Scottish Government, Scottish Enterprise and HIE

Scottish Multi-Modal Freight Locations Study

Final Report

Scott Wilson Ltd

June 2009

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Revision Schedule

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Executive Summary

E.1 Introduction

E.1.1 Providing efficient and accessible freight transport infrastructure helps to reduce journey times and subsequently costs, the benefits of which can filter through to the wider economy. Therefore, good freight transport facilities are important to stimulate and sustain economic growth in Scotland. One of the key elements of the freight network are good functioning multi-modal freight hubs which enable modal shift and interchange within and through the logistics supply-chain; these link up the complex patterns of freight movements throughout the country.

E.1.2 Scott Wilson were appointed by Scottish Enterprise, the Scottish Government and Highlands and Islands Enterprise to examine the possible development of Scotland's key freight locations in terms of their economic competitiveness and contribution to other issues such as promoting modal shift and providing wider benefits. This report presents these issues and findings in terms of the potential demand for and impact of multi-modal freight locations throughout the country.

E.2 Background

E.2.1 Several key pieces of legislation and policy reports have been published recently leading to the development of this multi-modal freight locations study, including:

- The Government Economic Strategy;
- The National Planning Framework (NPF);
- The National Transport Strategy (NTS);
- The Strategic Transport Projects Review (STPR); and
- The Freight Action Plan (FAP).

E.2.2 These aim to improve the movement of freight throughout Scotland on a transport network and to ensure Scottish businesses can compete internationally.

E.2.3 To meet these objectives, multi-modal freight facilities can be sited at strategic locations to aid interchange and have an important role to play whether they are local terminals, regional distribution centres or international connections. As such they should be encouraged in the planning process, in accordance with Government policy. They can be provided in relatively small numbers, strategically located throughout the country, to serve major urban conurbations as well as rural areas and are key to providing sustainable growth in freight.

E.3 Appraisal of Multi–Modal Freight Locations

Capacity Analysis

E.3.1 A total of 16 options/locations were identified following detailed stakeholder consultations, and are summarised in Table E.1. The criteria for categorising the level of investment in Table E.1 was based on the estimated capital costs of the relevant option. A capital cost of less than £2m was classed as minor, a capital cost of between £2m and £20m was categorised as moderate and a capital cost of over £20m was ranked as major.

Table E.1: Location and Level of Investment Required

RTP Area	Multi-modal Location	Type	Investment Level
HITRANS	Cromarty Firth	Freight Distribution Location	Moderate
	Elgin/A96	Freight Distribution Location	Minor
	Inverness	Regional Gateway	Minor
	Loch Fyne	Freight Distribution Location	Moderate
Nestrans	Aberdeen	Regional Gateway	Minor
	Peterhead	Regional Gateway	Minor
SEStran	Cameron Bridge – Leven	Regional Gateway	Moderate
	Grangemouth	National Gateway	Moderate
	Rosyth	National Gateway	Major
SPT	Coatbridge	National Gateway	No Change
	Hunterston	National Gateway	Major
	Mossend	National Gateway	No Change
	Prestwick Airport	National Gateway	No Change
SWestrans	Lockerbie	Freight Distribution Location	Moderate
TACTRAN	Dundee	Regional Gateway	Minor
ZetTrans	Lerwick	Freight Distribution Location	No Change

E.3.2 Of the above 16 options, the demand analysis identified which of them have sufficient capacity to meet forecast future levels of freight, although there might be a need for on-going maintenance. These are (not in any specific order):

- Coatbridge (National Gateway);
- Lerwick (Local Distribution Centre);
- Mossend (National Gateway); and
- Prestwick Airport (National Gateway).

Economic and STAG-based Appraisals

E.3.3 The 12 remaining options/locations were assessed using financial and economic evaluation tests in addition to a STAG-based appraisal to identify their benefits. A summary of the economic impact assessments for the remaining options is shown in Table E.2. This shows the internal rate of return (IRR), the net present value (NPV) and the benefit-to-cost ratio (BCR) of each option. Also shown is the estimated net job impacts. Two future scenarios were tested (Low Growth and High Growth Scenarios), based on different assumptions of growth up to 2020.

Table E.2: Summary of Economic Impacts (Low Growth Scenario)

RTP Area	Location	Financial	Economic		Estimated Net Job impacts
		IRR	NPV	BCR	
HITRANS	Cromarty Firth	2.7%	–£1.78m	0.9	15
	Elgin/A96	7.6%	£11.97m	2.1	27
	Inverness	8.2%	£4.87m	2.4	0
	Loch Fyne	0.9%	–£12.40m	0.4	2
Nestrans	Aberdeen	12.1%	£13.77m	2.9	0
	Peterhead	25.2%	£10.35m	3.3	0
SEStran	Cameron Bridge – Leven	2.9%	–£0.13m	1.0	48
	Grangemouth	15.3%	£47.06m	3.2	140
	Rosyth	6.1%	£115.04m	1.7	262
SPT	Hunterston	7.6%	£109.39m	1.4	219
SWestrans	Lockerbie	4.4%	£15.04m	1.6	61
TACTRAN	Dundee	22.0%	£10.06m	4.1	4

E.3.4 The above Table summarises the economic and financial performance results for the options at the low growth scenario and clearly they improve when considered under the high growth scenario. However, even at the low growth scenario, the appraisal identified a number of options which produce good economic returns. Some of these are largely because they require a limited amount of investment in order to promote multi-modal activities and the benefits that result. Nonetheless, investment in these options is not likely to have a significant national impact in terms of job creation. In terms of larger impacts, Grangemouth, Hunterston and Rosyth all show a reasonable to good level of economic return in terms of NPV and BCR values but also have a significant impact with regards to job impacts.

E.3.5 Following the economic tests, a STAG-based appraisal was also carried out to identify the wider benefits of the options. Table E.3 summarises the assessment.

Table E.3: Summary of STAG-based Assessment

RTP Area	Location	Air Quality and Noise	Other Environment	Safety	Integration	Connectivity
HITRANS	Cromarty Firth	✓✓	✗	O	✓✓	✓
	Elgin/A96	✓	✗	O	✓✓	✓
	Inverness	✓	O	O	✓	✓
	Loch Fyne	✓	✗	O	✓	✓
Nestrans	Aberdeen	✓	O	O	✓	✓
	Peterhead	✓	O	O	✓	✓
SEStran	Cameron Bridge – Leven	✓	✓✓	O	✓✓	✓✓
	Grangemouth	✓✓	✗	O	✓✓✓	✓
	Rosyth	✓✓✓	✗✗	✓	✓✓✓	✓✓✓
SPT	Hunterston	✓✓✓	✗✗✗	✓	✓✓✓	✓✓✓
SWestrans	Lockerbie	✓	✗✗	O	✓	✓
TACTRAN	Dundee	✓	O	O	✓	✓

Key:

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

E.3.6 The above Table shows the following options have the strongest benefits, interpreted as the higher number of ticks in the Table (in no particular order):

- Cameron Bridge/Leven;
- Cromarty Firth;
- Grangemouth;
- Hunterston; and
- Rosyth.

E.3.7 These options, especially Grangemouth, Hunterston and Rosyth, perform well with regards to integration and with connectivity, which have particular relevance to multi-modal freight operations.

E.4 Emerging Findings

Financially Viable Options

E.4.1 From the analysis we can see that the following eight options were found to be financially viable (not in any specific order):

- Aberdeen;
- Dundee;
- Elgin;
- Grangemouth;
- Hunterston;
- Inverness;
- Peterhead; and
- Rosyth.

E.4.2 This suggests that all these options should be implemented by the private sector with little or no need for Government intervention. It should be borne in mind that any option being considered for development will be constrained by private sector initiative and their desire to carry out the required investment.

E.4.3 However, Government intervention can be indirect. In particular planning permission can be assisted by projects being included in strategic plans. This includes the National Planning Framework which provides a national context for development plans and assists with wider government programmes. The Government can recognize those options listed above, subject to the required statutory processes.

E.4.4 A further form of Government involvement is with improving the transport accessibility links within the vicinity of the relevant sites. For example, a number of the interventions in the Strategic Transport Projects Review (STPR) compliment the identified options. Delivery of the STPR interventions would also assist the options identified in this study.

E.4.5 Finally, Government can also assist with the supply of information on freight, planning applications and projected land-use/demographic changes, which are all useful in estimating future demand for freight services.

Non Viable Options

E.4.6 From the analysis, it is clear that the following options do not provide sufficient societal benefits and therefore it could be argued that these options do not warrant Government intervention:

- Cromarty Firth; and
- Loch Fyne.

E.4.7 Hence the above options should not be considered for implementation based purely on economic, financial and STAG-based appraisal criteria.

Other Options

E.4.8 Following on from the above, there are two remaining options which could still be implemented and would provide wider economic and other benefits, but do not have sufficient demand/revenue to cover both their implementation and running costs. These are:

- Cameron Bridge/Leven; and
- Lockerbie.

E.4.9 These could be delivered with the assistance of Government support, subject to the usual State Aid conditions and checks.

1 Introduction

1.1 Overview

1.1.1 Transport is essential to ensure sustained economic growth and development for Scotland. Freight transport in particular makes a positive contribution to Scotland's economic growth, enabling the import and export of cargoes to/from the country while also facilitating the movement of goods within the country.

1.1.2 Adequate infrastructure and freight services on roads, rail, airports and ports are all vital to the Scottish economy, ensuring businesses have access to appropriate links to their customers. Providing efficient and accessible freight transport infrastructure helps to reduce journey times and subsequently costs, the benefits of which can filter through to the wider economy. Therefore, good freight transport facilities are important to stimulate and sustain economic growth in Scotland.

1.1.3 One of the key elements of the freight network is adequate freight hubs which enable modal shift and interchange within and through the logistics supply-chain; these link up the complex patterns of freight movements throughout the country. Multi-modal freight hubs can be sited at strategic locations to facilitate interchange and have an important role to play whether they are local terminals, regional distribution centres or international connections. As such they should be encouraged in the planning process, in accordance with Government policy. They can be provided in relatively small numbers, strategically located throughout the country, to serve major urban conurbations as well as rural areas and are key to providing sustainable growth in freight.

