

South East Scotland Transport Partnership (SEStran) & Fife Council

Levenmouth Sustainable Transport Study

STAG Part 2 Appraisal Report

Final Version
November 2008



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Revision Schedule



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Executive Summary

E.1 Introduction

E.1.1 SEStran has developed a Regional Transport Strategy (RTS), which has identified several projects for taking forward for potential development, categorised within identified strategic corridors for prioritising investment. The Queensferry and the Central Fife were two such corridors identified, both of which involve heavy commuter flows to Edinburgh. Part of the solution for these corridors would be to increase public transport provision between Fife and Edinburgh, and an important scheme in this respect would be the introduction of passenger services to Levenmouth, whilst also increasing the share of the freight transport market carried by rail. Consequently, South East Scotland Transport Partnership (SEStran) appointed Scott Wilson to carry out a STAG-based study to appraise proposals for improving services to the Levenmouth area. This report sets out the results of a STAG Part 2 Appraisal of potential opportunities for improving public transport in the Levenmouth area.

E.2 Findings from the STAG Part 1 Appraisal

E.2.1 The STAG Part 1 Appraisal concluded that the rail-based options are the only measures which would meet all the planning objectives and the criteria set out in the Scottish Transport Appraisal Guidance (STAG). Consequently, the STAG Part 1 Appraisal recommended that consideration should be given to the following in the subsequent STAG Part 2 Appraisal:

- a new heavy rail service based on re-opening the previous railway line. This would have a new station with park-and-ride facilities at both Leven and Muiredge/Cameron Bridge, to cater for the extensive new land-use developments planned. In addition to passenger services, the railway line should accommodate rail freight serving the local Diageo Site and Methil Docks, where demand has been identified; and
- since the rail line is unlikely to be delivered before 2015, bus priority measures could be a suitable short-term improvement and could provide a number of benefits such as accessibility and connectivity to local areas and the existing railway network.

E.3 Option Development

E.3.1 Further analysis of options and subsequent discussions with SEStran and Fife Council were carried out, after which two options for re-opening the line were identified for consideration:

- option A was based on utilising the existing alignment; and
- option B would establish a straightened track alignment between Thornton Junction and Windygates.

E.3.2 Both Options would include rail freight facilities at Cameron Bridge. Option B would permit greater speeds than would be possible in option A, from a maximum of 40mph to 60mph, which is likely to encourage greater patronage and hence benefits.

E.3.3 In terms of actual train services and rail operating plans, the modelling and economic analysis assessed the extension of either of the existing hourly services from Kirkcaldy and Cowdenbeath, as well as extending both services.

E.4 Scheme Costs

E.4.1 Capital costs were estimated in 2008 Q2 prices and included allowances for contingencies, risk & uncertainty costs estimates and optimism bias costs estimates. These gave the following estimates:



- option A outturn cost (2008) = £48.05m; and
- option B outturn cost (2008) = £54.34m.

E.4.2 Given that the project is unlikely to be open before 2015, it is worth presenting the anticipated final outturn costs for 2016. These have been estimated by applying the British construction industry projected inflation figures of approximately 6% per annum. This gave the following:

- option A outturn cost (2016) = £76.6m; and
- option B outturn cost (2016) = £86.6m.

E.4.3 However, for the purposes of the economic evaluation, the current prices are used as per standard appraisal convention.

E.5 Findings from the STAG Part 2 Appraisal

E.5.1 The STAG Part 2 Appraisal identified the following conclusions:

- the best performing option is to reconstruct the railway along the existing alignment, i.e. **option A**: the re-opening of the existing rail alignment, plus the implementation of the two stations at Leven and Cameron Bridge and rail freight facilities;
- in terms of the preferred train service strategy, the findings suggest that the extension of the hourly Kirkcaldy Service would produce the highest benefit-to-cost ratio (BCR) at 1.50 and net present value (NPV) of £20.9m. This train service strategy produces circa 349,000 passengers per annum at 2016 rising to circa 380,000 passengers per annum by 2031, mainly from modal shift, and not allowing for any induced patronage due to newly generated trips as a result of improved rail connections;
- it is worth noting that when possible additional generated trips are taken into account along the lines experienced with the re-opening of Alloa Station, the BCR and NPV figures improved significantly to 1.99 and £45.1m respectively;
- extending both the Kirkcaldy and the Cowdenbeath services to create a half hourly service to Leven provides the greatest passenger demand although the NPV and BCR are lower due to the assumed doubling of the operating cost. If a way could be found to minimise or reduce the running costs then this would increase the attractiveness of this service strategy;
- in terms of other STAG indicators, option A (existing railway alignment) has the least environmental impact, is less intrusive on visual amenity, has less impact on the cultural heritage of the area and has least impact on the landscape. It also has less of an impact in terms of the disruption on the geology, agriculture and soil structure of the area; and
- option A also meets most closely the three planning objectives identified by local stakeholders: it improves access to key areas and services in both the Levenmouth and wider geographical areas, it promotes the efficient movement of freight to and from Levenmouth and thereby encouraging modal shift from HGVs, and it encourages a more sustainable travel pattern for new and existing developments.



E.6 Conclusions & Recommendations

- E.6.1 Given the above appraisal results, the conclusions and recommendations are:
- Scheme Development – it is recommended that option A is taken forward through the railway industry's Guide to Railway Investment Projects (GRIP) stages, in order to consult further with other important stakeholders including Transport Scotland and Network Rail. This will assist with the design process and ensure key stakeholders are fully involved. It may also be advisable to carry out a preliminary outline environmental statement in order to identify mitigation factors which could further enhance the results of the appraisal. This is also important because the environmental measures may need to be included in the final outturn costs if these are found to be significant.
 - Timetable/service frequency – regarding train operations, as mentioned above, two alternatives should be considered: 1) extending the hourly Edinburgh to Kirkcaldy service to Leven, or 2) extending both the Edinburgh to Kirkcaldy and the Edinburgh to Cowdenbeath services, thereby providing a half-hourly service to Leven. This latter service plan would also provide improved service frequencies at Thornton, Cardenden and Lochgelly Stations which will produce some benefits although these have not been quantified in this study. In addition, there will be enhancements to the existing train services to Fife which are planned to be implemented in December but there may be further changes in due course to the service timetables assumed in this STAG study. Consequently, now would be a good opportunity to test the two alternative service strategies against the planned network-wide improvements, and develop a robust operating timetable which meets all the objectives.
 - Refined Economic Appraisal – the above actions could potentially further enhance the robustness of the Transport Economic Efficiency (TEE) Appraisal carried out. This is particularly the case for the unknown factors not covered in the remit of this study. For example, the operating costs of the proposal are related to the service strategy but since this study has focussed on the capital costs, the estimate of operating, maintenance and renewal (OMR) costs were based on default percentages. It could be that the incremental differences between having two trains per hour rather than one per hour may not be as high as assumed in this study which could improve the economic appraisal results. This may in turn influence the final decision as to which operating service strategy is best placed to meet the overall objectives of stakeholders. Furthermore, whilst the appraisal has identified a potential Risk Management Strategy (RMS), any possible reductions in the resultant Optimism Bias value used in the economic appraisal (i.e. post reduction of allowances for estimated risks and contingencies) have not been carried through in order to provide a more robust economic assessment. Again, if these were pursued as part of the GRIP process, and suitable mitigation measures are identified and properly managed, then there will be benefits to the final outturn costs. Consequently, it is recommended that the economic appraisal be considered in light of the outputs from the above recommendations as the project goes through the GRIP stages.
- E.6.2 The implementation of the above recommendations should help progress the project forward and also provide further confidence to key stakeholders.



1 Introduction

1.1 Background

1.1.1 South East Scotland Transport Partnership (SEStran) appointed Scott Wilson to carry out a STAG study to appraise proposals for improving rail services and other travel options to the Levenmouth area. The study is being carried out in partnership with Fife Council.

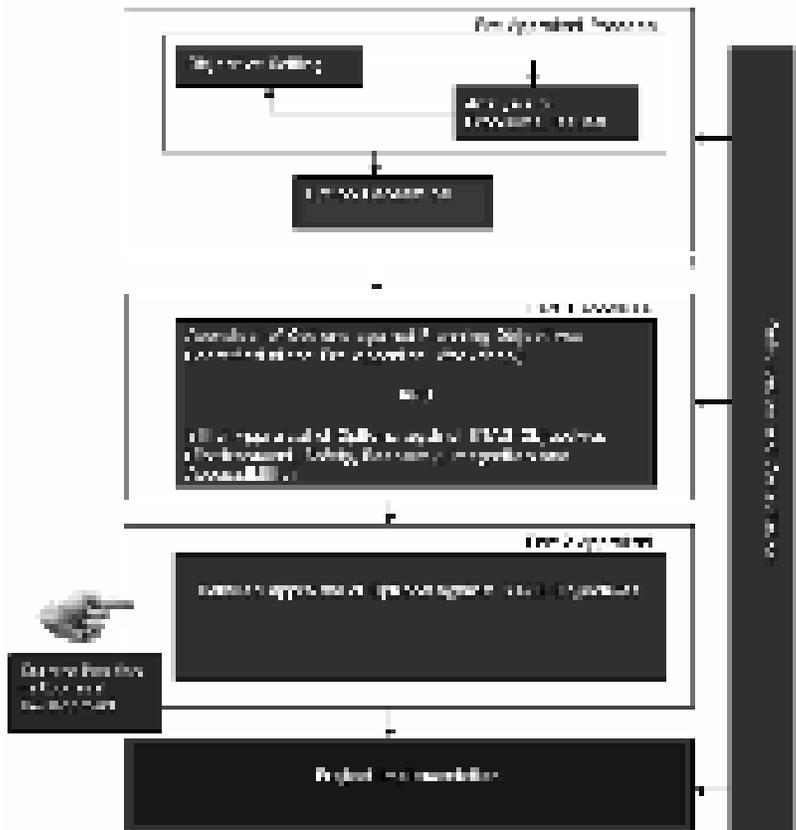
1.1.2 SEStran has developed a Regional Transport Strategy (RTS), which has identified several projects for taking forward for potential development. A number of these schemes are categorised within the network-based measures identified in the RTS, one of which is the identification of strategic corridors for prioritising investment where public transport modal share is low when compared with relatively similar corridors, and to set a target for modal shift to public transport use for these corridors.

1.1.3 The Queensferry and the Central Fife were corridors that have been identified where high volumes of modal shift are required in order to meet the targets set, and which both involve heavy commuter flows to Edinburgh. Part of the solution for these corridors would be to increase public transport provision between Fife and Edinburgh, and an important scheme in this respect would be the introduction of public transport passenger services to Levenmouth, whilst also increasing the prospect of raising the share of rail freight in the freight transport market.

1.1.4 This report sets out the results of the evaluation of the opportunities identified following a STAG Part 2 Appraisal.

1.2 The STAG Process

1.2.1 The Figure (inset, right) shows where Part 2 is set within the STAG process. It clearly shows that the activities in the pre-appraisal stage, that is objective setting, analysis of issues and option generation had been completed and fed into the subsequent stage – the Part 1 Appraisal. This set out the appraisal of the options, identified in the pre-





appraisal process, against the planning objectives and an initial (high level) appraisal against the Government's five main objectives¹.

- 1.2.2 This report will complete the STAG Part 2 of this process. This work takes the appraisal completed in Part 1 to a more rigorous level addressing the framework methodology central to the STAG process. Wherever possible, we have followed the reporting structure advised in Chapter 14 of STAG. However, some re-arrangement of the order of chapters has been carried out to help with the flow of information. Detailed analysis for certain aspects (e.g. environment, etc) has been produced in appendices attached with this report.

1.3 Overview of the Study Area

- 1.3.1 The study area for this appraisal is shown in Figure 1.1. However, while the STAG Part 2 Appraisal has, as in the case of the STAG Part 1, focussed on localised benefits and impacts in this study area, it is acknowledged that a proportion of journeys will extend outwith the study boundary. The implications of this, have, wherever possible, been identified and incorporated into the assessment qualitatively, and where sufficient information and data exists, quantitatively, in keeping with the nature of STAG Part 2.

Figure 1.1: The Study Area



- 1.3.2 The large growth in Queensferry and central Fife corridor commuter traffic has necessitated an increase for additional rail capacity between Fife and Edinburgh, including changes to local services as well as long distance services through Fife. It is therefore considered realistic at this time to consider developing options to improve access to the Levenmouth area, for both passengers and freight, so that if public transport improvements are shown to be beneficial, these may be integrated with the broader strategy of enhancing rail provision between Fife and Edinburgh.

¹ Scottish Transport Appraisal Guidance: Executive Summary, paragraph 27, Scottish Government, September 2003



1.4 Structure of this Report

1.4.1 The overall structure of this report follows that set out for STAG Part 2 appraisal.

Chapter 2 – Summarises the pre-appraisal results carried out for the Part 1 Appraisal.

Chapter 3 – Summarises the findings of the STAG Part 1 Appraisal.

Chapter 4 – Sets out the Option Development.

Chapter 5 – Outlines the Transport Modelling results.

Chapter 6 – Details the STAG Part 2 Appraisal of the options.

Chapter 7 – Sets out the Risk and Uncertainty assessment.

Chapter 8 – Outlines the Monitoring and Evaluation recommendations.

Chapter 9 – Provides the overall Conclusions.



2 Summary of the Pre-Appraisal

2.1 Introduction

2.1.1 This Chapter summarises the review of the present and future problems carried out in the STAG Part 1 Appraisal, which relate to the transport network and patterns of traffic flows in the Levenmouth area, and the specific areas that are susceptible to congestion. The Chapter gives a brief overview of the present and future problems identified, a summary of the feedback obtained from the stakeholder consultations, an outline of the planning objectives developed from this review and a summary of the initial options identified for appraisal. Further details of the full Pre-Appraisal are set out in the STAG Part 1 Appraisal Report².

2.2 Present and Future Problems

2.2.1 A number of major routes in the area, including the A915 and the A911, suffer considerable congestion, particularly at peak times; and with general rising traffic trends, the levels of congestion currently seen are expected to get worse.

2.2.2 The rising demand for longer distance travel within Fife and beyond means that there will be increasing demand for public transport facilities in the Levenmouth area. This has been explicitly recognised in the 3 – 5 year plan of the RTS with discussion on re-opening the Levenmouth link to the Fife Circle, and investment in a new rail station in Leven itself.

2.2.3 Accessibility to public transport in the Levenmouth area is regarded as suitable for local services but insufficient for medium to long-distance trips when compared with the nearby towns of Kirkcaldy and Glenrothes. This too has been explicitly acknowledged with the relatively recent upgrading of the Leven bus station enabling an extension of existing bus services, but this has not facilitated an increase in their frequency although it would appear that passenger levels have increased.

2.2.4 Even with relatively high regional car ownership rates, residents in the Levenmouth area seem to be more reluctant to commute to work by car than residents in some of the neighbouring towns. In fact a comparatively large proportion walk to work, which may be a reflection of the structure and distribution of local employment and residential patterns in Levenmouth as much as a reflection of the paucity of alternative modes of transport.

2.2.5 There are significant new land-use developments on the horizon, particular in terms of residential expansion. An increasing population will place additional strain on both the road network and on existing public transport in order to access key facilities such as colleges, hospitals and shopping areas, both in and around Levenmouth. Moreover, this anticipated rise in population would increase the demand for transport facilities and infrastructure in order to meet the increasing requirements for longer distance commuting to other towns in Fife, and potentially over the Forth Bridge.

2.2.6 Freight movements in the Levenmouth area are restricted to HGV traffic which is entirely absorbed onto the local road network. The problems this generates are compounded by the

² Levenmouth Sustainable Transport Study – STAG Part 1 Appraisal Report (Final Draft), Scott Wilson for SEStran & Fife Council, June 2008



fact that the Leven economy is heavily based on industry and manufacturing and, by its very nature, freight transport to/from Leven is long-distance.

2.3 Consultation

- 2.3.1 The consultation exercise was carried out using a number of different methods. A workshop was held with the key stakeholders of the study. This was followed by public consultation using the websites of Fife Council and SEStran, both of which were advertised with a press release before hand.
- 2.3.2 A key issue that emerged from the workshop was that currently modal choice for travel was restrictive, although bus services were reasonably good. Car ownership is relatively low in the area; therefore dependency on public transport is possibly higher than elsewhere in Fife.
- 2.3.3 Both the use of private car and the local bus services were constrained by heavy congestion, including significant HGV traffic, which is particularly bad along both the Kirkcaldy and Glenrothes Corridors, and especially so at peak times of travel.
- 2.3.4 There are significant plans for new land-use developments in the area, particularly for housing in the East Neuk, Muiredge and Lower Leven parts of the Levenmouth area. This is going to put additional pressure on the road network, exacerbating the existing 'pinch points' on the main roads leading out of Levenmouth, and will further contribute to the problems currently faced by car and public transport users.
- 2.3.5 A SWOT exercise was carried out at the STAG workshop, which identified a number of strengths and opportunities in providing rail transport investment in the Levenmouth area. The most important of these centres on improvements in accessibility to and from Levenmouth, with the benefits this brings in terms of widening the economic 'footprint' of Levenmouth. Greater accessibility means greater potential for local and inward investment and job creation in the area and access to jobs further afield.
- 2.3.6 Additional benefits with rail investment relate to the potential removal of both some car but mainly HGV traffic from Levenmouth's roads, reducing congestion and pollution, and ensuring a more efficient use of the existing road network. Against this there are comparatively few drawbacks to investment in rail.
- 2.3.7 Public consultation flagged up much of the same constraints to Levenmouth's transport network as put forward by the key stakeholders at the workshop. Safety on the main road links to and from Levenmouth emerged as a serious concern as was the poor links both by road and with public transport between Levenmouth and other areas of Fife and beyond. This is impeding Levenmouth's economic competitiveness, constraining employment and reducing opportunities for attracting young skilled employment to the conurbation; all of which re-enforces the perception of Levenmouth as an area characterised by chronic and high deprivation, the image of Levenmouth which the stakeholders at the workshop were also acutely aware and keen to dispel.

2.4 Planning Objectives

- 2.4.1 STAG differentiates between *Planning Objectives* and *Government Objectives*. Planning Objectives are specific to the study, whilst Government Objectives are over-arching criteria against which competing schemes for public funding may be measured. STAG sections 2.6.19 to 2.6.21 (Best Use of Existing Resources) recommend that where appropriate objectives already exist they should be re-employed. The STAG Workshop, which was held



on Monday 17 March 2008 and attended by various key representatives from Fife Council and SEStran, identified a number of outline objectives worthy of inclusion in the STAG Appraisal.

- 2.4.2 Improving public transport and accessibility in the Levenmouth area are the key objectives included in Fife Council's Local Transport Strategy (LTS)³. These are split in the LTS between Transport Themes and Transport Choices⁴, and have been similarly aligned below.

Transport Themes

- To improve access to all key needs and services for all (including employment, education, health and leisure opportunities);
- To encourage more sustainable travel for new and existing developments;
- To widen travel choice through the provision of integrated transport networks; and
- To improve safety for all forms of transport.

Transport Choices

- To promote efficient movement of freight and encourage transfer of goods from road to rail, sea and pipeline; and
- To work with passenger transport operators to develop an integrated public transport system.

- 2.4.3 It was therefore considered appropriate that the LTS policy objectives set out above relating to transport themes and choices should be key to the outline planning objectives, which are:

- **Objective 1:** Improve access to key areas and services in terms of employment, education, health, leisure and other transport modes in the local, regional and wider area for all residents in Levenmouth;
- **Objective 2:** Promote the efficient movement of freight to and from Levenmouth, and encourage the transfer of movement of goods, produce and materials from road to more sustainable distribution; and
- **Objective 3:** Encourage more sustainable travel for new and existing development.

- 2.4.4 Since the STAG Part 1 Appraisal, these outline planning objectives have been further refined in order to make them SMART that is specific, measurable, achievable, realistic and time-bound in order to conform to the STAG Part 2 appraisal requirements, see Section 6.9.

- 2.4.5 STAG recommends that, where possible, the planning objectives are "nested" with the Government Objectives⁵. This is intended to highlight synergies between objectives as well as simplifying the reporting process. These are summarised as:

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

³ Fife Local Transport Strategy, Section 4.6, page 28, paragraph 1

⁴ Fife Local Transport Strategy, Section 5.0, page 41

⁵ Scottish Transport Appraisal Guidance: Executive Summary, paragraph 33, Scottish Government, September 2003



2.4.6 The three local Planning Objectives identified above closely fit within the Government's five objectives, with some of the local planning objectives covering more than one of the Government's objectives. For this study they have been nested as shown in Table 2.1.

Table 2.1: Relationship of Planning Objectives to Government Objectives

STAG Criteria	NTS Objectives	Outline Planning Objectives
Environment	Protect our environment and improve health by building and investing in public transport and other types of efficient and sustainable transport which minimise emissions and consumption of resources and energy	Objective 3: Encourage more sustainable travel for new and existing development
Safety	Improve safety of journeys by reducing accidents and enhancing the personal safety of pedestrians, drivers, passengers and staff	<i>No specific Planning Objective identified – appraisal will be against Government Objective</i>
Economy	Promote economic growth by building, enhancing managing and maintaining transport services, infrastructure and networks to maximise their efficiency	Objective 2: Promote the efficient movement of freight to and from Levenmouth, and encourage the transfer of movement of goods, produce and materials from road to more sustainable distribution
Integration	Improve integration by making journey planning and ticketing easier and working to ensure smooth connection between different forms of transport	<i>No specific Planning Objective identified – appraisal will be against Government Objective</i>
Accessibility & Social Inclusion	Promote social inclusion by connecting remote and disadvantaged communities and increasing the accessibility of the transport network	Objective 1: Improve access to key areas and services in terms of employment, education, health, leisure and other transport modes in the local, regional and wider area for all residents in Levenmouth

2.4.7 During the STAG Part 1 appraisal a number of options were identified, and each option was appraised against each of the Government Objectives and Planning Objectives. These are outlines in the following section of this Chapter.



2.5 Options Identified

2.5.1 From the review, consultation and objectives identification described above, six options for the development of public transport in the Levenmouth area were identified and agreed. Some of the options had variations depending on the number of stations and with/without rail freight services. The main options and sub-options are described in Table 2.2.

Table 2.2: Main Options and Sub-options Identified for Levenmouth Public Transport Development

Main Option	Main Option Description	Secondary Option	Secondary Option Description
Option 1a	New Rail Alignment with Station at Leven.	• 1b	New Rail Alignment with Stations at Leven and Muiredge Development/Cameron Bridge.
		• 1c	As 1a plus Rail Freight Facilities.
		• 1d	As 1b plus Rail Freight Facilities.
Option 2a	Re-open previous rail line with a Station at Leven.	• 2b	As 2a but with an additional Station at Cameron Bridge.
		• 2c	As 2a plus Rail Freight Facilities.
		• 2d	As 2b plus Rail Freight Facilities.
Option 3a	New Rail Alignment to Markinch Station using part of Existing (De-commissioned) Railway with Station at Leven.	• 3b	As 3a plus Station at Muiredge Development/Cameron Bridge.
		• 3c	As 3a plus Rail Freight Facilities.
		• 3d	As 3b plus Rail Freight Facilities.
Option 4a	New Bus Rapid Transit (BRT) on segregated line from Leven to Markinch Station with Station at Leven.	• 4b	As 4a plus a second interchange at Muiredge/Cameron Bridge.
Option 5a	Introducing on-street bus facilities and priority measures including priority bus lanes and signalised bus priority junctions on the A955. Bus priority measures would continue on the A921.	• 5b	Bus priority on the A915 between Leven bus station and Kirkcaldy bus station instead of the A955 bus priority measures. As with Option 5a, bus priority measures would continue on the A921.
		• 5c	Introduces bus priority measures on a circular route between Leven and Kirkcaldy stations, using both the A955 and A915.
		• 5d	Bus priority service to Markinch/Glenrothes along the A911.
Option 6a	Extension of hovercraft services from Kirkcaldy to Leith with additional departure from Methil Docks & additional purpose-built terminal.	• 6b	This substitutes the new hovercraft service for a new ferry service between Methil Docks and Portobello.

2.5.2 Each of these options has been fully described in the STAG Part 1 Appraisal Report, and therefore it is not considered appropriate to repeat them here. However, the following Chapter summarises the results of the STAG Part 1 Appraisal for each option, and shows the best performing options which have been taken forward to the remainder of this report.



3. Summary of the STAG 1 Appraisal

3.1 Introduction

3.1.1 This Chapter summarises the STAG Part 1 Appraisal of the proposals. The appraisal of impacts, where this is explicitly tabulated, is based on a standard seven-point scale as outlined below:

✓✓✓ major beneficial impact	XXX	major adverse impact
✓✓ moderate beneficial impact	XX	moderate adverse impact
✓ minor beneficial impact	X	minor adverse impact
	O	neutral impact

3.1.2 Each score is assigned to each STAG sub-criterion to indicate the likely impact.

3.2 Findings of the STAG 1 Appraisal

Environmental Appraisal

3.2.1 Much of the coastal area from the centre of Leven northwards is designated as a nature conservation area and the same is true for the coastal strip from Buckhaven south-west as far as Blair point, and much of the same coastline is covered by SPA/SSSI/RAMSAR designation.

3.2.2 The area bordering the A955, between Kirkcaldy and East Wemyss, and sandwiched between the road and the designated coastal nature conservation area, is largely characterised by historic gardens and designed landscapes. Moreover, the Levenmouth urban area is also well represented by listed buildings, and to the north of Levenmouth is a substantial area of Great Landscape Value.

3.2.3 The following local planning objectives were been identified as nesting within the overall environmental heading.

*Government Objective*⁶: To protect our environment and improve health by building and investing in public transport and other types of efficient and sustainable transport which minimises emissions and consumption of resources and energy.

Planning Objective: To encourage more sustainable travel for new and existing development.

3.2.4 There are likely to be significant environmental issues associated with the development of transport options through existing rural areas. Any of the new rail alignment or BRT options is likely to have significant landscape and visual effects. There are also likely to be significant effects on biodiversity, with respect to both species and habitats, such as the local wildlife site at Kennoway-Windygates.

3.2.5 Construction disruption is likely to affect residential, commercial, and industrial properties, though this will be temporary and will not result in any permanent effects.

⁶ Government Objectives are quoted from Scotland's Transport Future, White Paper, 2004



- 3.2.6 There may a number of direct and indirect impacts on cultural heritage and landscape features in the area. Options 3a-d and 4a and 4b would have a major adverse impact upon residential receptors in the Kennoway-Windygates area resulting in the demolition of some properties.
- 3.2.7 There are other impacts during both construction and operation on air quality, noise and vibration, water quality, and geology and soils. However, some of these impacts could be suitably mitigated.
- 3.2.8 Any building work may affect the Firth of Forth SPA/SSSI/ Ramsar site with potential for significant impacts upon wildlife. The operation of a Ferry or Hovercraft service also has the potential to affect wildlife in the Firth of Forth. However, some of these impacts could be suitably mitigated and would be examined in an Environmental Impact Assessment.

- 3.2.9 The re-opening of the rail line options is the only option that has a major beneficial impact in terms of air quality and noise (Table, right inset). However this option, in common with the remaining options (excluding on-street bus), has a moderately adverse impact on other environmental parameters such as visual amenity and habitat disturbance. The on-street bus option has the least impact environmentally, either positively or negatively.

Option	Environmental Quality	Environmental Benefit
Option 1: On-street bus	++	++
Option 2: Local bus	++	++
Option 3: Rail	++	++
Option 4: Ferry	+	+
Option 5: Hovercraft	+	++

Safety and Security

- 3.2.10 The Safety objective identified within STAG is concerned with reducing the loss of life, injuries and damage to property resulting from transport accidents and crime. Two sub-objectives are considered, namely accidents and security.
- 3.2.11 The following local planning objectives have been identified as nesting within the overall safety heading.

*Government Objective*⁷: To improve safety of journeys by reducing accidents and enhancing the personal safety of pedestrians, drivers, passengers and staff.

Planning Objective: No specific Planning Objective identified – appraisal will be against Government Objective

- 3.2.12 The Table (right, inset) summarises the results of the safety appraisals for each of the options. In conclusion, by removing some of the vehicle traffic, and in particular some of the HGV traffic, there are

Option	Accidents	Security	Overall Safety/Security
Option 1: On-street bus	++	++	++
Option 2: Local bus	++	+	+
Option 3: Rail	++	+	+
Option 4: Ferry	+	+	+
Option 5: Hovercraft	+	+	+

⁷ Government Objectives are quoted from Scotland's Transport Future, White Paper, 2004



modest accident benefits from the public transport options. The rail options in particular perform well in terms of security.

Economy

3.2.13 The Economy objective identified within STAG is concerned with improving the economic efficiency of transport with the key aim of supporting sustainable economic activity and returning good value for money. Two sub-objectives are considered, namely:

- Transport Economic Efficiency (TEE); and
- Economic Activity and Location Impact (EALI).

Transport Economic Efficiency (TEE)

3.2.14 The analysis of the Transport Economic Efficiency (TEE) element is based on the results obtained from a high-level Restricted Cost/Benefit Analysis (RCBA). Exact details of each option were not identified at the STAG workshop, therefore it was considered appropriate to use a high-level RCBA based on traditional methods and appraisal parameters since this allows for a degree of flexibility in inferring the results. The appraisal assumed:

- A 60-year appraisal period;
- Annual discount rate of 3.5% over the first 30 years falling to 3% for the remainder; and
- An assumed opening year of 2015.

3.2.15 Table 3.1 shows the results of the transport economic efficiency.

Table 3.1: Summary of Results for the TEE Appraisal

Option	Scenario	Score
Option 1: New Railway Alignment	1a: with station at Leven	X
	1b: with stations at Leven & Muiredge/Cameron Bridge	X
Option 2: re-open existing railway alignment	2a: with stations at Leven	O
	2b: with stations at Leven & Muiredge/Cameron Bridge	X
	2c: with station at Leven with freight facilities	✓✓
	2d: with stations at Leven & Muiredge/Cameron Bridge with freight facilities	✓✓
Option 3: New railway alignment to Markinch	3a: with station at Leven	X
	3b: with stations at Leven and Muiredge/Cameron Bridge	X
	3c: with station at Leven with freight facilities	✓
	3d: with stations at Leven & Muiredge/Cameron Bridge with freight facilities	O
Option 4: New BRT system to Markinch	4a: with station at Leven	✓
	4b: with stations at Leven and Muiredge/Cameron Bridge	✓
Option 5: On Street Bus priority	5a: A955 Route	✓✓✓
	5b: A915 Route	✓✓✓
	5c: Circular – A955 & A915 Routes	✓✓
	5d: A911 Route to Markinch Stn	✓✓✓
Option 6: Hovercraft /	Same for both sub-options	XX

Economic Area Location Impacts (EALIs)

3.2.16 The aim of EALI analysis is to describe the impacts on the economy, in terms of the 'measuring rods' of income and / or employment of the different options. EALI analysis is



intended to identify how and under what circumstances the proposal might have impacts on the economic performance of the Levenmouth area in different sectors, and to capture those economic impacts that the TEE appraisal does not address.

- 3.2.17 In the Levenmouth area, some of the stakeholders that are likely to directly benefit from investment in new transport infrastructure are, in the short term, the builders, materials suppliers and engineering firms contracted to construct or re-commission the infrastructure requirements for each of the options. In the longer term, however, they include:
- Local businesses that depend on freight movements such as Diageo, Donaldsons Timber merchants and Cameron Bridge;
 - Local businesses that depend on customers or employees for access from outside the area;
 - Transport operators that would use or operate the new transport services;
 - Local commuters and regional commuters; and
 - Business based outside to region and who invest in the Levenmouth area.
- 3.2.18 There may be some displacement activity at the local level but this is unlikely to make a large impact on local business. Most of the displacement activity would be expected to occur on commuting patterns, and in the case of the rail options, the losers are likely to be bus companies losing customers to the new rail services on the longer routes, and possibly to the hovercraft/ferry option across the Forth.
- 3.2.19 Some local transport hauliers under contract, to say, Diageo or the Distillery at Cameron Bridge, may also disbenefit with the rail options if they start to lose contracts as a result of greater quantities of freight switching to rail. However, this impact is anticipated to be small, as it is understood at this point in time that these companies move the vast majority of materiel, both supplies and finished products, under 'own account' arrangements.
- 3.2.20 It is expected that the rail options, producing benefits that include reduced business costs, increasing commuting opportunities and accessibility to the largest companies in the area, whose scale of employment and assets, as well as broader commuting and business would be expected to have a *moderate beneficial impact* with the EALI issues identified above. The bus options and hovercraft/ferry option with a greater proportion of benefits associated with business accessibility, and fewer with reduced business costs would be expected to have a *minor beneficial impact* in these terms.

Integration

- 3.2.21 In appraising the Government Objective STAG requires the consideration of:
- Transport integration;
 - Transport land-use integration; and
 - Policy Integration.
- 3.2.22 The following local planning objectives have been identified as nesting within the overall integration heading.

Government Objective: To improve integration by making journey planning and ticketing easier and working to ensure smooth connection between different forms of transport.

Planning Objectives: No specific Planning Objective identified – appraisal will be against Government Objective



3.2.23 From the policy review outlined in the STAG 1 Report, it is clear that all options identified can be reasonably expected to compliment local and national policies. However, those options which provide opportunities for freight transport as well as public transport services will naturally satisfy additional policy objectives identified in the policy review in this Section. Such options are the rail-based options, which have the ability to accommodate rail freight services. Hence, it is reasonable to assume that the rail-based options will have *major beneficial* impacts, whereas the other options would have *moderate beneficial* impacts.

3.2.24 Taking account of this, the Table (inset, right) summarises the results of the integration appraisal to present a matrix of conclusions. Clearly in terms of policy integration, all the

Options	Language Integration	Land Use Transport Integration	Policy Integration	Overall Appraisal Policy Integration
Public transport	++	++	++	++
On-street bus	+	+	++	+
On-street bus systems	+	+	++	+
Hovercraft/ferry	++	+	++	+

options meet this objective. However, when taking into account the other areas of integration, the rail options score highest in having a *moderate beneficial impact*, as the rail options score consistently well across the board. It is worth noting that none of the options have an *adverse impact*, although the on-street bus and hovercraft/ferry options have a *neutral impact* with regards to land-use transport integration.

Accessibility and Social Inclusion

3.2.25 STAG requires the consideration of two aspects as part of the Accessibility and Social Integration Government Objective, namely:

- Community accessibility; and
- Comparative accessibility.

3.2.26 The following local planning objectives have been identified as nesting within the overall accessibility/social inclusion heading.

Government Objective: To promote social inclusion by connecting remote and disadvantaged communities and increasing the accessibility of the transport network.

Planning Objectives Improve access to key areas and services in terms of employment, education, health, leisure and other transport modes in the local, regional and wider area for all residents in

3.2.27 This element of appraisal allows a focus on minority groups in society. The rail options score particularly well for community accessibility (Table, right). This option would be expected to open up alternative commuter and tourism

Options	Community Accessibility	Comparative Accessibility	Overall Appraisal
Public transport	+++	+++	+++
On-street bus	++	++	++
On-street bus systems	+	++	+

access to the Levenmouth area. The rail options also provide direct connections to the national rail network which significantly increases connectivity. In addition, some of the rail sub-options also provide an opportunity to switch substantial volumes of road freight onto rail. By doing these rail options may generate substantial benefits and are therefore considered to have a *major beneficial impact*.



