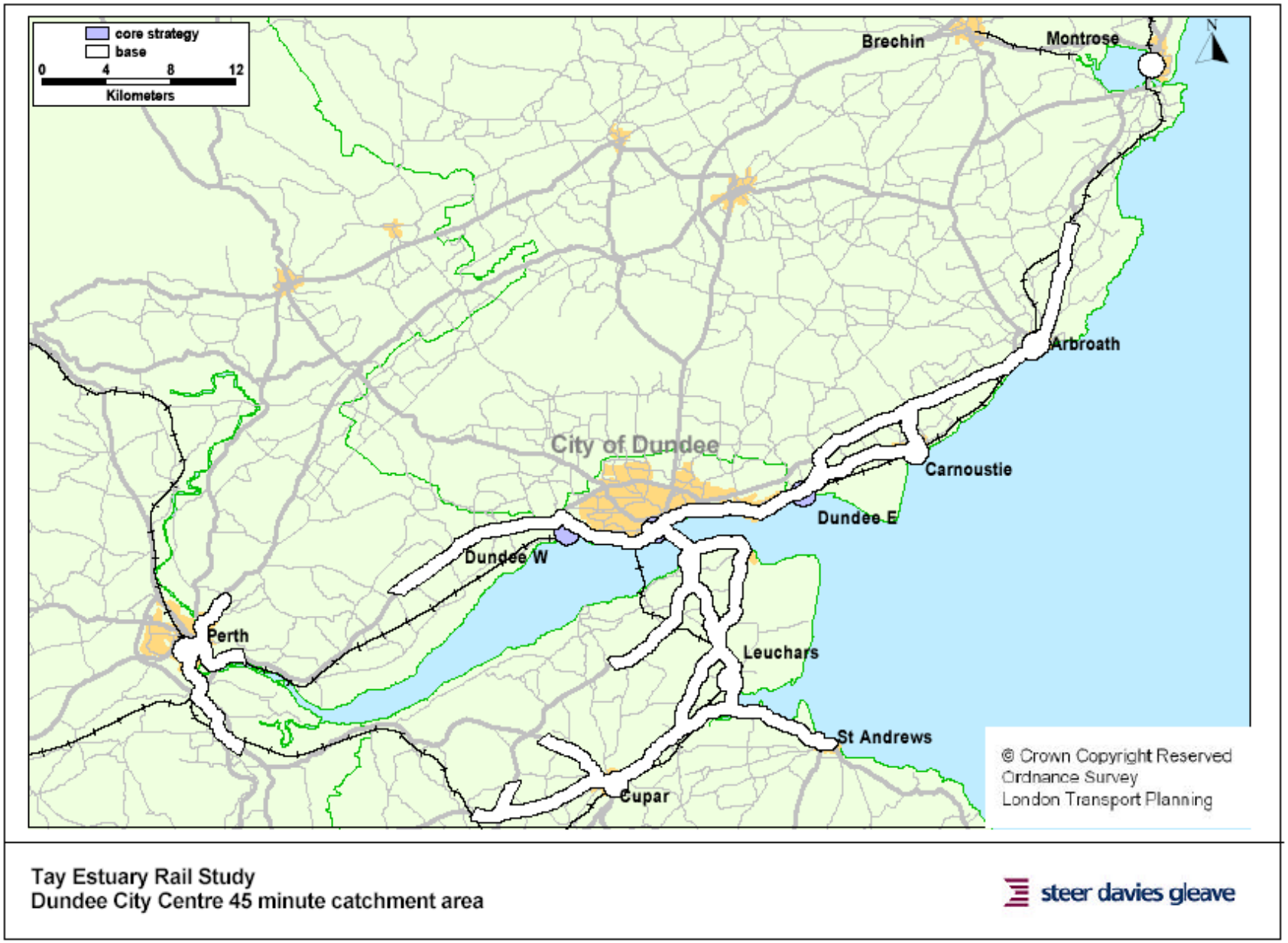

Tay Estuary Rail Study
Dundee City Centre 45 minute catchment area

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