1.1.4 This report aims to examine the possible development of Scotland's key freight locations in terms of their economic competitiveness and contribution to other issues such as promoting modal shift and providing wider benefits. The findings of this study are a result of a major consultation and data collection exercise undertaken with key stakeholders including freight operators, public bodies, customers and end-users, businesses and Government. These stakeholders have been crucial in building a picture of the current and future freight trends across Scotland, which has helped identify issues and potential demand for multi-modal freight locations throughout the country.

1.1.5 However, before the results of the analysis and its conclusions are presented, it is helpful to set the background context which led to this study and also describe the study objectives. Consequently, Section 1.2 explains where this study fits in with the wider Government Policy agenda and Section 1.3 summarises the individual study tasks which were required to complete the appraisal. In addition, Section 1.4 sets out a definition of multi-modal freight locations as assumed in this assessment. This introduction then concludes in Section 1.5 with a description of the structure of the remainder of this report.

1.2 Background to this Study

1.2.1 Several key pieces of legislation and reports have been published recently leading to the development of this multi-modal freight locations study, discussed in turn below.

Economic Strategy

1.2.2 The Government Economic Strategy[1] states that the overall intention of the Scottish Government is:

> *"To create a more successful country, with opportunities for all of Scotland to flourish, through increasing sustainable economic growth".*

1.2.3 In summary, the purpose of this strategy is to ensure a structured and vibrant economy capable of sustaining growth that in turn will offer opportunities to all and prosperity for the country.

1.2.4 The Strategy contains benchmarks to monitor progress being made in encouraging Scotland's growth and productivity. It contains five strategic priorities of which two relate directly to transport: infrastructure development and place, and supportive business environment. The development of such is linked directly to the National Planning Framework[2], which is outlined below.

National Planning Framework

1.2.5 The National Planning Framework (NPF) set out a strategy for Scotland's development between 2005 and 2025; which has now been extended to 2030 with the introduction of the second National Planning Framework[3] (NPF2). These documents provide a national setting for development plans and assist with wider government programmes.

1.2.6 The frameworks manage policies with a spatial dimension and aims to integrate investment priorities tailored to the strengths of each part of the country. In 2006 The Planning etc. (Scotland) Act ensured subsequent NPFs would be introduced as a statutory document. NPF2 is closely linked to STPR (see section 1.2.9), and sets out possible infrastructure interventions. These interventions will allow future traffic growth and enable Scotland's long-term development. NPF2 supports the three Key Strategic Outcomes of the National Transport Strategy[4], which is summarised in the following paragraphs.

National Transport Strategy

1.2.7 The National Transport Strategy (NTS), along with its associated document for freight, was published in 2006. The document identified three Key Strategic Outcomes for transport these were:

- *improving journey times and connections*, to tackle congestion and the lack of integration and connections in transport that impact on the potential for continued and economic growth;
- *reducing emissions*, to tackle the issues of climate change, air quality and health improvement; and

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[1] The Government Economic Strategy, Scottish Government, November 2007
[2] National Planning Framework, Scottish Government, April 2004
[3] National Planning Framework 2, Scottish Government, Consultation Draft, January 2008
[4] National Transport Strategy, Scottish Executive, December 2006

- *improving quality, accessibility and affordability*, to give people a choice of public transport, where availability means better quality transport services and value for money or an alternative to the car.

1.2.8 These objectives are aligned with the overall purpose of the Scottish Government purpose to ensure growth in the economy and are also closely correlated with the Strategic Transport Projects Review and the Freight Action Plan. These are now described in turn.

Strategic Transport Projects Review

1.2.9 The Strategic Transport Projects Review[5] (STPR) is a national review of the transport network to allow future issues to be identified and planned in advance, ensuring and enabling continued growth. Locations which require infrastructure improvements are identified and upgrade solutions proposed. STPR focuses on the period beyond 2012, and primarily between 2012 and 2022. Projects which will be completed, designed or developed within this timeframe are considered.

1.2.10 The focus of STPR is on interventions which are the responsibility of the Scottish Government. The document also reflects their views of providing better links to the rest of the UK. This includes providing better connections to ports and airports. STPR provides a base document upon which future action is taken and important improvements to freight transport is identified, which is particularly relevant to this study.

Freight Action Plan for Scotland

1.2.11 The Freight Action Plan[6] published in 2006 is the companion document of the Scottish National Transport Strategy, recognising the role The Scottish Government, and regional and local transport authorities can play in stimulating the economy by implementing market enhancement interventions that the market may not undertake by itself.

1.2.12 The plan aims to make the movement of freight throughout Scotland *"efficient and sustainable"*, on a transport network that is *"integrated and flexible"* – thereby ensuring Scottish businesses can compete internationally. To allow this to happen the plan developed the following aims:

- To enhance Scotland's **Competitiveness**;
- To support the development of the freight **Industry** in Scotland;
- To maintain and improve the **Accessibility** of rural and remote areas;
- To minimise the adverse impact of freight movements on the **Environment** in particular through the reduction in emissions and noise; and
- To ensure freight transport policy **Integration**.

[5] Strategic Transport Projects Review, Transport Scotland, December 2008
[6] Preparing for Tomorrow, Delivering Today – Freight Action Plan for Scotland, Scottish Executive, November 2006

1.2.13 The plan identified 20 actions to be undertaken. The first action was the STPR and the second was a multi-modal hubs study as stated below:

> *"The Scottish Government and Enterprise Networks will engage with business, industry, the ports sector and other key stakeholders to determine the need for and location of multi-modal freight hubs, taking account of the strategic economic importance of ports in providing access to international markets".*

1.2.14 It is this second action which is the focus and purpose of this study. Consequently, Scottish Enterprise (SE), Highlands and Islands Enterprise (HIE) and the Scottish Government appointed Scott Wilson to conduct a STAG-based study into the need for, and potential economic contribution of, one or more multi-modal freight locations in Scotland. The study would ensure a strategic approach is taken to the development of Scotland's key freight locations taking account of economies of scale and, potentially, enhanced freight services. The objectives of the appraisal are described in Section 1.3 below.

1.3 Study Objectives

1.3.1 In summary, this report seeks to address the following tasks[7]:

- compile a baseline of existing freight movements in Scotland;
- analyse and quantify future demand for freight transport over a 10-20 year time frame;
- consider the implications of existing and future demand for the need of inter-modal freight locations in Scotland over the time frame;
- identify options for the development of such locations and assess their potential impact on Scotland's economic competitiveness; and
- identify those options which could be entirely private-sector driven, and the role of the public sector in supporting other developments.

1.3.2 In addition to looking at the economic benefits of potential locations, the study has also sought to identify other benefits using a STAG-based criteria. At the time the study commenced, the most recent version of STAG was version 1.0 (September 2003) and it is this version which has been used[8].

1.3.3 Option definition is outlined to a level of detail which is intended to allow a broad-brush appraisal of each Option to STAG Part 1 level. Any options that successfully meet the objectives being appraised could be taken forward into a more rigorous STAG Part 2 level of assessment, but this is outwith the scope of this study.

1.3.4 The study has taken some considerable time to complete, due to the significant volumes of data collected and stakeholder consultation. Since then there have been further developments which have led to additional options/locations being suggested which, if starting the appraisal from now, would have also been examined in more detail. However, the emerging findings are considered to be a good range of options/locations for addressing the geographically wide range of issues identified in the study, and also provide a reasonable understanding of the type and size of freight facilities required to meet future demand estimates.

[7] Consultants Brief: Invitation To Tender, Scottish Enterprise, June 2007

[8] Scottish Transport Appraisal Guidance, version 1.0, Scottish Government, September 2003

1.4 Definition of Multi-Modal Freight Locations

1.4.1 For the purposes of this study, the term multi-modal freight location is defined as a site where two or more modes for freight transport (e.g. air, water, rail and road) are able to transfer freight between each other.

1.5 Structure of this Report

1.5.1 The rest of this report consists of the following elements.

Chapter 2 – sets out a short analysis of existing and future freight distribution issues and also highlights potential synergies with the STPR interventions;

Chapter 3 – summarises the consultations carried out and identifies various inter-modal locations for analysis;

Chapter 4 – appraises the future demand and capacity of each option/location and identifies their development needs and costs;

Chapter 5 – outlines the economic appraisal of each option/location;

Chapter 6 – sets out the STAG-based appraisal of each option/location; and

Chapter 7 – summarises the study findings and assesses the implications in terms of public sector involvement.

2 Existing and Future Freight Transport Patterns

2.1 Introduction

2.1.1 This Chapter examines the existing and future freight transport patterns, beginning with a brief overview of the economic background against which the freight industry is influenced. Scottish freight movements are then addressed by examining freight volumes. To assist in the presentation of the analysis, the data is set out for each of the Regional Transport Partnership (RTP) regions which make up the geographical area of Scotland. There are seven RTPs, set out alphabetically:

- HITRANS – Highlands and Islands Transport Partnership;
- Nestrans – North East of Scotland Transport Partnership;
- SEStran – South East of Scotland Transport Partnership;
- SPT – Strathclyde Partnership for Transport;
- SWestrans – South West of Scotland Transport Partnership;
- TACTRAN – Tayside and Central Scotland Transport Partnership; and
- ZetTrans – Shetlands Transport Partnership.

2.1.2 For each RTP area, an overview of freight movements is provided. This includes an outline of the headline indicators such as tonnage moved and modal split. Future trends are also summarised for each RTP area, with a short comment on the emerging findings for the particular RTP area in question. Connections to/from Scotland are also considered looking at freight transport by mode, and examining such issues as growth and capacity.

2.1.3 The analysis of current freight transport patterns is based on information collected from a series of surveys, existing databases and statistics supplied from key stakeholders including operators consulted during the course of the study. A base year of 2007 was used in the review of current conditions since this was the common year in the data collected.