3.2.28 Community accessibility impacts are further broken down by group and by location. There is little doubt that the scale and type of public transport investment proposed for the Levenmouth area will assist a broad range of beneficiaries. The rail options will assist a broad range of customers, including commuters, those seeking work, visitors and tourists. Both the bus and hovercraft/ferry options will help the same broad categories of people as above, but the latter would be particularly effective in meeting the requirements of commuters between the Levenmouth area and Edinburgh.

Implementability

3.2.29 In addition to the 5 main Government objectives, STAG also recommends that the capability of delivering an option should also be considered. This can highlight any potential problems with the implementation of a proposal.

3.2.30 In terms of technical issues, it is worth noting that the new rail alignments and the hovercraft/ferry options are considered to be the most complicated to implement (Table, right). The easiest options are considered to be the on-street bus options as they involve relatively modest new infrastructure.

Option	Technical Issues	Operational Issues	Public Acceptability
On-street bus options	L	B	+++
New rail alignments	+	+	+++
Hovercraft/ferry options	+	+	++
Urban rail options	++	+	+
Hovercraft/ferry options	+	B	B

3.2.31 The public consultation exercise has revealed that there is significant public interest in reinstating the railway to Levenmouth. The vast majority of questionnaires received have called for a new railway-based solution to the accessibility issues of the area. Rather fewer respondents have sought a bus based solution to accessibility, and little feedback on the hovercraft/ferry option. So it is reasonable to assume that the railway options would score the highest in terms of public acceptability compared to the other options followed by the BRT option.



4 Option Development

4.1 Way Forward

4.1.1 The STAG Part 1 results of the assessment are summarised in the Table below. In terms of the local planning objectives, the rail-based solutions would appear to perform very well, especially in terms of meeting the objectives for both passenger and freight transport. Similarly, in relation to the Government objectives and the Implementability Analysis, the rail-based solutions perform well.

4.1.2 For value for money, the best performing options were those which involved re-opening the previously closed railway line rather than building a new alignment.

4.1.3 This option also has the minimal environmental impacts. Overall, therefore the re-opening of the rail-based options satisfies the objectives sufficiently to permit onward progression to STAG Part 2 Appraisal.

4.1.4 The on-street bus-based options also appear to perform well in terms of the local *Planning Objectives*. However, these do not assist in taking forward the aspirations for more sustainable freight distribution. Notwithstanding this drawback, the on-street bus options appear to provide a range of worthwhile benefits to the local community, and in terms of economic return some of the on-street options performed the best overall (mainly due to the relatively low implementation costs).

4.1.5 Similarly, in relation to the *Government Objectives* and the Implementability Analysis, the bus-based options perform well. The BRT options did not perform sufficiently well and should not be considered further. It would therefore appear worthwhile to consider some of the bus options in the next STAG Part 2 Appraisal phase of the study.

4.1.6 For both the local *Planning Objectives* and the *Government Objectives* the hovercraft/ferry options did not perform well and should not be considered further. Table 4.1 (overleaf) summarises the options that have been dropped from further consideration and the reasons for doing so.

Option	Local Planning Objectives	Government Objectives	Implementability Analysis	Value for Money	Overall Performance
Local Planning Objectives					
Option 1 - New Alignment	✓	✓	✓	✓	✓
Option 2 - Re-opening	✓	✓	✓	✓	✓
Option 3 - BRT	✓	✓	✓	✓	✓
Option 4 - Ferry	✓	✓	✓	✓	✓
Government Objectives					
Option 1 - New Alignment	✓	✓	✓	✓	✓
Option 2 - Re-opening	✓	✓	✓	✓	✓
Option 3 - BRT	✓	✓	✓	✓	✓
Option 4 - Ferry	✓	✓	✓	✓	✓
Implementability Analysis					
Option 1 - New Alignment	✓	✓	✓	✓	✓
Option 2 - Re-opening	✓	✓	✓	✓	✓
Option 3 - BRT	✓	✓	✓	✓	✓
Option 4 - Ferry	✓	✓	✓	✓	✓
Value for Money					
Option 1 - New Alignment	✓	✓	✓	✓	✓
Option 2 - Re-opening	✓	✓	✓	✓	✓
Option 3 - BRT	✓	✓	✓	✓	✓
Option 4 - Ferry	✓	✓	✓	✓	✓



Table 4.1: Summary of Options Omitted from Further Consideration

Option	Reason for Omission
Options 1 and 3: Rail Options - New Rail Alignments	<ul style="list-style-type: none"> • Economic disbenefits; • Difficulties with technical Implementability; and • Severe environmental impacts.
Option 4: BRT Options	<ul style="list-style-type: none"> • No freight benefits; • Significant environmental disruption; and • Disappointing economic performance.
Option 6: Hovercraft/Ferry Option	<ul style="list-style-type: none"> • Significant economic disbenefits; • Little improvement to public accessibility; and • Significant environmental disruption.

4.1.7 It should be noted that some of the options selected for further appraisal also have significant disbenefits, such as the considerable environmental disruption expected with the re-opening of the existing rail line. However, these options meet the local and Government *planning objectives* more closely and score much higher on other measures to ensure their inclusion for future consideration. Table 4.2 summarises the options that are being taken forward for further appraisal, and the reasons for doing so.

Table 4.2: Summary of Options Included for Further Consideration in STAG Part 2

Option	Reason for Inclusion
Option 2: Rail Option Re-open Existing Line	<ul style="list-style-type: none"> • Significant economic benefits including freight; • Major accessibility and connectivity benefits; and • Minimal environmental impacts.
Option 5: On Street Bus Priority	<ul style="list-style-type: none"> • Excellent economic benefits (<i>Low cost – but no freight</i>); • Good accessibility & connectivity benefits; and • Technically easy to implement.

4.1.8 It is clear from the foregoing that a number of the rail-based and bus-based options are worthy of more detailed consideration in STAG Part 2. There are inter-relationships between the rail-based and bus-based options. Nevertheless, it is also clear that the bus options do not meet all the planning objectives, so the rail options are effectively the only solution which will satisfy all the stakeholders and aims of the study.

4.1.9 However, bearing in mind that the heavy rail option could potentially take a number of years to implement, consideration could therefore be given to providing improved bus facilities in the short term while the development of the heavy rail option is underway, with a view to stimulating demand and addressing some of the objectives identified.



4.2 STAG Part 2 Options

Reference Case & “Do Minimum”

4.2.1 The base case or Reference Case against which the options need to be tested represents the current situation regarding public transport provision in the Levenmouth area, including committed and on-going improvements. These are fully detailed in Chapter 5, but the most salient are reproduced in Table 4.3 below.

Table 4.3: Summary of Parameters Included in the Reference Case

Sector	Scheme
Road	<ul style="list-style-type: none"> • M9 Spur Extension/A90 Upgrade (A8000); • Rosyth Port link road (2006); and • Second Forth Crossing – without Tolls.
Bus	<ul style="list-style-type: none"> • November/December 2003 inter-urban bus services entering Edinburgh; including accurate modelling of Ferrytoll services; • WEBS (implemented 2004); • New bus-based P&R at Ingliston, Straiton, Todhills and Hermiston (2006); and • 540 additional parking spaces at Ferrytoll (2006).
Rail	<ul style="list-style-type: none"> • Stirling-Alloa-Kincardine Rail Reopening and diversion of all coal freight from the Forth Rail Bridge (2007); • car park expansion at Dalgety Bay rail station (additional 107 spaces, to give total of 203 spaces, including 9 disabled) (2006); • car park expansion at Dunfermline railway station (additional 93 spaces to give a total of 192 spaces (including 6 disabled bays) (2006); • car park expansion at Kirkcaldy railway station (additional 395 spaces to give a total of 540 spaces (including 10 disabled bays) (2006); • car park expansion at Markinch railway station (additional 149 spaces to give a total of 177 spaces (including 9 disabled bays) (2006); • car park expansion at Rosyth railway station (additional 112 spaces to give a total of 152 spaces (including 9 disabled bays) – 2006; and • Platform-lengthening (to 6-car) on Fife Circle and Bathgate line (2006).

4.2.2 Of the successful rail and bus options to be considered for the STAG Part 2 appraisal, the set of on-street bus priority options are adopted as the Do-Minimum base case scenario. This is because this option meets the passenger local planning objectives and also scores well in terms of the TEE appraisal results, but does not meet the freight local planning objectives. Three of the bus sub-options assessed in the STAG Part 1 appraisal are included in the Do-Minimum scenario. The fourth, the circular route option (5c in the STAG1 appraisal), performed less well than the others.

4.2.3 In order to re-cap the on-street bus priority measures, the Do-Minimum scenario includes the following:

- A955 – this will involve placing bus priority measures on the A955, which include bus lanes, priority bus signalling arrangements and bus priority junctions between Leven bus station and Kirkcaldy bus station. There will also be additional halts on the A955 and the ticketing system will be integrated with the rail service ticketing system;



- A911 – this will involve placing the same bus priority measures and bus infrastructure noted above on the A911 through Milton of Balgonie as far as the rail station at Markinch/Glenrothes; and
- A915 – this will involve placing similar bus priority measures on the A915. The bus priority measures noted above would continue on the A921 for the short distance after the A915 and A955 merge close to Dysart and on as far as the bus station in Kirkcaldy.

Rail Options A and B

4.2.4 The STAG 1 appraisal had split the rail options into a number of separate sub-options. These set of options are summarised as:

- Main option to re-open the previous rail line with a station at Leven, and the following sub-options:
 - As for the main option, but with an additional station at Cameron Bridge;
 - As for the main option, but with rail freight facilities; and
 - As for the main option, but with an additional station at Cameron Bridge plus rail freight facilities.

4.2.5 After further analysis of the above options and discussions with SEStran and Fife Council, it was decided that re-opening the previous rail line with stations at Leven and Cameron Bridge and rail freight facilities is the favoured option. To avoid confusion with the results of the STAG 1 Appraisal, this option is renamed **option A**.

4.2.6 This rail option to re-commission the existing rail line has pointed to an alternative opportunity. This would establish a straightened track alignment between Thornton Junction and Windygates. This second option would permit greater speeds than would be possible in option A, from a maximum of 40mph to 60mph, which is likely to encourage greater patronage and therefore benefits. To prevent confusion, this sub-option is termed **option B**.

4.2.7 Table 4.4 summarises the re-defined options that are to be assessed for the STAG2 appraisal.

Table 4.4: Summary of STAG2 Options for Appraisal

Option	Description of Option
“Do Minimum”	As in the list of schemes in the Reference Case (see Table 4.3) plus the three on-street bus priority measures: <ul style="list-style-type: none"> • Bus priority on the A955; • Bus priority on the A915; and • Bus priority on the A911.
Option A	Re-opening of the railway line between Leven and Thornton junction, with stations at Leven and Cameron Bridge and rail freight facilities.
Option B	Re-opening of the railway line between Leven and Thornton junction, with a new straightened section between Windygates and Thornton Junction, stations at Leven and Cameron Bridge and rail freight facilities.



4.3 STAG Part 2 Scheme Descriptions

4.3.1 The schemes selected above are now described in some detail.

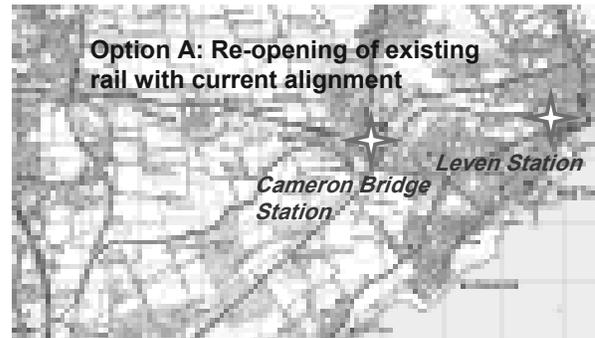
Do Minimum: On-street Bus Priority Measures

4.3.2 As well as the schemes identified in the Reference Case, bus priority measures are also added to form the Do-Minimum scenario against which options A and B are tested. This involves introducing bus priority measures such as priority lanes and signalised junctions on key points along the key routes linking Leven with the surrounding towns, via the A955, the A915 and the A911, starting at the new bus station in the centre of Leven. Although there would be no new stations in Leven and Cameron Bridge, there would be instead new halts with real-time passenger information linked to the First ScotRail rail service timetable to assist with the integration of bus and rail connections.

4.3.3 As noted in the STAG Part 1 Appraisal, while the rail option was identified as meeting both the major local *planning objectives*, the impressive TEE results of the bus priority option and the fact that it met some of the planning objectives, albeit not as well as the rail option, means that it is worthy of being considered as part of the Do-Minimum scenario.

Option A: Re-opening Existing Railway Line for Passenger and Freight Services with Stations at Leven and Cameron Bridge

4.3.4 This option (Figure, inset right) involves opening the existing rail alignment from Thornton Junction to Leven, and includes building new rail stations at Leven and Cameron Bridge.

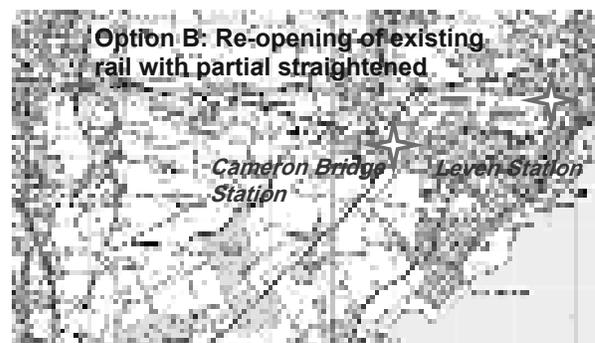


4.3.5 This current rail alignment joins the Markinch to Kirkcaldy line halfway between Markinch and Kirkcaldy, approximately 1.4km south of Coaltown of Balgonie, a suburb on the south-east corner of Glenrothes.

It is assumed that the re-opened existing railway line would have an average running speed of 40mph. The total length of this option A is in the vicinity of 8.89km.

Option B: Re-opening Existing Railway Line with partial new (straightened) alignment for Passenger and Freight Services with Stations at Leven and Cameron Bridge

4.3.6 Option B is almost the same as Option A but involves straightening out the line from Thornton Junction to Windygates (seen in the Figure, right), with the remainder of the line following the existing alignment through the built-up areas. The straightened section would permit a greater average running speed of 60mph and thus greater benefits associated with journey time savings. The total length of this option B is approximately 8.55km, only some 300 – 340 metres shorter than option A.





Extension to Existing Services

- 4.3.7 In terms of actual train services and rail operating plans, during the optioneering process it became clear that there was no need to run wholly new train services and that the objectives of the project could be met by extensions of existing services. During discussions with SEStran and Fife Council, two services were identified as being suitable without negatively impacting on the rest of the network. These were extensions to existing services from Kirkcaldy and Cowdenbeath respectively, which would provide an hourly frequency. In addition it may also be possible to extend both services and create a half-hourly frequency which would be more attractive, but naturally the operating costs will be higher (this may also require further study to confirm the operational elements).
- 4.3.8 Consequently, the modelling and economic analysis undertaken assesses the possibility of evaluating the two options as extensions to existing services from Kirkcaldy and Cowdenbeath respectively, as well as both together.

4.4 Scheme Costs

- 4.4.1 Table 4.5 shows a breakdown of capital costs in 2008 Q2 prices for both the rail options Option A and B, including contingencies, risk costs estimates and OB costs estimates. These are as follows:

Table 4.5: Summary of Capital Costs (2008 Prices)

Ref	Base Costs	Option A Amount £	Option B Amount £	Comments
1	Site clearance	£0.45m	£0.75m	
2	Earthworks	£1.03m	£1.63m	
3	Permanent way	£6.2m	£5.87m	
4	Fencing	£0.59m	£0.59m	
5	Structures	£8.34m	£8.34m	Assumes 4 structures
6	Railway junction costs	£2.22m	£2.22m	
7	Signaling, passing loop and telecom	£1.25m	£1.19m	
8	Station(s) costs	£7.15m	£7.15m	
9	Road works	£0.24m	£0.6m	
10	Land costs	£0.59m	£1.92m	Option A assumes 2 stations plus car parks of approx 0.5ha, Option B includes area of new track
	Subtotal	£28.05m	£30.26m	
12	Management, Contract & Design	£3.92m	£5.96m	
13	Possessions & Compensation	£1.40m	£1.52m	
14	Base Costs	£33.37m	£37.74m	
15	Contingencies	£5.01m	£5.66m	
16	Risk Costs Estimates	£5.16m	£5.84m	
17	OB Cost Estimates	£4.51m	£5.10m	
	Grand Total	£48.05m	£54.34m	

- 4.4.2 It should be noted that these costs have been adjusted to 2008 Q2 prices using the BCIS TPI⁸ inflator of approximately 6% per annum.
- 4.4.3 Given that the project is unlikely to be open before 2015, it is worth presenting the anticipated final outturn costs for 2016. We have estimated these outturn costs by increasing the totals shown above in Table 4.5 by the BCIS TPI inflator. This gives the following:
- Option A outturn cost (2016) = £76.6m; and
 - Option B outturn cost (2016) = £86.6m.
- 4.4.4 However, for the purposes of the economic evaluation, the current prices are used as per standard appraisal convention.

⁸ Building Cost Information Service Tender Price Index (BCIS TPI)



5 TRANSPORT MODELLING ESTIMATES

5.1 Introduction

5.1.1 This Chapter summarises the results of the transport modelling carried out to estimate patronage, revenues and area-wide benefits of the options appraised. The Chapter provides a brief overview of the transport model used for this exercise and then goes on to present the results of the forecasts by mode and for different years of the analysis.

5.1.2 For the purposes of this appraisal, the analysis has assumed the first full year of operation would be 2016 and a future design year of 2031. Estimates for intermediate years have been obtained by extrapolation of the results for 2016 and 2031. Patronage and revenue figures for future years beyond 2031 have been set at the estimates for 2031 due to the levels of uncertainties over these very long-term planning horizons and also to allow for a more robust appraisal.

5.2 Do-Minimum Scenario and Reference Case

5.2.1 STAG requires that options be appraised against a Do-Minimum Scenario of committed schemes within the study area⁹. In addition, in some circumstances it can be more appropriate to compare the proposed scheme (the Do-Something) against a “Reference Case” which encompasses not just committed schemes but also schemes that are highly likely to go-ahead and which could have a particular impact on the scheme under appraisal¹⁰. For this appraisal it was decided that the most appropriate method of appraisal was against a Do-Minimum scenario which incorporates any relevant schemes from a list of Reference Case schemes. The additional Do-Minimum schemes are described in Chapter 4.

5.2.2 The main Reference Case consists of the 2006 model networks used in the Edinburgh Airport Rail Link (EARL) study from the land-use/transport interactions (LUTI) model¹¹, updated to reflect recently-completed schemes plus schemes which are assumed to have sufficient merit and political/financial backing to be safely assumed to appear at some point in the future. These schemes were discussed and agreed with SEStran and Fife Council.

5.2.3 The following list summarises the Reference Case changes made to the base-year networks from the LUTI model and the assumed opening year (shown in brackets).

Road Schemes

- A1 Haddington-Dunbar dualling (completed 2004);
- M80 Auchenkilns Roundabout (completed 2006);
- M9 Spur Extension/A90 Upgrade (aka A8000), as per preferred option presented at the PLI (i.e. with no junction between the M9 and the B800/A8000 at Humbie) (2006);
- Rosyth Port link road (2006); and
- Second Forth Crossing – without Tolls.

⁹ STAG, section 4.3.19

¹⁰ STAG, sections 4.3.20 and 4.3.21

¹¹ For more information on the LUTI model see CEC LUTI Functional Specification Report, MVA/DSC, August 2003



Bus Schemes

- all current 'on the ground' bus priority schemes in Edinburgh, as per information provided by CEC in November 2003 - York Place/London Road/ A90/ A702 / etc (implemented 2003);
- November/December 2003 inter-urban bus services entering Edinburgh, including accurate modelling of Ferrytoll services;
- WEBS (implemented 2004);
- Straiton to Leith Quality Bus Corridor (implemented 2004);
- New bus-based P&R at Ingliston, Straiton, Todhills and Hermiston (2006);
- 540 additional parking spaces at Ferrytoll (2006); and
- Edinburgh Tram between Leith and Edinburgh Airport (via City Centre).

Rail Schemes

- Edinburgh Crossrail/ Brunstane station/Newcraighall P&R (implemented 2003);
- Edinburgh Park Station, served by all passing trains except the Edinburgh-Glasgow services (implemented 2003);
- Waverley Station Redevelopment Phase 1 (2008);
- Stirling-Alloa-Kinross Rail Reopening and diversion of all coal freight from the Forth Rail Bridge (2007);
- car park expansion at Dalgety Bay rail station (additional 107 spaces, to give total of 203 spaces, including 9 disabled) (2006);
- car park expansion at Dunfermline railway station (additional 93 spaces to give a total of 192 spaces (including 6 disabled bays) (2006);
- car park expansion at Kirkcaldy railway station (additional 395 spaces to give a total of 540 spaces (including 10 disabled bays) (2006);
- car park expansion at Markinch railway station (additional 149 spaces to give a total of 177 spaces (including 9 disabled bays) (2006);
- car park expansion at Rosyth railway station (additional 112 spaces to give a total of 152 spaces (including 9 disabled bays) – 2006;
- Platform-lengthening (to 6-car) on Fife Circle and Bathgate line (2006);
- Airdrie to Bathgate rail scheme (2012); and
- Waverley Line Re-opening (2013).

Other Schemes

- Edinburgh PT Interchange investment (Haymarket) (2011);
- Removal of Tolls on Bridges; and
- Second Kincardine Bridge.



5.3 Overview of the Transport Modelling

- 5.3.1 For passenger demand, the LUTI Model was used to predict the response of passengers to the introduction of improved surface-access public transport modes (e.g. rail service) arising from the identified options. In particular, the version of LUTI used was the same as that developed for the Edinburgh Airport Rail Link (EARL) project and features a number of enhancements including re-calibration/validation to key points in the network.
- 5.3.2 The EARL-enhanced version of LUTI was developed using locally collected survey data and calibrated to independent data, ensuring that the model reasonably reflects how passengers travel in the area and also how they react to the various elements of the journey experience (time, cost, etc). The model is based on industry-standard modelling techniques which are well-established and have been used on many similar studies for establishing the demand for new transport services.
- 5.3.3 The model uses decision-making algorithms based on sound research, and conforms to industry practice. These models were calibrated so that they reproduced observed modal shares in the base year. This gives the best starting point for forecasts. Further details of the EARL-enhanced version of LUTI are available in various reports^{12,13,14}.

New Developments

- 5.3.4 The study area includes various new the land uses that are proposed in the Local plan. This includes residential, commercial, industrial and mixed uses, areas of open space, transport provision and other uses. There are also a number of other proposed developments, including 15 hectares devoted to business development, a primary school and a doctor's surgery. STAG advises the appraisal can consider the interdependency between land use and transport proposals and assess the combined effects of land use and transport against local objectives¹⁵.
- 5.3.5 In particular, there will be considerable growth in passenger demand as a result of the significant new housing development planned in the Levenmouth area. The Levenmouth Local Plan 2004 identifies housing development areas up to 2011 comprising of approximately 2000 housing units constructed over the short term, plus another 500 or so potential units thereafter. These are summarised in the Table below:

Housing Area	House Quantity
East Neuk	500
Sea Road / Muir Edge	1000
Aberhill / Lower Leven	400
Local Plan	100
Others	500

- 5.3.6 Since the above plans are significant, they have been included in the modelling process, however to err on the side of caution and to provide a more robust economic evaluation, the other planned land-use developments have not been included.
- 5.3.7 TRICS 2008 (b) has been interrogated to obtain total people trip rates for privately owned housing. The trip rates for total people can be used with the size of developments being proposed. Furthermore, it is possible to work out the generated increase in trips by mode

¹² Development of EASAM and its Usage for EARL, Scott Wilson, September 2005

¹³ EASAM: Model Development and Calibration Report, Scott Wilson, September 2005

¹⁴ EARL Model Forecasting Report, Scott Wilson, September 2005

¹⁵ STAG, paragraph 9.3.18



produced in the Levenmouth area as a result of these new developments. The Table overleaf shows the number of trips by Car and by Public Transport for the Levenmouth Area.

	Cars		Public Transport	
	Arrive	Depart	Arrive	Depart
AM Peak	388	1,531	368	1,449
Interpeak	514	488	487	476
PM Peak	1,058	658	1,002	662

5.3.8 In terms of the distribution of trips across the region, rather than estimate an origin-destination (OD) distribution, it was considered more appropriate to survey a station on the recently opened Stirling-Alloa-Kincardine line, as this line has similar characteristics to the options proposed in this study and it is reasonably close to the study area. Hence, a recent survey was carried out at Alloa Station, which took into account different trip purposes and other travel characteristics of the users¹⁶. Further details of these surveys are outline in Section 5.5 of this Chapter.

5.3.9 The results of the surveys undertaken at Alloa station showed the proportion of trip distribution of 44% were for local trips, 43% to Edinburgh and Glasgow, and 13% were to other destinations. Consequently the modelling has applied a trip distribution of 40% local areas, 20% Edinburgh, 20% Glasgow and 20% other destinations. However, we acknowledge Alloa is reasonably equidistant to Edinburgh and Glasgow, whereas Levenmouth is more likely to have significantly more trips to Edinburgh as opposed to Glasgow. Hence, we have also carried out a sensitivity test assuming 40% of trips go to Edinburgh and 0% got to Glasgow, to gauge how this affects the economic appraisal results. The results of this sensitivity test are shown in Section 9.3 in Chapter 9.

New Train Services

5.3.10 First ScotRail issued a Tender Bulletin for the supply of new rolling stock and drivers to service providers in the public tenders notice¹⁷. The Bulletin advised bidders that First ScotRail require locomotive hauled services between Edinburgh and Fife via the Fife Circle. Each service will operate during either the morning or evening peak and service reliability is very important. The Bulletin advised suppliers will be responsible for ensuring the locomotives and vehicles are available for 5 days per week and must have adequate spare vehicle coverage to achieve this. Hence, we have assumed the new services will only operate during Monday to Friday.

5.3.11 The Bulletin advised from the December 2008 passenger change date one service will run in the evening peak and one in the morning peak, and that tenderers should assume the timetables for Train 1 and Train 2 will apply. It then went on to say that from the May 2009 passenger train date a further train will operate in the morning and evening peak times, and that tenderers should assume that the timetables for trains 3 and 4 will apply.

5.3.12 Subsequent to this Tender Bulletin, SEStran supplied draft timetable proposals which are still being worked up but are the most recent timetable information available for this study. These were coded into the LUTI model, as an approximation, to represent these timetable changes.

5.3.13 Given the proposed Levenmouth Rail Service is unlikely to be open for a number of years, we have included both new train services (i.e. Train 1 and 2 plus Train 3 and 4) in the STAG appraisal, since both sets are due to be running by the end of 2010.

¹⁶ Stirling-Alloa-Kincardine Bus-Rail Study, JMP Consultants on behalf of SEStran, 2008

¹⁷ Articles / Tenders: Transport & Related Services – Date: March 22, 2008



5.4 Results of Modelling

5.4.1 This section presents the estimates of trips to/from the Levenmouth area. Two forecast years have been modelled, namely 2016 (assumed to be the first full year of operation of new services), and 2031 (a design year of 15 years after the first full year of running). This allows for the identification of passenger growth rates by extrapolation. The results presented in this section show the estimates for both years. Two scenarios have been modelled:

- Rail Service with Stations at Leven and Cameron Bridge and 40 mph Average Running Speed (Option A); and
- Rail Service with Stations at Leven and Cameron Bridge and 60 mph Average Running Speed, applied to the section of straightened line (Option B).

5.4.2 All tests include the planned and committed transport schemes in the Reference Case Scenario and the bus priority measures in the Do-Minimum Scenario. They also include the additional passenger demands estimated from the planned new housing development described in Sections 5.3.4 to 5.3.9 above. Moreover, the benefits produced from the rail freight services have also been included, which have been derived from the information provided by Diageo based on their plans for running rail freight trains and the potential numbers of HGVs estimated to be removed from the road network.

5.4.3 In addition, as discussed in Section 4.3 (paragraph 4.3.7), there are also potential different rail operating plans which include either extending the existing Kirkcaldy or Cowdenbeath rail services (to give a one train per hour frequency), or both services, thereby giving a frequency of two trains per hour. Therefore the options A and B have been tested under all three service strategies. The results are set out below.

Summary of Results

5.4.4 Table 5.1 shows the estimated total rail passenger demand levels for the modelled years of 2016 and 2031. In order to provide a complete picture of rail movements, the Table also shows the abstraction of rail trips from other stations.

Table 5.1: Estimated Total Rail Passenger Numbers, 2016 & 2031

	2016 – Annual totals		
	Cowdenbeath Extension	Kirkcaldy Extension	Kirkcaldy plus Cowdenbeath Extension
Leven	125,613	208,851	226,025
Cameron Bridge	35,743	140,212	163,903
Markinch	-6,533	-9,169	-9,169
Thornton	-6,354	-9,169	-9,169
Kirkcaldy	-92,230	-173,974	-189,640
Net change	56,239	156,751	181,950

	2031 – Annual totals		
	Cowdenbeath Extension	Kirkcaldy Extension	Kirkcaldy plus Cowdenbeath Extension
Leven	132,697	226,033	241,333
Cameron Bridge	41,930	153,867	174,180
Markinch	-1,120	-557	-4,102
Thornton	-3,935	-7,313	-10,295
Kirkcaldy	-112,820	-208,800	-220,352
Net change	56,752	163,230	180,764



- 5.4.5 As Table 5.1 shows, there are some rail trips abstracted from other stations which is due to passengers being able to access the rail network at the new stations rather than having to travel further to connect with the rail services (i.e. they access the rail network upstream). The negative values shown above therefore represent re-assigned trips to Leven and Cameron Bridge and not an absolute loss in rail trips *per se*. In terms of the economic appraisal carried out (shown in Chapter 6), it is the increase between the new rail trips versus the re-assigned rail trips that is assessed. This is important as it prevents any potential double-counting of revenues and/or benefits in the economic evaluation.
- 5.4.6 It is also worth noting that in addition to the above net increase in rail trips, there will also be improved service frequencies at Thornton, Cardenden and Lochgelly Stations which will produce some benefits, although these have not been quantified in this study.
- 5.4.7 While there is some re-assignment of rail trips from existing stations to the new stations, there is an overall increase in rail passengers. This is partly due to a modal shift from car to rail and also from bus to rail, although the latter is largely due to extra public transport trips generated by the new land-use developments which would not be the case if the various bus priority measures were not included in the Do-Minimum scenario. In summary, the estimated modal shift from cars and bus to rail is shown in Table 5.2.

Table 5.2: Estimated Modal Shift to Rail

	Cowdenbeath Extension	Kirkcaldy Extension	Both
Modal shift from bus to rail	40%	51%	49%
Modal shift from car to rail	11%	14%	18%

Potential Rail Freight Demand

- 5.4.8 In addition to rail passengers, there are also plans for transporting freight movements along the new rail line. Diageo has aspirations to transfer significant volumes of materials using rail freight services. The origins and destinations of these materials extend as far as Manchester, suggesting there could be significant national benefits from removing HGVs off the road network.
- 5.4.9 This rail freight would bring in additional benefits in terms of Sensitive Lorry Mile (SLM) savings – monetised environmental benefits that result from the removal of significant volumes of HGV freight traffic from the national, regional and local road networks. We have obtained information from Diageo on their projected cargoes to/from their site in the area. This includes the origins/destinations of various movements and the road length savings, as shown in Table 5.3.

Table 5.3: Lorry Miles Data

Origin/Destination	Cargo	Annual Loads	Rd kms	Total Rd kms (per annum)
Leven – Grangemouth	RTD cased goods	5,000	126	627,510
Leven – Grangemouth	Other cased goods	7,000	126	878,514
Cameron Bridge – Cambus	Whisky	2,500	58	144,810
Elgin – Cameron Bridge	Malt	1,000	253	252,613
Grangemouth – Cameron Bridge	GNS	1,300	63	81,576
Manchester – Cameron Bridge	GNS	300	422	126,467
Leven – Cambus	Empty casks	900	116	104,263
Totals		18,000	1,162	2,215,754



5.4.10 As can be seen, there is potentially a saving of over 2.2 million HGV-kms per annum. This does not allow for annual increases in volumes. We have therefore included these plans in the transport modelling of the area-wide benefits of the rail options. The SLM benefits were derived using Department for Transport (DfT) guidance¹⁸ and estimated by applying a weighted SLM value of £0.58 per kilometre. The weighting was estimated on the proportion of the regional network represented by the road category *Principal and Rural Trunk road* with a value of £1.38 per kilometre, and the proportion of network represented by the road category *Rural and Urban Trunk road* value of £0.53 per kilometre. This weighted value was applied to the above lorry road-kms saved per annum.

5.5 Commentary from Other Schemes

5.5.1 A number of recent surveys were carried out over five days during August 2008 on the Stirling-Alloa-Kincardine Rail extension line¹⁹. This extension to the rail network shares characteristics with the rail investment proposed for Levenmouth including the intention to have both passenger and freight services. The sample size relating to these surveys were statistically significant but varied depending on the day and time of day the surveys were undertaken, with response rates of up to 72%.

5.5.2 The surveys indicated that observed passenger flows were higher than modelled passenger flows by a factor of circa 2:1. The surveys also showed that 70% of rail passengers had made the same journey with the same origin and destinations as before the rail line was re-opened, and demonstrated that there was a 35% modal shift from car trips to rail and a 40% modal shift from bus trips to rail, suggesting that the provision of the rail link has improved accessibility.

5.5.3 Our estimates of modal shift from cars range from 11% to 18% depending on the frequency of service used, and by these observed survey results can be considered conservative.

5.5.4 The survey results indicated that, as shown in the Chart (inset right), in terms of trip length and destination, 44% of trips were local in nature but a further 43% were either to Edinburgh or Glasgow, suggesting that there is a good mix of local and medium distance commuting journeys. A significant proportion of trips were for commuting and business purposes, about 20%, a little over and a little under a third of trips were for shopping and social and leisure reasons respectively, and 15% for visits to health or education facilities.



5.5.5 The results of these surveys also showed that 42% of passengers were newly generated trips, in effect releasing previously suppressed demand for a new rail link and new services. Our model, being a fixed-trip matrix model, does not allow for the generation of new trips resulting from the re-opening of the Levenmouth rail link, and thus only permits a conservative estimate of new passenger demand for rail services to and from Leven and Cameron Bridge.

¹⁸ Guidance on Freight Facilities Grants (FFG), DfT, 2007

¹⁹ Stirling – Alloa – Kincardine Rail Extension Surveys, JMP Consultants on behalf of SEStran, August 2008



6 STAG PART 2 APPRAISAL

6.1 Introduction

6.1.1 A number of alternative transport options were initially identified and evaluated to establish a shortlist of preferred options for developing public transport in the Levenmouth area. Two recap, the two shortlisted options are:

- Option A: Re-opening the Existing Railway Line with (new) Stations at Leven and at Cameron Bridge and additional freight facilities; and
- Option B: Re-commissioning the Existing Railway (straightened re-alignment) Line, with (new) Stations at Leven and at Cameron Bridge and additional freight facilities.