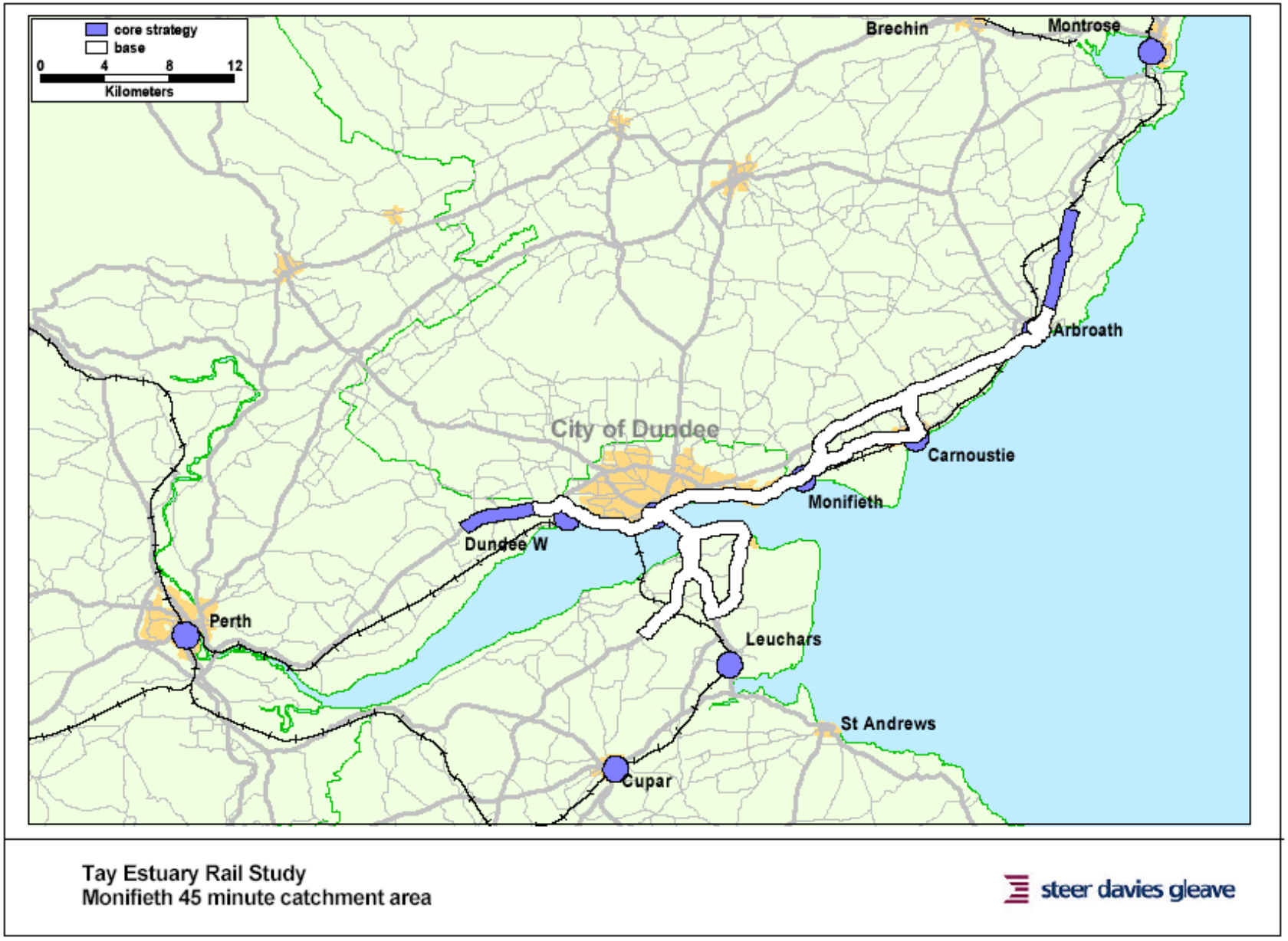
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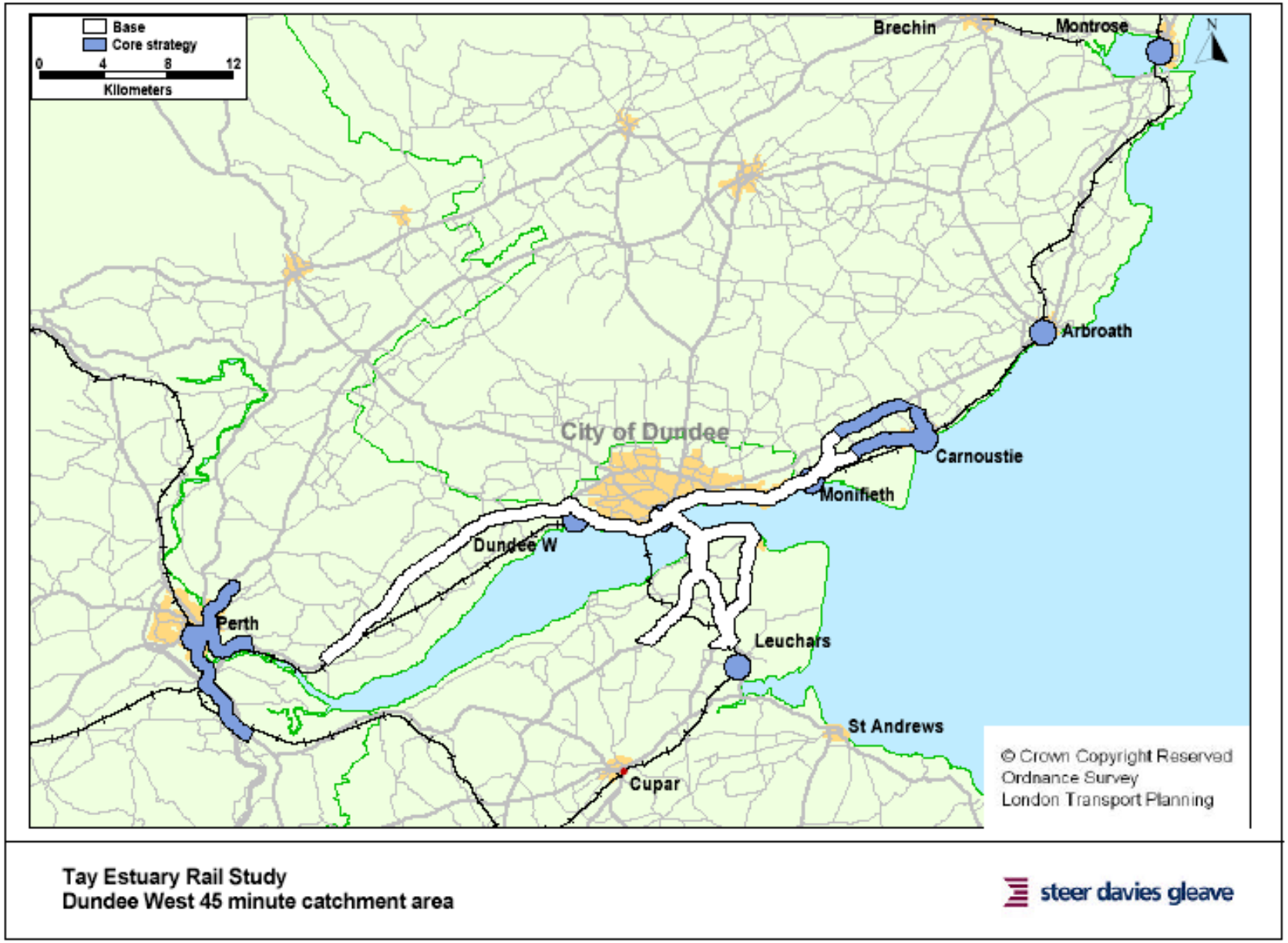