2.2 Estimating Future Demand

Freight Transport Modelling

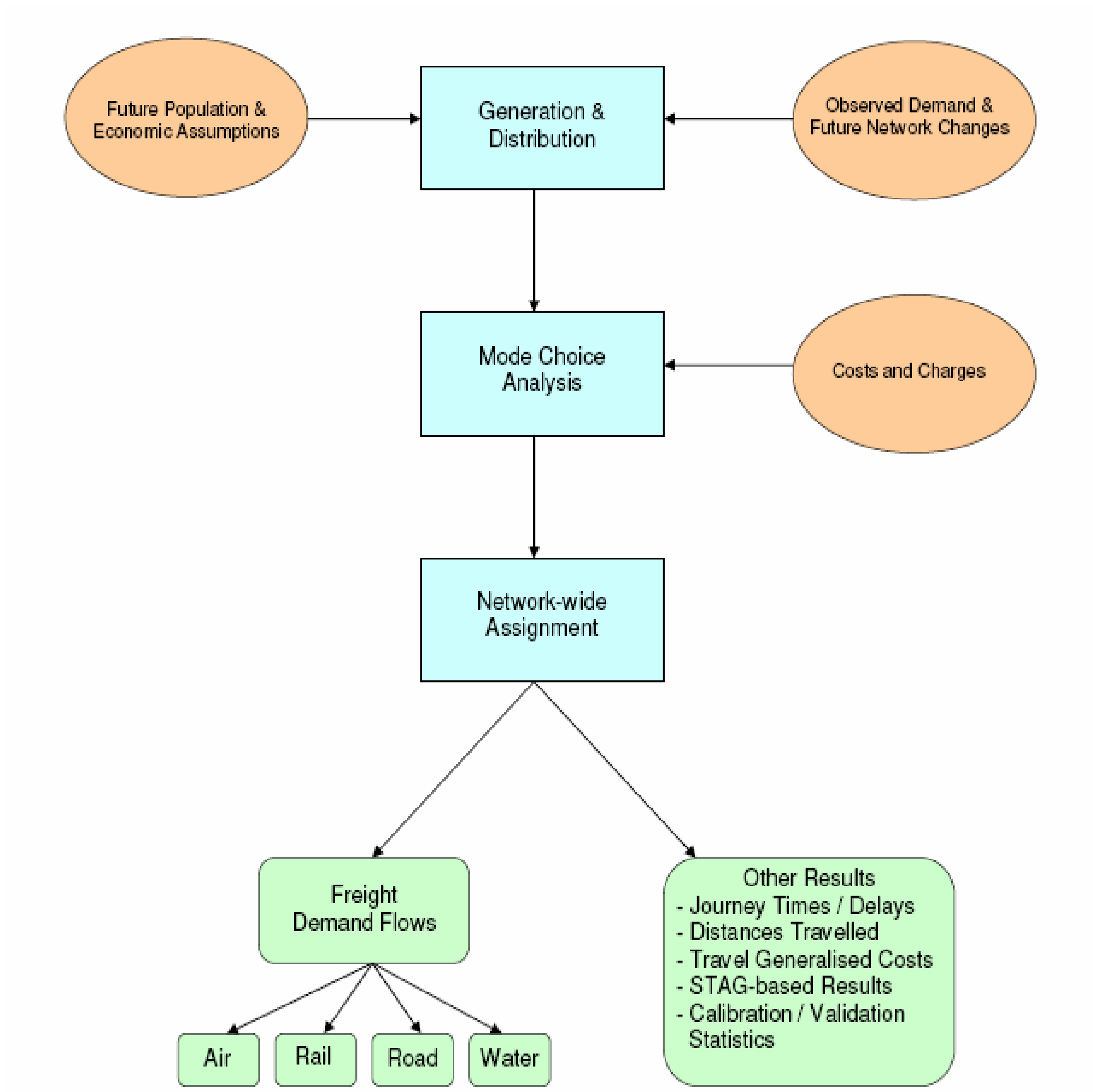
2.2.1 To help identify future freight patterns, transport modelling was used. A Scottish Freight Model (SFM) was built and calibrated to 2007 conditions using the information gathered from the surveys. Future forecasts were produced for an appraisal year of 2020.

2.2.2 So as to keep this main study report concise, details of the SFM and future estimates are shown in a separate Model Technical Note[9], which was discussed with the study Steering Group[10], and is included in Appendix A.

2.2.3 Figure 2.1 overleaf shows the layout of the SFM.

[9] Scottish Freight Model (SFM) – Modelling Technical Note, Scott Wilson, April 2009 (Draft issued October 2008)
[10] Presentation to the Steering Group to discuss and agree future forecasts held on 9 October 2008

Figure 2.1: Layout of the Scottish Freight Model



2.2.4 The SFM is based on the traditional transport modelling framework, and at its heart contains the industry-standard 4-stages of Generation, Distribution, Modal Split and Assignment.

2.2.5 The SFM was developed as a multi-modal transport model, based on procedures and practices that have been well tried and tested over many years.

2.2.6 The individual processes which make up the SFM include the following:

- Generation and Distribution – this estimates the freight generated in and attracted to each zone in the model area, split by different types of cargoes and purposes. A series of observed freight distribution matrices were developed for the base year (2007) from the data collected and analysed in the extensive surveys. Different observed matrices were produced for individual types of cargoes for a more refined analysis. Future planning data input into this stage of the analysis includes changes to the transport network due to planned or committed new schemes and also assumptions about how the population and economy will develop over time. Details on the proposed network changes were obtained from the interventions used in the Strategic Transport Projects Review[11] (STPR) and assumptions about future population and the economy were sourced from Government modelling guidance[12].

- Modal Choice Analysis – this takes the freight matrices produced by the generation and distribution stage and estimates by which main mode the freight will be transported. These are then converted into freight trips so they can be assigned across the freight network.

- Network-wide Assignment – this takes the estimated freight trip matrices and assigns them to the relevant freight networks (road, rail, air and water). Three time periods are modelled representing the different travel conditions throughout an average weekday (AM peak, inter-peak and PM peak). Daily totals are estimated by adding up the results from the various time periods modelled and annual totals are estimated by applying standard annualisation expansion factors, which are different for different types of cargoes for a more refined estimate. The assignment is undertaken using a multi-class assignment with capacity constraints to take into account the effects of increasing congestion.

- Post-Assignment Outputs – this produces the relevant outputs from the above sub-models for use in the various appraisals in the study. This includes:
  - demand flows (by different modes);
  - journey times and delays;
  - distances travelled;
  - results for use in STAG-based assessments; and
  - model calibration and validation results for checking against observed data.

2.2.7 There is nothing new in the model form in that it is based on previously used and understood analysis principles. Furthermore, it has been calibrated through the application of standard techniques that have been tried and tested elsewhere.

Future Modelling Assumptions

2.2.8 Part of the original study brief was to estimate future freight demand against which to test whether or not the existing freight network can accommodate future requirements. As explained in paragraph 2.1.4 earlier, the appraisal year selected

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[11] Strategic Transport Projects Review, Transport Scotland, December 2008
[12] Transport Analysis Guidance Website (WebTAG), Department for Transport, http://www.dft.gov.uk/webtag

for this study was 2020, which was identified and agreed with the study Steering Group since it provides a reasonable long-term planning horizon with which to develop any new measures which might be identified in this appraisal.

2.2.9 In addition, transport models require details of how the transport network and economy will develop over time, and hence forecasting too far into the future raises the level of uncertainties. Hence, 2020 was also considered to be a point in time which was reasonably well defined in terms of Government transport strategies and programmes for developing the network.

2.2.10 In order to model future scenarios across the country, it is important to compare against a Reference Case (or Do-Minimum Scenario). This takes into account planned and committed schemes which will occur and allow for comparison against the future state of the network.

2.2.11 Similarly, there are a number of population and economic parameters which sets out assumptions for the future development and growth of Scotland. These include forecasts for GDP which are produced by HM Treasury and population changes which are published by the Department for Transport (DFT), and have both been adopted by the Scottish Government for transport modelling[13].

2.2.12 Consequently, a wide range of assumptions were identified and discussed with the study Steering Group and agreed for inclusion in this appraisal. In addition, the assumptions were checked against those which were being used by the Strategic Transport Projects Review[14] (STPR) to maintain compatibility with the emerging programme for transport development.

2.2.13 Following on from the above discussions, it became clear that there was a wide range of assumptions for some key parameters such as fuel prices and economic growth. This was further highlighted by the significant fluctuations in fuel prices during 2008, over the period when the modelling was carried out. Therefore, two future scenarios were identified and agreed for modelling demand for freight in Scotland, to reflect the potential range of the estimates:

- ***low growth*** – this represents a modest growth due to high fuel prices and/or low economic growth; and
- ***high growth*** – this is higher and faster than the low growth scenario due to cheaper prices and/or a more buoyant economy.

2.2.14 Given the wide potential for variance in forecasts, the above two scenarios were considered helpful in gauging the level of demand for freight.

2.2.15 Since this study is looking at long term issues, should the current economic climate change significantly from the time the modelling and analysis was carried out, it is reasonable to assume that the study results are likely to be still applicable with only the timing of events or issues likely to change.

2.2.16 The economic context is further described in the following section.

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[13] Transport Analysis Guidance Website (WebTAG), Department for Transport, http://www.dft.gov.uk/webtag
[14] Strategic Transport Projects Review, Transport Scotland, December 2008

2.3 Economic Context

2.3.1 In 2008, it became clear that Scotland, in common with many other parts of the developed world, is heading for an economic downturn. As yet it is unknown how severe or how prolonged this recession will be, and the core economic fundamentals governing this downturn are largely outwith Scotland's immediate control. However, this study takes a long-term view and hence in discussion with the study Steering Group we have taken the year 2020 as a reasonable planning horizon for the estimation of future freight demand levels. Before we present our estimates, it is worth looking at how the Scottish economy has developed over recent years.

2.3.2 From 1998 until 2007 the Scottish economy grew by an average 2.2% per year in Gross Value Added (GVA) at basic prices whereas the UK grew by 2.7%[15]. In 2003, the Gross Value Added (GVA) per head, which is an indicator of general prosperity in the economy, was £15,789 in Scotland, 7.4% lower than for the UK as a whole. However in recent years this has improved, so that by 2007 the Scottish value for GVA per head had increased to £19,152, which represented a drop to 6.4% difference with the value for the UK as a whole[16].