6.1.2 The shortlisted options are shown in the Figure, right.

6.1.3 Each of these shortlisted options was tested against a Do-Minimum scenario, that is, they also incorporate the improvements to the bus infrastructure consistent with introducing bus priority measures.

6.1.4 The purpose of this Chapter is to document the outcome of the detailed STAG Part 2 Appraisal in terms of the performance of these two options against the



Government's five objectives for transport, shown in Table 2.1, and which are:

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

6.1.5 It is unlikely that the rail component of the options would be implemented before 2015. However, bus improvements component could be implemented by 2010 if the works on this element of the investment begins in 2009.



6.2 Appraisal of Impacts

6.2.1 As with the STAG Part 1 process, the appraisal of impacts, is based on a standard seven-point scale as outlined below:

✓✓✓	major beneficial impact	XXX	major adverse impact
✓✓	moderate beneficial impact	XX	moderate adverse impact
✓	minor beneficial impact	X	minor adverse impact
	○		neutral impact

6.2.2 Each score is assigned to each STAG sub-criterion to indicate the likely impact.

6.3 The Environmental Appraisal

6.3.1 A full Environmental Appraisal has been carried out in accordance with STAG guidance. It is important to note that the environmental evaluation considers the likely impacts that will occur during the construction and operation of the proposed transport options. Accordingly, this section of appraisal focuses initially on the guidance provided for environmental appraisal in STAG Part 2, before concluding with a summary of the anticipated impacts. This section is a summary of the full environmental appraisal presented in Appendix A.

Planning Objectives

6.3.2 The following Planning Objectives have been identified as nesting within the overall environmental heading.

*Government Objective*²⁰:

To protect our environment and improve health by building and investing in public transport and other types of efficient and sustainable transport which minimises emissions and consumption of resources and energy.

Planning Objective:

To encourage more sustainable travel for new and existing development.

6.3.3 The study is based on a desktop review of technical reports, consultation responses and initial site survey information. The proposed rail components of the options considered by this report are primarily located within a triangular area between Windygates, Markinch and Waulkmill.

Appraisal Methodology

6.3.4 Each sub-objective section follows the same format and assessment hierarchy in accordance with the STAG guidance, which consists of four stages as follows:

- Scoping – defining potential impacts and assessment methods. Within each sub-objective this includes specific methodologies and a definition of the study area;
- Baseline – information about the environment in the year of project commencement and foreseeable developments;
- Assessment – identifying the likely environmental impacts and magnitude of these impacts. All types of impacts are assessed which may be positive or negative, permanent

²⁰ Government Objectives are quoted from Scotland's Transport Future, White Paper, 2004



or temporary, direct, indirect, short, medium or long term, secondary, cumulative and synergistic. For the purpose of this study the assessment has considered the effects of construction, as well as future operations, unless other timescales are used for specific sub-objectives; and

- Appraisal – determining the significance of the impacts.

Consultation

6.3.5 The statutory consultees recommended by the STAG guidelines were consulted. In addition a number of non-statutory bodies were also consulted. A summary of the responses is given in the full environmental appraisal presented in Appendix A.

Noise and Vibration

6.3.6 Assessments of the likely noise and vibration impacts for both option A and option B were carried out based on an understanding of the traffic flow changes brought about by investment in re-opening the rail link to Leven. The following section summarises the results of the assessment.

6.3.7 For the construction impacts, as a detailed design is not available and therefore the operations, plant etc. likely to be used cannot definitely be stated at this time, a generic assessment was carried out. Some re-furbishment of the line and associated works will take place in or close to residential areas, especially in the neighbourhood of Cameron Bridge. The appraisal suggests that given the likely nature of the operations and the statutory and contractual controls which will require to be met then the impacts on adjacent areas will be kept to the absolute minimum that is reasonably practicable, whilst allowing the works to proceed.

6.3.8 The assessment of noise impacts is estimated based on a proxy of the forecast changes in vehicle kilometres on the network. This is balanced against the anticipated increase in rail services, likely to affect the properties in the vicinity of the railway line.

6.3.9 The assessment of the effect of the use of the rail services on the local area showed properties fronting on or in close proximity to the re-commissioned rail link, particularly in the vicinity of Cameron Bridge, will experience some minor adverse impacts. However this is shown to be balanced by corresponding moderate beneficial impacts across the existing road network including the A911, the A915 and the A955.

6.3.10 In overall terms the assessments indicate a net benefit when the increases in noise are compared with the potential decrease.

Appraisal of Options

6.3.11 The potential impacts of both options have been derived based on an understanding of the traffic flows produced / amended by the respective options. These have been presented using the STAG scoring convention and are summarised in Table 6.1 overleaf.



Table 6.1: Summary of Noise Assessment Results

Option	Option A: Re-commissioning the Existing Railway Line	Option B: Re-commissioning the Existing Railway Line – straightened alignment
Local Noise Assessment	✓	✓
Wider Area Noise Assessment	✓	✓
Overall Noise Assessment	✓	✓

6.3.12 The resultant assessment of the impacts of the two options area as follows:

- *Option A: assessment is minor beneficial impact; and*
- *Option B: assessment is minor beneficial impact.*

Air Quality

6.3.13 As with the noise and vibration assessments, the likely air quality effects for the two options were carried out based on an understanding of the traffic flow changes brought about by these options.

6.3.14 The following section summarises the results of the assessment. For the construction impacts, as a detailed design is not available and therefore the operations, plant etc. likely to be used cannot definitely be stated at this time, a generic assessment was carried out. Some re-furbishment of the line and associated works will take place in or close to residential areas, especially in the neighbourhood of Cameron Bridge. The appraisal suggests that in these areas, although exhaust emissions from vehicles and plant on and accessing the site were expected to have no significant effect on local air quality, dust generation could have a significant impact on adjacent property. However statutory and contractual controls, which will be required to be met, will ensure dust impacts are kept to the absolute minimum that is reasonably practicable, whilst allowing the works to proceed.

6.3.15 Given the expected frequency of the services are one to two trains per hour, it is reasonable to assume that this is unlikely to contravene the AQS health based objectives with the rail line constructed. In addition, it is also reasonable to assume that given the predicted decreases in vehicle kilometres on the road network, there is likely to be moderate beneficial impacts on properties fronting and in close proximity to the existing road network, including the A911, the A915 and the A955.

6.3.16 The assessment is also likely to be the same for exposure to PM₁₀ and NO₂ across the road network.



Appraisal of Options

6.3.17 The potential impacts for both options are summarised in Table 6.2.

Table 6.2: Summary of Air Quality Assessment Results

Option	Option A: Re-commissioning the Existing Railway Line	Option B: Re-commissioning the Existing Railway Line – straightened alignment
Local AQ Assessment	✓	✓
Wider Area AQ Assessment	✓	✓
Overall AQ Assessment	✓	✓

6.3.18 The resultant assessments of the impacts of the two options area as follows:

- *Option A: assessment is minor beneficial impact; and*
- *Option B: assessment is minor beneficial impact.*

Water Quality, Drainage and Flood Defence

6.3.19 The hydraulic capacity of the River Leven and River Ore must be maintained to minimise any impacts on upstream flooding. In particular, the design of any additional infrastructure required for the preferred option must preserve the hydraulic capacity of the River Leven, River Ore and the surrounding floodplains. The impacts of construction and operation on the hydrological resource are likely to be low providing that the necessary mitigation measures are put in place to avoid pollution of watercourses.

6.3.20 The River Leven and the River Ore are in close proximity to the route options A and B. And, for these options, any impacts occurring during the construction phase of the options are likely to be confined to these river systems. However, these impacts are likely to be short term, fairly localised and temporary in nature as they are associated with the duration of construction. Thus for options A and B, the impacts have been assessed as being of small minor negative impact. However the impact significance would increase to moderate / major negative impact in the unlikely event that the hydraulic capacity of the river is reduced during the construction works. The impacts over the operational phase of these options are assessed as being of small minor negative significance.

Geology, Agriculture and Soils

6.3.21 Option A would have a neutral impact on the Geology, Agriculture and Soils as the infrastructure for the options is currently intact. Option B would require the construction of a new rail line which could lead to minor adverse impacts.

6.3.22 No designated sites have been identified at this stage. The predicted effects are likely to be *neutral impacts* or *negative minor impacts* which will be local in nature, but further investigation will be required at the detailed design stage.



Biodiversity

- 6.3.23 The impacts of option A on biodiversity are likely to be minimal due to the majority of the infrastructure required by this scheme being already in place. There is nevertheless potential for impacts on the Firth of Forth, River Leven, River Ore and the Back Burn during both construction and operation stages due to the proximity of the rail line to the Firth of Forth and the River Ore (circa 10 metres at some points). Pollution incidents during construction and operation could have implications for the Firth, the river tributaries and their habitats.
- 6.3.24 Option B (which involves straightening out the rail line) will see significantly more land-take of currently undeveloped land, direct habitat loss and habitat fragmentation associated with the construction of a new rail line. Full ecological survey of the corridor ear-marked for construction of a new rail-line would have to be conducted before potential impacts upon biodiversity receptors can be reliably quantified.
- 6.3.25 It is worth noting that the provision of extended bus lanes and bus lay-bys will have potential impacts on the River Leven and the Back Burn during both construction and operation stages. This is due to the relative proximity of the A911 to the river and burn at some points. Pollution incidents during construction/operation could have implications for the rivers and their habitats. However, owing to the A911 bisecting the Kennoway-Windygates Wildlife Site and the proximity of the route to other nature reserves, due consideration should be made during design and construction stages to ensure the nature conservation value of these areas is not threatened. Neither the A915 nor the A955 run close to a major watercourse, and therefore developments on these routes would be expected to have minimal impact on the surrounding river-dependent habitats.
- 6.3.26 In summary, the most likely impacts of the two route proposals are on the loss of areas of scrub and grassland habitat, loss of bat roosts within trees and structures to be demolished and the potential for pollutants entering sensitive and protected watercourses during both construction and operation stages; and the potential spread of invasive plant species. Each route option has impacts of varying significance, with options A having a *minor negative impact* and option B a *moderate negative impact*.

Visual Amenity

- 6.3.27 For all options the most sensitive receptors are those adjacent to the proposed works which will directly overlook the scheme from close range.
- 6.3.28 The visual impacts of option A will be very slight. The impacts will largely involve the removal of some vegetation beside the line and the laying of new tracks. There are relatively few receptors close to the line because much of it runs through a rural area. The largest numbers of receptors are at Cameron Bridge and between Methil and Leven, but a significant proportion of these will be screened by vegetation associated with the river. The most noticeable changes will be the cut back of vegetation and greater rail activity on the line. For this option, construction will involve a *moderate to major negative impact*, and operation a *moderate negative impact*.
- 6.3.29 The realignment of the railway line will result in major landscape changes but there are very few receptors. The extent to which the changes will affect the receptors will depend on the proximity of the receptors to the works and the degree to which there is screening. Thus option B will be the most disruptive option because it will introduce a new length of railway line into a previously undeveloped countryside area. There is not much opportunity to reduce the effects significantly by mitigation. Therefore, in terms of visual amenity, both construction and operation will involve a *major negative impact*.



Cultural Heritage

- 6.3.30 The cultural heritage assessment identified those cultural and archaeological resources within a 200m corridor along the route of the three proposed options. There are a number of listed buildings present within the 200m study corridor, but only one Scheduled Ancient Monuments (SAM, Balgonie Castle) is located within the corridor.
- 6.3.31 Although there are a number of listed buildings adjacent to the major road corridors, the construction and operation of bus services with priority measures, are unlikely to impact on these, nor on any Scheduled Ancient Monuments (SAMs) in the area. In fact, the SAMs are unlikely to be seriously affected by either of the two options, although the rail element of option A could have a *moderate negative impact* on the Bridge of Ore SAM.
- 6.3.32 Non-statutory designations comprise National Monument Record of Scotland sites. It is unlikely that any of the NMRS will experience direct short-term negative impacts as a result of any construction works associated with the A and B options. Therefore, the construction and operational impacts on non-statutory sites and uncharted archaeological remains will be *neutral or negative minor*, as there may be changes to the receptors settings, while the significance of the impacts are judged to be minor negative. However, owing to the ground preparation works, those associated with option B, signifying a new rail alignment, may be *negative moderate to negative major*, depending on the exact alignment selected.
- 6.3.33 In terms of statutory designations, there are unlikely to be any significant impacts due to the fact that the vast majority of the required infrastructure for the options is already in place.

Landscape

- 6.3.34 The construction effects associated with the two options are temporary, with the exception of the removal of mature vegetation from the site.
- 6.3.35 For option A, the cutting back of vegetation and the laying of new track will cause temporary changes to, but will not significantly affect, the character of the landscape, so the impact is regarded as *minor negative*. However for the introduction of a new railway line into the open countryside, as will be the case for option B, there will be significant landscape changes which will only moderately affect the landscape character, so this option will have a *moderate negative impact*. The bus components of each of the options will result in small changes to the landscape but this will not affect the landscape character of the area.
- 6.3.36 Hence in summary, the option that will have the largest effect on the landscape is option B because it will introduce a new length of railway line into a previously undeveloped countryside area. Option A will have only relatively minor landscape effects.

Summary of Environmental Appraisal Results

- 6.3.37 Table 6.3 summarises the results of the environmental appraisal for each of the options. In conclusion, by removing some of the vehicle traffic, and in particular some of the HGV traffic, there are modest accidents benefits from the two public transport options, and the re-commissioned rail line options also perform well in terms of security.

Table 6.3: Summary of Environmental Appraisal Results

Option	Noise & Vibration	Air Quality	Water Quality, Drainage & Flood Defence	Geology, Agriculture & Soils	Bio-diversity	Visual Amenity	Cultural Heritage	Landscape
Option A	✓	✓	X	O	X	XX	X	X
Option B	✓	✓	X	X	XX	XXX	XXX	XX



6.4 The Safety Appraisal

Planning Objectives

6.4.1 The following local planning objectives have been identified as nesting within the overall safety heading.

*Government Objective*²¹: To improve safety of journeys by reducing accidents and enhancing the personal safety of pedestrians, drivers, passengers and staff.

Planning Objective: No specific Planning Objective identified – appraisal will be against Government Objective

6.4.2 The Safety objective identified within STAG is concerned with reducing the loss of life, injuries and loss or damage to property resulting from transport accidents and crime. Two sub-objectives are considered, namely accidents and security. These are described below.

Accidents

6.4.3 STAG emphasises the need to “consider the impact of the proposal under consideration on accidents”²². For proposals which change road traffic accident numbers, or their severity, standard methodologies exist for calculating the projected number of accidents, the types of accidents and associated casualties in the before and after scenarios. The methods relate the traffic on a road (measured by vehicle-kilometres) to the number of accidents via the application of an accident rate. Accident rates and costs for different road types are set out in Government appraisal guidance²³ and which STAG suggests “these should be adopted”.

6.4.4 The two options under consideration will remove traffic from the main trunk routes leading into and out of Levenmouth and will undoubtedly have an impact on both the number and severity of accidents on these roads. And, as we have seen in the STAG Part 1 appraisal, safety was raised as an issue by stakeholders.

6.4.5 Given the transport modelling has suggested that there will be modal shift from cars to rail, the options will change road traffic accident numbers and/or their severity, and to estimate the potential impacts we have used the following method:

- In carrying out the accident data analysis, accident casualty rates were used, as described in Table 6/5/2 of the NESA Manual;
- Personal injury accident (PIA) rates have been obtained directly from Table 6/5/2 of the NESA Manual;
- It was assumed that the appropriate NESA Road Category to derive appropriate PIA and casualty rates to use would be NESA Road Category 27 (Rural Single Good 2 lanes); and
- Accident rates and costs were re-based and factored as per the NESA manual rates, to allow for a drop in the PIA rate as future road safety measures take effect.

6.4.6 The results of the appraisal are shown in Table 6.4 at the end of this section with the results of the security appraisal (this is described in the following section) also included.

²¹ Government Objectives are quoted from Scotland’s Transport Future, White Paper, 2004

²² Section 7.2 in Chapter 7 of STAG

²³ NESA Manual, DMRB (Volume 15), April 2002



Security

6.4.7 STAG Section 7.3 states that “when undertaking a Part 1 appraisal [for Security], planners should consider whether the proposal under consideration has any material impact on security for the users”²⁴. Detailed assessment, for example using GOMMMS²⁵, is required at the STAG Part 2 appraisal, and the GOMMMS security indicators provide a useful checklist for this, namely:

- Site perimeters, entrances and exits;
- Formal and informal surveillance;
- Landscaping;
- Lighting and visibility; and
- Emergency call facilities.

6.4.8 Reference to the security indicators set out above show that the emphasis is on physical infrastructure and its impact on security. The essence of the assessment could be paraphrased:

“Will travellers be (or feel) any safer as a result of the measure proposed?”

6.4.9 Options A and B will involve substantial amounts of construction, including replacement rail tracks, new rail alignments, and the construction of new rail stations and termini. In terms of these new facilities, it is expected that minimum safety requirements would be met with regard to personal security concerning their design and construction with respect to site perimeters, site surveillance, both formal and informal, lighting, visibility and emergency call facilities. Therefore in terms of personal security, it is reasonable to assume that for both option A and option B, there will be a *minor to moderate beneficial impact*.

Summary of Safety Appraisal Results

6.4.10 Table 6.4 summarises the results of the safety appraisals for the two options. In conclusion, by removing some of the vehicle traffic, and in particular some of the HGV traffic, there are modest accidents benefits from the rail elements of each option, and both options also perform well in terms of security.

Table 6.4: Summary of Safety Appraisal Results

Option		Accidents	Security	Overall Average Appraisal for Safety
Option A	Re-opening of railway – current alignment-	✓	✓✓	✓✓
Option B	Re-opening of railway – straightened alignment-	✓	✓✓	✓✓

6.5 Economy

Planning Objectives

6.5.1 The following local planning objectives have been identified as nesting within the overall economy heading.

²⁴ STAG, September 2003, section 7.3.1

²⁵ Guidance on the Methodology for Multi-Modal Studies, DETR, March 2000



*Government Objective*²⁶: Promote economic growth by building, enhancing managing and maintaining transport services, infrastructure and networks to maximise their efficiency

Planning Objective: Promote the efficient movement of freight to and from Levenmouth, and encourage the transfer of movement of goods, produce and materials from road to more sustainable distribution

6.5.2 The Economy objective identified within STAG is concerned with improving the economic efficiency of transport and the efficiency of economic activities, with the key aim of supporting sustainable economic activity and returning good value for money. Two sub-objectives are considered, namely:

- Transport Economic Efficiency (TEE); and
- Economic Activity and Location Impact (EALI).

Transport Economic Efficiency

6.5.3 The central principle of the TEE analysis is to estimate the welfare gain from the transport investment, as measured by the “willingness to pay” for these improvements and the financial impact on the private sector transport operators. The TEE does not include financial costs and benefits to the Government as these are quantified separately.

Development of TEE Appraisal Model

6.5.4 In order to appraise the benefits and costs of the different options, the Railway Economic Appraisal Model (REAM) was used. This is a detailed TEE Model developed specifically for the appraisal of railway projects in the UK since it takes into account some of the specific characteristics of heavy rail schemes. It has been applied widely in other projects including the Edinburgh Airport Rail Link (EARL) and the Waverley Station Redevelopment project^{27,28,29}. The model contains the following features:

- The model is based on the requirements of DfT’s web-based Transport Appraisal Guidance (webTAG³⁰) and STAG. It has a long track-record in appraising other projects;
- The model has been developed over a number of years and is constantly being updated to reflect recent project appraisal experiences, feedback from Government agencies and appraisal guidance; and
- Its analysis is transparent to users thereby helping to avoid potential ‘black box’ calculations.

Application of TEE Appraisal Model

6.5.5 Specific economic assumptions and cost adjustments are consistent with the Scottish Government’s STAG appraisal methodology. All monetary values are in 2002 market prices, unless explicitly stated otherwise, and values are discounted to the base year 2002, as adopted in webTAG convention.

²⁶ Government Objectives are quoted from Scotland’s Transport Future, White Paper, 2004

²⁷ Edinburgh Airport Rail Link (Design Development Appraisal), Scottish Executive, May 2007

²⁸ Waverley Station Redevelopment: Final STAG Report, Scottish Executive, July 2004

²⁹ Phase 1 of Waverley Station Redevelopment: Passenger Escalators Analysis, Transport Scotland, July 2008

³⁰ webTAG: web-based Transport Analysis Guidance, Department for Transport 2004



- 6.5.6 The appraisal discount rate is 3.5% for appraisal years 1 to 30, and 3% thereafter. An appraisal period of 60 years has been adopted for options A and B, as per STAG procedures, with an assumed first full year of appraisal of 2016 and with a final horizon year of 2075. The capital expenditure profiles for the two options are assumed to be over two years, with a 40%:60% split.
- 6.5.7 The undiscounted costs for the two scenarios to be considered are shown in Table 6.5a in 2008 prices. These costs include allowances for risk and uncertainty and Optimism Bias as estimated in Chapter 7.

Table 6.5a: Costs Including Risk & Uncertainty and Optimism Bias

Costs	Option A: Re-opening existing rail alignment – two stations plus freight facilities	Option B: Re-opening existing rail alignment with straightened section plus – two stations plus freight facilities
Capital costs	£48.1m	£54.3m
Of which the following make up Optimism Bias	£4.5m	£5.1m
Operating, Maintenance and Renewals (OMR) Costs (per annum)	£2.4m	£2.7m

Note: all costs are in 2008 prices

- 6.5.8 With respect to the Optimism Bias calculations, the process used followed that applied in the EARL project and Waverley Station Redevelopment appraisal, details of which are covered in Chapter 7. OMR costs are based on an assumed rate of 5% of the capital costs. However, for service scenarios which involve two trains an hour the operating costs are double that applied to the scenario involving one train per hour frequency.

Summary of TEE Appraisal Results

- 6.5.9 The results of the TEE appraisal on monetised benefits and costs are shown in the STAG Part 2 AST's and summarised in Table 6.5b below. This includes the tests of each option under the three different service operating plan and frequency scenarios. From these, it will be possible to gain an insight into the relative economic efficiency of the options. Appendix B contains TEE model output tables showing the various benefits and cost streams.

Table 6.5b: Summary of TEE Appraisal

Option	NPV	BCR
Option A: Rail Re-opening (Extension of Kirkcaldy Service)	£20.93m	1.50
Option A: Rail Re-opening (Extension of Cowdenbeath Service)	-£0.82m	0.98
Option A: Rail Re-opening (Both Kirkcaldy & Cowdenbeath Services)	£8.35m	1.15
Option B: Rail Re-opening (Extension of Kirkcaldy Service)	£16.65m	1.35
Option B: Rail Re-opening (Extension of Cowdenbeath Service)	-£7.00m	0.84
Option B: Rail Re-opening (Both Kirkcaldy & Cowdenbeath Services)	£11.10	1.18

Note: all values are re-based and discounted to 2002 prices



6.5.10 The TEE Appraisal results show the relative performance of the two options in terms of the Benefit-to-Cost Ratio (BCR) and Net Present Value (NPV). As can be seen in the Table, both options using services that operate the Kirkcaldy Extension return the best results, with BCRs of 1.50 and 1.35 for options A and B respectively.

6.5.11 However when comparing services between the two options, option A performs better, and the best overall option is option A using the Kirkcaldy Extension service.

Economic Activity & Locational Impacts

6.5.12 The EALI analysis is intended to identify how and under what circumstances the options analysed above impacts on the economic performance of the Levenmouth area in different sectors, and to capture those economic impacts that Transport Economic Efficiency (TEE) appraisals do not capture.

6.5.13 EALIs are particularly important in this case as the transport investment is targeting employment opportunities, market accessibility and supply chains by re-introducing rail freight accessibility, re-connecting rail passenger services and generally improving accessibility and connectivity to the area.

6.5.14 In the Levenmouth area, some of the stakeholders that are likely to directly benefit from investment in new transport infrastructure are, in the short term, the builders, materials suppliers and engineering firms contracted to construct or re-habilitate the infrastructure requirements of each of the options. In the longer term, however, they include:

- Local businesses that depend on freight movements such as Diageo and Donaldsons Timber merchants;
- The construction industry dependent on freight services to import high volume low value supplies such as aggregates and cement for new construction in the area;
- Local businesses that depend on customers or employees for access from outside the area;
- Transport operators that would use or operate the new transport services;
- Local commuters and regional commuters; and
- Business based outside to region and who invest in the Levenmouth area.

6.5.15 There may be some displacement activity at the local level but this is unlikely to make a large impact on local business. Most of the displacement activity would be expected to occur on commuting patterns, and in the case of the rail options, the losers are likely to be bus companies losing customers to the new rail services on the longer routes. Values from the TEE appraisal suggest that nearly 108,000 trips will be abstracted from bus and coach services in 2016, with this figure rising to almost 119,000 trips by 2031. However, recent experience from the introduction of the Stirling-Alloa-Kincardine service suggest there may be some positive effects³¹.

6.5.16 Some local transport hauliers under contract to, say, Diageo at Cameron Bridge, may also disbenefit with the rail options if they start to lose contracts as a result of greater quantities of freight switching to rail. However, this impact is anticipated to be small, as it is understood at this point of time that these companies move the vast majority of materiel, both supplies and finished products, under 'own account' arrangements (in-house transport fleet).

³¹ SEStran have advised that their discussions with Clackmannanshire Council suggest that the impacts of the Stirling-Alloa-Kincardine service would appear to have had a positive impact on bus services, in that there has been no reduction in bus services between Stirling and Alloa and operators are now also extending more of the bus network beyond Alloa to feed passengers into the railway and to explore new markets in general.



6.5.17 Table 6.6 summarises the EALI issues arising from re-commissioning the railway line to the Levenmouth area. In EALI terms, these issues remain identical between Option A and Option B, so no particular distinction between the two is made in the Table.

Table 6.6: Summary of EALI Issues Resulting from Railway Re-commissioning (Both Alignments)

Factor	Issue
Perceptions, confidence and profile	An increase in profile of local companies with improved access with new rail links
	Improvements in access would increase confidence of the area's potential in meeting the local needs and aspirations in bringing health, education and other services and facilities within reach
	Accessibility improvements would assist unemployed and underemployed local people in the Levenmouth area to reach jobs elsewhere
	Perceptions of improved rail accessibility raises profile of investment opportunities in Levenmouth
	Shorter road journey times within and to and from Leven will precipitate greater intra- and inter-business interaction between Levenmouth and other areas
Retail and service sectors	Opportunities for spreading supply risks across more than one mode and broadening competitive retail supply chains
	Opportunities for engaging a wider workforce catchment area, with improved access to people, skills and training
	New rail services and quicker road access means enhanced commercial opportunities for expediting the marketing of goods, produce and services, and tapping into an extended marketing environment
	Improvements to local public transport and quicker road access to the Levenmouth area encourages larger numbers of retail customers based elsewhere to shop in Leven
Land and Property	Perceptions of Levenmouth's relative inaccessibility depress land and property prices
	Improved transport infrastructure relieves accessibility constraints which by increasing property and land prices encourages greater level of economic activity backed by these rising local asset prices
	Growth in companies like Diageo, Donaldsons at Cameron Bridge may offer potential for clusters of other related businesses, subject to land availability
	Increased transport accessibility important for kick-starting development in the Muiredge Development site and the new energy park close to the Methyl Dockyard area
Labour and employment	Improved accessibility to and from the Levenmouth area means increased employment potential, both for local employment and for the employment of locals further afield
	Local businesses no longer as confined to or dependent on the local population for employment or skills
	Would also help to integrate the Levenmouth area with other adjacent settlements ensuring greater potential for integration in education, training and broader employment policies



- 6.5.18 It is probably worth stressing the impact that transportation investment may have on property and land prices and the knock-on effects that these prices engender. Rising property prices represent increasing local asset wealth which can be and is used to borrow against for business investment. This in turn means greater local business competitiveness, and confidence and growth, including increasing local employment opportunities.
- 6.5.19 However, there will be gainers and losers from improvements to the local transport network. It is key to identify whom these likely gainers and losers might be and specify where they are based and what their likely response would be in terms of economic behaviour.
- 6.5.20 Table 6.7 summarises the likely gainers and losers by sector, identifying them as to whether they are local or national.

Table 6.7: EALI Summary of Impacts

Sector	Summary of Impacts			
	Local		National	
	Gainers	Losers	Gainers	Losers
Manufacturing and Processing	The large indigenous drinks & other businesses, primarily Diageo and Donaldsons	No significant effects	Consumers if the gains are passed on in lower product prices	Competitors for the same reason
Local Trade	Local businesses able to respond to greater market opportunities and competitive environment	Those businesses unable to respond to increased competition	No significant effects	No significant effects
External Trade	Most external trade is associated with the large established businesses noted above who will benefit from reduced transportation costs and facilitated access for supplies and to markets	No significant effects	Retailers and ultimately consumers with cheaper products and more reliable supplies	No significant effects
Inward Investment	Improved transportation enabling the established successful companies to reduce costs and facilitate access to markets and skilled employment will attract interest in investment on a national and international scale. Furthermore smaller	No significant effects	In the long term retailers, consumers and potential investors in the companies concerned	The opportunities presented by improved transport arrangements should enable local companies to challenge more effectively nationally against companies based elsewhere in when competing in the same markets



Summary of Impacts				
	or new companies should be able to attract wider external sources of capital funding for the same reasons			
Tourism	Increased accessibility to the local scenic areas	No significant effects	No significant effects	No significant effects
Shoppers	New opportunities may result from some local retail expansion	Some loss of local shopping opportunities if shops reliant on passing trade close	No significant effects	No significant effects
Residents	Employment during construction could assist the unemployed to get back to work	No significant effects	Employment during construction could assist the unemployed to get back to work	No significant effects
Transport	Train Operating Companies (TOCs) will gain passengers & therefore revenue	Potential to impact on local bus passenger numbers and ultimately the viability of bus services	No significant effects	No significant effects
Agglomeration effects	No significant effects	No significant effects	No significant effects	No significant effects

6.5.21 There should be no differences in terms of impact occurring across the two options. It is therefore concluded that an overall appraisal of *minor-to-moderate beneficial for each option* most reasonably reflects the EALI issues identified.

6.6 Integration Appraisal

Planning Objectives

6.6.1 The following local *Planning Objectives* have been identified as nesting within the overall integration heading.

Government Objective:

To improve integration by making journey planning and ticketing easier and working to ensure smooth connection between different forms of transport.

Planning Objectives:

No specific Planning Objective identified – appraisal will be against Government Objective

Overview of the Integration Appraisal

6.6.2 In appraising the Government Objective STAG requires the consideration of:

- Transport integration;
- Transport land-use integration; and
- Policy integration.



Transport Integration

6.6.3 STAG makes clear that the TEE will capture most assessment of this sub-objective. Transport Integration needs only to be appraised if both of the following justifications apply:

- There is an identifiable impact on transport interchange; and
- Aspects of this impact are not captured elsewhere in the appraisal (e.g. TEE)³².

6.6.4 Transport Interchange as it affects people is subdivided by STAG into:

- Services and ticketing; and
- Infrastructure and information.

Services and ticketing

6.6.5 STAG recognises the role played by services and ticketing to the potential “seamlessness” of movement between trips and between transport modes. This must confer benefits additional to those of savings of time or money, such as greater convenience. STAG emphasises that the extent of this integration must be substantial and supported by shared-branding and whole-journey information.

6.6.6 Both options A and B will have an impact in terms of integration of services with the existing bus service network. Opportunities will arise within the Levenmouth area to share brand names, ticketing arrangements and to ‘dove-tail’ existing and new bus services and timetables with new rail timetables.

6.6.7 Moreover, synchronising new rail services with the existing rail network and bus network will occur both within and outwith the area, so a significant proportion of benefits may be regional rather than specifically local.

6.6.8 Anecdotal commentary supplied by SEStran³³ suggests that the re-commissioned Alloa-Stirling-Kinross line had no impact in terms of reducing bus passenger numbers or services between Stirling and Alloa, and operators are now extending more of the network beyond Alloa to feed passengers into the railway and to explore new markets in general.

Infrastructure and Information

6.6.9 This relates to the physical attributes of an interchange site, and must be additional to those reflected in other parts of the appraisal. Again STAG emphasises the need for considerable integration before an appraisal can be considered under this sub-heading.

6.6.10 The options involve new rail stations which will have the opportunity for providing bus-rail interchange infrastructure to facilitate modal switch at the rail stations themselves. The noticeable changes are more likely to be with services.

6.6.11 The appraisal must be as objective as possible, with quantification of benefits if available. The methodology adopted here is that set out in GOMMMS³⁴, with the analysis based on an extension of GOMMMS Worksheet 8.1 to incorporate services and ticketing.

6.6.12 Table 6.8 overleaf shows the appraisal.

³² STAG, section 9.2.1

³³ Feedback from SEStran based on discussions with Clackmannanshire Council, October 2008

³⁴ GOMMMS Volume 2, section 8.2



Table 6.8: Transport Integration Appraisal

Transport Interchange Indicator	Option A: Re-opening existing rail alignment plus two stations & freight facilities	Option B: Re-opening existing rail alignment with straightened section plus two stations & freight facilities
Seamless Public Transport Network	Moderate	Moderate
Seamless Ticketing	Moderate	Moderate
Waiting Environment	Moderate	Moderate
Level of Facilities	Moderate	Moderate
Level of Information	Moderate	Moderate
Visible Staff Presence	Neutral	Neutral
Physical Linkage for Next Journey	High	High
Overall Assessment of Impact	✓✓	✓✓
✓✓✓ Major Beneficial Impact ✓✓ Moderate Beneficial Impact ✓ Minor Beneficial Impact	○ Neutral Impact	✗ Minor Adverse Impact ✗✗ Moderate Adverse Impact ✗✗✗ Major Adverse Impact

6.6.13 As can be seen in the Table, there are no observable differences in the impacts on integration by either option, which is as expected as the services provided are almost identical.

Transport Land-use Integration

6.6.14 This has been approached in two parts, including a “simple check to see if the proposal is in harmony with the aims of wider government policies and national transport targets.”³⁵ The opportunity is also taken to briefly assess options against transport policies, such as the appropriate Local Transport Strategy and central government policies, before then turning to non-transport policies including:

- Health;
- Rural Affairs; and
- Transport Targets.

6.6.15 The Disability and Social Exclusion issues will be dealt with in the Accessibility and Social Inclusion section of this Chapter. It is also worthwhile to consider at this stage the relationship between such documentation as Structure Plans, Local Plans and Scottish Planning Policy statements on the one hand, and the options under initial appraisal, to avoid wasted work with proposals that are incompatible with land-use.

6.6.16 Reference was made to the following statutory documents:

- Fife Local Transport Strategy³⁶;

³⁵ STAG, section 9.4.2

³⁶ Local Transport Strategy, Fife Council, 2006



- Fife Structure Plan (version 2);
 - SEStran Regional Transport Strategy;
 - Scottish Planning Policy statement (SPP) 17; and
 - SPP1.
- 6.6.17 Transport improvements in the study area offer a major opportunity to implement local and strategic planning and transport policies, as a mechanism for promoting sustainable development. The proposals examined in this STAG Part 2 Appraisal would generally encourage a modal shift away from private car use, improve the quality of the environment, increase access for all to a public transport system serving areas of employment, housing and recreation and would encourage social inclusion.
- 6.6.18 In addition, the freight transport improvements offered by the proposed investment in the rail investment in the study area offer a major opportunity to implement local and strategic planning and transport policies as a mechanism for promoting development on a more sustainable footing.