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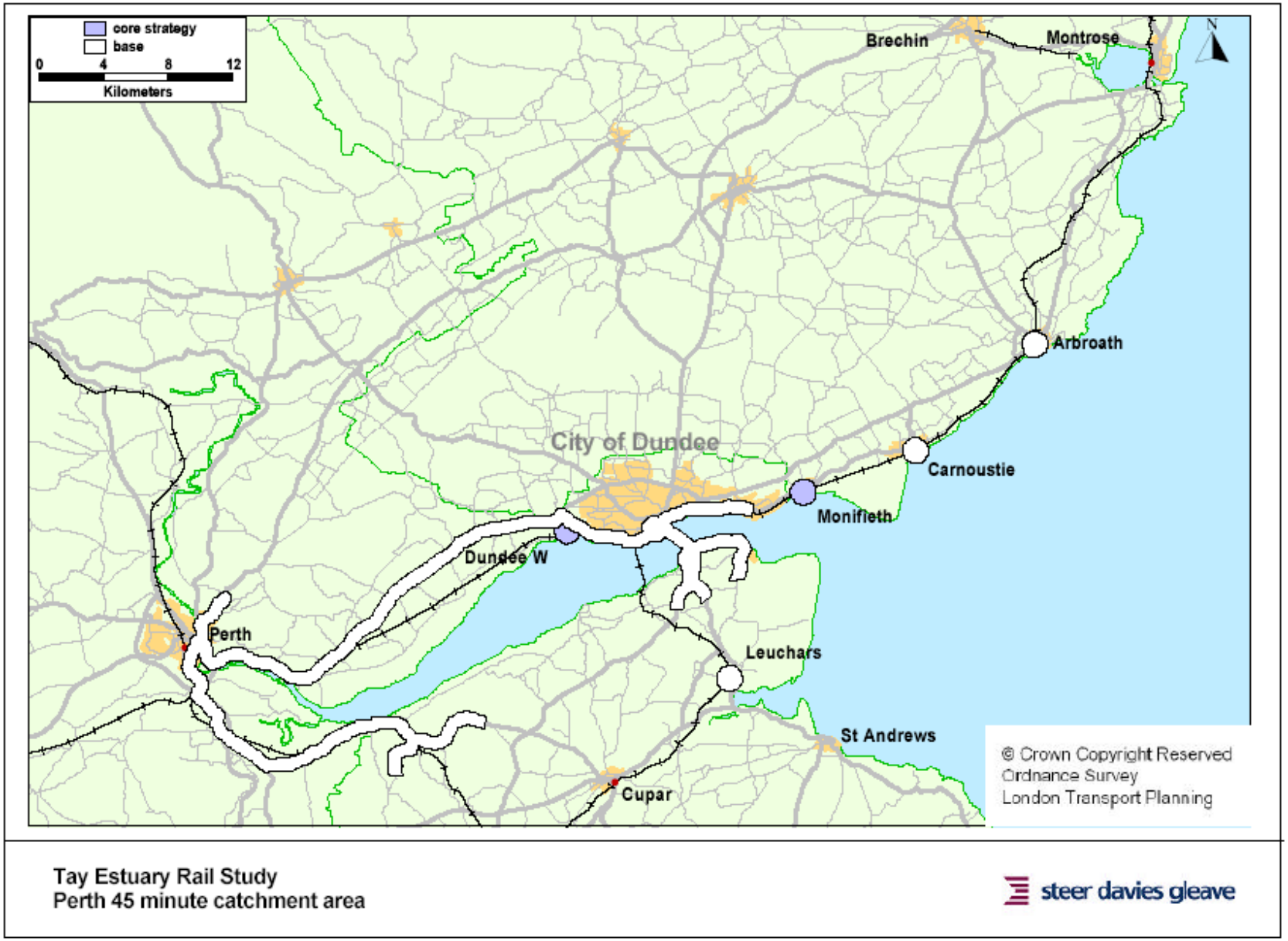
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note for file