2.3.3 The above trend has been mirrored by a number of individual sectors of the economy. For example, sectors which have experienced recent high growths include Electrical Machinery (up 19%); Coke, Refined Petroleum Products and Nuclear Fuel (up 17%); Machinery and Equipment (up 12%) and Other Transport Equipment (up 12%). These figures suggest that, prior to the economic downturn, many firms are resilient and have operated successfully within the Scottish economy.

2.3.4 In 2007 the Scottish Government issued its Government Economic Strategy which has five strategic objectives to enable sustainable economic growth, so as to generate wider opportunities in work, increase our competitiveness and make Scotland a more attractive place to live, work and invest[17].

2.3.5 Improving Scotland's productivity was seen in the Economic Strategy as key to raising the level of business competitiveness within the economy. To this end, the Government has set out five key priorities in order to achieve the economic objectives, of which the two most relevant to this study are:

- provide a supportive business environment; and
- provide infrastructure development and place.

2.3.6 The emphasis of national economic policy is on establishing a strong business environment within which Scottish companies can effectively compete with those from other parts of the UK and overseas. An important policy to ensure this occurs is to support and develop transport infrastructure which is used by industry.

2.3.7 Within this economic context the changing nature of Scotland's economy has helped to influence the freight transport sector. For example, services now account for over 70% of the economy, up from 63% ten years ago, and financial and business services make up nearly a quarter of GDP and the public sector (including health and education) accounts for a further 21%.

[15] NUTS 1 Regional, Sub-Regional and Local GVA Data, Office for National Statistics, December 2008
[16] IBID, *note 2007 figures are provisional*
[17] The Government Economic Strategy, Scottish Government, November 2007

2.3.8 Another significant influence on freight transport is fuel prices. This has seen steep fluctuations during 2008, where oil prices rose from $80 per barrel in the early part of the year to nearly $150 per barrel by mid-year, only to fall back to less than $50 per barrel by December. In traditional economic theory, high fuel prices can lead to reduced or consolidated freight flows.

2.4 Overview of Scottish Freight Movements

Presentation of Data

2.4.1 As explained in Sections 2.1 and 2.2, a series of surveys combined with some transport modelling was carried out to help identify current and future freight patterns. A significant element of the data provided is commercially sensitive and hence, as per the study Inception Report[18], the surveys were carried out in accordance with the *Market Research Society Code of Conduct (MRSCC)* and the *Interviewer Quality Control Scheme (IQCS)*, we therefore advised stakeholders that all information provided by them would be treated in strict confidence and only used for this study. This is important since it facilitated a free and candid exchange of information and views from stakeholders, including operators and end-users, which would otherwise not have been available. Consequently, the information cannot be presented in a very detailed level, but it is possible to present information in an outline format and aggregated for the main RTPs across Scotland[19].

Categorisation of Types of Cargo

2.4.2 Different areas of Scotland have different freight characteristics, patterns of movements and priorities. This is particularly relevant given the country's varying economic sectors which are the focus of the study. Consequently, to allow for a reasonable level of detail in the study, we have collected the freight data by key industry categories which collectively make up the entire freight transport market for Scotland. These categories were identified using the key sectors set out in the Scottish Government's Economic Strategy and further developed using Scottish Enterprise's priority industries, the details of which are discussed below.

2.4.3 The Scottish Government's Economic Strategy recognises that there are a number of key sectors that contribute most to Scotland's competiveness. The strategy focuses on the following six key sectors that have a high growth potential and the capacity to boost productivity[20]:

- creative industries (including digital content and technologies);
- energy (with particular focus on renewables);
- financial and business services;
- food and drink (including agriculture and fisheries);
- life sciences (including biotechnology and translation medicine); and
- tourism.

2.4.4 However, it should be noted that some of these will have little involvement in the movement of freight (i.e. tourism and financial services). Hence, in addition to

[18] Scottish Freight Study – Inception Report, Final Version, Scott Wilson, December 2007
[19] See last page of the report for Freedom of Information Statement
[20] The Government Economic Strategy, Scottish Government, November 2007

those above, it was therefore considered applicable to take note of Scottish Enterprise's key priority industries. Some of these are closely aligned with the Government's six key sectors, but those priority industries not specified within these are as follows:

- aerospace, defence and marine;
- chemical sciences;
- construction;
- other emerging technologies; and
- textiles.

2.4.5 In addition to these, there are a number of sectors which would be expected to have an important association with freight transport, and would be significantly freight dependent. These include the retail and wholesale sectors, the transport of white goods and the forestry industry.

2.4.6 Therefore, taking into account all of the above identified sectors, nine major categories were identified as being relevant for this assessment. The names of these were slightly modified so that they can be cross-referenced with the Standard Index Classifications (SIC) codes used in economic appraisal. The nine final economic sector groupings identified were:

- Agriculture, Fishing and Foodstuffs;
- Forestry and Forestry Products (timber/furniture/paper);
- Solid Fuels and Petroleum Products;
- Minerals, Building Materials and Construction;
- Metal Products, Machinery and Transport Equipment;
- Leather and Textiles, and Retail/Wholesale;
- Fertilizers and Chemicals;
- Electronic (white) Goods; and
- Other/Miscellaneous.

2.4.7 Future levels of freight demand for each of the above categories were estimated and aggregated together to give the total freight patterns across the Scottish network. Although commercial confidence prohibits showing estimates at specific locations and disaggregated to the sectors listed above, it is possible to describe how changes in freight are anticipated in each of the 9 categories at the national level. This is discussed in the following section.

Current and Future Estimates of Freight Tonnage

2.4.8 The volume of overall freight tonnage is projected to increase by 23% for the low growth scenario and 35% for the high growth scenario, as Table 2.1 shows. Solid fuel and petroleum products constitute the largest individual component of freight traffic tonnages in Scotland, making up 29% of the total in 2007. However this proportion is projected to drop substantially both in the low growth scenario and the high growth scenario to 16% and 11%, respectively, by 2020. This is mainly due to significantly more oil being transported by pipeline rather than shipped, as is currently the case.

Table 2.1: Scottish 2007 and 2020 Low & High Growth Annual Tonnages by Commodity

Commodity	Tonnes (x1000)					
	2007*		2020 Low Growth		2020 High Growth	
Agriculture, Fishing & foodstuffs	11,923	*3%*	15,864	*3%*	17,941	*3%*
Forestry and forestry products	31,899	*8%*	54,053	*10%*	64,358	*11%*
Solid Fuel & petroleum** products	122,133	*29%*	82,672	*16%*	60,037	*11%*
Minerals, building materials & construction	31,465	*7%*	44,570	*9%*	51,518	*9%*
Metal products, machinery & transport equipments	1,765	*0.4%*	2,533	*0.5%*	2,928	*0.5%*
Leather, textiles & retail/wholesale	31,476	*7%*	45,497	*9%*	54,640	*10%*
Fertilisers & chemicals	1,781	*0.4%*	2,172	*0.4%*	2,393	*0.4%*
Electronics goods	21	*0%*	29	*0%*	38	*0%*
Other/Miscellaneous	190,388	*45%*	272,089	*52%*	314,999	*55%*
Total	**422,851**	**100%**	**519,479**	**100%**	**568,852**	**100%**
Index	*100*		*123*		*135*	

Notes: * includes intra-zonal and OD double-counting

** the petroleum industry is assumed to continue its current trend of increasing movement of petroleum products by pipelines and the high growth assumes a higher take-up compared to the low growth

Source: Scott Wilson

2.4.9 The above suggests nearly all of the sectors are expected to grow, with the following commodities in particular:

- forestry and forestry products;
- minerals, building materials and construction;
- retail/wholesale, leather goods and textiles; and
- other/miscellaneous cargoes.

2.4.10 There will be slight growth in tonnes in the remaining goods, but these grow from a low base.

2.4.11 The above freight tonnages can be compared to similar estimates outlined in the recent Strategic Transport Projects Review[21] (STPR), however there are some important differences to note. The Scottish Freight Model used in this study takes into account all modes of freight transport (road, rail, air and water modes) and also includes tonnes lifted in Scotland in addition to throughput freight movements. This helps to consider the needs of freight flows to/from Scotland as well as intra-Scotland requirements. STPR on the other hand focused on road freight modes and freight tonnes lifted in Scotland[22].

2.4.12 In terms of origins/destinations, the largest freight flows both within Scotland and external to the country are to and from the SPT and SEStran RTP areas. This is most clearly seen in the bar charts in Figures 2.2a to 2.2d overleaf.