Policy Integration

- 6.6.19 The stakeholder feedback identified following the STAG workshop (including public authorities responsible for setting policies), highlighted a number of indicators relating to transport investment in the Levenmouth area. These are:
- Improve access to key services in terms of employment, education, health leisure and other transport modes in the local, regional and wider area for all residents in the Levenmouth;
 - Improve the relative isolation (perceived and actual) in terms of accessibility criteria and the 20 year framework in the Structure Plan;
 - Improve the relative (perceived and actual) level of connections to Fife and wider area;
 - Promote the efficient movement of freight to and from Levenmouth, and encourage the transfer of movement of goods, produce and materials from road to rail;
 - Encourage more sustainable travel for new and existing development;
 - Provide a wider choice of travel mode, through the provision of and local integrated transport network;
 - Make Levenmouth better integrated with the rest of Fife and wider area; and
 - By removing traffic from Levenmouth's roads, improving safety for all road users.
- 6.6.20 A number of these objectives are directly referred to both in the Fife Local Transport Strategy (LTS) and in the Structure Plan. For example reference is made in the LTS to:
- Promote efficient movement of freight and encourage transfer of goods from road to rail;
 - To widen travel choice through the provision of integrated transport networks;
 - Encourage more sustainable travel for new and existing developments;
 - To work with passenger transport operators to develop an integrated public transport system; and



- To limit the growth in the use of driver only car trips, especially for commuting, by encouraging more use of public transport.
- 6.6.21 Clearly, there is a high degree of integration between the objectives as set out for this study and those determined in the LTS. However, in addition to these, they also reflect a number of policies expressed in the Fife Structure Plan (version 2). The relevant ones are to:
- Develop a Coastal Development Zone along the North Forth Coastline from Rosyth to Leven – linking significant brownfield regeneration opportunities at Inverkeithing Bay and Methil with new proposed Strategic Development Areas at Levenmouth and Kirkcaldy East and West;
 - Guide inward migration to Mid Fife in particular, to halt and reverse net out-migration and to assist in regenerating Mid Fife in accordance with the National Planning Framework;
 - Focus major development on public transport interchanges and town centres well served by public transport, and to increase development densities in these areas; and
 - Grow the energy sector with a focus on the Renewable Energy Park at Methil and the Green Energy Park at Westfield.
- 6.6.22 Scottish Planning Policy 17 Planning for Transport states in paragraph 7 that the planning system is a key mechanism for integration through supporting a pattern of development and re-development that:
- Supports economic growth and regeneration;
 - Takes account of identified population and land use changes in improving accessibility to public services, including health services jointly planned with Health Boards;
 - Promotes road safety and safety on public transport;
 - Facilitates movement by public transport including provision of interchange facilities between modes;
 - Encourages and facilitates freight servicing by rail or water;
 - Provision of high quality public transport access, in order to encourage modal shift away from car use to more sustainable forms of transport, and to fully support those without access to a car;
 - Effective management of motorised travel, within a context of sustainable transport objectives; and
 - The infrastructure for modern electronic communication networks which support home-working, real time information on public transport and in-car information systems to reduce car commuting and congestion.
- 6.6.23 In addition, transport improvements in the study area are in accordance with 'Scottish Planning Policy 1: The Planning System' which has a principle of Sustainable Development which includes:
- Promoting regeneration and the full and appropriate use of land, buildings and infrastructure;
 - Promoting the use of previously developed land and minimising greenfield development;
 - Conserving important historic and cultural assets;
 - Protecting and enhancing areas for recreation and natural heritage;



- Supporting better access by foot, cycle and public transport, as well as by car;
- Encouraging energy efficiency through the layout and design of development;
- Considering the lifecycle of development from the outset; and
- Encouraging prudent use of natural resources.

Summary of Appraisal

6.6.24 From the above policy review, it is clear that the options identified can be reasonably expected to compliment local and national policies. In addition, the options provide opportunities for freight transport as well as public transport services, which will naturally satisfy additional policy objectives identified in the policy review in this Section. Hence, it is reasonable to assume that both options A and B will have *major beneficial* impacts.

Overall Appraisal against Government Objective for Integration

6.6.25 Taking account of the discussions set out so far in this Chapter, Table 6.9 summarises the results of the integration appraisals to present a matrix of conclusions for the Government Objective.

Table 6.9: Transport Integration Appraisal

Option	Transport Integration	Land-Use Transport Integration	Policy Integration	Overall Average Appraisal for Integration
A	✓✓	✓✓	✓✓✓	✓✓
B	✓✓	✓✓	✓✓✓	✓✓

6.7 Accessibility and Social Inclusion Appraisal

Planning Objectives

6.7.1 The following local *Planning Objectives* have been identified as nesting within the overall accessibility/social inclusion heading.

Government Objective: To promote social inclusion by connecting remote and disadvantaged communities and increasing the accessibility of the transport network.

Planning Objectives Improve access to key areas and services in terms of employment, education, health, leisure and other transport modes in the local, regional and wider area for all residents in Levenmouth.

Overview of the Accessibility/Social Inclusion Appraisal

6.7.2 STAG requires the consideration of two aspects as part of the Accessibility and Social Integration Government Objective, namely:

- Community accessibility; and
- Comparative accessibility.



6.7.3 STAG advises “*the scope and detail required in the accessibility analysis needs to be commensurate with the planning objectives*”³⁷. STAG also states that “*quite simple measurement approaches should be adequate*” for appraising accessibility and identifying changes (improvements) as a result of new proposals. Hence, given the scale of the study and the STAG advice regarding scope, a qualitative approach has been undertaken.

Community Accessibility

6.7.4 This element of appraisal allows a focus on minority groups in society, and allows “*Social Inclusion policy [to] be informed by accessibility measures to ensure that all relevant people groups and trip purposes are considered*”³⁸. For the purposes of this study, a qualitative approach is adopted, looking at the potential benefits (or disbenefits) for public transport network coverage resulting from the provision of the various options.

6.7.5 In terms of passenger transport improvements, both options will open up alternative commuter and tourism access to the Levenmouth area from the surrounding towns, Dunfermline and Edinburgh. Moreover, both options also provide direct connections to the regional and national rail networks which significantly increase connectivity. In addition, the options also provide an opportunity to switch substantial volumes of road freight onto rail. By doing both the options may generate substantial benefits and are therefore considered to have a *major beneficial impact*.

Comparative Accessibility

6.7.6 For STAG purposes this is divided into two further sub-headings:

- Impacts by People Group; and
- Impacts by Location.

6.7.7 The impacts by people group relates to *the impact of the transport options on various groupings of individuals in society* (e.g. age group, socio-economic status, gender, ethnicity, and mobility status, as well as impacts split between car-owners and non car-owners). Enhancing the modal choice available to all Levenmouth residents provided by an expanded local public transport network will be beneficial to all groups, without exception. Even car users will benefit. The only possible caveat is the fare terms arranged for public transport and whether there is a cost recovery component included in these that penalise those unable to afford them, such as the unemployed, the elderly and the lower socio-economic groups.

6.7.8 Considering impacts by Location, STAG states “*it is important to understand the locus of impact of transport investment. This is particularly when assessing ... major network changes ... [and] as a minimum the analysis should compare the impacts on designated areas of deprivation such as social inclusion partnership (SIP) areas or priority partnership areas*”³⁹. There is little doubt that the scale and type of public transport investment proposed for the Levenmouth area will assist a broad range of beneficiaries. Both the options will assist commuters and those seeking work, those visiting further afield, tourists and for business, and will also assist bulk freight movements into and out of the area.

6.7.9 Given the above arguments, it is reasonable to assume the appraisal results described in Table 6.10 overleaf.

³⁷ STAG, paragraph 10.1.4

³⁸ STAG, paragraph 10.5.1

³⁹ STAG, sections 10.8.1 to 10.8.3



Table 6.10: Summary of Accessibility Appraisal

Option	Community Accessibility	Comparative Accessibility	Overall Appraisal
Option A	✓✓✓	✓✓	✓✓✓
Option B	✓✓✓	✓✓	✓✓✓

6.8 Implementability Appraisal

- 6.8.1 In addition to the five main Government objectives, STAG also recommends that the capability of delivering an option should also be considered. This can highlight any potential “implementability” problems with any proposal.
- 6.8.2 In terms of the technical issues, the options considered in this study are relatively straight forward since they are all based on standard civil engineering practices and have been successfully implemented elsewhere. However, the new rail alignment in option B will involve passing through some known mining grounds which could require special attention, more so than option A. The latter only involves re-opening of the existing railway line, which is not affected by mining works. Therefore, the new rail alignment in option B is considered to be the most complicated to implement.
- 6.8.3 When considering operational aspects, Leven is off the mainline therefore the issue of the train operation will be relatively straightforward to accommodate. In addition, if the Kirkcaldy services were extended to Leven, this would remove the need for trains to terminate or wait at Kirkcaldy station which is on the East Coast Main Line (ECML). Furthermore, if the Edinburgh to Cowdenbeath services were also extended to Leven, only a very short section of this additional running mileage would involve using the ECML. It is envisaged that in either service plan only one additional unit will be required, because the turnaround time for either option should be less than 1 hour and can be accommodated within current timetable requirements. However, if both the Kirkcaldy and Cowdenbeath services are extended then it is reasonable to assume there could a need for two additional units.
- 6.8.4 Therefore for both options A and B there may be the additional flexibility associated with more service scheduling options to implement as well as taking off waiting trains at Kirkcaldy from the ECML. Hence, these would have a slight positive impact.
- 6.8.5 Public consultation has shown there is significant public interest in re-instating the railway to Levenmouth. The vast majority of questionnaires received have called for a new railway-based solution to the accessibility issues of the area.
- 6.8.6 The above appraisal results are summarised in Table 6.11.

Table 6.11: Summary of Implementability Appraisal

Option	Technical Issues	Operational Aspects	Public Acceptability
Option A	✓	✓	✓✓✓
Option B	o	✓	✓✓✓



6.9 Appraisal against the Local Planning Objectives

6.9.1 The STAG Part 1 Appraisal identified three outline local *Planning Objectives* which were discussed with key local stakeholders at the STAG Workshop. From the transport modelling work undertaken it was possible to expand the outline planning objectives to make them SMART (specific, measurable, achievable, realistic and time-bound) and provide target values for each of them. After discussion and agreement with key local stakeholders, the following SMART planning objectives were established:

- **Objective 1:** Improve accessibility in terms of reducing public transport journey times for medium/long-distance trips from the Levenmouth area by an average of 10 minutes by the year 2020;
- **Objective 2:** Reduce impacts of HGV freight movements by at least 1 million vehicle-kilometres per annum across the national network by the year 2020; and
- **Objective 3:** Encourage a transfer of modal shift by 10% of medium/long-distance passengers in the Levenmouth area to more sustainable modes by the year 2020. This could also include a corresponding increase in public transport patronage of 100,000 medium/long-distance trips per annum.

6.9.2 The appraisal results indicate that both options meet the local planning objectives, either producing a major beneficial impact in terms of the first two objectives or a moderate beneficial impact in relation to the third objective. The modelling results have confirmed these initial findings for each of the three SMART local planning objectives and have defined the levels of achievement for both options, which are as follows:

- **Objective 1:** Both improvements in accessibility and in connectivity to medium and long-distance destinations is achieved by reducing journey times. For example, there is an average saving across the working day of 13.2 minutes from Leven to Edinburgh and 13.0 minutes to Kirkcaldy by the 2016, the first full year of operation modelled;
- **Objective 2:** Due to a transfer of freight from road to rail, there is a reduction of road freight by 2.2 million vehicle-kilometres per annum by the 2016, the first full year of operation modelled. This includes freight journeys across the national network; and
- **Objective 3:** More sustainable travel for new and existing development is achieved by a modal shift of 14% of car trips to public transport by 2016. This includes a corresponding net increase in public transport patronage of 156,000 trips by the year 2016, which is also set to rise in future years.

6.9.3 Clearly, the re-opening of the rail line between Leven and Thornton, either with the existing alignment or with a new section of straightened alignment, more than meets the three SMART local planning objectives as described above. The targets are achieved by 2016, the first full year of investment results, and therefore it is anticipated that they will be met in the succeeding years including 2020.



- 6.9.4 Because both options essentially only differ in terms of partial rail alignment, there would be no differences expected in either of these options meeting the integration, accessibility, social inclusion, nor local planning objectives covering connectivity, freight and sustainable development. The only area they would diverge to any significant extent is in implementability where installing entirely new rail alignment, particularly over land where mining may have occurred in the past, will be technically more challenging than replacing existing line.
- 6.9.5 The appraisal results are summarised in Table 6.12 below.

Table 6.12: Summary of Local Planning Objectives Appraisal

Criteria	Option A	Option B
Objective 1 – Connectivity	✓✓✓	✓✓✓
Objective 2 – Freight	✓✓✓	✓✓✓
Objective 3 – Sustainable Development	✓✓	✓✓

6.10 Cost to Government

- 6.10.1 Table 6.13 shows the Government impacts of the project. The TEE investment costs indicate the costs that have been adjusted and discounted back to 2002 prices. However, the investment costs of each option in 2016 outturn costs are shown in Chapter 4.

Table 6.13: Summary of Investment and Public Sector Costs

Option	Option A: Re-opening existing rail alignment plus two stations & freight facilities	Option B: Re-opening existing rail alignment with straightened section plus two stations & freight facilities
Investment Costs (from TEE Appraisal)	-£25.9m	-£29.2m
Grant/Subsidy (from TEE Appraisal)	-£32.1m	-£36.7m
Indirect Tax Revenues (from TEE Appraisal)	-£16.2m	-£18.0m

Note: all values are discounted to 2002 prices, and appraised over a 60-year period

- 6.10.2 The Table above suggests there is likely to be an on-going subsidy for either option.



7 RISK AND UNCERTAINTY

7.1 Introduction

7.1.1 Estimates of project costs of the Levenmouth transport proposals, as with all large infrastructure projects, are subject to a degree of uncertainty and change. This is due to changes in a number of factors including technical standards, the political environment, project interfaces, technological improvements or amendments required to obtain the necessary consents and approvals.

7.1.2 It should be stated at the outset that it is impossible to identify and manage all project risks. The objective of the Levenmouth project management team is to reduce all identified financial and programme risks to a minimum level as is reasonably practical for each stage of the project lifecycle.

7.1.3 To reduce the level of uncertainty of the Levenmouth transport proposals, the project team has employed a risk management process based on current best practice guidelines and on experience with similar projects elsewhere.

Best Practice Risk Management

7.1.4 The risk management approach adopted is aligned to the key UK Government guidelines required for large transport infrastructure projects. These are:

- The four stages central to the risk management process, that is to identify, assess, mitigate and monitor risk, should be implemented;
- Risks should be identified for all stages of the project lifecycle;
- Risks should be recorded in a Risk Register, which as a “live” document, should be continuously reviewed, revised and updated throughout the project lifecycle; and
- Identified risks should be managed to a level “as low as reasonably practicable” for each stage of the project lifecycle.

7.1.5 Not all tools and techniques for risk management can be applied to all projects, so we have selected and utilised the most appropriate tools to reflect the characteristics of the Levenmouth study area.

7.1.6 The selection of the correct tools and techniques has been facilitated by our experience drawn from work on other comparable projects in terms of geographical location, size, complexity and similarities in engineering requirements. This has aided our ability to identify the likely risks generated by the Levenmouth transport proposals, and the upfront risk mitigation techniques to reduce the probability that such risks will occur.

7.2 Risk Management Process

Key Stages

7.2.1 As has been identified above, there are four key stages to the risk management process as applied to this study:

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



7.2.2 The identified risks are analysed by combining their probability of occurrence and their scale of impact on the proposed investment in the area's public transport system. They are subsequently assessed in terms of overall risk of exposure and priority for action. Mitigation measures are developed, where suitable, for each risk recorded in the Risk Register. These measures are applied in proportion to the severity of the risk in question, which influences the time and cost required to address the relevant risk.

7.2.3 The risks and costs associated with these are monitored on a regular basis by the project team. The Risk Register includes data which provides a current risk profile of the project, and represents a snapshot of the progress towards mitigation of all identified project risks.

Project Risk Register

7.2.4 The Risk Register is the key tool of the Risk Management process in line with best practice. It records all identified risks as inputs and produces qualitative and quantitative information regarding these risks as outputs such as risk severity, mitigation process and capital expenditure contingencies. In summary, the Register provides:

- A fully auditable track record of all 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.

7.2.5 The Register provides the basis for risk prioritisation, mitigation action, risk control and risk reporting. It is maintained and updated by the Levenmouth Study's technical advisors, and is regularly monitored by the project team.

Stakeholder Management Process

7.2.6 It is clear that the perception and reputation of the Levenmouth study proposals rests on the stakeholder management process employed by the project team. It is particularly important that the risk management process captures the anticipated concerns of all identified stakeholders, the composition of which may change depending on the stage of the project lifecycle.

7.2.7 An important product of the stakeholder management process is the generation of risk mitigation processes designed to address the concerns raised by the stakeholders and their potential impact on project costs, and to take the appropriate steps identified to mitigate these.

7.2.8 A meeting to discuss and agree the risk register with SEStran and Fife Council Officials was held on Friday 26 September 2008. In addition the risk mitigation strategy was also agreed. The results of these discussions were taken forward in the development of the risk mitigation plan and the resulting monetary estimates set out in the Chapter.



Other Key Activities

- 7.2.9 Risk identification, recording, monitoring and mitigation is not an isolated activity, but undertaken in conjunction with a number of other project activities, including:
- Construction methodology;
 - Environmental Impact Assessment (EIA);
 - Demand forecasting and STAG Assessment; and
 - Finance and funding.
- 7.2.10 The construction methodology involves considerable potential for risk, and therefore account should be taken of the management processes applied to the mitigation of construction risks recorded in the Project Risk Register. The construction methodology will also have an environmental impact, the consideration of which will be in the EIA. Both these and the mitigation measures identified in the EIA will be entered into the Project Risk Register.
- 7.2.11 The Project Risk Register also shows the risks arising from the uncertainties surrounding forecasting of projected travel patterns and modal shift values used to develop the STAG Part 2 Appraisal for the scheme. Furthermore the Register highlights issues that may affect the level or likelihood of available funding to finance the project, where the assessment of risks is used to develop robust capital cost estimates informing the projects financial requirements.

Approach to Optimism Bias

- 7.2.12 Optimism Bias (OB) is the tendency for a project's costs and duration to be underestimated and/or benefits overestimated. It is defined as a measure of the extent to which actual project costs (capital and operating costs), and project duration (planning to operations) exceed the expected benefits delivered by the project.
- 7.2.13 The project team has, where appropriate, made explicit adjustments to the key project parameters affected by any potential understatement of the timings and costs of the programme. This section describes Optimism Bias has been addressed within the framework of the risk management processes in place. The guidelines for the assessment of Optimism Bias are set out in the HM Treasury's Green Book and the Review of Large Public Procurement in the UK⁴⁰, both of which have been adhered and referred to throughout this section.
- 7.2.14 There are three drivers to the assessment and calculation of OB:
- An assessment of the project risks most likely to contribute;
 - The classification of a risk by project type, which in turn determines the specific upper and lower bounds for the contributing factors to optimism bias; and
 - A realistic assessment of the progress made towards the mitigation of project risks, measured by risk mitigation factors.
- 7.2.15 The project team has reviewed all the contributing factors that may lead to cost and time overruns. Contributing factors have been assigned for every risk in the Risk Register.
- 7.2.16 There are three levels of disaggregation in the application of contributing factors:
- Contributing factors are divided into two main types of OB: capital costs and works duration;

⁴⁰ Mott MacDonald, July 2002



- Contributing factors are grouped into five overarching project risk areas; Procurement, Project Specific, Client Specific, Environment and External Influences; and
- Each of the five overarching project risk areas are sub-divided into specific risk areas that may negatively impact capital expenditure and works duration forecasts.

7.2.17 For the most part, the railway options follow a previous railway line and do not require any special design considerations due to space constraints, unusual output specifications or innovative construction methods. Based on this analysis the project was classed as a *Standard Civil Engineering* project and therefore has Upper Boundary starting values, based on the assumption of no risk mitigation, of:

- 44% for capital costs; and
- 20% for work duration.

7.2.18 These values are based upon the values recommended, in HM Treasury Green Book, for Standard Civil Engineering projects. The above values have been taken forward into the analysis and calculations which are summarised in the following section.

7.3 Analysis and Findings

Areas of Risk Impact

7.3.1 The 17 individual risks identified from the structured stakeholder workshop were entered into the Levenmouth Study Risk Register and each of these falls into one of the following seven categories of key impact areas:

- Ground Conditions;
- Land;
- Environment;
- Statutory Works;
- Other Engineering Issues;
- Construction Contractual; and
- Strategic Risks.

7.3.2 The distribution of the risk impact area is shown in Table 7.1. These have been derived from the results of the Monte Carlo simulation exercise⁴¹ carried out to determine the level and value of risks, the results of which are further described in the Risk Profile section below.

Table 7.1: Risk Impact Areas

Impact Area	Proportion of Risks (%)
Construction/contractual	35%
Strategic Risks	23%
Engineering Issues	16%
Ground Conditions	14%
Environment	10%
Land	2%

⁴¹ The Monte Carlo method is a standard statistical tool based on the generation of estimates from multiple trials to determine the expected value of a random variable, in this case the likelihood of risks occurring and their monetised values.



Identification of Key Risks

7.3.3 The risks that are anticipated to have a potential impact on construction costs are recorded in the Project Risk Register, and are shown below in Table 7.2, ranked in order of severity. Construction/contractual, engineering and ground condition risks contribute approximately two-thirds (65%) of the total risks identified to date.

Table 7.2: Details of Key Risks

Ranking	Identified Risks
1	Construction escalation costs
2	Financial and funding
3	Junction layouts
4	Structures
5	Mining problems anticipated (fill deposits)
6	Structural foundation
7	Live Railway line
8	ES process
9	Public access right of way
10	Network Rail Possession & Compensation
11	River Leven impacts, mitigation, landscaping, provisions
12	Lack of Stakeholder agreements
13	Scottish Govt Planning Permission or Statutory process
14	STAG Process
15	Increase in market value of land due to delays
16	Risk to bus subsidy due to passenger abstraction to rail
17	Construction consent
18	Invasive species
19	Land take and trying to accommodate SUDS

7.3.4 It is worth noting that the risks associated with construction and engineering issues are amongst the most important, representing five of the six top ranked identified risks. Risks associated with construction costs and the funding of the investment are the most significant of all.

Risk Profile

7.3.5 The Monte Carlo simulation was undertaken on each of the “high” level category risks identified and highlighted in the Risk Register to estimate the mean Risk Value Estimate and to give the risk profile shown in Figure 7.1 overleaf.

7.3.6 The Monte Carlo simulation returns a mean value of risk of £5.16m, which is greater than the 50th Percentile, so this has been taken forward into the STAG Part 2 Appraisal to provide a slightly more conservative analysis.



Figure 7.1: Details of Key Risks



- 7.3.7 The computer model undertaken for the Monte Carlo Simulation also carried out a regression analysis of all the risks in the Risk Register. It estimated a correlation co-efficient (R-squared value) of 0.921 which suggests a very good level of representation of the potential risks.

Risk Mitigation Strategy

- 7.3.8 Following the development of the Risk Register, a Risk Mitigation Strategy (RMS) was identified and tasked with various actions to militate against the remaining risk factors. The intention of the RMS is to take into account the rigorous capital costing methodology employed in this study.
- 7.3.9 Of the risks identified in the Risk Register, four risk areas (as defined by HM Treasury Guidance on Optimism Bias) were not appraised during the risk analysis hence are subject to uplift values for Optimism Bias. These are:
- Project Specific – Other;
 - Client Specific – Poor Project Intelligence;
 - Environment – Public Relations; and
 - External Influences – Economic.
- 7.3.10 However, two of these risk areas are within the control of the project team and the team already has a wealth of understanding of the issues involved in them, which is also constantly being improved. These are:
- Client Specific – Poor Project Intelligence; and
 - Environment – Public Relations.
- 7.3.11 In addition, there is significant information available on the potential risks in these two risk areas held by the team, due to the extensive studies and consultation exercises carried out to date on the project. Some of this existing information was used in the cost estimates shown in this report, and the project team believe a significant number of potential risks have been captured in the construction costs estimation and methodology produced.



7.3.12 Further suitable RMS actions were identified for these two risk areas with which to potentially extend the reduction in the level of Optimism Bias. Table 7.3 below summarises these RMS actions.

Table 7.3: Risk Areas and RMS Actions

Risk Areas	Mitigation Actions
Client Specific – Poor Project Intelligence	<ul style="list-style-type: none"> • Further ground investigations including Borehole surveys will be carried out; • Further scheme development and design will be carried out, particularly for the railway engineering elements; • Following on from the scheme design, more detailed cost estimates will be produced; and • Accordingly, the Risk Register will be updated and maintained throughout the above design/costings processes. This will include a Quantified Risk Assessment (QRA).
Environment – Public Relations	<ul style="list-style-type: none"> • Extensive stakeholder consultation has already been carried out including a Public Consultation in the area. Further consultation will continue including negotiations with private developers and landowners; and • Detailed Environmental Impact Assessment (EIA) of the plans will be prepared.

7.3.13 However, the mitigation factors identified in Table 7.3 have not been taken forward in the capital cost estimates in order that the analysis errs on the side of caution. Therefore the Optimism Bias values detailed below have not been adjusted by these mitigation factors so as to provide a more robust appraisal of capital costs.

7.3.14 Mitigation factors for the other risk areas have been unchanged, as the project team recognises that not all project risks can be mitigated at this stage. However, it is a key objective of the project team to improve mitigation factors and hence reduce further the optimism bias values calculated and the overall financial risk to the project. This will be done as the project progresses taking into account the increased knowledge and certainty gained from the outcomes of key decisions on, for example, the final procurement strategy, the commencement of advance works and the continued application of the risk management process.

7.3.15 The risk register will be developed further and maintained as the project moves into further stages of development and more detail is available on construction methodologies and their associated risks.

Investment Cost of the Options & Optimism Bias

7.3.16 To estimate Optimism Bias, the Upper Boundary levels of the Optimism Bias were reduced progressively by the removal of risks already identified and taken account of in the quantified risk assessment described above and the starting values for capital costs and costs associated with work duration as explained in Section 7.2.17 above. The process followed is the same as that used in the EARL project and the Waverley Station Redevelopment^{42,43}.

7.3.17 The results for the capital costs calculation, in 2008 prices, to achieve the appropriate uplift factor are as follows:

⁴² Edinburgh Airport Rail Link (Design Development Appraisal), Scottish Executive, May 2007

⁴³ Waverley Station Redevelopment: Final STAG Report, Scottish Executive, July 2004



- Standard Civil Engineering Works – 14% uplift factor;
- This results in a capital cost of £48.05 million for option A of which £5.16 million is for Risk and £4.51 million is for Optimum Bias; and
- This results in a capital cost of £54.34 million for option B of which £5.84 million is for Risk and £5.10 million is for Optimum Bias.

7.3.18 The maximum Optimism Bias figure for duration of 20% obtained from the HM Treasury Guidance. The projected construction period of 24 months results in a potential delay of six months, which in turn results in an increased risk of six additional months of indexation.

7.4 Sensitivity Tests

7.4.1 In order to analyse how sensitive the economic appraisal results are to key input variables, a number of tests have been carried out on Option A. The sensitivity tests were identified by way of identifying potential risk areas associated with patronage/revenue forecasts and costs estimates developed for the scheme. This section provides a summary of the risk areas identified and their estimated level of impact. The main risk areas identified and associated tests carried out can be summarised as:

- Time savings in TEE Appraisal lower than predicted. A drop of 10% was tested;
- Vehicle operating costs savings in TEE Appraisal lower than predicted. A drop of 10% was tested;
- Forecast patronage/revenue on the rail service is lower (e.g. affected by competitor response). A drop of 10% was tested;
- Increase in capital costs (e.g. contractors tenders are higher than anticipated). An increase of 10% was tested;
- Increase in operating costs (e.g. operators' tenders are higher than anticipated). An increase of 10% was tested; and
- Increase in the construction programme (e.g. works duration delay). A delay of 1 year was tested.

7.4.2 A series of TEE Appraisals were undertaken to enable the impact of risks on the Net Present Value (NPV) and Benefit-to-Cost Ratio (BCR) to be understood. The summary results of the sensitivity tests are presented in Tables 7.3.

Table 7.3: Results of Sensitivity Tests

Sensitivity Test	Identified Risks	NPV	BCR
	Base	£20.9m	1.50
(a)	Base minus 10% of time savings benefits	£13.5m	1.32
(b)	Base minus 10% of VOC benefits	£19.7m	1.49
(c)	Base minus 10% of revenues	£19.6m	1.47
(d)	Base plus 10% increase in Capital Costs	£9.2m	1.21
(e)	Base plus 10% increase in Operating Costs	£11.8m	1.28
(f)	Base plus 1 year delay to construction programme	£18.4m	1.44

Note: all NPVs are discounted to 2002 prices

7.4.3 As can be seen from Table 7.3, all sensitivity tests produced positive NPVs and BCRs greater than 1.0.



8 MONITORING AND EVALUATION

8.1 Introduction

8.1.1 STAG requires consideration to be given to the monitoring and evaluation of the option or options recommended as an outcome of the study process. This is because a process of monitoring and evaluation will be required for projects receiving financial support, in whole or in part, from the Scottish Executive. The two processes can be distinguished as follows:

Monitoring – An on-going process to measure progress towards a set of agreed targets.

Evaluation – A specific one-off activity to investigate project performance in depth.

8.2 Key Performance Indicators

8.2.1 *“Monitoring is the process of gathering and interpreting information on the performance of a project. This process should be an on-going one and may take place in conjunction with other information gathering exercises”*⁴⁴. The focus of monitoring will be on outcomes and to assist in this it is necessary to establish key performance indicators (KPIs) to measure the impact of the options implemented. These KPIs should build on the study’s *Planning Objectives* and be SMART. Table 8.1 sets out some suggested monitoring yardsticks for consideration.

Table 8.1: Suggested KPIs for Monitoring

<i>Planning Objective/Criteria</i>	<i>Key Performance Indicator</i>
Environment	1. no specific Planning Objective identified
Safety	2. no specific Planning Objective identified
Economy	3. monitor travel times along key corridors for freight movements 4. monitor modal shares on key corridors 5. monitor the travel patterns of new developments and their interaction with the proposals
Integration	6. no specific Planning Objective identified
Accessibility & Social Inclusion	7. survey social groups and different types of travellers to gauge how they are using the new proposal

8.3 Evaluation

8.3.1 *“It is necessary to demonstrate at the post-implementation stage of a project how effectively that project has met the established objectives”*⁴⁵. Evaluation can be divided into two types:

Process Evaluation – Primarily concerned with how well the project has been implemented.

Outcome Evaluation – Examines the performance of the project after completion, and measures its “success”. It therefore cannot take place until sufficiently long after implementation for success to be measurable.

⁴⁴ STAG, section 14.2.46

⁴⁵ STAG, section 15.8.1



8.3.2 Process evaluation is concerned with implementation, and can be carried out by assessing how well the implementation has been delivered at key stages throughout the process, so that (for example), decisions on the scope and scale of the project can be reassessed in the light of experience. Chapter 7 has discussed some potential issues to consider in terms of risk and uncertainty, and these could form the basis for outputs upon which the process evaluation could be based. In order to achieve this, it is recommended that the Project Risk Register be set-up at the start of the development and continuously maintained throughout the project development lifecycle.

8.3.3 Outcome evaluation looks at the results of a scheme once it has been implemented, and can only take place when the scheme has “bedded down” sufficiently for realistic results to be measurable. With large schemes, this will be inevitably a number of years after the opening. Outcome evaluation is often related to the so-called “Four E’s”⁴⁶:

- | | |
|-----------------|--|
| Economy – | The costs of resources used, procurement and tendering issues. |
| Efficiency – | How well were inputs translated into outputs, and could more output have been achieved with less or different inputs or processes/management? |
| Effectiveness – | Did achieving the defined outputs then enable the wider policy objectives to be achieved; could these have been achieved through some alternative intervention or process? |
| Equity – | Were the gainers from the project, such as particular social groups or areas, as intended; is this in line with other policy intentions? |

8.3.4 STAG sets out the following series of sequential steps for an outcome evaluation⁴⁷:

- Step 1: definition of scope and purpose;
- Step 2: project rationale;
- Step 3: aims and objectives;
- Step 4: measures and indicators;
- Step 5: base case for comparison;
- Step 6: analysis and interpretation; and
- Step 7: reporting and recommendations.

8.3.5 Steps 1 to 3 will be carried forward from this STAG appraisal, along with the Base Case for Step 5. The analysis and interpretation of results could then form an “outcome evaluation” report structured around the suggested KPIs in Table 8.1, and culminating in recommendations for the future development of the project and that of similar schemes elsewhere in Scotland and the UK.

⁴⁶ STAG, section 15.11.11

⁴⁷ STAG, section 15.12.1



9 CONCLUSIONS

9.1 Findings of the Part 2 Appraisal

9.1.1 In accordance with normal STAG practice, Appraisal Summary Tables have been prepared. These are shown in Appendix C. The results of these are summarised in Table 9.1, using the key shown below.

Table 9.1: Summary of STAG Assessment

Criteria	Option A: Re-opening existing rail alignment – two stations plus freight facilities	Option B: Re-opening existing rail alignment with straightened section plus – two stations plus freight facilities
Objective 1 – Connectivity	✓✓✓	✓✓✓
Objective 2 – Freight	✓✓✓	✓✓✓
Objective 3 – Sustainable Development	✓✓	✓✓
Environment – Air Quality & noise	✓	✓
Environment – Other	✗	✗✗
Safety	✓✓	✓✓
Economy	✓✓	✓
Integration	✓✓	✓✓
Accessibility/Social Inclusion	✓✓✓	✓✓✓
Technical Issues	✓✓	✓
Operational Aspects	✓	✓
Public Acceptability	✓✓✓	✓✓✓

Key:

✓✓✓	Major Beneficial Impact	✗	Minor Adverse Impact
✓✓	Moderate Beneficial Impact	✗✗	Moderate Adverse Impact
✓	Minor Beneficial Impact	✗✗✗	Major Adverse Impact
○	Neutral Impact		



9.2 Preferred Option

- 9.2.1 The best performing option is to reconstruct the railway along the existing alignment, rather than construct along a new alignment. Hence, the preferred option is option A: the re-opening of the existing rail alignment, plus the implementation of the two stations at Leven and Cameron Bridge and rail freight facilities.
- 9.2.2 In terms of the preferred train service strategy, the TEE model results suggest that the extension of the Kirkcaldy Service operating on an hourly frequency would produce the highest benefit-to-cost ratio (BCR) and net present value (NPV). This option, with this service structure, secures the best value-for-money for the new investment, returning the highest NPV of £20.9m and a BCR of 1.50. This train service strategy produces circa 349,000 passengers per annum at 2016 rising to circa 380,000 passengers per annum by 2031, mainly from modal shift, and not allowing for any induced patronage due to newly generated trips as a result of improved rail connections.
- 9.2.3 However, extending both the Kirkcaldy and the Cowdenbeath services provides the greatest numbers of passenger demands as it increases train frequency to half an hour, even though the NPV and BCR are lower. This is because the operating costs for the half-hourly service strategy (i.e. extending both the Kirkcaldy and Cowdenbeath services) are assumed to be approximately double the hourly frequency, since in effect there are twice as many trains running. If a way could be found to minimise or reduce the running costs then this would increase the attractiveness of this service strategy.
- 9.2.4 In terms of other STAG indicators, the option involving the reconstruction of the existing railway alignment (as it does not involve constructing a new rail section through the countryside) also has the least impact in terms of the environmental appraisal, being less intrusive on visual amenity, has least impact on the cultural heritage of the area and least impact on the landscape. It also has less of an impact in terms of the disruption on the geology, agriculture and soil structure of the area.
- 9.2.5 This option also meets most closely the three planning objectives identified by local stakeholders and noted in Section 2.4. It improves access to key areas and services in both the Levenmouth and wider geographical areas, it promotes the efficient movement of freight to and from Levenmouth and thereby encouraging modal shift from HGVs, and it encourages a more sustainable travel pattern for new and existing developments. The difference between the two train service strategies is that the half-hourly frequency provides more accessibility than the hourly service, and consequently a little more passenger demand and modal shift, albeit at the expense of higher running costs.