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Subject	**Base and Forecast Demand Levels at TERS Stations**		

This note supplements the internal working note issued by Steer Davies Gleave dated November 2002[1] which set out details of the available information relating to travel patterns and volumes in the TERS study area. It is intended to provide an indication of the potential impact of the Core Strategy, as set out in Working Paper E, on rail passenger volumes at a disaggregate level.

The key source of information relates to existing rail usage derived from the CAPRI dataset, obtained from Scotrail for a base year of 2000. The table below sets out estimates of the forecast impact of the core strategy on station boarding levels within the study area based on this dataset. It should be noted that whilst we believe the overall total aggregated demand impacts to be reasonable estimates, these disaggregated figures should be treated as being indicative only.

TABLE 1 ANNUAL DEMAND LEVELS - BASE AND FORECAST (2000 LEVELS)

Station Name	Base Annual Passenger Boardings 000s	Total Annual Uplift in with Service and Station Improvements 000s	Percentage Change	Forecast Future Annual Passenger Boardings 000s
Stations included in Core Strategy				
Montrose	182.9	6.4	4%	189.3
Arbroath	176.1	26.4	15%	202.5
Carnoustie	22.6	3.7	16%	26.4
Monifieth	1.0	3.5	350%	4.5
Broughty Ferry	3.0	7.1	236%	10.1
Dundee	464.9	64.4	14%	529.3
Perth	269.4	54.7	20%	324.1
Leuchars	155.5	1.1	1%	156.6
Cupar	96.0	2.6	3%	98.6
Ladybank	19.4	0.3	2%	19.8
Dundee West	0.0	31.8	n/a	31.8
Total	1,390.9	201.9	15%	1,592.9
Stations not included in Core Strategy				
Golf Street	0.03	-	-	0.03
Invergowrie	0.06	-	-	0.06
Balmossie	0.02	-	-	0.02
Springfield	0.46	-	-	0.46
Barry Links	0.02	-	-	0.02
Total	0.59			0.59

[1] Tay Estuary Rail Study – Travel Demand in the Tay Estuary Corridor

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This information is presented graphically in Figure 2.

FIGURE 2 BASE AND FORECAST DEMAND LEVELS