[21] Strategic Transport Projects Review, Transport Scotland, December 2008

[22] Para 4.4.3 & Table 4.10, Report 1 – Review of Current and Future Network Performance, STPR, December 2008

Figure 2.2a: Domestic Freight by Origin – 2007 Annual Tonnage

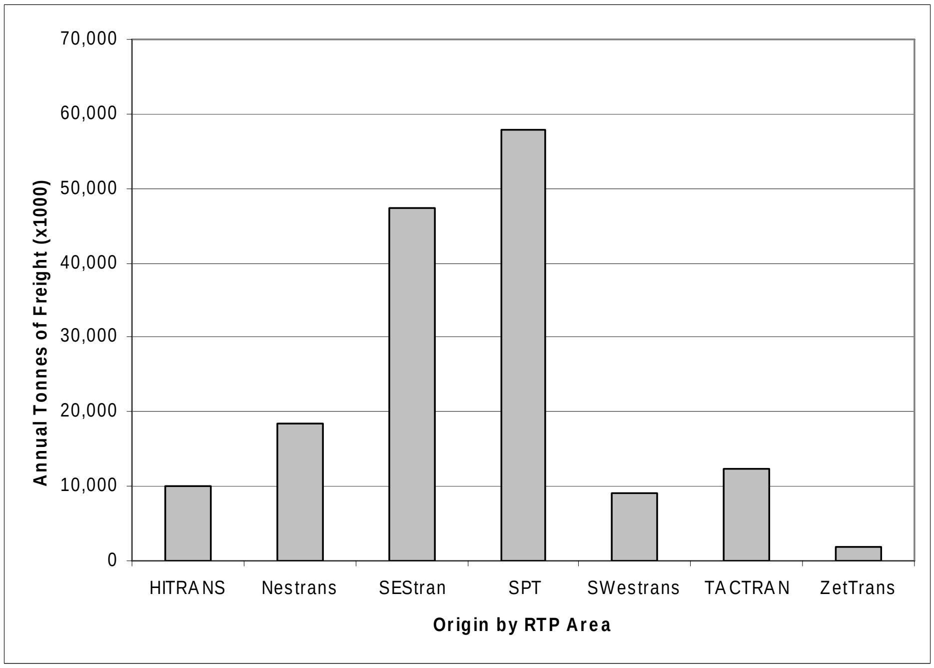


Figure 2.2b: Domestic Freight by Destination – 2007 Annual Tonnage

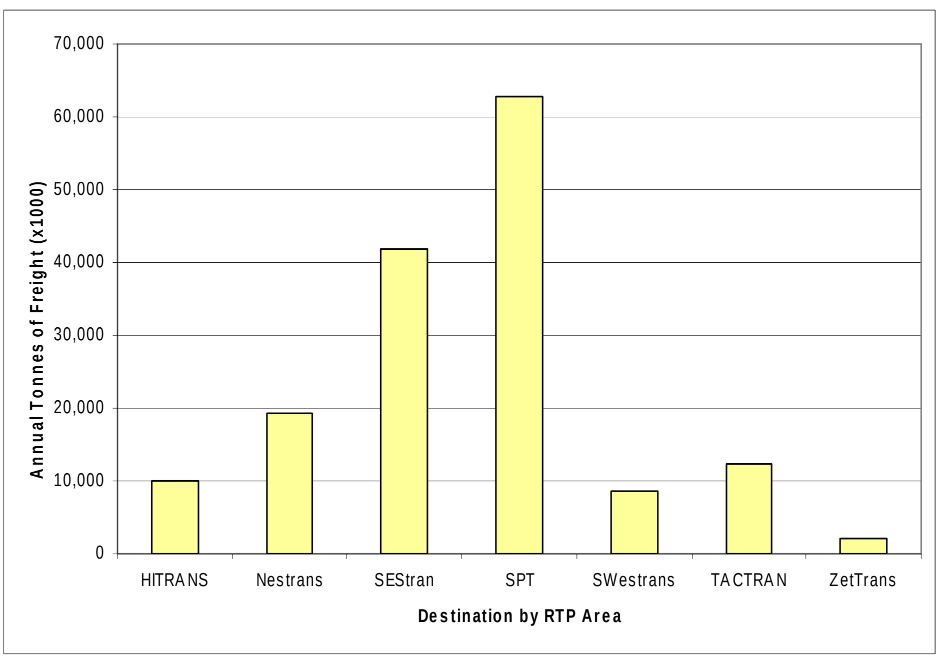


Figure 2.2c: Exported Freight by Origin – 2007 Annual Tonnage

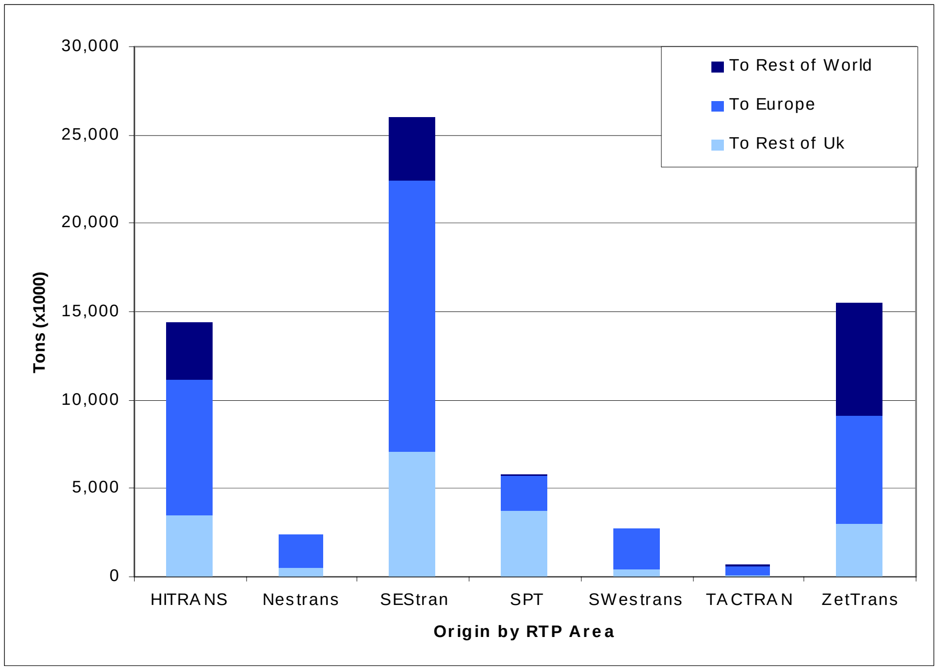
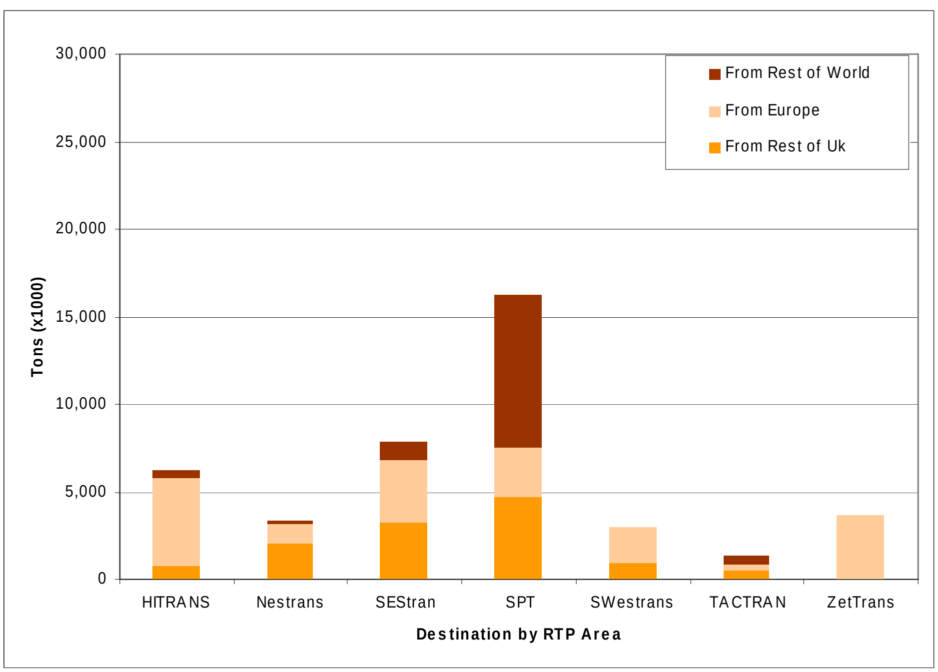


Figure 2.2d: Exported Freight by Destination – 2007 Annual Tonnage



2.4.13 Figures 2.2a to 2.2d suggest the origin/destination of freight tonnage is highest:

- from SEStran to the rest of the UK and Europe;
- from the rest of the UK to SPT;
- between SPT and SEStran and to other parts Scotland to/from these RTPs;
- from ZetTrans to Europe and the rest of the world, signifying flows of oil and oil-based products (water freight only); and
- from HITRANS to Europe, indicating the importance of freight flows of forestry and forestry products between the region and areas such as Scandinavia.

2.4.14 Looking at some of the key locations, Table 2.2 below summarises tonnages at 2007 through existing freight facilities.