9.3 Results of Sensitivity Tests on the Model Assumptions

- 9.3.1 We have acknowledged in section 5.5 that the estimates of passenger demand are somewhat conservative. This is especially given recent experiences with railway services including the Stirling-Alloa-Kinross (SAK) railway line which has exceeded original model estimates. Despite some of these conservative assumptions, the economic results remain robust, returning a good positive return.
- 9.3.2 However, to gauge the effects of introducing some of the recent lessons learned from the SAK railway service, we have undertaken two sensitivity tests.
- 9.3.3 The first replaces the 20%:20% Edinburgh-Glasgow split with a test for a 40%:0% split in favour of Edinburgh.



- 9.3.4 The second sensitivity test includes the effects of a 42% additional generated passenger demand, which was observed at a survey at Alloa station when 42% of passengers said they had previously not travelled and were now doing so following the introduction of the railway service (these passengers were over-and-above those which has transferred from other modes). In this latter sensitivity test, we have assumed there would be a complimentary 42% increase in our base passenger estimates, but to err on the side of caution we have only applied half the benefits of these additional trips based on the “rule-of-a-half” economic appraisal process assumption.
- 9.3.5 Both sensitivity tests were compared against Option A with the extension of the Kirkcaldy railway service, as this is the best performing option.
- 9.3.6 A summary of the results of these sensitivity tests are as follows, discounted to 2002 prices, with the original results of Option A with the extension of the Kirkcaldy railway service shown as a comparator:
- Option A – Rail Re-opening (Kirkcaldy Service Extension): NPV = £20.9m and BCR = 1.50;
 - Sensitivity Test 1 (40% Distribution to Edinburgh): NPV = £23.2m and BCR = 1.51; and
 - Sensitivity Test 2 (42% Additional Generated Demand): NPV = £45.1m and BCR = 1.99.
- 9.3.7 These results are better than those returned using the conservative assumptions, especially the test including a 42% increase in passengers with a corresponding 21% increase in benefits due to generated demand. This suggests there are further benefits which could be obtained from the proposals.

9.4 Recommendations

- 9.4.1 Given the above conclusions and the appraisal in this report, there are a number of factors that warrant further investigation. These are:
- Scheme Development – it is recommended that option A is taken forward through the railway industry’s Guide to Railway Investment Projects (GRIP) stages, in order to consult further with other important stakeholders including Transport Scotland and Network Rail. This will assist with the design process and ensure key stakeholders are fully involved. It may also be advisable to carry out a preliminary outline environmental statement in order to identify mitigation factors which could further enhance the results of the appraisal. This is also important because the environmental measures may need to be included in the final outturn costs if these are found to be significant.
 - Timetable/service frequency – regarding train operations, as mentioned above, two alternatives should be considered: 1) extending the hourly Edinburgh to Kirkcaldy service to Leven, or 2) extending both the Edinburgh to Kirkcaldy and the Edinburgh to Cowdenbeath services, thereby providing a half-hourly service to Leven. This latter service plan would also provide improved service frequencies at Thornton, Cardenden and Lochgelly Stations which will produce some benefits although these have not been quantified in this study. In addition, there will be enhancements to the existing train services to Fife which are planned to be implemented in December but there may be further changes in due course to the service timetables assumed in this STAG study. Consequently, now would be a good opportunity to test the two alternative service strategies against the planned network-wide improvements, and develop a robust operating timetable which meets all the objectives.



- Refined Economic Appraisal – the above actions could potentially further enhance the robustness of the Transport Economic Efficiency (TEE) Appraisal carried out. This is particularly the case for the unknown factors not covered in the remit of this study. For example, the operating costs of the proposal are related to the service strategy but since this study has focussed on the capital costs, the estimate of operating, maintenance and renewal (OMR) costs were based on default percentages. It could be that the incremental differences between having two trains per hour rather than one per hour may not be as high as assumed in this study which could improve the economic appraisal results. This may in turn influence the final decision as to which operating service strategy is best placed to meet the overall objectives of stakeholders. Furthermore, whilst the appraisal has identified a potential Risk Management Strategy (RMS), any possible reductions in the resultant Optimism Bias value used in the economic appraisal (i.e. post reduction of allowances for estimated risks and contingencies) have not been carried through in order to provide a more robust economic assessment. Again, if these were pursued as part of the GRIP process, and suitable mitigation measures are identified and properly managed, then there will be benefits to the final outturn costs. Consequently, it is recommended that the economic appraisal be considered in light of the outputs from the above recommendations as the project goes through the GRIP stages.
- 9.4.2 The implementation of the above recommendations should help progress the project forward and also provide further confidence to key stakeholders.

Appendix A

Environmental Appraisal Report



SEStran & Fife Council

Levenmouth Sustainable Transport Study – STAG 2 Environmental Appraisal Report

Revision Schedule

SEStrans & Fife Council

Levenmouth Sustainable Transport Study – STAG 2 Environmental Appraisal

October 2008

Rev	Date	Details	Prepared by	Reviewed by	Approved by
01	06/06/08	STAG 2 Environmental Appraisal	Nicolas Whitelaw (Planner), Shelagh Brian (Senior Landscape), Carolyn Cowan (Ecologist) & Jonathan Campbell (Transport Planner)	Gayle Adams Principal Planner	Nigel Hackett Technical Director
02	October 2008	Final Report	Nicolas Whitelaw (Planner), Shelagh Brian (Senior Landscape), Carolyn Cowan (Ecologist) & Jonathan Campbell (Transport Planner)	Gayle Adams Principal Planner	Nigel Hackett Technical Director

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Figure 1.1 – Study Area Location

Figure 1.2 – Route Options

Figure 1.3 – Environmental Constraints



1 Introduction

1.1 Background

1.1.1 This report is a STAG 2 appraisal of the potential environmental impacts of the route options for the Levenmouth Sustainable Transport Study scheme within the overall study area as shown in Figure 1.1. It forms part of the overall STAG appraisal process which is outlined below.

1.2 The STAG Process

1.2.1 The Scottish Transport Appraisal Guidance (STAG) is a comprehensive method of assessment which is required for any transport proposals that seek Scottish Executive funding. The process is set out in Scottish Transport Appraisal Guidance Technical Database (Transport Scotland - 27th May 2008). The overall aim of the process is to ensure that Scottish transport proposals accord with Government policy for Scotland which has three key aims: A strong economy; a clean environment; and an inclusive society.

1.2.2 These aims are reflected in the appraisal process under five government (STAG) objectives; environment, safety, economy, integration and accessibility and social inclusion. The appraisal uses a two-part appraisal process with the results set out in Appraisal Summary Tables (AST's). Part 1 is an initial appraisal and broad assessment of impacts designed to be used for approval in principle and to decide whether a proposal proceeds to Part 2 which is a detailed appraisal against the STAG objectives.

1.3 Background to the STAG appraisal of the Levenmouth Sustainable Transport Study

1.3.1 Following the recommendations of the STAG Part 1 appraisal, the current project comprises of two identified rail options. These are:

- Option A: Re-opening of the railway line between Leven and Thornton junction, with stations at Leven and Cameron Bridge and rail freight facilities; and
- Option B: Re-commissioning of the railway line between Leven and Thornton junction, with a new straightened section between Windygates and Thornton Junction, and with stations at Leven and Cameron Bridge and rail freight facilities.

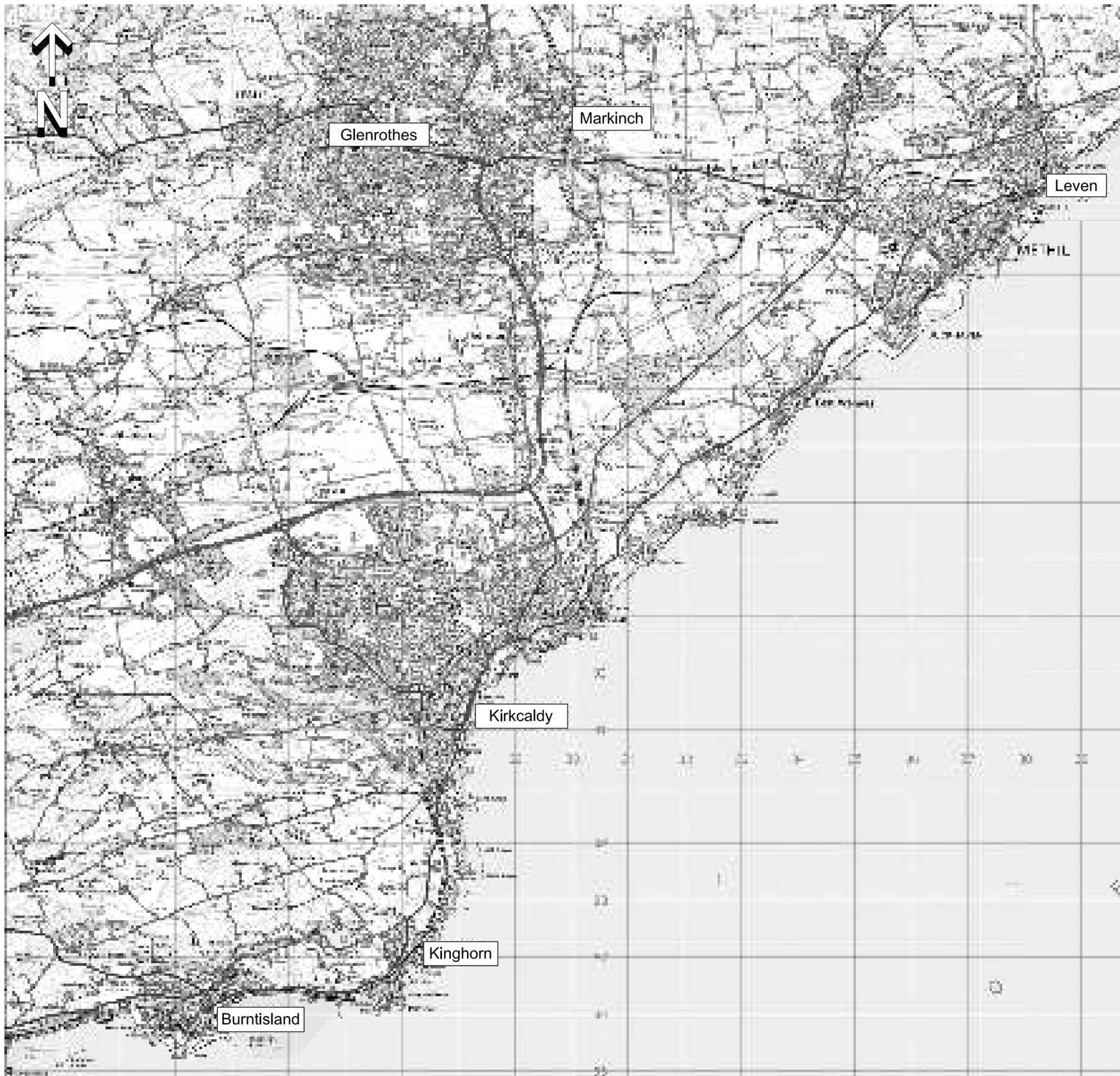
1.3.2 Both of these options incorporate the Do-Minimum recommendations which comprise of on-street bus priority measures on the three main trunk routes linking the Levenmouth area with the rest of the region, which are the A911, the A915 and the A955.

1.3.3 Figure 1.2 shows the alignments of the route options.

1.4 The Environment Objective

1.4.1 For the purposes of the STAG appraisal process the environment objective is split into sub objectives as follows:

- Noise and Vibration;
- Air Quality - (CO₂, PM₁₀, NO₂);
- Water quality, drainage and flood defence;



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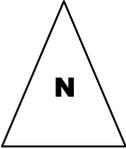
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Levenmouth STAG Study

June 08

FIGURE 1.1 Location Plan

Scale: 1:70000



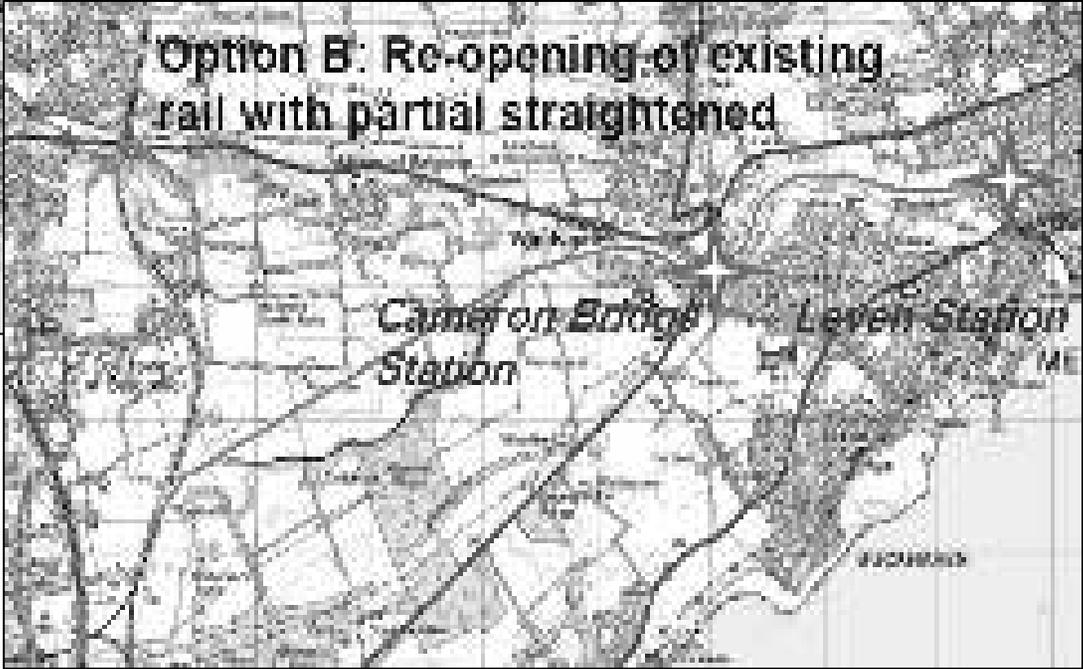
Option A: Re-opening of existing rail with current alignment



Option A involves opening the existing rail alignment from Thornton Junction to Leven, and includes building new rail stations at Leven and Cameron Bridge.

Train speeds would be approximately 40mph along this alignment.

Option B: Re-opening of existing rail with partial straightened



Option B involves straightening out the line from Thornton Junction to Windygate, with the remainder of the line following the existing alignment through the built-up areas.

The straightened section would permit a greater average running speed for trains of 60mph.



Notes

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Levenmouth Sustainable Transport Study
Route Options Plan

Figure 1.2



- Geology;
- Biodiversity;
- Visual Amenity;
- Agriculture and Soils;
- Cultural Heritage; and
- Landscape.

- 1.4.2 This chapter is divided into the above sub-objective headings and an appraisal is carried out for each one. Geology, agriculture and soils have been combined into one sub-section. The Scottish Government requires that the environmental appraisal of a proposal for which it is to provide funding, is well documented and auditable, and will comply with all statutory requirements.
- 1.4.3 The study is based on a desktop review of available technical reports, consultation responses and initial site survey information and therefore is a preliminary study. Further supporting information should be provided when or if the preferred option is developed through the Environmental Impact Assessment (EIA) process. The study area lies within the Fife Council administrative areas. The proposed route options considered by this report will largely be located on existing transport routes.
- 1.4.4 The Appraisal Summary Table (AST) that has resulted from this STAG assessment is shown in the STAG Part 2 Appraisal Report.

1.5 Methodology

- 1.5.1 The STAG guidance should be used for all transport projects for which Scottish Government support or approval is required. STAG is also complementary to and not mutually exclusive from other guidance available to transport policy and investment. Each sub-objective section in this report follows the same format and assessment hierarchy in accordance with the STAG guidance, which consists of five stages as follows:
- Scoping – defining potential impacts and assessment methods. Within each sub-objective this includes specific methodologies and a definition of the study area.
 - Baseline – information about the environment in the year of project commencement and foreseeable developments. Figure 1.3 shows the Environmental Baseline.
 - Assessment – identifying the likely environmental impacts and magnitude of these impacts. All types of impacts are assessed which may be positive or negative, permanent or temporary, direct, indirect, short, medium or long term, secondary, cumulative and synergistic. For the purpose of this study the base year has been taken as 2016 and the assessment of effects is at construction, at year 1 and at year 15 unless other timescales are used for specific sub-objectives.
 - Appraisal – determining the significance of the impacts. The STAG guidelines state that a seven-point scale should be used to determine the magnitude of effect as follows:
 - negative major;
 - negative moderate;
 - negative minor;
 - neutral;
 - positive minor;
 - positive moderate; and
 - positive major.



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LEGEND

- | | | | | | |
|--|-----------------------------|--|--|--|--|
| | Conservation Areas | | Historic Gardens and Designed Landscapes | | Areas at risk of flooding from river |
| | Scheduled Ancient Monuments | | Area of Great Landscape Value | | Areas at risk of flooding from the sea |
| | SPA / SSSI / Ramsar | | Nature Conservation Sites | | |
| | Listed Buildings | | Leven Valley Corridor | | |
| | Ancient woodland | | | | |



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FIGURE 1.3
Environmental Constraints

Scale: 1:30000

1.5.2 The recommended thresholds for significance of effect (a judgement of magnitude against sensitivity) are as follows:

- major negative impact;
- moderate negative impact;
- minor negative impact;
- no impact;
- minor positive impact;
- moderate positive impact; and
- major positive impact.

1.5.3 Reporting – The information is presented in the form of the AST with supporting information in order to highlight significant beneficial and adverse impacts, which should be considered in decision-making. Suggested mitigation measures (to avoid, minimise or offset adverse impacts) and residual impacts (those likely to remain after mitigation) are reported.

1.6 Consultations

1.6.1 The statutory consultees recommended by the STAG guidelines were consulted during the STAG 1 stage process. In addition a number of non-statutory bodies were also consulted. A summary of the responses is given in Table 1.1 below.

Table 1.1: Summary of Consultation Responses

Consultee	Consultation Stage	Letter Sent	Date Response Received	Name of Responder	Comments
Fife Council – Development Services, Business & Strategy, Local and Community Policy;	STAG 1	31/03/08	15/04/08	Alison Wood	Options 3 and 4 would have adverse impacts on properties in built up area in Kennoway - Windygates. Option 1 would affect local plan designations. The Sea Road/Muiredge Development shown in Figure 1 is in wrong location.
Fife Council – TAPIF Environmental Information Centre;	STAG 1	31/03/08	29/04/08	Simon Scott	Provided extensive list and data of known species in study area
Fife Council – Business & Strategy, Economic Development	STAG 1	31/03/08	No Response Received		
Fife Council – Development, Promotion and Design	STAG 1	31/03/08	No Response Received		
Fife Council – Locality Manager Buckhaven & Methil Localities	STAG 1	31/03/08	No Response Received		

Consultee	Consultation Stage	Letter Sent	Date Response Received	Name of Responder	Comments
Fife Council – Environmental Services	STAG 1	31/03/08	10/04/08	Kenny Bissett	'suitable consideration of relevant transport option potential impacts on air quality and contaminated land issues should be undertaken in order to demonstrate compliance with both PAN 33 " <i>Development of Contaminated Land</i> " and the appropriate statutory air quality objectives/standards.'
NHS Travel Co-ordinator	STAG 1	31/03/08	No Response Received		
Scottish Enterprise Fife	STAG 1	31/03/08	No Response Received		
City of Edinburgh Council – Planning and Strategy	STAG 1	31/03/08	No Response Received		
Scottish Natural Heritage (SNH)	STAG 1	31/03/08	07/04/08	Keith Dalglish	Key issues to be addressed will be the ecological impacts upon designated sites, protected species and habitats and provides details or the Site Link facility on their website. Other issues include Landscape and visual impacts; recreational impacts; siting, design and layout of planting and any built aspects; and proposed green network provision.
Scottish Environmental Protection Agency (SEPA)	STAG 1	31/03/08	28/04/08	Alistair Morrison	Controlled Activities Regulations (CAR) license required for Ferry and Hovercraft Option.
The Scottish Government – Director General Environment	STAG 1	31/03/08	No Response Received		
The Scottish Government – General Economy	STAG 1	31/03/08	No Response Received		



Consultee	Consultation Stage	Letter Sent	Date Response Received	Name of Responder	Comments
Health and Safety Executive (HSE)	STAG 1	31/03/08	07/04/08	Dr G A Cook	No comments to make.
Scottish Water	STAG 1	31/03/08	No Response Received		
Historic Scotland	STAG 1	31/03/08	No Response Received		
Stagecoach in Fife	STAG 1	31/03/08	15/04/08	Robert Andrew	Cannot foresee how a Rail or BRT is affordable or best value. Suggest that identify likely pinch points on bus network; identify mitigation measures to avoid bus delays at pinch points; develop a through ticketing scheme; install a rail ticket sales point at Leven Bus Station; identify gaps in existing bus provision; and develop any bus services enhancements through a statutory quality partnership. Welcome waterborne options
Moffat and Williamson	STAG 1	31/03/08	No Response Received		
Fife Chamber of Commerce and Enterprise Ltd	STAG 1	31/03/08	No Response Received		



2 Noise and Vibration

2.1 Scoping

2.1.1 Assessments of the likely noise and vibration impacts for both option A and option B were carried out based on an understanding of the traffic flow changes brought about by investment in re-opening the rail link to Leven.

2.1.2 The following section summarises the results of the assessment.

2.2 Baseline

2.2.1 For the construction impacts, as a detailed design is not available and therefore the operations, plant etc. likely to be used cannot definitely be stated at this time, a generic assessment was carried out. Some re-furbishment of the line and associated works will take place in or close to residential areas, especially in the neighbourhood of Cameron Bridge.

2.3 Assessment and Appraisal

2.3.1 The assessment of noise impacts is estimated based on a proxy of the forecast changes in vehicle kilometres on the network. This is balanced against the anticipated increase in rail services, likely to affect the properties in the vicinity of the railway line.

2.3.2 The assessment of the effect of the use of the rail services on the local area showed properties fronting on or in close proximity to the re-commissioned rail link, particularly in the vicinity of Cameron Bridge, will experience some minor adverse impacts. However this is shown to be balanced by corresponding moderate beneficial impacts across the existing road network including the A911, the A915 and the A955.

2.3.3 The appraisal suggests that given the likely nature of the operations and the statutory and contractual controls which will require to be met then the impacts on adjacent areas will be kept to the absolute minimum that is reasonably practicable, whilst allowing the works to proceed.

2.4 Summary

2.4.1 In overall terms the assessments indicate a net benefit when the increases in noise are compared with the potential decrease.



3 Air Quality

3.1 Scoping

3.1.1 As with the noise and vibration assessments, the likely air quality effects for the two options were carried out based on an understanding of the traffic flow changes brought about by these options.

3.1.2 The following section summarises the results of the assessment.

3.2 Baseline

3.2.1 For the construction impacts, as a detailed design is not available and therefore the operations, plant etc. likely to be used cannot definitely be stated at this time, a generic assessment was carried out. Some refurbishment of the line and associated works will take place in or close to residential areas, especially in the neighbourhood of Cameron Bridge.

3.3 Assessment and Appraisal

3.3.1 The appraisal suggests that in these areas, although exhaust emissions from vehicles and plant on and accessing the site were expected to have no significant effect on local air quality, dust generation could have a significant impact on adjacent property. However statutory and contractual controls, which will be required to be met, will ensure dust impacts are kept to the absolute minimum that is reasonably practicable, whilst allowing the works to proceed.

3.3.2 Given the expected frequency of the services is one to two trains per hour, it is reasonable to assume that this is unlikely to contravene the AQS health based objectives with the rail line constructed. In addition, it is also reasonable to assume that given the predicted decreases in vehicle kilometres on the road network, there is likely to be moderate beneficial impacts on properties fronting and in close proximity to the existing road network, including the A911, the A915 and the A955.

3.3.3 The assessment is also likely to be the same for exposure to PM₁₀ and NO₂ across the road network.

3.4 Summary

3.4.1 In overall terms the assessments indicate a net benefit when the increases in emissions from rail movements are more than offset by the reductions in emissions from road traffic displaced to rail.



4 Water Quality, Drainage and Flood Defence

4.1 Scoping

4.1.1 This section investigates the potential for the proposed options to impact upon water quality, drainage, and flooding. The Baseline Data sub section identifies and describes the significant water resource features in proximity to the study options corridor. The baseline conditions were evaluated from a brief desktop investigation, OS maps, flow and water quality data from the Scottish Environmental Protection Agency (SEPA) website, and ground water data from British Geological Survey maps. Identification of the range and location of potential impacts was based on a review of similar projects and the professional experience of the assessment team. Impacts on surface water resources were considered over a range of some 200m either side of the route options (and further downstream where required), whilst groundwater features and impacts were considered using regional information and an overview of current land use in the study areas.

4.1.2 In terms of the magnitude of an impact, a “Negative Major” would, for example, be the degrading of water quality classification, and a “Negative Minor” could be measurable changes in some water quality parameters but no effect on overall classification. In regard to sensitivity of a receptor, it is proposed that a further subsequent assessment of the present water quality classification, the flow rates, and the amenity value of the water resource be made to derive an impression of the resilience of the water resource to cope with changes resulting from an impact. The assessment of potential impacts has assumed that standard mitigation measures have been “built in”.

4.2 Baseline

4.2.1 The water resources baseline data is given in Table 4.2.

Table 1.1: Water Resources Baseline Data

Recept or	Water Quality Classification	Flow Rate (m3/s)	Amenity Use	Overall Sensitivity
River Leven	A2 (Good) ¹	6.45 (Mean Flow of River Leven at Leven) ³	Boating interest and a fishing interest u/s (up stream) (e.g. Sea Trout and Salmon)	Moderate
River Ore	B (Moderate) ¹	2.13 (Mean Flow of River Ore at Balfour Mains) ³	N/A	Moderate
Firth of Forth	C (Unsatisfactory) ²	N/A	Fishing, Recreational, Boating, Shipping channel	Major
Back Burn	N/A	N/A	N/A	N/A
Ground Water	The Hydrogeological Map of Scotland and the Groundwater Vulnerability Map of Scotland show no significant ground water resources the site study area. Brief investigations for this study have not revealed any significant discharges to or abstractions from groundwater in these areas. No groundwater pollution incidents or areas of groundwater quality degradation have been noted by SEPA. There are a number of built up areas along the banks of the Leven and the Firth of Forth Shoreline; a detailed investigation into any existing local groundwater pollution would be required as part of further preliminary design and environmental assessment of the preferred option during the EIA process if required.			

The following notes relate to the table above; ¹ Quality Classification is the River Classification; ² Estuarine classification; and ³ UK Gauging Stations the Rivers Leven and Ore in the SEPA east area.

- 4.2.2 Based on the requirements of the Water Framework Directive, which are broadly to prevent deterioration in the status of water bodies and to restore water bodies to good ecological status by 2015, any deterioration of water quality in the watercourses in question as a result of the preferred option is unlikely to be acceptable.
- 4.2.3 SEPA have indicated that authorisation under the Water Environment (Controlled Activities)(Scotland) Regulations 2005 (CAR) would be required for any engineering works adjacent to the river Leven and Ore, such as bank reinforcement, bridges and sediment management. SEPA refer to Pollution Prevention Guidance note PPG5 which is applicable to all works in or adjacent to watercourses.
- 4.2.4 The Back Burn has been identified by SEPA as a watercourse with good water quality, and like the River Leven and Ore, also supports Salmonids.
- 4.2.5 SEPA have also indicated the existence of several water abstraction points for agricultural and horticultural irrigation. The Cameron Bridge Distillery also abstracts water from the River Leven for indirect cooling purposes. The Ore Valley Sewer runs adjacent to the River Ore. There is a considerable amount of sewerage infrastructure in Leven and Methil which would require consideration for both options A and B.

4.3 Assessment

- 4.3.1 An assessment has not been carried out for each of the options, as the impacts on water quality, drainage and flood defence are similar for each option. Only a more detailed analysis of specific option designs would allow any differentiation of impacts.
- 4.3.2 Any impacts occurring during the construction phase of the options are likely to be confined to the River Leven and River Ore. These impacts are likely to be short term, fairly localised, and temporary in nature e.g. for the duration of construction. It is noted that given the history of flooding of the River Leven, it is essential that the hydraulic capacity of the watercourse is not reduced during any phase of the construction works.
- 4.3.3 Further assessment would be required to identify the presence of any culverted watercourses.

4.4 Appraisal

- 4.4.1 An appraisal has not been carried out for each of the options, as the impacts on water quality, drainage and flood defence are similar for each option. Only a more detailed analysis of specific option designs would allow any differentiation of impacts.
- 4.4.2 It is noted that the impacts described below are focussed on the River Leven and the River Ore which are in close proximity to the route for option A. In fact option A crosses and runs immediately adjacent to the River Leven and River Ore, although the infrastructure for this option is already in place. It is therefore unlikely that this watercourse will experience any serious impacts with either option A or option B. It is noted that impacts to water resources features described below may lead to or be associated with other impacts, which are addressed separately in other sections of this report. For example no impacts on aquatic ecology have been considered in this section but are reviewed in the Biodiversity section.

- 4.4.3 The SEPA Indicative River and Coastal Flood Map shows parts of the study area to be located in an area at risk of flooding from rivers (Rivers Leven and Ore) as well as Coastal flooding the Firth of Forth at Leven. The map shows those areas estimated to have a 0.5% or greater chance of flooding each year. The extent of this area is shown in Figure 1.3 - Environmental Constraints Map. No flood defences are shown on this map.
- 4.4.4 Impacts on the River Leven, River Ore, Back Burn and the Firth of Forth have been assessed as being of small minor negative impact significance. It is considered that the impact significance would increase to moderate / major negative impact in the unlikely event that the hydraulic capacity of the river is reduced during the construction works.
- 4.4.5 Any impacts occurring during the operational phase of the options are assessed as being of small minor negative impact significance. Any potential long-term pollution and maintenance impacts are considered to be addressed using standard mitigation measures. The hydraulic capacity of the River Leven, River Ore and Back Burn must be maintained, to minimise any impacts on upstream flooding. In particular, the design of any embankments must preserve the hydraulic capacity of the Leven and its floodplain. Should the hydraulic capacity of the river be reduced during the operation of either option A or B, i.e. a long-term impact, it is then considered that the impact significance would increase to negative moderate / major Impact. In terms of the disturbance and release of any groundwater contaminants, it is considered that the impact significance would range from no impact to small minor negative impact.

4.5 Summary

- 4.5.1 The impacts of construction and operation on the hydrological resource are likely to be low providing that the necessary mitigation measures are put in place to avoid pollution of watercourses.
- 4.5.2 The hydraulic capacity of the River Leven and River Ore must be maintained to minimise any impacts on upstream flooding. In particular, the design of any additional infrastructure required for the preferred option must preserve the hydraulic capacity of the River Leven and River Ore and the floodplains.
- 4.5.3 However both rivers are shown to be at risk from flooding events. Further assessment would be required to examine this issue further.

5 Geology, Agriculture and Soils

5.1 Scoping

5.1.1 The sub objectives of Geology and Agriculture and Soils have been combined in this section.

Agriculture

5.1.2 The study area lies within the built up area of Leven and in open countryside and some agricultural land may be affected therefore agriculture has been included in the scope of this assessment.

Geology and Soils

5.1.3 The soils and underlying geology are important factors in determining many of the physical attributes of an area, such as the physical appearance of the environment, water quality and land use. Soils and the underlying bedrocks can contain valuable resources, including economically valuable mineral and water reserves. Consideration should be given to whether a planned development reduces or affects the resource base or inhibits future use of such resources. Proposed infrastructure works can impact on geological or geomorphological features, which are considered valuable in their own right (e.g. for academic or research purposes) or designated sites.

Methodology

5.1.4 At this stage no detailed investigation of geology or soils has been carried out. A desktop study was undertaken by Scott Wilson. The study drew upon geological mapping from the British Geological Survey, Soils mapping produced by the MacAuley Institute and Local Plans.

5.1.5 This report will serve to highlight any important issues, which may need further investigation. The level of confidence by which the predicted impact has been assessed is low i.e. the predicted impact and its level are best estimates. More information is likely to be required to improve the level of confidence.

5.2 Baseline

Geological Features

5.2.1 Searches of SNH data have revealed that the Firth of Forth SSSI may contain geological features that are of statutory designated importance along the study corridor – although this is difficult to quantify due to the large extent and fragmented extent of the Firth of Forth SSSI designation. There are no Regional Sites of Geological Significance (RIGS) identified in the Local Plans. Further consultation should be considered during the next stages of the project to identify whether the route will affect any other non-designated sites of value as geological features and mineral reserves. The area is known for its history of coal mining.

Solid Geology Underlying Geology and Superficial Deposits

5.2.2 The Bedrock in the study area consists of predominately Carboniferous rocks. Superficial deposits consist mainly of glaciofluvial deposits and raised beach deposits, with some areas of Sub-alluvial.

Drift Geology

5.2.3 The study area consists of drifts derived from Carboniferous sandstones, shales and limestones and raised beach sands and gravels derived from Carboniferous rocks with some Old Red Sandstone material.

Made Ground

5.2.4 Part of the study corridor is located over ground that has been subject to previous development. The roads and former railways account for most of the made ground deposits at Leven.

Geomorphology

5.2.5 The study area is located in the Coastal Hills and Urban Landscape Character Types of the Fife Landscape Character Assessment (LCA). The landform consists of undulating lowlands with gentle and strong slopes which slope towards the Firth of Forth.

Contaminated Land

5.2.6 It is expected that contaminated land may be present in the study area where there is made ground present. Former industries present at in the study area may have produced, used and stored substances that are harmful to human health. However, further investigation will be required.

Agricultural Land Classification

5.2.7 The majority of land use adjacent to the study area is agricultural land mainly used for arable purposes. Land quality is generally Class 2 or 3(1) and 3(2) (Macaulay Institute for Soil Research, 1986). Agricultural land designated as Class 2 is defined as 'Land capable of producing a wide variety of crops', and Class 3(1) and 3(2) as 'Land capable of producing a moderate range of crops'. Land designated as Class 1, 2 and 3(1) is considered to be prime agricultural land.

5.3 Assessment**Construction**

5.3.1 Any available topsoil (upper 0.5 m approximately) should be excavated, stored and reused for covering verges, earthworks slopes and landscaping wherever possible. Any excess topsoil arising from excavation should be transferred offsite, for re-use if of suitable quality.

5.3.2 Any excavation material could be reused for fill in earthworks and landscaping and surplus removed from the site. Any contaminated material that is discovered during construction will require to be analysed to determine the hazard, suitability of re-use and whether unusable deposits should be disposed of at a licensed site.

Effects on Underlying Geology

5.3.3 Construction of the new railway stations associated with both options is expected to involve shallow cuttings. It is not known at this stage the depth and extent of the works. The cuttings are expected to be made in drift deposits and are not expected to affect the underlying Bedrock. At present there is expected to be a neutral effect on the underlying geology and on water reserves.

Operation

5.3.4 Whichever option, option A or option B has been constructed, it is expected that there will be no discernable effects associated with the geology along the route.

5.4 Appraisal

- 5.4.1 Option A would have a neutral impact on the Geology, Agriculture and Soils as the infrastructure for the option is currently intact. There may be some additional works required in which case impacts are expected to be negative minor to negative moderate depending on the design and location. The construction of new railway stations at Leven and Cameron Bridge are likely to cause negligible to minor adverse impacts during construction associated with groundbreaking work, and the potential removal of spoil. This issue would be temporary.
- 5.4.2 Option B would require the excavation of foundations and will result in an impact of local permanent negative slight magnitude. The construction will require granular fill for use in the construction of the tracks, earthworks and backfill to drainage. This will result in an impact of permanent negative minor magnitude at the source of extraction. Option B will also have a negative moderate to major impact on agriculture.
- 5.4.3 The predicted impacts are expected to be local but are dependent on the final design of the preferred option and the materials chosen for construction. If mitigation measures in the form of best practice construction methods are utilised, the significance of any potential impact will be negative minor to no impact. No residual impacts are expected.

5.5 Summary

- 5.5.1 The predicted effects are likely to be no impacts and negative minor to moderate impact for option A and B respectively, and the impacts are expected to be local, but further investigation will be required at the detailed design stage.

6 Biodiversity

6.1 Scoping

- 6.1.1 This section deals with the potential ecological impacts associated with the route options for the Levenmouth Sustainable Transport Study scheme. The key ecological features of this area are the Firth of Forth Special Protection Area (SPA), Site of Special Scientific Interest (SSSI) and Ramsar site, three areas of Inventory Ancient Woodland, the Kennoway-Windygates Wildlife Site and the River Leven, the River Ore and the Back Burn.
- 6.1.2 This ecological appraisal is based on the Scottish Transport Appraisal Guidance (STAG) for conducting Stage 2 environmental assessments. It must be noted that this appraisal is solely based on a thorough desk-based study and consultation with relevant nature conservation groups. Information regarding species status and key environmental schemes and designations of relevance to the site was gained through consulting the Fife Local Biodiversity Action Plan (LBAP), the UK BAP, Kirkcaldy Area Local Plan (March 2003), Glenrothes Area Local Plan (March 2003), Levenmouth Area Local Plan (July 2005), the Scottish Natural Heritage (SNH) Sitelink website and the Forestry Commission Land Information Search website. Sites deemed of relevance were those within 2km of the site boundaries for statutory designated sites, and within 1km for non-statutory sites and features. The National Biodiversity Network (NBN) Gateway website was consulted to provide baseline information on protected species records close to the site areas.
- 6.1.3 Written consultation responses were received from the Scottish Natural Heritage Area Officer for West and Central Fife, the Scottish Environment Protection Agency (SEPA) and the Take a Pride in Fife Environmental Information Centre about the nature conservation features present in the study corridor.
- 6.1.4 It must be noted that no site visits by ecologists were undertaken as part of the site assessment procedure. If the development moves to a further stage of assessment, survey of the chosen option route by an ecologist will be necessary to verify the presence of species of nature conservation importance such as protected species or invasive species prior to development.

6.2 Baseline

- 6.2.1 The baseline conditions within the area are presented below.
- 6.2.2 Firth of Forth is, in terms of statutory importance, designated as an SPA, a SSSI and a Ramsar site. In terms of non-statutory sites of importance, there are two woodland areas of significance which are in proximity to the scheme options and fall within the Inventory of Ancient, Long-Established and Semi-Natural Woodland. Wemyss Wood is immediately south of the mothballed railway line (close to both options A and B) and Little Park Plantation is located just north of the River Ore (close to Option B).
- 6.2.3 Consultation with the Take a Pride in Fife Environmental Information Centre (TAPIF EIC) and information searches of the SNH National Biodiversity Network (NBN) Gateway website have indicated the following potential ecological constraints:

- The proximity of the options A and B to the Firth of Forth and its associated Designated Sites;
 - Trees, scrub and hedgerows that border the River Leven, the River Ore, the Back Burn, the disused railway line (both options A and B);
 - Buildings and structures e.g. rail bridges currently within the route may provide suitable habitat for breeding birds and roosting bats;
 - Records of otter (*Lutra lutra*), red squirrel (*Sciurus vulgaris*), badger (*Meles meles*), kingfisher (*Alcedo atthis*), pipistrelle bat (*Pipistrellus pipistrellus*) and Daubenton's bat (*Myotis daubentoni*) are present in the wider area (within 1km of the railway corridors) all of which are on the Fife Local Biodiversity Action Plan (LBAP); and
 - Otter might visit the stretch of the River Leven, River Ore or Back Burn adjacent to the route Option corridors as they transit the area while foraging within their home range (which can be up to 35km for males and up to 20km for females), it is also possible that water vole (*Arvicola terrestris*), an LBAP species, may inhabit these watercourses.
- 6.2.4 An ecological walkover survey would be required to ascertain the potential use of the site by the above mentioned protected species and breeding birds. Investigation of all structures to be demolished, refurbished or affected will be necessary to check their use and potential use by roosting bats or breeding birds.
- 6.2.5 There is potential for impacts on the River Leven, River Ore, Back Burn and Firth of Forth estuary due to the proposals. The River Leven will be crossed by both options, and the lines will run along the banks of the River Ore. Potential impacts on aquatic life will require to be considered; these include contamination, noise, vibration and lighting. Attention during the next stage of the project should be given to salmonids e.g. Atlantic salmon (*Salmo salar*) which are known to inhabit these watercourses (Alistair W Morrison, SEPA, letter dated 23rd April 2008), and also to species such as the European eel (*Anguilla anguilla*) and lamprey species (*Lampetra* spp.) It may be necessary to time works with consideration to spawning periods of these species.
- 6.2.6 No site visit has been carried out. It is unknown whether there are any invasive plant species. Under the Wildlife and Countryside Act 1981 section 14 (as amended by the Nature Conservation (Scotland) Act 2004) it is an offence to plant or otherwise cause species listed in Schedule 9 (Part II) to grow in the wild. Species listed within Schedule 9 (Part II) of the 1981 Act include Japanese knotweed (*Fallopia japonica*) and giant hogweed (*Heracleum mantegazzianum*). Both of these plant species carry with them the ability to undermine built structures and health risks respectively and both grow on industrial, urban ground akin to the study area. An ecological walkover survey would confirm presence or absence of these species.
- 6.2.7 Both options A and B are examined in turn for the assessment and appraisal. Both options include bus priority measures which are likely to have minimal ecological impact principally because of minimal construction works required, and are identical for each option. Therefore the assessment and appraisal primarily relate to the railway impacts of each option.

6.3 Assessment

- 6.3.1 Without up-to-date survey information yielded from an ecological walkover survey by a trained ecologist, it is only possible to assess the options using the “precautionary principle”, i.e. assess the options as though the species would be affected, until proven otherwise. Scottish Natural Heritage will require surveys of protected species and development of mitigation measures as part of an Environmental Impact Assessment process if any are affected by the preferred route option. *Option A: Re-commissioning the Existing Railway Line.*
- 6.3.2 The impacts of this option are likely to be minimal due to the majority of the infrastructure required by this scheme being in place already. The construction phase will however require vehicles and machinery on site, and the operation of the railway will have its associated impacts as follows.
- 6.3.3 The removal of trees or scrub along the rail line to allow its re-opening will result in the loss of breeding bird habitat during the construction phase. To date the nature of the vegetation cover of the existing disused rail-line is unknown. An ecological survey of the rail-line will be required before potential impacts upon breeding birds can be reliably quantified.
- 6.3.4 Any mature trees or structures e.g. bridges, buildings, to be demolished may provide suitable roost sites for bats. Any proposals requiring removal or disturbance to such trees or structures may have negative impacts on any resident bat populations. Bat surveys would be required for any mature trees or structures earmarked for demolition, and mitigation measures put in place to identify alternative roost sites and possibly provide replacement roosting boxes if necessary. In the long-term, bats would be expected to relocate their roost sites to other suitable areas.
- 6.3.5 From desk-based research it appears there is suitable badger sett and foraging habitat to the north and south of the mothballed rail line, in particular in the vicinity of Wemyss Wood. Further survey is essential to confirm presence or absence of badgers along the route. Records from Scottish Badgers should be sought as part of further assessment procedures. Badger survey of the route would also inform mitigation options should there be any risk of impact upon this species.
- 6.3.6 Aquatic species, including Atlantic salmon, river lamprey, brook lamprey, sea lamprey, European eel, water vole and otter may be impacted upon during construction. If otters venture onto the route during either construction or operational phases, they may be injured or killed. Comprehensive survey for otters along all watercourses bisecting the rail line route will be required as part of further assessment of this route option to inform mitigation options to minimise impacts upon this species.
- 6.3.7 There is potential for impacts on the Firth of Forth, River Leven, River Ore and the Back Burn during both construction and operation stages due to the proximity of the rail line to the Firth of Forth and the River Ore (c. 10 metres at some points). Pollution incidents during construction/operation could have implications for the Firth, the rivers and their habitats.
- 6.3.8 The Firth of Forth SPA, SSSI and Ramsar Site extend to within approximately 10 metres of the Leven Docks along which the rail line runs. Although the rail line is established, there is nonetheless a possibility that pollution incidents during reinstatement/operation could have

an impact on the sites, although it is considered unlikely that the important features for which the sites are designated would be significantly affected.

- 6.3.9 The route bisects the Kennoway-Windygates Wildlife Site and runs to the immediate north of the Inventory Ancient Woodland of Lady's Wood. Due consideration should be made during design and construction to ensure the nature conservation value of these areas, in particular trees and scrub habitat, are not threatened.
- 6.3.10 Although unconfirmed to date, there is the possibility that Japanese knotweed or giant hogweed could be spread throughout the site and surrounding area during construction and operation stages. This would breach the legislation detailed above and incur a prosecution. If found on site, these plants will be subject to a specific eradication/management programme before works can commence.

Option B: Re-commissioning the Existing Railway Line – straightened alignment

- 6.3.11 The assessment of the impacts for the realignment of the rail line between Windygates and Waukmill junction are broadly similar to those identified for option A. There is however likely to be significantly more land-take of currently undeveloped land, direct habitat loss and habitat fragmentation associated with the construction of a new rail line. Full ecological survey of the corridor ear-marked for construction of a new rail-line would have to be conducted before potential impacts upon biodiversity receptors can be reliably quantified.

6.4 Appraisal

- 6.4.1 Without up-to-date survey information yielded from an ecological walkover survey, it is only possible to appraise the options using the "precautionary principle", i.e. appraise the options as though the species would be affected, until proven otherwise.

Option A: Re-commissioning the Existing Railway Line

- 6.4.2 The impact of the loss of habitat on breeding birds would be permanent direct negative and the magnitude is expected to be negative moderate. Significance is assessed as being moderate negative impact.
- 6.4.3 If structures supporting bat roosts are to be removed, this would have a short-term direct negative impact on the species involved. The magnitude of the impact would be expected to be negative moderate. Significance is assessed as being moderate negative impact.
- 6.4.4 If badgers were discovered in the study corridor, the reinstatement of a functional rail line within their foraging grounds and territory would have a long-term direct negative impact. If good site management and any necessary mitigation is employed the magnitude of the impact is taken to be negative minor. Significance is assessed as being minor negative impact.
- 6.4.5 The impact of the loss of habitat - especially riparian habitat along the River Ore, within the Kennoway-Windygates Wildlife Site and loss of trees from the edges of the Wemyss Wood Inventory Ancient Woodland site - along the route line would be permanent direct negative and the magnitude is expected to be negative moderate. Wherever possible, the removal of habitat/vegetation should be minimised and where possible, new native woodland/scrub species should be planted to complement any existing nature conservation interest. New planting would have a positive permanent, medium-term, direct impact of positive minor magnitude. Taken together, the significance of habitat loss on this rail-line site and

subsequent gains through landscape planting is assessed as moderate negative. It must be noted that loss of any ancient woodland will not be ameliorated by new planting and will involve a more significant impact – such loss should be avoided where possible. Ecological survey would quantify any loss involving ancient woodland.

6.4.6 There is likely to be a temporary, indirect negative effect on aquatic species within the Rivers Leven and Ore and the Back Burn and the magnitude of the effect is considered to be negative slight. There is also the potential for engineering works such as bridges, bank reinforcement, sediment management and discarded construction waste e.g. plastics and pollution incidents to affect the quality of these watercourses and injure animal life in the water such as otters. The impact would be temporary, short-term, direct negative, although it is expected that good site management and mitigation (involving adherence to SEPA pollution prevention guidance notes (PPGs) and the Water Environment (Controlled Activities)(Scotland) Regulations 2005) would minimise the risk of this occurring, and consequently the magnitude of the impact is considered to be negative minor. Significance is assessed as being minor negative impact.

6.4.7 The impact of the spread of Japanese knotweed or giant hogweed would be permanent direct negative and the magnitude anticipated to be negative moderate although it is expected that through good site management and species eradication, the risk of negative impacts occurring would be removed. Consequently the eradication of these invasive plant species (if found on site) would have a positive permanent, long-term, direct impact of positive minor magnitude. Significance is assessed as being minor benefit.

Option B: Re-commissioning the Existing Railway Line – straightened alignment

6.4.8 Realignment of the existing rail-line through undeveloped land would involve significantly more land-take of mainly agricultural land and consequently direct habitat loss and fragmentation compared with option A. Full ecological survey of the corridor ear-marked for construction of a new rail-line would have to be conducted before potential impacts upon biodiversity receptors can be reliably quantified.

6.4.9 The impact of the loss of habitat on breeding birds would be permanent direct negative and the magnitude is expected to be negative moderate. Significance is assessed as being moderate negative impact.

6.4.10 If structures supporting bat roosts are to be removed, this would have a short-term direct negative impact on the species involved. The magnitude of the impact would be expected to be negative moderate. Significance is assessed as being moderate negative impact.

6.4.11 If badgers were discovered in the study corridor, the reinstatement of a functional rail line within their foraging grounds and territory, potentially fragmenting this habitat, would have a long-term direct negative impact. If full survey for signs and setts, good site management and any necessary mitigation is employed the magnitude of the impact is taken to be negative moderate. Significance is assessed as being moderate negative impact.

6.4.12 The impact of the loss of habitat - especially riparian habitat along the River Ore, within the Kennoway-Windygates Wildlife Site and loss of trees from the edges of the Little Park Plantation Inventory Ancient Woodland site and the augmentation of habitat to include rail line embankments and the line itself would be permanent direct negative and the magnitude is expected to be negative high. Wherever possible, the removal of habitat/vegetation should be minimised and where possible, new native woodland/scrub species should be planted to complement any existing nature conservation interest. New

planting would have a positive, permanent, medium-term, direct impact of positive minor magnitude. Taken together, the significance of habitat loss through this corridor and subsequent gains through landscape planting is assessed as moderate negative. It must be noted that loss of any ancient woodland will not be ameliorated by new planting and will involve a more significant impact – such loss should be avoided where possible. Ecological survey of the route corridor would quantify any loss involving ancient woodland.

- 6.4.13 There is likely to be a temporary, indirect negative effect on aquatic species within the Rivers Leven and Ore and the Back Burn. Two new river crossings will have to be constructed, one at the River Leven and one at the River Ore (close to Little Park Plantation), therefore there is the potential for engineering works such as bridges, bank reinforcement, sediment management and discarded construction waste e.g. plastics and pollution incidents to affect the quality of these watercourses and injure animal life in the water such as otters. The impact would be temporary, short-term, direct negative, although it is expected that good site management and mitigation (involving adherence to SEPA pollution prevention guidance notes (PPGs) and the Water Environment (Controlled Activities)(Scotland) Regulations 2005) would minimise the risk of detrimental impacts occurring. Consequently the magnitude of the impact is considered to be negative minor. Significance is assessed as being minor negative impact.
- 6.4.14 If it is ascertained that there is a significant risk of impact to the Firth of Forth in further assessment procedures for either option A or option B (which implicate the SPA, SSSI and Ramsar site) then an Appropriate Assessment (AA)¹ may be required.
- 6.4.15 The impact of the spread of Japanese knotweed or giant hogweed would be permanent direct negative and the magnitude anticipated to be negative moderate although it is expected that through good site management and species eradication, the risk of negative impacts occurring would be removed. Consequently the eradication of these invasive plant species (if found on site) would have a positive permanent, long-term, direct impact of positive minor magnitude. Significance is assessed as being minor benefit.

Caveat

- 6.4.16 The impact of the options on protected species is only indicative and is not reliably quantifiable at this time. An ecological walkover survey will be required during further assessment procedures to fully assess the likely impacts and their significance based on field evidence.

6.5 Summary

- 6.5.1 The most likely impacts of two railway line proposals on the ecological and nature conservation resources along each route are: the loss of areas of scrub and grassland habitat which have developed on site or adjacent to the site and will require clearing as part of the development works; loss of bat roosts within trees and structures to be demolished; the potential for pollutants entering sensitive and protected watercourses during both construction and operation stages; and the potential spread of invasive plant species.

¹ S48 of the Conservation (Natural Heritage &c) Regulations 1994 requires the competent authority to undertake an Appropriate Assessment where it is considered that a development or project unrelated to the conservation management of that site is *likely* to have *significant* effects upon the features of the site for which the area has been designated. For the purposes of an Appropriate Assessment, the competent authority is defined as the organisation that grants consent for the scheme to proceed.

- 6.5.2 Option B, however, is likely to have the higher ecological impact principally as a result in that it would involve significantly more land-take of mainly agricultural land and consequently direct habitat loss and fragmentation compared with option A.
- 6.5.3 There is the potential for significant impacts on protected species, such as bats and to a lesser extent badgers, otters and water voles, and legal implications pertaining to invasive plant species for each route. However the likelihood and significance of impacts will not be known until detailed ecological field surveys are carried out on site. Surveys of protected species, including detailed inspection of any structures and trees to be demolished should be conducted at an appropriate time of year to allow the results to be incorporated into the proposals.

7 Visual Amenity

7.1 Scoping

7.1.1 This appraisal assesses the visual effects of the proposed transport options. Visual effects are how the landscape is experienced the modifications that the proposed development will make on views. The appraisal is based on the STAG Guidance for conducting Stage 2 environmental assessments. It is based on desk-top research and consultation with relevant statutory bodies. There has been no site visit by a landscape Architect for this study. In order to fully assess the options a site visit would be required.

Methodology

7.1.2 The methodology is based on best practice guidance from the 'Guidelines for Landscape and Visual Impact Assessment' Second Edition, The Landscape Institute/Institute of Environmental Management and Assessment (Spon Press 2002) (GLVIA). The assessment uses the following timescale:

- Baseline - existing conditions before the proposal;
- Operation - year 1 to show the preferred option as implemented; and
- Construction phase to show the temporary effects.

7.1.3 Suggested mitigation measures are reported in the AST under qualitative information to enable mitigation to be considered at an early stage in the development of the project. The residual effects (after mitigation) are recorded.

7.1.4 The Study Area for a full visual assessment would be the zone of visual influence (ZVI) of the proposed options as determined by a site visit. The ZVI is defined by physical conditions such as topography, built up areas and large areas of woodland. As this is a desk based study a notional ZVI of 200m from the route has been used. The visual effects are assessed as they relate to groups of receptors identified from the map.

7.2 Baseline

7.2.1 The proposed options are located between Leven and Methil and Glenrothes on flat to gently undulating ground. They run through urban, urban fringe and rural areas. There appears to be no major vantage points in the study area where an overview of the options would be seen. Where the options enter the built up areas the ZVI will be relatively confined but in the urban fringe and rural areas a wider view will be seen.

7.2.2 The groups of receptors together with the visual baseline are further reported in the STAG 2 AST. There are residential, business, recreational and travelling receptors along the proposed routes. Their sensitivity to visual change rating is a judgement determined by their proximity to the route and the extent to which they are screened by vegetation, barriers, topography etc. The importance of the view is taken into account e.g. whether the property is residential or business use. Travelling receptors experience transient views whilst travelling through the area. The receptors who are likely to experience the greatest effects are the residential receptors adjacent to the proposal or in close proximity.

7.3 Assessment

Construction

7.3.1 Temporary effects would depend on the scale of the works for each option. Construction works may comprise:

- The movement of construction vehicles, machinery etc;
- Siting of the contractor's main offices and works compound areas;
- Fencing, road works, signing etc;
- Stripping of topsoil;
- Excavations;
- Transfer and storage of cut and fill material;
- The construction of temporary haul roads;
- Potential security lighting at night;
- The storage of construction equipment and materials;
- On-site fabrication of major structures; and
- Removal of trees and vegetation.

7.3.2 The magnitude of construction effects for each option would be as follows: option A – negative moderate; Option B – negative major.

7.3.3 The most visually intrusive construction works would be those associated with option B, the realignment of the railway line. Permanent effects would be the removal of vegetation and cut and fill operations.

Operation

7.3.4 Both options A and B are examined in turn for the operational impacts.

Option A: Re-commissioning the Existing Railway Line

7.3.5 The reinstatement of the railway line will involve the cut back of some vegetation beside the line and the laying of new tracks. This will result in adverse effects for some receptors. There are relatively few receptors close to the line because much of it runs through a rural area. The largest numbers of receptors are at Cameron Bridge and between Methil and Leven. A large number of receptors at Methilhill and Kirkland will be screened by vegetation associated with the river. The most noticeable changes will be the cut back of vegetation and more activity on the line.

Option B: Re-commissioning the Existing Railway Line – straightened alignment

7.3.6 The realignment of the railway line will result in major landscape changes but there are very few receptors. There are a few receptors at Windygates and some isolated farms and small settlements within the 200m zone. The changes will include extensive cut and fill areas, the introduction of a new line into the rural landscape, cut back of vegetation and the introduction of two river crossings. The extent to which the changes will affect the receptors will depend on the proximity of the receptors to the works and the degree to which there is screening.

7.4 Mitigation

- 7.4.1 General mitigation recommendations in relation to both options would be careful siting and design of any associated structures to avoid adverse effects on adjacent receptors and minimising vegetation removal.
- 7.4.2 Specific railway line mitigation recommendations would be to design the cut and fill areas to blend with the existing topography as far as possible and the use of planting to provide screening where appropriate.

Residual Effects

- 7.4.3 Both options, after mitigation, would result in changes to the views of receptors affected by the proposals as described above. For option A there is likely to be little scope for mitigation measures other than minor changes to the siting and design of structures. For option B there may be scope for introducing planting to provide screening to soften the effects to some degree, but the residual effects will largely remain as described in the visual effects section.

7.5 Appraisal

Construction

- 7.5.1 Construction effects are temporary except for the removal of mature vegetation from the site.
- 7.5.2 Option A: The cut back of vegetation and laying of new track will cause major temporary disruption for some receptors. Major /moderate negative impact.
- 7.5.3 Option B: The introduction of a new railway line into the open countryside will cause major disruption to nearby receptors. Major negative impact.

Operation

- 7.5.4 Option A: The cut back of vegetation and introduction of new track on to the existing base will significantly change the views of nearby receptors. Moderate negative impact.
- 7.5.5 Option B: The introduction of a new railway line into the open countryside will cause a significant intrusion into the views of some nearby receptors. There may be some opportunity for screening. Major negative impact.

7.6 Summary

- 7.6.1 The most disruptive option is Option B because it will introduce a new length of railway line into a previously undeveloped countryside area. However, for both options the most sensitive receptors are those adjacent to the proposed works who will directly overlook the scheme from close range. There is not much opportunity to reduce the effects significantly by mitigation.

8 Cultural Heritage

8.1 Scoping

- 8.1.1 This section of the STAG Environmental Appraisal relates to the assessment of cultural heritage issues, with particular respect to local archaeology, listed buildings and the historic built environment within the study area of the route options.
- 8.1.2 Cultural heritage offers a tangible link to the past, which might be permanently affected by development. To prevent needless damage and destruction, care must be taken either through design or mitigation measures to ensure that negative impacts are kept to a minimum.
- 8.1.3 The scoping of cultural heritage issues relates to the proposed study area and the factors that are requiring assessment.
- 8.1.4 A 200m search zone was identified on either side of the two options. Four sources of information were used: Kirkcaldy Area Local Plan (March 2003); Glenrothes Area Local Plan (March 2003); Levenmouth Area Local Plan (July 2005); data from the Pastmap interactive website developed by Historic Scotland, RCAHMS; and the Association of Local Government Archaeological Officers UK. These sources of information provided details of statutory and non-statutory designated sites within the study and of archaeological remains.
- 8.1.5 In addition, no consultation responses have been received from Historic Scotland.

8.2 Baseline

- 8.2.1 The baseline reported below relates to the existing situation, the year of opening and 15 years after opening. It is unknown as to what future designations will be made and what archaeological finds will be discovered. Cultural heritage appraisal is based on a desk study and consultations as described above. The constraints described below are shown in Figure 1.3 – Environmental Constraints.

Statutory designations

- 8.2.2 There is only Scheduled Ancient Monuments (SAM) located just within a 200 metre search zone either side of the route corridor - Balgonie Castle. There is a SAM located just without the 200 metre search zone - Bridge over the River Ore at Waukmill.
- 8.2.3 There are no Conservation Areas within the study corridor. There are Historic Gardens and Designed Landscapes (HGDL) at Balgonie Castle, Balfour, and Letham Glen. There is a significant number of Listed Buildings in and between Leven and Markinch.

Non-statutory designations

- 8.2.4 There is a significant number of National Monument Records of Scotland (NMRS) and Scottish Sites and Monuments Records (SMRs) within a 200m search zone of the route corridor.
- 8.2.5 There are pockets of Ancient Woodland adjacent to the River Leven and River Ore.

Archaeological remains

- 8.2.6 It is likely that the study areas may contain uncharted archaeological remains due to the previous history, industrial activity and presence of a watercourse.

8.3 Assessment**Statutory designations**

- 8.3.1 There are a number of listed buildings adjacent to the A911 corridor that may experience construction impacts and impacts on their setting.
- 8.3.2 The construction and operation of bus services with priority measures is unlikely to affect the setting of any Conservation Areas, Listed Buildings and Scheduled Ancient Monuments. Both SAMs mentioned identified above in the baseline are unlikely to be affected by the Options. However, option B could have a negative moderate impact upon the Bridge of River Ore SAM.
- 8.3.3 There are not expected to be any significant physical impacts on any Listed Buildings or SAMs.

Non-statutory designations

- 8.3.4 Non-statutory designations comprise National Monument Record of Scotland sites. It is unlikely that any of the NMRS will experience direct short-term negative impacts as a result of any construction works, such as the construction of a new railway station at Cameron Bridge. Additionally, it is likely that the settings of all the NMRSs and SMRs will be affected, but it is unlikely to be of any great significance, as the majority of the infrastructure required for the options are existing, therefore impacts to surrounding cultural heritage receptors are likely to be neutral to negative minor, depending on the design and location of the works.
- 8.3.5 For option B a number of NMSR sites could be directly affected by the introduction of a new railway alignment. Impacts would be negative moderate.

Archaeological remains

- 8.3.6 The impact of the site options on uncharted archaeological remains is not quantifiable at this time, and survey work may be required during the subsequent stages of the project in order to fully assess the likely impacts and their significance.

8.4 Appraisal

- 8.4.1 The full appraisal of cultural heritage impacts is reported in the STAG 2 AST.
- 8.4.2 The magnitude of construction and operational impacts on non-statutory sites and uncharted archaeological remains for both the sites will be neutral or negative minor, as there may be changes to the receptors settings, while the significance of the impacts are judged to be direct small minor negative impact.

8.5 Summary

- 8.5.1 The cultural heritage assessment identified those cultural and archaeological resources within a 200m corridor along the route of the two proposed options. There are a number of listed buildings present within the study corridor. Only one SAM (Balgonie Castle) is

located within the 200m study corridor. There would be a neutral impact upon the setting of this SAM.

- 8.5.2 There are unlikely to be any significant impacts to statutory designations due to the fact that the vast majority of the required infrastructure for the options is already in place. There are also a number of non statutory designations (NMRSs and SMRs) near to both sites that may experience impacts upon their setting although this would be a negligible - minor impact. Option B has the potential to directly impact upon NMRSs and SMRs therefore the impact could be negative moderate to major depending on the exact alignment.
- 8.5.3 The possibility of uncharted archaeological remains was also investigated and accepted, given the nature of the study corridor and the need for further study at the next stage.
- 8.5.4 Construction and operational effects were considered to have a neutral to negative minor impact on any cultural heritage and archaeological resources within the study areas.

9 Landscape

9.1 Scoping

9.1.1 This appraisal assesses the landscape effects of the proposed transport options. The landscape effects are changes to the landscape resource. The appraisal is based on the STAG Guidance for conducting Stage 2 environmental assessments. It is based on desk-top research and consultation with relevant statutory bodies. There has been no site visit by a landscape Architect for this study. In order to fully assess the options a site visit would be required.

Methodology

9.1.2 The methodology is based on best practice guidance from the 'Guidelines for Landscape and Visual Impact Assessment' Second Edition, The Landscape Institute/Institute of Environmental Management and Assessment (Spon Press 2002) (GLVIA). The assessment uses the following timescale:

- Baseline - existing conditions before the proposal;
- Operation - year 1 to show the preferred option as implemented; and
- Construction phase to show the temporary effects.

9.1.3 This assessment uses the five point scale in accordance with the Design Manual for Roads and Bridges Volume 11: Environment Assessment, which is intended for the assessment of roads but provides a good general landscape classification (i.e. high quality, very attractive, good landscape, ordinary landscape and poor landscape).

9.1.4 Suggested mitigation measures are reported in the AST under qualitative information to enable mitigation to be considered at an early stage in the development of the project. The residual effects (after mitigation) are recorded.

9.2 Baseline

9.2.1 There are a number of Historic Gardens and Designed Landscapes located within the study area including Coaltown of Wemyss. There are two Areas of Great Landscape Value located outside the study area – Durie AGLV located approximately 1km north of Leven and an AGLV to the north of Glenrothes, Leslie and Star (including Lomond Hills). (See Figure 1.3 Environmental Constraints).

9.2.2 The study area is located in an established area of countryside and urban area between Leven and Glenrothes and Kirkcaldy. This area is undergoing redevelopment so there are recent changes to the layout of built up areas and associated landscaping. The land is flat to gently undulating and criss-crossed with transport corridors. The landscape is classified as the Lowland River Basin and Urban Landscape in the Fife Landscape Character Assessment.

9.2.3 The landscape is attractive but increasingly undergoing development. It is not specifically designated although there are AGLV's nearby and Historic Gardens and Designed Landscapes within the area. The landscape would be classified as good/ordinary landscape.

9.3 Assessment

9.3.1 The routes for the two options run through urban, urban fringe and rural areas.

Construction

9.3.2 Temporary effects would depend on the scale of the works for each option. Construction works may comprise:

- The movement of construction vehicles, machinery etc;
- Siting of the contractor's main offices and works compound areas;
- Fencing, road works, signing etc;
- Stripping of topsoil;
- Excavations;
- Transfer and storage of cut and fill material;
- The construction of temporary haul roads;
- Potential security lighting at night;
- The storage of construction equipment and materials;
- On-site fabrication of major structures; and
- Removal of trees and vegetation.

9.3.3 It is unlikely that construction effects will permanently affect the landscape character. The most intrusive construction works would be those associated with Option B, the realignment of the railway line. Permanent effects would be the removal of vegetation and cut and fill operations.

9.3.4 The magnitude of construction effects for each option would be as follows: Option A – negative minor/neutral; Option B – Negative moderate.

Operation

Option A: Re-commissioning the Existing Railway Line

9.3.5 The reinstatement of the railway line will involve the cut back of some vegetation beside the line and the laying of new tracks. The route is close to the River Leven and River Ore and the cut back of vegetation might affect the riparian vegetation of the river corridor. As the route is on an existing railway line there will be minimal effects on the landscape character. The magnitude of effects are likely to be negative minor.

Option B: Re-commissioning the Existing Railway Line – straightened alignment

9.3.6 The realignment of the railway line will result in major landscape changes including extensive cut and fill areas which cut across the grain of the landscape, the introduction of a new line into the rural landscape, cut back of vegetation and the introduction of two river crossings which might affect the riparian vegetation of the river corridors. The new line would, however, be a relatively short distance in an area already containing an extensive transport network. The magnitude of effects would be negative moderate.

Mitigation

9.3.7 Mitigation recommendations in relation to option A would be careful siting and design of any associated structures to avoid adverse effects.

- 9.3.8 In relation to option B mitigation recommendations would be to design the cut and fill areas to blend with the existing topography as far as possible and the use of planting to soften the appearance of the cut and fill works and to set the scheme into the landscape structure.

Residual effects

- 9.3.9 Both options, after mitigation, would result in changes to the landscape as described above. For option A there is likely to be little scope for mitigation measures other than minor changes to the siting and design of structures. For option B there may be scope for introducing planting to soften the effects and to set the scheme into the landscape structure but the residual effects will largely remain as described in the landscape effects section.

9.4 Appraisal

Construction

- 9.4.1 Construction effects are temporary except for the removal of mature vegetation from the site.
- 9.4.2 Option A: The cut back of vegetation and laying of new track will cause temporary changes to the landscape but will not significantly affect the landscape character. Minor negative impact.
- 9.4.3 Option B: The introduction of a new railway line into the open countryside will cause major temporary landscape changes. Major negative impact.

Operation

- 9.4.4 Option A: The cut back of vegetation and introduction of new track on to the existing base will cause some landscape changes but will not significantly affect the landscape character. Minor negative impact.
- 9.4.5 Option B: The introduction of a new railway line into the open countryside will cause significant landscape changes but will only moderately affect the landscape character. Moderate negative impact.

9.5 Summary

- 9.5.1 The option which will have the largest effect on the landscape is option B because it will introduce a new length of railway line into a previously undeveloped countryside area. Option A will have relatively minor landscape effects.