Table 2.2: 2007 Freight Tonnes at Some of the Key Multi-Modal Hubs

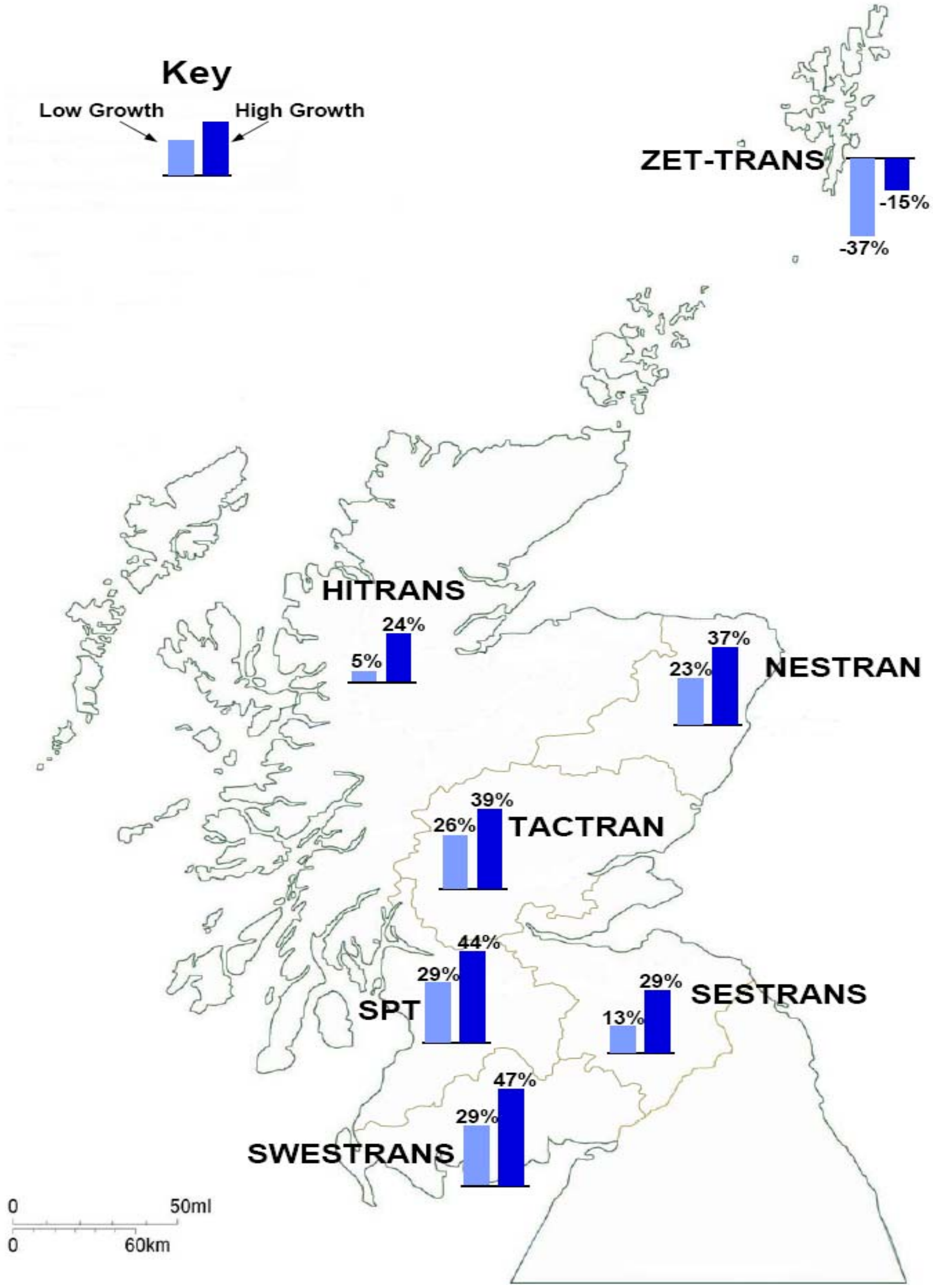
RTP	Freight Location	Type	2007 Tonnage (000s)	Change from 2006
HITRANS	Inverness	Airport	0.6	-13%
	Stornoway	Airport	0.5	+7%
	Cromarty Firth	Port	3,502	+9%
	Inverness	Port	684	+1%
	Glensanda	Port	7,050	+17%
	Orkneys	Port	10,592	-6%
	Inverness	Rail site	1,530	5%
Nestrans	Aberdeen	Airport	3.4	-15%
	Aberdeen	Port	5,131	+10%
	Peterhead	Port	790	-17%
SEStran	Edinburgh	Airport	19.3	-47%
	Forth	Ports	36,681	+16%
SPT	Glasgow	Airport	4.3	-33%
	Prestwick	Airport	31.5	+10%
	Clyde	Port	12,063	-20%
	Hunterston	Port	6,125	+3%
	Coatbridge	Rail site	1,175	+3%
SWestrans	Cairnryan	Port	3,163	+0.5%
	Stranraer	Port	1,231	+1%
TACTRAN	Dundee	Port	1,035	-14%
	Montrose	Port	582	-9%
	Perth	Port	144	-3%
ZetTrans	Scatsta	Airport	0.8	+5%
	Lerwick	Port	615	+13%
	Sullom Voe	Port	16,573	-15%

Source: Table 9.13 for Air Freight and Table 10.3 for Water Freight of the Scottish Transport Statistics[23]
Rail tonnages supplied by operators

[23] Scottish Transport Statistics No 27, December 2008

2.4.15 Figure 2.3 shows predicted freight transport growth from 2007 to 2020, both for the low growth and high growth scenarios. Growth in each RTP area is set out later in this report.

Figure 2.3: 2020 Estimated Growth in Freight Tonnages



2.4.16 The figure shows there is growth forecast for all RTPs in Scotland, except ZetTrans. The main movements experiencing significant change are:

- flows between SPT and SEStran;
- movements to/from the rest of the UK and SEStran, SPT and to a lesser extent HITRANS;
- tonnage to/from Europe and SEStran, HITRANS and SPT;
- flows within Scotland in between the RTP areas; and
- there is a decline between ZetTrans and both Europe and the rest of the world, indicating the changing nature of oil transportation from tanker to pipeline.

2.4.17 Looking at modal share, Table 2.3 shows the continued importance of road as the dominant means of moving freight in Scotland. The proportion is set to increase from 71% in 2007 to 74% by 2020, with a corresponding increase in tonnage.

Table 2.3: 2007 and 2020 Freight Modal Shares

Scenario	Tonnes (x1000)	Distribution per Mode							
		Road		Water		Air		Rail	
2007 Base	422,851	302,306	*71%*	99,838	*24%*	64	*0.02%*	20,642	*5%*
2020 Low Growth	519,479	384,818	*74%*	102,632	*20%*	84	*0.02%*	31,947	6%
2020 High Growth	568,852	422,285	*74%*	105,206	*18%*	114	*0.02%*	41,246	7%

Note: Actual figures may not add up exactly due to rounding

2.4.18 The table indicates the following:

- road freight is forecast to increase by significantly higher tonnes in the high growth scenario;
- modal share of water freight is set to decrease, due to the growing trend of transferring fuel through pipes rather than ships. This will mean the overall growth of water freight will be low even though other water freight commodities are forecast to grow significantly;
- rail freight shows a modest increase but this represents a relatively large increase in actual tonnage shifted by this mode; and
- air freight currently has a very low proportion of the overall freight market and is expected to remain modest, although tonnage is anticipated to increase in time.

2.5 The HITRANS Area

Overview

2.5.1 HITRANS is the largest area in Scotland and also has three island groups: the Argyll Islands, the Western Isles in the north-west and the Orkney Islands to the north of Caithness. The nature of the HITRANS area means that although volumes may be lower than other areas, the distances travelled are relatively high.

2.5.2 The principal routes in the area are the A9, the A82, the A87/A887, the A835 and the A96. Of these the most important roads are the A9 trunk route to the central belt of Scotland and the A96 to Aberdeen. The rail network mirrors the trunk route network above. There are rail lines to the central belt, Aberdeen and links to some of the most rural parts in the north.

2.5.3 Most freight to Orkney is trunked up the A9, to be transported across either at Gills Bay or Scrabster. In addition, the isles of Lewis and Harris are heavily dependent on road transport to the port of Ullapool for freight deliveries.

Headline Indicators

2.5.4 Table 2.4 shows the overall freight tonnes.

Table 2.4: 2007 and 2020 Annual Tonnes in the HITRANS Area

HITRANS	Total Tonnes (x1000)	Tonnage by Mode			
		Road	Water	Air	Rail
2007 Base	40,569	17,556	21,380	2	1,631
2020 Low Growth	47,473	22,346	22,599	3	2,525
2020 High Growth	50,919	24,522	23,132	4	3,261

2.5.5 Key points to note are:

- total freight is projected to increase by 17% for the low growth scenario and 26% for the high growth scenario. These are lower values than the forecast increases in freight tonnes for Scotland as a whole;
- the road freight tonnage is quite low compared to the national total (circa 6%), and reflects the relatively sparse population of this area;
- a significant percentage of freight is transported by water (21% in 2007). This includes bulk freight, livestock and oil transfers passing through ports such as the Cromarty Firth, Invergordon and the port of Inverness; and
- those commodities experiencing the largest growth in freight are timber and forestry products, agriculture, fishing and foodstuffs, retail and other/miscellaneous cargoes.

Future Trends

2.5.6 Table 2.5 overleaf shows current and future forecasts of modal share for the area.

Table 2.5: 2007 and 2020 Modal Share in the HITRANS Area

HITRANS	Modal Shares			
	Road	Water	Air	Rail
2007 Base	43%	53%	0.01%	4%
2020 Low Growth	47%	48%	0.01%	5%
2020 High Growth	48%	45%	0.01%	6%

2.5.7 Key points to note are:

- the proportion of freight transported by water is set to fall between 2007 and 2020. This is mainly due to the growing use of pipelines to transfer fuel ;
- the proportion of freight carried by road will increase. This is amplified by the reduction in water freight;
- actual tonnes of road freight are the lowest of the RTP areas with the exception of ZetTrans (discussed later in this Chapter). However the actual growth in this mode is amongst the highest, increasing by nearly 40% by 2020 assuming the high growth scenario; and
- the corresponding increase in rail freight is virtually double by 2020 in the high growth scenario.

Emerging Findings

2.5.8 The above findings suggest the following:

- road transport is understated to some extent as freight transported by water to the main island groups will have been transported by road to reach the respective ports;
- the reduction in water freight relates to the oil industry and not to other primary commodities which are forecast to increase;
- in this respect, decreasing tonnes of non-island water freight related to the oil sector could accelerate the share of freight carried by road; and
- the major ports used to serve the Western Isles or Orkney are not served by rail, limiting the potential of rail as a freight mode. However rail does link Invergordon, which is an important location for forestry and forestry products.

Planned Network Improvements

2.5.9 The Strategic Transport Projects Review[24] (STPR) has developed various transport proposals to be delivered by 2022 including the following projects for HITRANS, described overleaf.

[24] Strategic Transport Projects Review, Transport Scotland, December 2008

Intervention 17 – Rail Enhancements between Perth and Inverness

2.5.10 Intervention 17 is intended to improve rail connections between Inverness and Perth and includes the following improvements:

- provision of bi-directional signalling to reduce the impact of engineering works on the route (permitting the route to remain open for freight throughout the day and week);
- increased length of freight loops (allowing longer freight trains); and
- removal of speed limits below 75mph for freight trains.

2.5.11 This would improve journey times and also allow the operation of low floor wagons, facilitating standard containers to be carried on existing infrastructure with minimal physical works. The intervention is currently classed as a 'Tier 3' intervention in the Scottish Ministers' High Level Output Specification, and plans are being made for potential implementation between 2009 and 2014.

Intervention 18 – Upgrade A96 to Dual Carriageway between Inverness and Nairn

2.5.12 This intervention focuses on providing a new dual carriageway on the A96 between Inverness and Nairn, which will improve access to Inverness Airport and also provide relief for Raigmore Interchange. This would reduce freight journeys times, particularly between Aberdeen and Inverness.