Appendix B

Transport Economic Efficiency (TEE) Tables

Levenmouth Sustainable Transport Study**Results of Cost/Benefit Analysis**

Proposal: Option A - Rail Re-Opening (Kirkcaldy Extension) **versus** Reference Case (incl Bus-Priority in Do-Minimum)

60 Year Analysis Period Annual discount rate 3.5% 0-30 years and thereafter 3.0%
Residual Value = £1.79 million

(Note: Residual Values are included in the PVB and BCR estimates shown below)

Transport Economic Efficiency (TEE) Table

USER BENEFITS		STAG	PVB-60 £m		Comments
Safety Accident Savings		PV1	£0.32		Calculated in Safety Section (see Chapter 6 of STAG2 Report)
Travel Time Highway Time Savings			£63.24	(a)	Part of de-congestion benefits
PT Time Savings			£11.30	(b)	Part of de-congestion benefits
Rail Stopping Delays			£0.00	(c)	Due to extra train stopping time at the new stations
<i>Net Time Savings (Sub-Total)</i>		PV2	£74.55		= (a) + (b) + (c)
User Charges User Charges		PV3	-£1.24		Negative of revenues for Rail, B&C and Other PT added
VOC Fuel			£4.83	(d)	Part of de-congestion benefits
Taxation			£16.18	(e)	Included to show tax impact as transfer payment
Non-Fuel			£6.64	(f)	Part of de-congestion benefits
<i>Net VOC (Sub-Total)</i>		PV4.a	£27.64		= (d) + (e) + (f)
Quality/Reliability Performance Impacts			£0.00	(g)	Due to performance effects of new train service timetables
Station Facilities			£1.08	(h)	Due to ambience and facilities benefits from new stations
New Rolling Stock			£0.00	(i)	Due to benefits from rolling stock impacts
<i>Net Quality/Reliability (Sub-Total)</i>		PV4.b	£1.08		= (g) + (h) + (i)
Freight Sensitive Lorry Miles (SLM) Benefits		PV4.c	£35.17		Based on Diageo plans and FFG Bid estimates
Residual Value Residual Value at end of appraisal period		PV4.d	£1.79		The value of the new infrastructure at the end of the appraisal periods
PRIVATE SECTOR COSTS		STAG	PVB-60 £m		Comments
Private Sector Provider Impacts Investment Costs from Private Sector		PV5	£0.00		Assumes Government pays all infrastructure costs
Operations, Maintenance & Renewals Costs		PV6	-£45.49		Three elements make up the OMR costs
Revenues Rail trips			£13.39	(j)	Revenue generated by Rail trips
Other Rail (Non-Fare Box)			£0.00	(k)	Revenue from non-Fare Box sources
Bus and Coach			-£12.15	(l)	Revenue from B&C trips
Other PT			£0.00	(m)	Revenue from Other PT trips
<i>Net Revenue (Sub-Total)</i>		PV7	£1.24		= (j) + (k) + (l) + (m)
Grant/Subsidy Grant/Subsidy from Private Sector		PV8	-£32.10		Rail revenues do not cover OMR costs over appraisal period
Present Value of Benefits (PVB)			£62.96		= PV1 + PV2 + PV3 + PV4.a + PV4.b + PV4.c + PV4.d + PV5 + PV6 + PV7 + PV8
PUBLIC SECTOR IMPACTS		STAG	PVB-60 £m		Comments
Investment Costs Investment Costs from Public Sector		PV9	-£25.85		Capital costs discounted to price base
OMR Costs Operations, Maintenance & Renewals		PV10	£0.00		Revenues cover OMR costs over appraisal periods
Grant/Subsidy Grant/Subsidy Required to Operate System		PV11	£0.00		Revenues cover OMR costs over appraisal periods
Revenues Revenue Streams from Public Sector		PV12	£0.00		Revenues cover OMR costs over appraisal periods
Taxation Taxation from Public Sector		PV13	-£16.18		The negative of Item (e) above
Present Value of Costs (PVC) to Government			-£42.03		= PV9 + PV10 + PV11 + PV12 + PV13
Net Present Value (NPV)			£20.93		Comments NPV is in £million
NPV/K Ratio			0.81		This is the NPV divided by the Investment Costs from Public Sector (PV9)
Benefit/Cost Ratio (BCR) to Government			1.50		Ratios are the BCR to Government

Levenmouth Sustainable Transport Study**Results of Cost/Benefit Analysis**

Proposal: Option A - Rail Re-Opening (Cowdenbeath Extension) **versus** Reference Case (incl Bus-Priority in Do-Minimum)

60 Year Analysis Period Annual discount rate 3.5% 0-30 years and thereafter 3.0%
Residual Value = £1.79 million

(Note: Residual Values are included in the PVB and BCR estimates shown below)

Transport Economic Efficiency (TEE) Table

USER BENEFITS		STAG	PVB-60 £m		Comments
Safety Accident Savings		PV1	£0.32		Calculated in Safety Section (see Chapter 6 of STAG2 Report)
Travel Time Highway Time Savings			£46.25	(a)	Part of de-congestion benefits
PT Time Savings			£17.99	(b)	Part of de-congestion benefits
Rail Stopping Delays			£0.00	(c)	Due to extra train stopping time at the new stations
<i>Net Time Savings (Sub-Total)</i>		PV2	£64.23		= (a) + (b) + (c)
User Charges User Charges		PV3	-£0.10		Negative of revenues for Rail, B&C and Other PT added
VOC Fuel			£3.69	(d)	Part of de-congestion benefits
Taxation			£12.36	(e)	Included to show tax impact as transfer payment
Non-Fuel			£5.77	(f)	Part of de-congestion benefits
<i>Net VOC (Sub-Total)</i>		PV4.a	£21.81		= (d) + (e) + (f)
Quality/Reliability Performance Impacts			£0.00	(g)	Due to performance effects of new train service timetables
Station Facilities			£0.38	(h)	Due to ambience and facilities benefits from new stations
New Rolling Stock			£0.00	(i)	Due to benefits from rolling stock impacts
<i>Net Quality/Reliability (Sub-Total)</i>		PV4.b	£0.38		= (g) + (h) + (i)
Freight Sensitive Lorry Miles (SLM) Benefits		PV4.c	£35.17		Based on Diageo plans and FFG Bid estimates
Residual Value Residual Value at end of appraisal period		PV4.d	£1.79		The value of the new infrastructure at the end of the appraisal periods
PRIVATE SECTOR COSTS		STAG	PVB-60 £m		Comments
Private Sector Provider Impacts Investment Costs from Private Sector		PV5	£0.00		Assumes Government pays all infrastructure costs
Operations, Maintenance & Renewals Costs		PV6	-£45.49		Three elements make up the OMR costs
Revenues Rail trips			£4.68	(j)	Revenue generated by Rail trips
Other Rail (Non-Fare Box)			£0.00	(k)	Revenue from non-Fare Box sources
Bus and Coach			-£4.57	(l)	Revenue from B&C trips
Other PT			£0.00	(m)	Revenue from Other PT trips
<i>Net Revenue (Sub-Total)</i>		PV7	£0.10		= (j) + (k) + (l) + (m)
Grant/Subsidy Grant/Subsidy from Private Sector		PV8	-£40.82		Rail revenues do not cover OMR costs over appraisal period
Present Value of Benefits (PVB)			£37.39		= PV1 + PV2 + PV3 + PV4.a + PV4.b + PV4.c + PV4.d + PV5 + PV6 + PV7 + PV8
PUBLIC SECTOR IMPACTS		STAG	PVB-60 £m		Comments
Investment Costs Investment Costs from Public Sector		PV9	-£25.85		Capital costs discounted to price base
OMR Costs Operations, Maintenance & Renewals		PV10	£0.00		Revenues cover OMR costs over appraisal periods
Grant/Subsidy Grant/Subsidy Required to Operate System		PV11	£0.00		Revenues cover OMR costs over appraisal periods
Revenues Revenue Streams from Public Sector		PV12	£0.00		Revenues cover OMR costs over appraisal periods
Taxation Taxation from Public Sector		PV13	-£12.36		The negative of Item (e) above
Present Value of Costs (PVC) to Government			-£38.21		= PV9 + PV10 + PV11 + PV12 + PV13
Net Present Value (NPV)			-£0.82		NPV is in £million
NPV/K Ratio			-0.03		This is the NPV divided by the Investment Costs from Public Sector (PV9)
Benefit/Cost Ratio (BCR) to Government			0.98		Ratios are the BCR to Government

Levenmouth Sustainable Transport Study**Results of Cost/Benefit Analysis****Proposal:** Option A - Rail Re-Opening (Kirkcaldy & Cowdenbeath) **versus** Reference Case (incl Bus-Priority in Do-Minimum)60 Year Analysis Period Annual discount rate 3.5% 0-30 years and thereafter 3.0%
Residual Value = £1.79 million

(Note: Residual Values are included in the PVB and BCR estimates shown below)

Transport Economic Efficiency (TEE) Table

USER BENEFITS		STAG	PVB-60 £m		Comments
Safety Accident Savings		PV1	£0.37		Calculated in Safety Section (see Chapter 6 of STAG2 Report)
Travel Time Highway Time Savings			£123.22	(a)	Part of de-congestion benefits
PT Time Savings			£20.23	(b)	Part of de-congestion benefits
Rail Stopping Delays			£0.00	(c)	Due to extra train stopping time at the new stations
<i>Net Time Savings (Sub-Total)</i>		PV2	£143.45		= (a) + (b) + (c)
User Charges User Charges		PV3	£-2.60		Negative of revenues for Rail, B&C and Other PT added
VOC Fuel			£9.25	(d)	Part of de-congestion benefits
Taxation			£30.97	(e)	Included to show tax impact as transfer payment
Non-Fuel			£9.96	(f)	Part of de-congestion benefits
<i>Net VOC (Sub-Total)</i>		PV4.a	£50.17		= (d) + (e) + (f)
Quality/Reliability Performance Impacts			£0.00	(g)	Due to performance effects of new train service timetables
Station Facilities			£1.21	(h)	Due to ambience and facilities benefits from new stations
New Rolling Stock			£0.00	(i)	Due to benefits from rolling stock impacts
<i>Net Quality/Reliability (Sub-Total)</i>		PV4.b	£1.21		= (g) + (h) + (i)
Freight Sensitive Lorry Miles (SLM) Benefits		PV4.c	£35.17		Based on Diageo plans and FFG Bid estimates
Residual Value Residual Value at end of appraisal period		PV4.d	£1.79		The value of the new infrastructure at the end of the appraisal periods
PRIVATE SECTOR COSTS		STAG	PVB-60 £m		Comments
Private Sector Provider Impacts Investment Costs from Private Sector		PV5	£0.00		Assumes Government pays all infrastructure costs
Operations, Maintenance & Renewals Costs		PV6	£-90.99		Three elements make up the OMR costs
Revenues Rail trips			£14.99	(j)	Revenue generated by Rail trips
Other Rail (Non-Fare Box)			£0.00	(k)	Revenue from non-Fare Box sources
Bus and Coach			£-12.39	(l)	Revenue from B&C trips
Other PT			£0.00	(m)	Revenue from Other PT trips
<i>Net Revenue (Sub-Total)</i>		PV7	£2.60		= (j) + (k) + (l) + (m)
Grant/Subsidy Grant/Subsidy from Private Sector		PV8	£-76.00		Rail revenues do not cover OMR costs over appraisal period
Present Value of Benefits (PVB)			£65.17		= PV1 + PV2 + PV3 + PV4.a + PV4.b + PV4.c + PV4.d + PV5 + PV6 + PV7 + PV8
PUBLIC SECTOR IMPACTS		STAG	PVB-60 £m		Comments
Investment Costs Investment Costs from Public Sector		PV9	£-25.85		Capital costs discounted to price base
OMR Costs Operations, Maintenance & Renewals		PV10	£0.00		Revenues cover OMR costs over appraisal periods
Grant/Subsidy Grant/Subsidy Required to Operate System		PV11	£0.00		Revenues cover OMR costs over appraisal periods
Revenues Revenue Streams from Public Sector		PV12	£0.00		Revenues cover OMR costs over appraisal periods
Taxation Taxation from Public Sector		PV13	£-30.97		The negative of Item (e) above
Present Value of Costs (PVC) to Government			£-56.82		= PV9 + PV10 + PV11 + PV12 + PV13
Net Present Value (NPV)			£8.35		NPV is in £million
NPV/K Ratio			0.32		This is the NPV divided by the Investment Costs from Public Sector (PV9)
Benefit/Cost Ratio (BCR) to Government			1.15		Ratios are the BCR to Government

Levenmouth Sustainable Transport Study**Results of Cost/Benefit Analysis****Proposal:** Option B - New Rail Line (Kirkcaldy Extension)**versus** Reference Case (incl Bus-Priority in Do-Minimum)

60 Year Analysis Period

Annual discount rate 3.5%

0-30 years and thereafter 3.0%

Residual Value = £1.86

million

(Note: Residual Values are included in the PVB and BCR estimates shown below)

Transport Economic Efficiency (TEE) Table

USER BENEFITS	STAG	PVB-60 £m		Comments
Safety Accident Savings	PV1	£0.45		Calculated in Safety Section (see Chapter 6 of STAG2 Report)
Travel Time Highway Time Savings		£69.61	(a)	Part of de-congestion benefits
PT Time Savings		£12.43	(b)	Part of de-congestion benefits
Rail Stopping Delays		£0.00	(c)	Due to extra train stopping time at the new stations
<i>Net Time Savings (Sub-Total)</i>	PV2	£82.05		= (a) + (b) + (c)
User Charges User Charges	PV3	-£1.97		Negative of revenues for Rail, B&C and Other PT added
VOC Fuel		£5.37	(d)	Part of de-congestion benefits
Taxation		£17.99	(e)	Included to show tax impact as transfer payment
Non-Fuel		£7.97	(f)	Part of de-congestion benefits
<i>Net VOC (Sub-Total)</i>	PV4.a	£31.34		= (d) + (e) + (f)
Quality/Reliability Performance Impacts		£0.00	(g)	Due to performance effects of new train service timetables
Station Facilities		£1.19	(h)	Due to ambience and facilities benefits from new stations
New Rolling Stock		£0.00	(i)	Due to benefits from rolling stock impacts
<i>Net Quality/Reliability (Sub-Total)</i>	PV4.b	£1.19		= (g) + (h) + (i)
Freight Sensitive Lorry Miles (SLM) Benefits	PV4.c	£35.17		Based on Diageo plans and FFG Bid estimates
Residual Value Residual Value at end of appraisal period	PV4.d	£1.86		The value of the new infrastructure at the end of the appraisal periods
PRIVATE SECTOR COSTS				
Private Sector Provider Impacts Investment Costs from Private Sector	STAG PV5	£0.00		Comments Assumes Government pays all infrastructure costs
Operations, Maintenance & Renewals Costs	PV6	-£51.45		Three elements make up the OMR costs
Revenues Rail trips		£14.73	(j)	Revenue generated by Rail trips
Other Rail (Non-Fare Box)		£0.00	(k)	Revenue from non-Fare Box sources
Bus and Coach		-£12.76	(l)	Revenue from B&C trips
Other PT		£0.00	(m)	Revenue from Other PT trips
<i>Net Revenue (Sub-Total)</i>	PV7	£1.97		= (j) + (k) + (l) + (m)
Grant/Subsidy Grant/Subsidy from Private Sector	PV8	-£36.72		Rail revenues do not cover OMR costs over appraisal period
Present Value of Benefits (PVB)		£63.88		= PV1 + PV2 + PV3 + PV4.a + PV4.b + PV4.c + PV4.d + PV5 + PV6 + PV7 + PV8
PUBLIC SECTOR IMPACTS				
Investment Costs Investment Costs from Public Sector	STAG PV9	-£29.24		Comments Capital costs discounted to price base
OMR Costs Operations, Maintenance & Renewals	PV10	£0.00		Revenues cover OMR costs over appraisal periods
Grant/Subsidy Grant/Subsidy Required to Operate System	PV11	£0.00		Revenues cover OMR costs over appraisal periods
Revenues Revenue Streams from Public Sector	PV12	£0.00		Revenues cover OMR costs over appraisal periods
Taxation Taxation from Public Sector	PV13	-£17.99		The negative of Item (e) above
Present Value of Costs (PVC) to Government		-£47.23		= PV9 + PV10 + PV11 + PV12 + PV13
Net Present Value (NPV)		£16.65		Comments NPV is in £million
NPV/K Ratio		0.57		This is the NPV divided by the Investment Costs from Public Sector (PV9)
Benefit/Cost Ratio (BCR) to Government		1.35		Ratios are the BCR to Government

Levenmouth Sustainable Transport Study**Results of Cost/Benefit Analysis****Proposal:** Option B - New Rail Line (Cowdenbeath Extension) **versus** Reference Case (incl Bus-Priority in Do-Minimum)60 Year Analysis Period Annual discount rate 3.5% 0-30 years and thereafter 3.0%
Residual Value = £1.86 million

(Note: Residual Values are included in the PVB and BCR estimates shown below)

Transport Economic Efficiency (TEE) Table

USER BENEFITS		STAG	PVB-60 £m		Comments
Safety Accident Savings		PV1	£0.28		Calculated in Safety Section (see Chapter 6 of STAG2 Report)
Travel Time Highway Time Savings			£52.62	(a)	Part of de-congestion benefits
PT Time Savings			£19.78	(b)	Part of de-congestion benefits
Rail Stopping Delays			£0.00	(c)	Due to extra train stopping time at the new stations
<i>Net Time Savings (Sub-Total)</i>		PV2	£72.40		= (a) + (b) + (c)
User Charges User Charges		PV3	-£0.34		Negative of revenues for Rail, B&C and Other PT added
VOC Fuel			£4.02	(d)	Part of de-congestion benefits
Taxation			£13.47	(e)	Included to show tax impact as transfer payment
Non-Fuel			£5.84	(f)	Part of de-congestion benefits
<i>Net VOC (Sub-Total)</i>		PV4.a	£23.33		= (d) + (e) + (f)
Quality/Reliability Performance Impacts			£0.00	(g)	Due to performance effects of new train service timetables
Station Facilities			£0.42	(h)	Due to ambience and facilities benefits from new stations
New Rolling Stock			£0.00	(i)	Due to benefits from rolling stock impacts
<i>Net Quality/Reliability (Sub-Total)</i>		PV4.b	£0.42		= (g) + (h) + (i)
Freight Sensitive Lorry Miles (SLM) Benefits		PV4.c	£35.17		Based on Diageo plans and FFG Bid estimates
Residual Value Residual Value at end of appraisal period		PV4.d	£1.86		The value of the new infrastructure at the end of the appraisal periods
PRIVATE SECTOR COSTS		STAG	PVB-60 £m		Comments
Private Sector Provider Impacts Investment Costs from Private Sector		PV5	£0.00		Assumes Government pays all infrastructure costs
Operations, Maintenance & Renewals Costs		PV6	-£51.45		Three elements make up the OMR costs
Revenues Rail trips			£5.14	(j)	Revenue generated by Rail trips
Other Rail (Non-Fare Box)			£0.00	(k)	Revenue from non-Fare Box sources
Bus and Coach			-£4.80	(l)	Revenue from B&C trips
Other PT			£0.00	(m)	Revenue from Other PT trips
<i>Net Revenue (Sub-Total)</i>		PV7	£0.34		= (j) + (k) + (l) + (m)
Grant/Subsidy Grant/Subsidy from Private Sector		PV8	-£46.31		Rail revenues do not cover OMR costs over appraisal period
Present Value of Benefits (PVB)			£35.70		= PV1 + PV2 + PV3 + PV4.a + PV4.b + PV4.c + PV4.d + PV5 + PV6 + PV7 + PV8
PUBLIC SECTOR IMPACTS		STAG	PVB-60 £m		Comments
Investment Costs Investment Costs from Public Sector		PV9	-£29.24		Capital costs discounted to price base
OMR Costs Operations, Maintenance & Renewals		PV10	£0.00		Revenues cover OMR costs over appraisal periods
Grant/Subsidy Grant/Subsidy Required to Operate System		PV11	£0.00		Revenues cover OMR costs over appraisal periods
Revenues Revenue Streams from Public Sector		PV12	£0.00		Revenues cover OMR costs over appraisal periods
Taxation Taxation from Public Sector		PV13	-£13.47		The negative of Item (e) above
Present Value of Costs (PVC) to Government			-£42.70		= PV9 + PV10 + PV11 + PV12 + PV13
Net Present Value (NPV)			-£7.00		NPV is in £million
NPV/K Ratio			-0.24		This is the NPV divided by the Investment Costs from Public Sector (PV9)
Benefit/Cost Ratio (BCR) to Government			0.84		Ratios are the BCR to Government

Levenmouth Sustainable Transport Study**Results of Cost/Benefit Analysis**

Proposal: Option B - New Rail Line (Kirkcaldy & Cowdenbeath) **versus** Reference Case (incl Bus-Priority in Do-Minimum)

60 Year Analysis Period Annual discount rate 3.5% 0-30 years and thereafter 3.0%
Residual Value = £1.86 million

(Note: Residual Values are included in the PVB and BCR estimates shown below)

Transport Economic Efficiency (TEE) Table

USER BENEFITS		STAG	PVB-60 £m		Comments
Safety Accident Savings		PV1	£0.55		Calculated in Safety Section (see Chapter 6 of STAG2 Report)
Travel Time Highway Time Savings			£127.90	(a)	Part of de-congestion benefits
PT Time Savings			£22.25	(b)	Part of de-congestion benefits
Rail Stopping Delays			£0.00	(c)	Due to extra train stopping time at the new stations
<i>Net Time Savings (Sub-Total)</i>		PV2	£150.15		= (a) + (b) + (c)
User Charges User Charges		PV3	-£3.48		Negative of revenues for Rail, B&C and Other PT added
VOC Fuel			£9.81	(d)	Part of de-congestion benefits
Taxation			£32.84	(e)	Included to show tax impact as transfer payment
Non-Fuel			£11.72	(f)	Part of de-congestion benefits
<i>Net VOC (Sub-Total)</i>		PV4.a	£54.37		= (d) + (e) + (f)
Quality/Reliability Performance Impacts			£0.00	(g)	Due to performance effects of new train service timetables
Station Facilities			£1.33	(h)	Due to ambience and facilities benefits from new stations
New Rolling Stock			£0.00	(i)	Due to benefits from rolling stock impacts
<i>Net Quality/Reliability (Sub-Total)</i>		PV4.b	£1.33		= (g) + (h) + (i)
Freight Sensitive Lorry Miles (SLM) Benefits		PV4.c	£35.17		Based on Diageo plans and FFG Bid estimates
Residual Value Residual Value at end of appraisal period		PV4.d	£1.86		The value of the new infrastructure at the end of the appraisal periods
PRIVATE SECTOR COSTS					
Private Sector Provider Impacts Investment Costs from Private Sector		STAG PV5	£0.00		Comments Assumes Government pays all infrastructure costs
Operations, Maintenance & Renewals Costs		PV6	-£93.37		Three elements make up the OMR costs
Revenues Rail trips			£16.49	(j)	Revenue generated by Rail trips
Other Rail (Non-Fare Box)			£0.00	(k)	Revenue from non-Fare Box sources
Bus and Coach			-£13.00	(l)	Revenue from B&C trips
Other PT			£0.00	(m)	Revenue from Other PT trips
<i>Net Revenue (Sub-Total)</i>		PV7	£3.48		= (j) + (k) + (l) + (m)
Grant/Subsidy Grant/Subsidy from Private Sector		PV8	-£76.88		Rail revenues do not cover OMR costs over appraisal period
Present Value of Benefits (PVB)			£73.17		= PV1 + PV2 + PV3 + PV4.a + PV4.b + PV4.c + PV4.d + PV5 + PV6 + PV7 + PV8
PUBLIC SECTOR IMPACTS					
Investment Costs Investment Costs from Public Sector		STAG PV9	-£29.24		Comments Capital costs discounted to price base
OMR Costs Operations, Maintenance & Renewals		PV10	£0.00		Revenues cover OMR costs over appraisal periods
Grant/Subsidy Grant/Subsidy Required to Operate System		PV11	£0.00		Revenues cover OMR costs over appraisal periods
Revenues Revenue Streams from Public Sector		PV12	£0.00		Revenues cover OMR costs over appraisal periods
Taxation Taxation from Public Sector		PV13	-£32.84		The negative of Item (e) above
Present Value of Costs (PVC) to Government			-£62.07		= PV9 + PV10 + PV11 + PV12 + PV13
Net Present Value (NPV)			£11.10		Comments NPV is in £million
NPV/K Ratio			0.38		This is the NPV divided by the Investment Costs from Public Sector (PV9)
Benefit/Cost Ratio (BCR) to Government			1.18		Ratios are the BCR to Government

Appendix C

Appraisal Summary Tables (ASTs)

Appraisal Summary Table – Option A: Re-commissioning of the Existing Railway Line

Levenmouth Sustainable Transport Study - Option A: Re-commissioning of the Existing Railway Line plus Stations plus Freight Facilities			
Name and address of authority or organisation promoting the proposal:		SEStran 8b MacDonald Street Edinburgh EH7 4LZ	
Proposal Name:	Levenmouth Sustainable Transport Study – Option A	Name of Planner:	SEStran
Proposal Description:	The proposal would consist of a re-opening the railway line between Leven and Thornton Junction, plus stations at Leven and Cameron Bridge including freight handling facilities.	Estimated Total Public Sector Funding Requirement:	Capital costs/grant: £48.1m (2008 prices) (including risk & Optimism Bias)
			Present Value of Cost to Govt: £42.0m (2002 prices)
Background Information			
Geographic Context:	<p>The large growth in Queensferry and central Fife corridor commuter traffic has necessitated an increase for additional rail capacity between Fife and Edinburgh, including changes to local services as well as long distance services through Fife. It is therefore considered realistic at this time to consider developing options to improve access to the Levenmouth area, for both passengers and freight, so that if public transport improvements are shown to be beneficial, these may be integrated with the broader strategy of enhancing rail provision between Fife and Edinburgh.</p> <p>The route itself occupies follows the original rail alignment between Leven and Thornton junction passing through a mix of urban, peri-urban and rural flat to gently rolling topography. The rail services will operate on new rail line on the existing alignment linking new stations at Leven and Cameron Bridge on the western edge of Leven with Kirkcaldy station and beyond serving both the local potential passenger and freight markets, including existing and future residential and commercial developments.</p> <p>The short section from the new station at Leven to the new station situated at Cameron Bridge follows a route characterised as mainly residential development. There are major new and planned residential developments in the vicinity of Cameron Bridge, committed over the next 10 years which will significantly change the local area and will place greater pressure on the transport network and services. SEStran and its partners are pursuing new transport infrastructure to simultaneously serve the development proposals and pursue the opportunities in freight modal shift that the new transport infrastructure will confer.</p>		

Appraisal Summary Table – Option A: Re-commissioning of the Existing Railway Line

Social Context:	<p>The eight wards comprising the Levenmouth area have a population of 35,910 inhabitants. This represents a significant proportion, 10.28%, of the total population of the Fife Council area. The data for daytime population changes (Census 2001) shows that there is extensive movement in and out of the Levenmouth area the day which suggests that people travel to different wards for employment and need reliable and frequent public transport if they do not have a car. The strongest increase in the daytime population can be observed in Leven West and Kirkland (+116.19%), close to where Diageo is situated. In contrast the daytime population decreases in Windygates (-42.44%), Methilhill (-32.37%) and Methil (-16.67%).</p> <p>Figures from the 2001 Census reveal that the area is characterised by high levels of social deprivation. Only 31.24% of all people over 16 in households in the Levenmouth area belong to the social group ABC1. The proportions in Methilhill, Methil and Leven West and Kirkland are at, 21.54%, 24.85% and 25.67% respectively, particularly low. This compares with a Scottish average of 45.52%. In addition, 34.35% in Methilhill, 30.51% in Methil and 29.98% in Leven West and Kirkland belong to the lowest social group E (on state benefits, unemployed or the lowest grade workers). This compares with an average of 22.41% in Scotland.</p> <p>Over the whole Levenmouth area, the Social Grade distribution in all wards is very poor compared to Scotland, with Leven East being the only ward that has a higher proportion of those in the ABC1 social category than the Scottish average. Across the whole Levenmouth area, only two wards have over 40% belonging to the Social Grade group ABC1.</p> <p>The Social Grade statistics are important in the context of this study because those from the lowest social group are less likely to own or have access to a car, yet in the context of other available transport options, ownership of which may be regarded as essential. The Census 2001 data supports this statement showing clearly that the percentage of households without a car in the Levenmouth area is significantly higher than the Scottish average. While 34.23% households in Scotland have no car, this figure was 46.15% in Methil and 41.31% in Methilhill with 37.12% being the average for the entire Levenmouth area.</p>
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Appraisal Summary Table – Option A: Re-commissioning of the Existing Railway Line

Economic Context:	<p>The latest official unemployment figures at ward level reveal that the area is characterised by exceedingly high levels of unemployment – the 2001 Census provides the latest data at ward level. The unemployment rates in all wards exceeded the Scottish average in 2001 (4.0%), in almost all cases by over double the value, with particularly high rates in a number of areas, including 17.0% for Buckhaven and Denbeath, 14.8% in Methil, 14.6% in Methilhill, 12.0% in Leven West and Kirkland, 10.6% Wemyss and Muiredge and 8.9% in Leven East. These rates of unemployment rank alongside the worst in the entire country.</p> <p>Welfare claimant counts for the Levenmouth area were therefore, unsurprisingly, higher than for Fife or for Scotland as a whole. Whereas the claimant count for Scotland in 2001 was 2.5% and for Fife it was 3.0%, in parts of the Levenmouth area it was as high as 6.7% (Buckhaven and Denbeath), 6.2% (Methil), 5.2% (Methilhill) and 5.0% for Wemyss and Muiredge.</p> <p>The 2001 Census data also reveals that the industrial structure of the Levenmouth area, although broadly similar to the Scottish industrial structure, differs in some important aspects. The main employment area in the Levenmouth region is the service sector, as is the case for Scotland as a whole. However, the 2001 census reveals that, whereas 74.61% of the all employees work in the service sector in Scotland, this is significantly higher than for most of the wards in the Levenmouth area. For example, only 57.11% of employees work in the service sector in Methilhill, 62.73% in Leven West and Kirkland, 64.29% in Methil and 69.47% in Leven East. For the core public sectors of health, education and public administration, this pattern is broadly repeated. With the exception of Leven East, all the wards in the Levenmouth area see lower levels of employment in the public sector than is experienced throughout Scotland.</p> <p>The corollary to this is that manufacturing is a more important source of employment to the Levenmouth area than to Scotland as a whole. This is not surprising with the presence of Diageo, the world’s largest wine and spirit group and its Cameron Bridge bottling facility at Windygates, with an annual capacity output of 30 million litres and monthly peak production of 3 million bottles. The result is that whereas 13.23% of employment in Scotland as a whole is in manufacturing, for the Levenmouth area this ranges from 19.60% in Leven East, 23.56% in Methil and 25.29% in Leven West and Kirkland, through to nearly 30% (29.60%) in Methilhill.</p> <p>Recent housing developments in the Muiredge area mean that the construction industry may continue to represent a higher level of employment in Leven as a whole than is seen in the rest of Scotland. The 2001 Census records that for wards across the Levenmouth area the proportion of employed that worked in construction was 7.75% for Leven East, 8.89% in Leven West and Kirkland, 9.53% in Methil and 9.69% for Methilhill.</p>
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Planning Objectives	
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Objective:	Performance against planning objective:
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Appraisal Summary Table – Option A: Re-commissioning of the Existing Railway Line

<ul style="list-style-type: none"> ▪ Objective 1 (Accessibility): Improve access to key areas and services in terms of employment, education, health, leisure and other transport modes in the local, regional and wider area for all residents in Levenmouth; ▪ Objective 2 (Economy and modal shift): Promote the efficient movement of freight to and from Levenmouth, and encourage the transfer of movement of goods, produce and materials from road to more sustainable distribution; and ▪ Objective 3 (Sustainable transport): Encourage more sustainable travel for new and existing development. 	<p>Yes – the project would meet this objective. The re-opening of the rail link from Leven to other nearby towns will open up alternative commuter and tourism access to the Levenmouth area from the surrounding towns, Dunfermline and Edinburgh. Moreover, this option also provides direct connections to the regional and national rail networks which significantly increase connectivity. Re-establishing the rail link and expanding the local public transport network will enhance the modal choice available to all Levenmouth residents and to all groups, without exception. Even car users will benefit. There is little doubt that the scale and type of public transport investment proposed for the Levenmouth area will assist a broad range of beneficiaries. This option will also assist commuters and those seeking work, those visiting further afield, tourists and for business.</p> <p>Yes – In terms of the preferred train service strategy, the TEE model results suggest that the extension of the Kirkcaldy Service operating on an hourly frequency with this option would produce the highest benefit-to-cost ratio (BCR) and net present value (NPV). This option, with this service structure, secures the best value-for-money for the new investment, returning an NPV of £20.9m and a BCR of 1.50. However, extending both the Kirkcaldy and the Cowdenbeath services provides the greatest numbers of passenger demand as it increases train frequency to twice an hour. But the NPV and BCR are lower because the assumed operating costs are higher. If a way could be found to minimise or reduce these costs then this could increase the attractiveness of this service strategy.</p> <p>Yes - this option is sustainable in that it actively promotes modal shift from car usage to public transport for commuting, shopping, business travel and for other reasons depending on whether the destination is local, regional or national, for both existing residential communities and the planned developments in the Muiredge area and elsewhere. Just as significant, this option also encourages freight modal shift from high dependency on HGV activity to rail freight for the import and export of goods, materials and supplies for the large businesses based in Leven between Leven and the rest of Scotland for the large businesses based in the town. This will have a large impact on reducing heavy traffic on the key trunk routes to and from Leven such as the A911, A915 and A955, promoting quicker and safer journeys for the remaining road users.</p>
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Appraisal Summary Table – Option A: Re-commissioning of the Existing Railway Line

Rationale for Selection or Rejection of Proposal:	It is recommended that the proposal be taken forward to the next stage as the scheme meets the planning objectives and has no significant adverse impacts on the government’s 5 objectives for transport.
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Implementability Appraisal	
Technical:	There are not expected to be any Technical issues associated with the Implementability of this option.
Operational:	There are not expected to be any Operational issues associated with the Implementability of this option.
Financial:	There are not expected to be any problems associated with the financial requirements for the Implementation of this option.
Public:	There are no issues associated with Public support for the Implementability of this option.