Intervention 19 – Rail Service Enhancements between Aberdeen and Inverness

2.5.13 Intervention 19 will help improve rail freight connections between Aberdeen and Inverness and includes installation of new loops in the area, improvements to line speeds and the provision of some dual tracking. This is designated as a 'Tier 3' intervention in the Scottish Ministers' High Level Output Specification and Network Rail have been asked to produce a delivery plan to progress this intervention over the period between 2009 and 2014.

Intervention 22 – Targeted Road Congestion / Environmental Relief Schemes

2.5.14 Intervention 22 is a nationwide objective aimed at reducing conflicts between strategic and local traffic, which includes road freight movements. In the HITRANS area, this would involve enhancements to the A96 such as a bypass at Nairn and a new Inveramsay Bridge, the implications of which would be reduced journey times and improved reliability for road freight.

2.6 The Nestrans Area

Overview

2.6.1 Nestrans consists of the local authority areas of Aberdeen City and Aberdeenshire Councils. The A96 and rail line from Aberdeen to Inverness facilitate east-to-west transport flows, while the A90 and A92 along with rail lines facilitate southwards movements through Angus and to South East Scotland and beyond.

2.6.2 Nestrans is also well equipped with ports at Aberdeen, Fraserburgh and Peterhead. Aberdeen airport is located at Dyce, and the area is a hub for oil related supplies and goods transhipments whereas Montrose is an important port for forestry and forestry-related freight flows to and from the continent. Fraserburgh and Peterhead are mainly fishing ports, served by the A90 but not by rail.

Headline Indicators

2.6.3 Table 2.6 shows the overall freight tonnes.

Table 2.6: 2007 and 2020 Annual Tonnes in the Nestrans Area

Nestrans	Total Tonnes (x1000)	Tonnage by Mode			
		Road	Water	Air	Rail
2007 Base	43,312	35,515	5,845	4	1,948
2020 Low Growth	53,120	45,209	5,957	5	3,014
2020 High Growth	59,497	49,612	6,135	7	3,893

2.6.4 Key points to note are:

- total freight is projected to increase by 25% for the low growth scenario and 38% for the high growth scenario. These are in line with the increases in freight tonnes for Scotland as a whole;
- road freight tonnage is about 12% of the national total, with only the SPT and SEStran shares being higher (discussed later in this Chapter); and
- despite the presence of Aberdeen and Montrose, relatively little freight is transported by water;
- rail freight is about 9% of all rail movements in Scotland. Again, only SEStran and SPT see a larger share of rail freight tonnes; and
- key commodities experiencing a significant growth in freight transport are agriculture, fishing & foodstuffs, retail and other/miscellaneous, with forestry experiencing a modest growth.

Future Trends

2.6.5 Table 2.7 shows current and future forecasts of modal share for the area.

Table 2.7: 2007 and 2020 Modal Share in the Nestrans Area

Nestrans	Modal Shares			
	Road	Water	Air	Rail
2007 Base	82%	13%	0.01%	4%
2020 Low Growth	83%	11%	0.01%	6%
2020 High Growth	83%	10%	0.01%	7%

2.6.6 Key points to note are:

- the share of road freight is forecast to increase slightly while the share of water freight is estimated to drop; and
- the biggest increase, in proportional terms, is in rail freight, albeit from a relatively low base.

Emerging Findings

2.6.7 The above findings suggests the following:

- rail freight is planned to grow substantially with a near doubling in the high growth scenario by 2020;
- road transport will see the largest increase in tonnage terms. This is set to increase by 40% by 2020 in the high growth scenario;
- growth in freight moved by water is more modest with a 5% increase by 2020 at the high growth scenario; and
- road transport will remain the overwhelmingly dominant mode of freight transport despite gains made by other modes.

Planned Network Improvements

2.6.8 The Strategic Transport Projects Review[25] (STPR) has developed various transport proposals to be delivered by 2022 including the following projects for Nestrans.

<u>Intervention 19 – Rail Service Enhancements between Aberdeen and Inverness</u>

2.6.9 Intervention 19 will help improve rail freight connections between Aberdeen and Inverness and includes installation of new loops in the area, improvements to line speeds and the provision of some dual tracking. Currently this is designated as a 'Tier 3' intervention in the Scottish Ministers' High Level Output Specification and Network Rail have been asked to produce a delivery plan to progress this intervention over the period between 2009 and 2014.

<u>Intervention 23 – Rail Service Enhancements between Aberdeen and Central Belt</u>

2.6.10 Intervention 23 will help improve rail connections between Aberdeen and the Central Belt. Implemented in two phases the first would involve:

- provision of bi-directional signalling along the route to reduce the impact of engineering works on the route (permitting the route to remain open for freight throughout the day and week);
- increased length of freight loops (allowing longer freight trains); and
- removal of speed limits that are below 75mph for freight trains.

2.6.11 The second phase would involve the removal of the single track at Usan, including a new bridge over Montrose Basin.

2.6.12 This intervention would allow the use low floor wagons permitting standard containers to be carried on existing infrastructure with minimal physical works (e.g. targeted gauge enhancements at appropriate structures). Currently designated as a 'Tier 3' intervention in the Scottish Ministers' High Level Output Specification, development of the option is continuing for possible implementation between 2009 and 2014.

[25] Strategic Transport Projects Review, Transport Scotland, December 2008

2.7 The SEStran Area

Overview

2.7.1 SEStran covers the south-east of Scotland, including Edinburgh and the Lothians, the Scottish Borders, Fife, Falkirk and Clackmannanshire. The transport network is characterised by links to the central belt, in addition to motorway/Trunk Road and rail links to other major parts of Scotland as well as connections to North England.

2.7.2 Road freight is served by a number of major roads, including the M8/A8, M9, A90 and A92 strategic roads. There are also rail lines which serve a number of freight centres and locations in the region.

2.7.3 Grangemouth and Rosyth are two of the major ports in the area. Grangemouth is served by rail connections and, although Rosyth, has no rail terminus, it is a relatively large port with a well developed capacity for handling container freight traffic. Both Rosyth and Grangemouth are mentioned in the National Planning Framework (NPF2) which is in draft before Parliament. The Forth Road and Rail Bridges are two of Scotland's busiest crossings and are used to cross the Firth of Forth.

Headline Indicators

2.7.4 Table 2.8 shows the overall freight tonnes.

Table 2.8: 2007 and 2020 Annual Tonnes in the SEStran Area

SEStran	Total Tonnes (x1000)	Tonnage by Mode			
		Road	Water	Air	Rail
2007 Base	123,040	85,803	31,409	20	5,808
2020 Low Growth	147,438	109,224	29,198	27	8,989
2020 High Growth	160,030	119,858	28,529	38	11,605

2.7.5 Key points to note are:

- total freight is projected to increase by 20% for the low growth scenario and 30% for the high growth scenario. These are lower values than growth estimates for Scotland as a whole, reflecting the heavy dominance of the financial services in the region;
- road freight tonnage is about 28% of the national total, with only SPT being higher (discussed later in this Chapter);
- the area has the highest proportion of freight transported by water compared with the other RTP areas, due to the significance of Grangemouth and Rosyth;
- rail freight is about 28% of all rail movements in Scotland. Only SPT has a larger share of rail freight tonnes;
- the area is responsible for 31% of the total air freight tonnes in Scotland. Only SPT has more air freight; and
- those commodities experiencing a significant growth in freight are retail, minerals and other/miscellaneous cargoes, with forestry products experiencing a modest growth.

Future Trends

2.7.6 Table 2.9 shows current and future forecasts of modal share for the area.

Table 2.9: 2007 and 2020 Modal Share in the SEStran Area

SEStran	Modal Shares			
	Road	Water	Air	Rail
2007 Base	70%	26%	0.02%	5%
2020 Low Growth	74%	20%	0.02%	6%
2020 High Growth	75%	18%	0.02%	7%

2.7.7 Key points to note are:

- road freight is expected to increase its share by up to 5% in high growth scenario;
- although this appears to be at the expense of water freight, this is not really the case. The quite dramatic fall in water freight is largely explained by the reduced tonnes of oil being shipped by water and transferring to pipelines; and
- rail freight is anticipated to experience the biggest increase in terms of percentage growth, albeit from a relatively low base.

Emerging Findings

2.7.8 The above findings suggests the following:

- rail freight is planned to double in the high growth scenario by 2020;
- road transport will see the largest increase in tonnage terms. This is set to increase by 39% by 2020 in the high growth scenario; and
- these results reflect the heavy dominance of the services sectors in the area.

Planned Network Improvements

2.7.9 The Strategic Transport Projects Review[26] (STPR) has developed various transport proposals to be delivered by 2022 including the following projects for SEStran, set out below.

Intervention 14 – Forth Replacement Crossing

2.7.10 Intervention 14 identifies the need for a replacement crossing of the current Forth Road Bridge with a cable-stayed bridge to the west of the existing crossing. The current bridge will be developed as a possible public transport corridor, thereby providing additional capacity for road freight traffic on the new replacement crossing.

Intervention 20 – Grangemouth Road and Rail Access Upgrades

2.7.11 Intervention 20 comprises upgrades to both road and rail access to Grangemouth. The improved road access would require the upgrading of connections to Motorways. In the case of the M9, this would be providing south – facing slip roads

[26] Strategic Transport Projects Review, Transport Scotland, December 2008

at Junction 6. To provide better access to the M8, the A801 would require upgrading between the M8 and Grangemouth.

2.7.12 The rail access improvements would focus on increasing the numbers of freight trains able to run into Grangemouth terminal. This would be enabled through capacity enhancements at and around Grangemouth Junction, electrification between Coatbridge and Grangemouth as well as increasing loading gauge to allow access for larger containers. Furthermore, track modifications are proposed to provide improved access from the west and a new curve to permit direct access from the east. These rail improvements would tie in with Intervention 15 (Edinburgh to Glasgow Rail Improvements Programme) and allow freight trains to be operated from the West Coast Main Line by faster electric locomotives.

2.7.13 These proposals would reduce journey times and increase capacity on the road and rail networks for freight transport.

Intervention 28 – Inverkeithing to Halbeath Rail Line

2.7.14 Intervention 28 proposes the ides of a new rail link between Inverkeithing and Halbeath taking the form of a double track rail link. This would improve access to the port of Rosyth and also reduce journey times.