Appraisal Summary Table – Option A: Re-commissioning of the Existing Railway Line

Environment			
Sub-objective	Qualitative Information	Quantitative Information	Significance of Impact
Noise and Vibration	The assessment of the effect of the use of the rail services on the local area showed properties fronting on or in close proximity to the re-commissioned rail link, particularly in the vicinity of Cameron Bridge, will experience some minor adverse impacts. However this is shown to be balanced by corresponding moderate beneficial impacts across the existing road network including the A911, the A915 and the A955.	The re-introduced rail services will in the main pass through rural areas where there are no significant receptors. In addition the option is anticipated to reduce traffic volumes on the chief arterial routes between Leven and the nearby towns, giving a net positive impact in terms of a reduction of dB (A) in Leven itself and properties lining the routes.	These correspond in overall terms to a slight net benefit where the increase in noise associated with the rail option is compared with the potential decrease in volume of traffic noise and vibration.
Air Quality - Overall	It is estimated that given the predicted decreases in vehicle kilometres on the road network, there is likely to be moderate beneficial impacts on properties fronting and in close proximity to the existing road network, including the A911, the A915 and the A955.	Meets safe levels for Scottish Executive Guidance in terms of CO ₂ global, PM ₁₀ local and NO ₂ local. Slightly lower emissions in all these expected overall from the Do-Minimum.	Slight beneficial.
CO ₂ - Global	Meets safe levels for Scottish Executive Guidance.	Slightly lower emissions expected overall from the Do-Minimum.	Slight beneficial.
PM ₁₀ - Local	Meets safe levels for Scottish Executive Guidance.	Slightly lower emissions expected overall from the Do-Minimum.	Slight beneficial.
NO ₂ - Local	Meets safe levels for Scottish Executive Guidance.	Slightly lower emissions expected overall from the Do-Minimum.	Slight beneficial.
Water Quality, Drainage and Flood Defence	The impacts of construction and operation on the hydrological resource are likely to be low providing that the necessary mitigation measures are put	Some short term impacts possible during the construction phase only, and only on the Leven and Ore	Assessed as being of small minor negative impact to moderate/major negative impact in the unlikely event that the hydraulic capacity of the

Appraisal Summary Table – Option A: Re-commissioning of the Existing Railway Line

	<p>in place to avoid pollution of watercourses.</p> <p>The River Leven and the River Ore are in close proximity to the route but any impacts on these watercourses are likely to be short term, fairly localised and temporary in nature as they are associated only with the duration of construction.</p>	<p>watercourses.</p> <p>No impacts expected occurring during the operational phase, and unlikely to be any disturbance and release of groundwater contaminants.</p>	<p>river be reduced during the construction works.</p> <p>The impacts over the operational phase of these options are assessed as being of small minor negative significance.</p>
Geology, Agriculture and Soils	<p>This option would have a neutral impact on the Geology, Agriculture and Soils as the infrastructure for the option is currently intact.</p>	<p>No designated sites that are sensitive to this option have been identified at this stage.</p>	<p>Neutral impact.</p>
Biodiversity	<p>Pollution incidents during construction and operation could have implications for the Firth, the river tributaries and their habitats.</p> <p>The most likely impacts of the option proposals are on the loss of areas of scrub and grassland habitat, loss of bat roosts within trees and structures to be demolished and the potential for pollutants entering sensitive and protected watercourses during both construction and operation stages; and the potential spread of invasive plant species.</p>	<p>The impacts of this option on biodiversity are likely to be minimal due to the majority of the infrastructure required by this scheme already being in place.</p>	<p>The likely impact is estimated to being a minor negative impact.</p>
Visual Amenity	<p>The impacts will largely involve the removal of some vegetation beside the line and the laying of new tracks.</p> <p>There are relatively few receptors close to the line because much of it runs through a rural area. The largest numbers of receptors are at Cameron Bridge and between Methil and Leven, but a significant proportion of these</p>	<p>The visual impacts of this option will be very slight.</p> <p>The most noticeable changes will be the cut back of vegetation and greater rail activity on the line.</p>	<p>Construction will have a moderate/major negative impact.</p> <p>Operation will have a moderate negative impact.</p>

Appraisal Summary Table – Option A: Re-commissioning of the Existing Railway Line

	will be screened by vegetation associated with the river.		
Cultural Heritage	There are a number of listed buildings present within the 200m study corridor, but only one Scheduled Ancient Monuments (SAM, Balgonie Castle) is located within the corridor.	It is unlikely that any of the NMRS will experience direct short-term negative impacts as a result of any construction works.	The construction and operational impacts on non-statutory sites and uncharted archaeological remains will be neutral or negative minor.
Landscape	The construction effects associated with this option are temporary, with the exception of the removal of mature vegetation from the site.	The cutting back of vegetation and the laying of new track will cause temporary changes to, but will not significantly affect, the character of the landscape.	Minor negative impact.

Safety			
Sub-objective	Qualitative Information	Quantitative Information	Significance of Impact
Accidents	The transport modelling has suggested that there will be significant modal shift from cars to rail and from HGV freight traffic to rail freight. Therefore this option would be expected to reduce traffic accident numbers and/or their severity.	The option under consideration will remove traffic from the main trunk routes leading into and out of Levenmouth and will undoubtedly have an impact on both the number and severity of accidents on these roads. The estimated PVB for savings in accidents is £0.32m.	Minor positive beneficial impact.
Security	This option will involve a substantial amount of construction, including replacement rail tracks and the construction of new rail stations and termini.	In terms of these new facilities, it is expected that minimum safety requirements would be met with regard to personal security concerning their design and construction with respect to site perimeters, site surveillance, both formal and informal, lighting, visibility and emergency call facilities.	There will be a minor to moderate beneficial impact.

Appraisal Summary Table – Option A: Re-commissioning of the Existing Railway Line

Economy (Transport Economic Efficiency)			
Sub-objective	Item	Qualitative Information	Quantitative Information
User Benefits	Travel Time	Users will benefit from improved travel times due to de-congestion effects. Values for these were derived from the national default value-of-time data obtained from WebTAG and average (default) information.	£74.6m (PVB 60-years)
	User Charges	There are limited user charges associated with this option.	-£1.2m (PVB 60-years)
	Vehicle Operating Costs	Users will benefit from savings in fuel costs and from savings in vehicle wear and tear consistent with greater uniformity in vehicle speed. Values were based on the WebTAG and average (default) data.	£27.6m (PVB 60-years)
	Quality – Reliability Performance Impacts	These are mainly derived from the benefits associated with the new stations.	£1.1m (PVB 60-years)
	Freight Sensitive Lorry Mile Benefits	These monetised benefits reflect those gained by the removal of HGV traffic from the local network in terms of de-congestion and environmental improvements that result.	£35.2m (PVB 60-years)
Private Sector Operator Impacts	Investment Costs	There are no anticipated private sector investment costs. Assumes Govt will pay for all infrastructure costs.	Not applicable here
	Operating & Maintenance Costs	There are anticipated to be significant private sector operating and maintenance costs with this option associated with the maintenance of rail track and rolling stock on the one hand, and operating the stations on the other.	-£45.5m (PVB 60-years)
	Revenues	There will, obviously, be rail fare-box receipts from this option. However there will also be some displacement from bus transport to rail, with a corresponding drop in these from other PT revenue streams. Hence, only the net gain is presented in this AST.	£1.2m (PVB 60-years)
	Grant/Subsidy payments	There will be some grant/subsidy payments with this option as rail revenues are not anticipated to cover OMR costs over the appraisal period.	-£32.1m (PVB 60-years)

Economy (Economic Activity and Location Impacts)

Appraisal Summary Table – Option A: Re-commissioning of the Existing Railway Line

Sub-objective	Item	Qualitative Information	Quantitative Information
Economic Activity and Location Impacts	Local Economic Impacts	<p>The large indigenous drinks & other businesses, primarily Diageo and Donaldsons and other local businesses, will be able to respond to greater market opportunities and competitive environment and new opportunities may result from some local retail expansion.</p> <p>Most external trade is associated with the large established businesses noted above, who will benefit from reduced transportation costs and facilitated access for supplies and to markets. Improved transportation will enable the established successful companies to reduce costs and facilitate access to markets and skilled employment. Employment requirements during construction would assist the unemployed to get back to work.</p> <p>Smaller or new companies should be able to attract wider external sources of capital funding for the same reasons as above. For tourism business there should be a tourism boost with the increased accessibility to the local scenic areas.</p>	Minor-to-moderate beneficial impact.
	National Economic Impacts	<p>There will be few economic impacts on a national scale. However, because of the presence of nationally important companies in Leven, both retailers and ultimately consumers will benefit on a national scale where these companies are able and willing to pass on reduced costs of transportation and greater reliability of delivery to their customers irrespective of location.</p>	Minor beneficial impact.
	Distributional Impacts	<p>There will be some distributional effects associated with travel time changes, which are captured quantitatively in the TEE analysis. In addition, Leven which suffers from areas of significant unemployment, and other indices of social deprivation, would be expected to gain from the increased accessibility resulting from the re-introduction of rail and the improvement of other PT services and also from the reduced journey times that these improvements permit.</p>	Minor-to-moderate beneficial impact.

Appraisal Summary Table – Option A: Re-commissioning of the Existing Railway Line

Integration			
Sub-objective	Item	Qualitative Information	Quantitative Information
Transport Interchanges	Services & Ticketing	<p>This option will have an impact in terms of integration of services with the existing bus service network. Opportunities will arise within the Levenmouth area to share brand names, ticketing arrangements and to ‘dove-tail’ existing and new bus services and timetables with new rail timetables.</p> <p>Moreover, synchronising new rail services with the existing rail network and bus network will occur both within and outwith the area, so a significant proportion of benefits may be regional rather than specifically local.</p>	Moderate beneficial impact.
	Infrastructure Information &	The option involves new rail stations which will have the opportunity for providing bus-rail interchange infrastructure to facilitate modal switch at the rail stations themselves. The noticeable changes are more likely to be with services.	Moderate beneficial impact.
Land-use Transport Integration		<p>This option encourages a modal shift away from private car use, to improve the quality of the environment, and to increase access for all to a public transport system serving areas of employment, housing and recreation and would encourage social inclusion.</p> <p>In addition, the freight transport improvements offered by the proposed investment in the rail investment in the study area offer a major opportunity to implement local and strategic planning and transport policies as a mechanism for promoting development on a more sustainable footing.</p>	Moderate beneficial impact
Policy Integration		This option articulates well the transport policies and strategies as detailed in the LTS, SPP17, PP1 and Local Structure Plan; including efforts to improve connectivity of the Levenmouth to other parts of the region in terms of rail and road transport links, widen accessibility to transport for all residents, promote modal choice, promote the efficient movement of freight, and to support local economic growth and employment.	Moderate beneficial impact

Appraisal Summary Table – Option A: Re-commissioning of the Existing Railway Line

Accessibility & Social Inclusion			
Sub-objective	Item	Qualitative Information	Quantitative Information
Community Accessibility	Public Transport Network Coverage	This option will open up alternative commuter and tourism access to the Levenmouth area from the surrounding towns, Dunfermline and Edinburgh. Moreover, this option also provides direct connections to the regional and national rail networks which significantly increase connectivity.	Major beneficial impact
	Access to Other Local Services	This option, with two new rail stations will provide intermodal change facilities for bus, rail and car, giving ready access to local facilities and services.	Major beneficial impact
Comparative Accessibility	Distribution/Spatial Impacts by Social Group	Enhancing the modal choice available to all Levenmouth residents is provided by an expanded local public transport network which will be beneficial to all groups, without exception. Even car users will benefit. The only possible caveat is the fare terms arranged for public transport and whether there is a cost recovery component included in these that penalise those unable to afford them, such as the unemployed, the elderly and the lower socio-economic groups.	Moderate beneficial impact
	Distribution/Spatial Impacts by Area	The public transport investment proposed for the Levenmouth area will assist a broad range of beneficiaries. This option will assist commuters and those seeking work, those visiting further afield, tourists and for business, and will also assist bulk freight movements into and out of the area.	Moderate beneficial impact

Cost to Public Sector		
Item	Qualitative information	Quantitative information
Public Sector Investment Costs	These anticipated public sector investment costs include risk & Optimism Bias.	-£25.9m (PVC 60-years)

Appraisal Summary Table – Option A: Re-commissioning of the Existing Railway Line

Public Sector Operating & Maintenance Costs	There are no anticipated public sector O&M costs.	Not applicable here
Grant/Subsidy Payments	There are significant public sector grant and subsidy payments with this option.	-£32.1m (PVC 60-years)
Revenues	There are no anticipated public sector revenues with this Option.	Not applicable here
Taxation impacts	Due to a loss of Government taxation revenues from improved VOCs.	-£16.2m (PVC 60-years)

Monetised Summary	
Present Value of Transport Benefits	£62.96m (PVB 60-years)
Present Value of Cost to Government	-£42.03m (PVC 60-years)
Net Present Value	£20.93m (PVB 60-years)
Benefit-Cost to Government Ratio	1.50

Appraisal Summary Table – Option B: Re-commissioning of the Existing Railway Line – Straightened Alignment

Levenmouth Sustainable Transport Study - Option B: Re-commissioning of the Existing Railway Line plus Stations plus Freight Facilities – Straightened Alignment			
Name and address of authority or organisation promoting the proposal:		SEStran 8b MacDonald Street Edinburgh EH7 4LZ	
Proposal Name:	Levenmouth Sustainable Transport Study – Option A	Name of Planner:	SEStran Programme Manager
Proposal Description:	The proposal would consist of a re-opening the railway line from Leven, and establishing a straightened rail alignment between Windygates and Thornton Junction, plus stations at Leven and Cameron Bridge including freight handling facilities.	Estimated Total Public Sector Funding Requirement:	Capital costs/grant: £54.3m (2008 prices) (including risk & Optimism Bias)
			Present Value of Cost to Govt: £47.2m (2002 prices)
Background Information			
Geographic Context:	<p>The large growth in Queensferry and central Fife corridor commuter traffic has necessitated an increase for additional rail capacity between Fife and Edinburgh, including changes to local services as well as long distance services through Fife. It is therefore considered realistic at this time to consider developing options to improve access to the Levenmouth area, for both passengers and freight, so that if public transport improvements are shown to be beneficial, these may be integrated with the broader strategy of enhancing rail provision between Fife and Edinburgh.</p> <p>The route itself occupies partially follows the original rail alignment between Leven and Thornton junction passing through a mix of urban, peri-urban and rural flat to gently rolling topography. There will be a section of new straightened rail alignment between Windygates and Thornton Junction. The rail services will operate on new rail line linking new stations at Leven and Cameron Bridge on the western edge of Leven with Kirkcaldy station and beyond serving both the local potential passenger and freight markets, including existing and future residential and commercial developments.</p> <p>The short section from the new station at Leven to the new station situated at Cameron Bridge follows a route characterised as mainly residential development. There are major new and planned residential developments in the vicinity of Cameron Bridge, committed over the next 10 years which will significantly change the local area and will place greater pressure on the transport network and services. SEStran and its partners are pursuing new transport infrastructure to simultaneously serve the development proposals and pursue the opportunities in freight modal shift that the new transport infrastructure will confer.</p>		

Appraisal Summary Table – Option B: Re-commissioning of the Existing Railway Line – Straightened Alignment

Social Context:	<p>The eight wards comprising the Levenmouth area have a population of 35,910 inhabitants. This represents a significant proportion, 10.28%, of the total population of the Fife Council area. The data for daytime population changes (Census 2001) shows that there is extensive movement in and out of the Levenmouth area the day which suggests that people travel to different wards for employment and need reliable and frequent public transport if they do not have a car. The strongest increase in the daytime population can be observed in Leven West and Kirkland (+116.19%), close to where Diageo is situated. In contrast the daytime population decreases in Windygates (-42.44%), Methilhill (-32.37%) and Methil (-16.67%).</p> <p>Figures from the 2001 Census reveal that the area is characterised by high levels of social deprivation. Only 31.24% of all people over 16 in households in the Levenmouth area belong to the social group ABC1. The proportions in Methilhill, Methil and Leven West and Kirkland are at, 21.54%, 24.85% and 25.67% respectively, particularly low. This compares with a Scottish average of 45.52%. In addition, 34.35% in Methilhill, 30.51% in Methil and 29.98% in Leven West and Kirkland belong to the lowest social group E (on state benefits, unemployed or the lowest grade workers). This compares with an average of 22.41% in Scotland.</p> <p>Over the whole Levenmouth area, the Social Grade distribution in all wards is very poor compared to Scotland, with Leven East being the only ward that has a higher proportion of those in the ABC1 social category than the Scottish average. Across the whole Levenmouth area, only two wards have over 40% belonging to the Social Grade group ABC1.</p> <p>The Social Grade statistics are important in the context of this study because those from the lowest social group are less likely to own or have access to a car, yet in the context of other available transport options, ownership of which may be regarded as essential. The Census 2001 data supports this statement showing clearly that the percentage of households without a car in the Levenmouth area is significantly higher than the Scottish average. While 34.23% households in Scotland have no car, this figure was 46.15% in Methil and 41.31% in Methilhill with 37.12% being the average for the entire Levenmouth area.</p>
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Appraisal Summary Table – Option B: Re-commissioning of the Existing Railway Line – Straightened Alignment

<p>Economic Context:</p>	<p>The latest official unemployment figures at ward level reveal that the area is characterised by exceedingly high levels of unemployment – the 2001 Census provides the latest data at ward level. The unemployment rates in all wards exceeded the Scottish average in 2001 (4.0%), in almost all cases by over double the value, with particularly high rates in a number of areas, including 17.0% for Buckhaven and Denbeath, 14.8% in Methil, 14.6% in Methilhill, 12.0% in Leven West and Kirkland, 10.6% Wemyss and Muiredge and 8.9% in Leven East. These rates of unemployment rank alongside the worst in the entire country.</p> <p>Welfare claimant counts for the Levenmouth area were therefore, unsurprisingly, higher than for Fife or for Scotland as a whole. Whereas the claimant count for Scotland in 2001 was 2.5% and for Fife it was 3.0%, in parts of the Levenmouth area it was as high as 6.7% (Buckhaven and Denbeath), 6.2% (Methil), 5.2% (Methilhill) and 5.0% for Wemyss and Muiredge.</p> <p>The 2001 Census data also reveals that the industrial structure in the Levenmouth area, although broadly similar to the Scottish industrial structure, differs in some important aspects. The main employment area in the Levenmouth region is the service sector, as is the case for Scotland as a whole. However, the 2001 census reveals that, whereas 74.61% of the all employees work in the service sector in Scotland, this is significantly higher than for most of the wards in the Levenmouth area. For example, only 57.11% of employees work in the service sector in Methilhill, 62.73% in Leven West and Kirkland, 64.29% in Methil and 69.47% in Leven East. For the core public sectors of health, education and public administration, this pattern is broadly repeated. With the exception of Leven East, all the wards in the Levenmouth area see lower levels of employment in the public sector than is experienced throughout Scotland.</p> <p>The corollary to this is that manufacturing is a more important source of employment to the Levenmouth area than to Scotland as a whole. This is not surprising with the presence of Diageo, the world’s largest wine and spirit group and its Cameron Bridge bottling facility at Windygates, with an annual capacity output of 30 million litres and monthly peak production of 3 million bottles. The result is that whereas 13.23% of employment in Scotland as a whole is in manufacturing, for the Levenmouth area this ranges from 19.60% in Leven East, 23.56% in Methil and 25.29% in Leven West and Kirkland, through to nearly 30% (29.60%) in Methilhill.</p> <p>Recent housing developments in the Muiredge area mean that the construction industry may continue to represent a higher level of employment in Leven as a whole than is seen in the rest of Scotland. The 2001 Census records that for wards across the Levenmouth area the proportion of employed that worked in construction was 7.75% for Leven East, 8.89% in Leven West and Kirkland, 9.53% in Methil and 9.69% for Methilhill. .</p>
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<p>Planning Objectives</p>	
<p>Objective:</p>	<p>Performance against planning objective:</p>

Appraisal Summary Table – Option B: Re-commissioning of the Existing Railway Line – Straightened Alignment

<ul style="list-style-type: none"> ▪ Objective 1 (Accessibility): Improve access to key areas and services in terms of employment, education, health, leisure and other transport modes in the local, regional and wider area fro all residents in Levenmouth; ▪ Objective 2 (Economy and modal shift): Promote the efficient movement of freight to and from Levenmouth, and encourage the transfer of movement of goods, produce and materials from road to more sustainable distribution; and ▪ Objective 3 (Sustainable transport): Encourage more sustainable travel for new and existing development. 	<p>Yes – the project would meet this proposal. The re-opening of the rail link from Leven to other nearby towns under this option will open up alternative commuter and tourism access to the Levenmouth area from the surrounding towns, Dunfermline and Edinburgh. Moreover, this option also provides direct connections to the regional and national rail networks which significantly increase connectivity. Re-establishing the rail link and expanding the local public transport network will enhance the modal choice available to all Levenmouth residents and to all groups, without exception. Even car users will benefit. There is little doubt that the scale and type of public transport investment proposed for the Levenmouth area will assist a broad range of beneficiaries. This option will also assist commuters and those seeking work, those visiting further afield, tourists and for business.</p> <p>Yes – In terms of the preferred train service strategy, the TEE model results suggest that the extension of the Kirkcaldy Service operating on an hourly frequency with this option would produce a relatively high benefit-to-cost ratio (BCR) and net present value (NPV). This option, with this service structure, secures good value-for-money for the new investment, returning an NPV of £16.7m and a BCR of 1.35. However, extending both the Kirkcaldy and the Cowdenbeath services provides the greatest numbers of passenger demand as it increases train frequency to twice an hour. But the NPV and BCR are lower because the operating costs are higher. If a way could be found to minimise or reduce these costs then this would increase the attractiveness of this service strategy of this option.</p> <p>Yes - this option is sustainable in that it actively promotes modal shift from car usage to public transport for commuting, shopping, business travel and for other reasons depending on whether the destination is local, regional or national, for both existing residential communities and the planned developments in the Muiredge area and elsewhere. Just as significant, this option also encourages freight modal shift from high dependency on HGV activity to rail freight for the import and export of goods, materials and supplies for the large businesses based in Leven between Leven and the rest of Scotland for the large businesses based in the town. This will have a large impact on reducing heavy traffic on the key trunk routes to and from Leven such as the A911, A915 and A955, promoting quicker and safer journeys for the remaining road users.</p>
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Appraisal Summary Table – Option B: Re-commissioning of the Existing Railway Line – Straightened Alignment

Rationale for Selection or Rejection of Proposal:	It is recommended that the proposal be taken forward to the next stage as the scheme meets the planning objectives and has no significant adverse impacts on the government’s 5 objectives for transport.
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Implementability Appraisal	
Technical:	Owing to the new section of straightened track alignment, there may be some Technical issues associated with the Implementability of this option.
Operational:	There are not expected to be any Operational issues associated with the Implementability of this option.
Financial:	There are not expected to be any problems associated with the financial requirements for the Implementation of this option.
Public:	There are no issues associated with Public support for the Implementability of this option.

Appraisal Summary Table – Option B: Re-commissioning of the Existing Railway Line – Straightened Alignment

Environment			
Sub-objective	Qualitative Information	Quantitative Information	Significance of Impact
Noise and Vibration	The assessment of the effect of the use of the rail services on the local area showed properties fronting on or in close proximity to the re-commissioned rail link, particularly in the vicinity of Cameron Bridge, will experience some minor adverse impacts. However this is shown to be balanced by corresponding moderate beneficial impacts across the existing road network including the A911, the A915 and the A955.	The re-introduced rail services will in the main pass through rural areas where there are no significant receptors. In addition the option is anticipated to reduce traffic volumes on the chief arterial routes between Leven and the nearby towns, giving a net positive impact in terms of a reduction of dB (A) in Leven itself and properties lining the routes.	These correspond in overall terms to a slight net benefit where the increase in noise associated with the rail option is compared with the potential decrease in volume of traffic noise and vibration.
Air Quality - Overall	It is estimated that given the predicted decreases in vehicle kilometres on the road network, there is likely to be moderate beneficial impacts on properties fronting and in close proximity to the existing road network, including the A911, the A915 and the A955.	Meets safe levels for Scottish Executive Guidance in terms of CO ₂ global, PM ₁₀ local and NO ₂ local. Slightly lower emissions in all these expected overall from the Do-Minimum.	Slight beneficial.
CO ₂ - Global	Meets safe levels for Scottish Executive Guidance.	Slightly lower emissions expected overall from the Do-Minimum.	Slight beneficial.
PM ₁₀ - Local	Meets safe levels for Scottish Executive Guidance.	Slightly lower emissions expected overall from the Do-Minimum.	Slight beneficial.
NO ₂ - Local	Meets safe levels for Scottish Executive Guidance.	Slightly lower emissions expected overall from the Do-Minimum.	Slight beneficial.
Water Quality, Drainage and Flood Defence	The impacts of construction and operation on the hydrological resource are likely to be low providing that the necessary mitigation measures are put	Some short term impacts possible during the construction phase only, and only on the Leven and Ore	Assessed as being of small minor negative impact to moderate/major negative impact in the unlikely event that the hydraulic capacity of the

Appraisal Summary Table – Option B: Re-commissioning of the Existing Railway Line – Straightened Alignment

	<p>in place to avoid pollution of watercourses.</p> <p>The River Leven and the River Ore are in close proximity to the route but any impacts on these watercourses are likely to be short term, fairly localised and temporary in nature as they are associated only with the duration of construction.</p>	<p>watercourses.</p> <p>No impacts expected occurring during the operational phase, and unlikely to be any disturbance and release of groundwater contaminants.</p>	<p>river be reduced during the construction works.</p> <p>The impacts over the operational phase of these options are assessed as being of small minor negative significance.</p>
Geology, Agriculture and Soils	<p>The construction of a new section of rail line will have an impact on the Geology, Agriculture and Soils.</p>	<p>No designated sites that are sensitive to this option have been identified at this stage.</p>	<p>Minor adverse impact.</p>
Biodiversity	<p>Pollution incidents during construction and operation could have implications for the Firth, the river tributaries and their habitats.</p> <p>The most likely impacts of the option proposals are on the loss of areas of scrub and grassland habitat, loss of bat roosts within trees and structures to be demolished and the potential for pollutants entering sensitive and protected watercourses during both construction and operation stages; and the potential spread of invasive plant species.</p>	<p>This option will see significantly more land-take of currently undeveloped land, direct habitat loss and habitat fragmentation associated with the construction of a new rail line.</p> <p>Full ecological survey of the corridor ear-marked for construction of a new rail-line would have to be conducted before potential impacts upon biodiversity receptors can be reliably quantified.</p>	<p>Moderate negative impact.</p>
Visual Amenity	<p>The impacts will largely involve the removal of some vegetation beside the line and the laying of new tracks.</p> <p>There are relatively few receptors close to the line because much of it runs through a rural area. The largest numbers of receptors are at Cameron Bridge and between Methil and Leven, but a significant proportion of these will be screened by vegetation</p>	<p>The realignment of the railway line will result in major landscape changes but there are very few receptors.</p> <p>The extent to which the changes will affect the receptors will depend on the proximity of the receptors to the works and the degree to which there is screening. Thus option B will be the most disruptive option because it will</p>	<p>Both construction and operation will have a major negative impact.</p>

Appraisal Summary Table – Option B: Re-commissioning of the Existing Railway Line – Straightened Alignment

	associated with the river.	introduce a new length of railway line into a previously undeveloped countryside area. There is not much opportunity to reduce the effects significantly by mitigation.	
Cultural Heritage	There are a number of listed buildings present within the 200m study corridor, but only one Scheduled Ancient Monuments (SAM, Balgonie Castle) is located within the corridor.	Owing to the substantial ground preparation works with this option requiring the new alignment, there is potentially significant disruption.	Major negative impact, severity depends on the exact alignment.
Landscape	There will be some landscape changes with this option.	This option that will have some effect on the landscape because it will introduce a new length of railway line into a previously undeveloped countryside area.	Moderate negative impact.

Safety			
Sub-objective	Qualitative Information	Quantitative Information	Significance of Impact
Accidents	The transport modelling has suggested that there will be significant modal shift from cars to rail and from HGV freight traffic to rail freight. This option would be expected to reduce traffic accident numbers and/or their severity to a greater extent than option A merely because with the better journey time performance of option B, it is expected that there will be more modal shift from cars to rail for this option.	The option under consideration will remove traffic from the main trunk routes leading into and out of Levenmouth and will undoubtedly have an impact on both the number and severity of accidents on these roads. The estimated PVB for savings in accidents is £0.45m.	Minor positive beneficial impact.

Appraisal Summary Table – Option B: Re-commissioning of the Existing Railway Line – Straightened Alignment

Security	This option will involve a substantial amount of construction, including replacement rail tracks, new rail emplacement and the construction of new rail stations and termini.	In terms of these new facilities, it is expected that minimum safety requirements would be met with regard to personal security concerning their design and construction with respect to site perimeters, site surveillance, both formal and informal, lighting, visibility and emergency call facilities.	There will be a minor to moderate beneficial impact.
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Economy (Transport Economic Efficiency)			
Sub-objective	Item	Qualitative Information	Quantitative Information
User Benefits	Travel Time	Users will benefit from improved travel times due to de-congestion effects. Values for these were derived from the national default value-of-time data obtained from WebTAG and average (default) information.	£82.1m (PVB 60-years)
	User Charges	There are limited user charges associated with this option.	-£2.0m (PVB 60-years)
	Vehicle Operating Costs	Users will benefit from savings in fuel costs and from savings in vehicle wear and tear consistent with greater uniformity in vehicle speed. Values were based on the WebTAG and average (default) data.	£31.3m (PVB 60-years)
	Quality – Reliability Performance Impacts	These are mainly derived from the benefits associated with the new stations.	£1.1m (PVB 60-years)
	Freight Sensitive Lorry Mile Benefits	These monetised benefits reflect those gained by the removal of HGV traffic from the local network in terms of de-congestion and environmental improvements that result.	£35.2m (PVB 60-years)
Private Sector Operator Impacts	Investment Costs	There are no anticipated private sector investment costs. Assumes Govt will pay for all infrastructure costs.	Not applicable here
	Operating & Maintenance Costs	There are anticipated to be significant private sector operating and maintenance costs with this option associated with the maintenance of rail track and rolling stock on the one hand, and operating the stations on the other.	-£51.5m (PVB 60-years)

Appraisal Summary Table – Option B: Re-commissioning of the Existing Railway Line – Straightened Alignment

	Revenues	There will, obviously, be rail fare-box receipts from this option. However there will also be some displacement from bus transport to rail, with a corresponding drop in these from other PT revenue streams. Hence, only the net gain is presented in this AST.	£2.0m (PVB 60-years)
	Grant/Subsidy payments	There will be some grant/subsidy payments with this option as rail revenues are not anticipated to cover OMR costs over the appraisal period.	-£36.7m (PVB 60-years)

Economy (Economic Activity and Location Impacts)			
Sub-objective	Item	Qualitative Information	Quantitative Information
Economic Activity and Location Impacts	Local Economic Impacts	<p>The large indigenous drinks & other businesses, primarily Diageo and Donaldsons and other local businesses, will be able to respond to greater market opportunities and competitive environment and new opportunities may result from some local retail expansion.</p> <p>Most external trade is associated with the large established businesses noted above, who will benefit from reduced transportation costs and facilitated access for supplies and to markets. Improved transportation will enable the established successful companies to reduce costs and facilitate access to markets and skilled employment. Employment requirements during construction would assist the unemployed to get back to work.</p> <p>Smaller or new companies should be able to attract wider external sources of capital funding for the same reasons as above. For tourism business there should be a tourism boost with the increased accessibility to the local scenic areas.</p>	Minor-to-moderate beneficial impact.

Appraisal Summary Table – Option B: Re-commissioning of the Existing Railway Line – Straightened Alignment

	National Impacts	Economic	There will be few economic impacts on a national scale. However, because of the presence of nationally important companies in Leven, both retailers and ultimately consumers will benefit on a national scale where these companies are able and willing to pass on reduced costs of transportation and greater reliability of delivery to their customers irrespective of location.	Minor beneficial impact.
	Distributional Impacts		There will be some distributional effects associated with travel time changes, which are captured quantitatively in the TEE analysis. In addition, Leven which suffers from areas of significant unemployment, and other indices of social deprivation, would be expected to gain from the increased accessibility resulting from the re-introduction of rail and the improvement of other PT services and also from the reduced journey times that these improvements permit.	Minor-to-moderate beneficial impact.

Integration				
Sub-objective	Item		Qualitative Information	Quantitative Information
Transport Interchanges	Services & Ticketing		<p>This option will have an impact in terms of integration of services with the existing bus service network. Opportunities will arise within the Levenmouth area to share brand names, ticketing arrangements and to ‘dove-tail’ existing and new bus services and timetables with new rail timetables.</p> <p>Moreover, synchronising new rail services with the existing rail network and bus network will occur both within and outwith the area, so a significant proportion of benefits may be regional rather than specifically local.</p>	Moderate beneficial impact.
	Infrastructure Information	&	The option involves new rail stations which will have the opportunity for providing bus-rail interchange infrastructure to facilitate modal switch at the rail stations themselves. The noticeable changes are more likely to be with services.	Moderate beneficial impact.

Appraisal Summary Table – Option B: Re-commissioning of the Existing Railway Line – Straightened Alignment

Land-use Transport Integration		<p>This option encourages a modal shift away from private car use, to improve the quality of the environment, and to increase access for all to a public transport system serving areas of employment, housing and recreation and would encourage social inclusion.</p> <p>In addition, the freight transport improvements offered by the proposed investment in the rail investment in the study area offer a major opportunity to implement local and strategic planning and transport policies as a mechanism for promoting development on a more sustainable footing.</p>	Moderate beneficial impact
Policy Integration		<p>This option articulates well the transport policies and strategies as detailed in the LTS, SPP17, PP1 and Local Structure Plan; including efforts to improve connectivity of the Levenmouth to other parts of the region in terms of rail and road transport links, widen accessibility to transport for all residents, promote modal choice, promote the efficient movement of freight, and to support local economic growth and employment.</p>	Moderate beneficial impact

Accessibility & Social Inclusion			
Sub-objective	Item	Qualitative Information	Quantitative Information
Community Accessibility	Public Transport Network Coverage	<p>This option will open up alternative commuter and tourism access to the Levenmouth area from the surrounding towns, Dunfermline and Edinburgh. Moreover, this option also provides direct connections to the regional and national rail networks which significantly increase connectivity.</p>	Major beneficial impact
	Access to Other Local Services	<p>This option, with two new rail stations will provide intermodal change facilities for bus, rail and car, giving ready access to local facilities and services.</p>	Major beneficial impact

Appraisal Summary Table – Option B: Re-commissioning of the Existing Railway Line – Straightened Alignment

Comparative Accessibility	Distribution/Spatial Impacts by Social Group	Enhancing the modal choice available to all Levenmouth residents is provided by an expanded local public transport network which will be beneficial to all groups, without exception. Even car users will benefit. The only possible caveat is the fare terms arranged for public transport and whether there is a cost recovery component included in these that penalise those unable to afford them, such as the unemployed, the elderly and the lower socio-economic groups.	Moderate beneficial impact
	Distribution/Spatial Impacts by Area	The public transport investment proposed for the Levenmouth area will assist a broad range of beneficiaries. This option will assist commuters and those seeking work, those visiting further afield, tourists and for business, and will also assist bulk freight movements into and out of the area.	Moderate beneficial impact

Cost to Public Sector		
Item	Qualitative information	Quantitative information
Public Sector Investment Costs	These anticipated public sector investment costs include risk & Optimism Bias.	-£29.2m (PVC 60-years)
Public Sector Operating & Maintenance Costs	There are no anticipated public sector O&M costs.	Not applicable here
Grant/Subsidy Payments	There are significant public sector grant and subsidy payments with this option.	-£36.7m (PVC 60-years)
Revenues	There are no anticipated public sector revenues with this Option.	Not applicable here
Taxation impacts	Due to a loss of Government taxation revenues from improved VOCs.	-£18.0m (PVC 60-years)

Appraisal Summary Table – Option B: Re-commissioning of the Existing Railway Line – Straightened Alignment

Monetised Summary	
Present Value of Transport Benefits	£63.88m (PVB 60-years)
Present Value of Cost to Government	-£47.23m (PVC 60-years)
Net Present Value	£16.65m (PVB 60-years)
Benefit-Cost to Government Ratio	1.35

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