Intervention 22 – Targeted Road Congestion / Environmental Relief Schemes

2.7.15 Intervention 22 is a nationwide objective aimed at reducing conflicts between strategic and local traffic, which includes road freight movements The enhancement in the SEStran area focuses on Junction improvements for the A720 Edinburgh City Bypass – such as at Sheriffhall Roundabout. The effects of the improvements would be reduced journey times and improved reliability for road freight.

2.8 The SPT Area

Overview

2.8.1 SPT is the most populated and industrialised RTP in Scotland. As such it has the densest freight transport movements and volumes of all the RTP areas – Strathclyde is responsible for nearly 35% of Scottish freight intensity (volumes weighted by distance) twice that of any other region in Scotland[27]. It is well connected by road, rail and sea to other parts of the UK and overseas.

2.8.2 Road freight is served by a number of major roads, including the M74/M73, M77, M8 and A82. There are also rail lines which serve a number of freight centres and locations in the region, including Mossend (Eurocentral) and Coatbridge. Rail links to England and southern Scotland are via the West Coast Mainline and via the Glasgow and South Western line. The region also has a number of railway stations that have or are close to freight marshalling yards facilitating multi-modal freight movements.

2.8.3 The region is also host to a number of maritime facilities including the King George V Dock, Port of Glasgow, Greenock and Hunterston, the latter the principal sea port and rail connection on the west coast used to import coal used to fuel Scotland's power stations at Cockenzie, Longannet and others.

Headline Indicators

2.8.4 Table 2.10 shows the overall freight tonnes.

Table 2.10: 2007 and 2020 Annual Tonnes in the SPT Area

SPT	Total Tonnes (x1000)	Tonnage by Mode			
		Road	Water	Air	Rail
2007 Base	142,695	117,884	14,993	37	9,782
2020 Low Growth	185,106	150,060	19,860	47	15,139
2020 High Growth	206,062	164,669	21,784	63	19,546

2.8.5 Key points to note are:

- total freight is projected to increase by 30% for the low growth scenario and 44% for the high growth scenario. These are significantly higher values than the forecast increases in freight tonnes for Scotland as a whole;
- road freight tonnage is about 39% of the national total, the highest proportion out of all the RTP areas;
- the area has the largest share of air freight tonnes in Scotland (at 57%) largely due to Prestwick airport;
- rail freight is about 47% of all rail movements in Scotland, the largest share in Scotland; and
- the main commodities experiencing the largest growth in freight are timber, minerals and other/miscellaneous cargoes, with retail experiencing a modest growth.

[27] Measuring the Value of Freight to the Scottish Economy, Scottish Government, October 2006

Future Trends

2.8.6 Table 2.11 shows current and future forecasts of modal share for the area.

Table 2.11: 2007 and 2020 Modal Share in the SPT Area

SPT	Modal Shares			
	Road	Water	Air	Rail
2007 Base	83%	11%	0.03%	7%
2020 Low Growth	81%	11%	0.03%	8%
2020 High Growth	80%	11%	0.03%	9%

2.8.7 Key points to note are:

- road freight is expected to decrease its share in high growth scenario, mainly due to the up-take of tonnes by other modes. There is still anticipated to be an increase of over 46,000 tonnes of road freight by 2020 in the high growth scenario;
- water freight is expected to increase its tonnage by circa 45% by 2020 in the high growth scenario. However, its modal share will remain constant due to the increases in other modes;
- rail freight is anticipated to experience the biggest increase in terms of percentage growth; and
- air freight is forecast to grow, although this growth is from a low base.

Emerging Findings

2.8.8 The above findings suggests the following:

- rail freight is expected to play an increasing role in moving freight in the area, and is planned to double in the high growth scenario by 2020;
- road freight is the dominating mode for freight and will continue to dominate with the largest increase in tonnage terms;
- water transport accounts for the second largest tonnage of freight. However, the relatively slow growth in freight volumes transported by water means that its share will remain constant over the foreseeable future; and
- air freight is dominated by Prestwick airport.

Planned Network Improvements

2.8.9 The Strategic Transport Projects Review[28] (STPR) has developed various transport proposals to be delivered by 2022 including the following projects for SPT, outlined overleaf.

[28] Strategic Transport Projects Review, Transport Scotland, December 2008

Intervention 15 – Edinburgh to Glasgow (Rail) Improvements Programme

2.8.10 Intervention 15 focuses on improvements to the rail corridors between Glasgow and Edinburgh, with some elements of the infrastructure upgrading benefitting freight including diversion routes which would allow freight trains to be operated from the West Coast Main Line by faster electric locomotives.

Intervention 26 – Rail Enhancements between Inverclyde / Ayrshire and Glasgow

2.8.11 Intervention 26 proposes the reconnection of the Paisley Canal line to Ayrshire, providing an alternative route for freight services from Glasgow to Ayrshire and importantly for freight-coal trains from Hunterston to Longannet. Enhancements would include:

- signalling upgrades between Kilwinning and Paisley;
- reinstatement of the line from Elderslie to Paisley Canal, provision of double track and electrification on the existing Paisley Canal branch and increased track capacity between Paisley and Glasgow;
- provision of turnback facilities at Johnstone; and
- extension to the Lugton loop and a new loop between Kilmaurs and Stewarton.

2.8.12 However, the actual implementation of this intervention is dependent on being able to provide a suitable solution to more platform capacity in central Glasgow to accommodate other services.

Intervention 22 – Targeted Road Congestion / Environmental Relief Schemes

2.8.13 Intervention 22 is a nationwide objective aimed at reducing conflicts between strategic and local traffic, which includes road freight movements. The intervention covers two areas in SPT:

- upgrade of the A77 from single to dual carriageway around Ayr, grade separation of key junctions and enhancements south of Ayr; and
- enhancements on the A737 such as a bypass around Dalry.

2.8.14 The effects of the improvements would be reduced journey times and improved reliability for road freight.

2.9 The SWestrans Area

Overview

2.9.1 SWestrans is the main bridge for freight movements between Northern Ireland and western Scotland. The region is served by two main strategic roads, the A75 which links the ports of Stranraer and Cairnryan with the M6/M74 motorway system and the A77 which provides a link to SPT.

2.9.2 Both Stranraer and Cairnryan are important ports for freight shipping between SWestrans and Belfast and Larne in Northern Ireland. The rail network shadows the A77, linking the area with SPT, but in terms of ports, only serves Stranraer.

Headline Indicators

2.9.3 Table 2.12 shows the overall freight tonnes.

Table 2.12: 2007 and 2020 Annual Tonnes in the SWestrans Area

SWestrans	Total Tonnes (x1000)	Tonnage by Mode			
		Road	Water	Air	Rail
2007 Base	23,460	17,806	4,610	0	1,044
2020 Low Growth	30,280	22,667	5,997	0	1,616
2020 High Growth	34,503	24,874	7,542	0	2,087

2.9.4 Key points to note are:

- total freight is projected to increase by 29% for the low growth scenario and 47% for the high growth scenario. These are significantly higher values than the forecast increases in freight tonnes for Scotland as a whole;
- road freight tonnage is about 6% of the national total, which is amongst the lowest and reflects the relatively sparse population of this area characterised by a very limited number of settlements of significant size;
- the amounts of freight shifted both by water and rail, as a proportion of Scotland's, is also relatively low. However, this is to be expected for an area with the lowest population after ZetTrans; and
- key commodities experiencing a significant growth in freight are retail and other/miscellaneous cargoes, with agriculture experiencing a modest growth.

Future Trends

2.9.5 Table 2.13 shows current and future forecasts of modal share for the area.

Table 2.13: 2007 and 2020 Modal Share in the SWestrans Area

SWestrans	Modal Shares			
	Road	Water	Air	Rail
2007 Base	76%	20%	0%	4%
2020 Low Growth	75%	20%	0%	5%
2020 High Growth	72%	22%	0%	6%

2.9.6 Key points to note are:

- road freight is expected to increase by 47% in the high growth scenario, amongst the highest percentage increases of all the RTP areas;
- despite this increase in road freight tonnes, freight carried by water and rail are also forecast to increase and this will reduce the overall mode share of road freight;
- water freight is expected to increase its tonnage by circa 64% by 2020 in the high growth scenario, with a modest increase in its modal share. This is mainly due to the increase in traffic to/from Ireland and other external areas; and
- rail freight is anticipated to experience the biggest increase in terms of percentage growth, but this is from a small base.

Emerging Findings

2.9.7 The above findings suggests the following:

- road freight is the dominating mode for freight and will continue to dominate with the largest increase in tonnage terms; and
- the rate of increase in road freight means that it is unlikely that other modes will make a serious impression on reducing road freight tonnes. Although water and rail help to reduce the modal share of road, they only serve to slow not halt the increase in road freight in total tonnage terms.

Planned Network Improvements

2.9.8 The Strategic Transport Projects Review[29] (STPR) has developed various transport proposals to be delivered by 2022 including the following projects for SWestrans, described below.

Intervention 11 – Implement Targeted Programme of Measures to Improve Links to the Loch Ryan Port Facilities from the Trans European Network

2.9.9 Intervention 11 seeks to upgrade and improve links to the port facilities at Loch Ryan, in particular improving the linkage of the Trans-European Network (TEN) with measures including:

- physical works aimed at providing safer overtaking opportunities such as 2+1 sections, climbing lanes and overtaking lay-bys;
- improvements to the operation of junctions around Dumfries; and
- improvements to the access roads around Stranraer (A751).

2.9.10 This intervention will reduce journey times and also improve reliability for road freight. Transport Scotland has already widened a number of lengths of the A75 trunk road to enhance overtaking opportunities, and this Intervention will complement the previous initiatives and provide further enhancements along the corridor.

[29] Strategic Transport Projects Review, Transport Scotland, December 2008

Intervention 27 – Enhancements to Rail Freight between Glasgow and the Border via West Coast Main Line

2.9.11 Intervention 27 is directly linked to increasing freight transport on the West Coast Main Line between Glasgow and the Border, allowing more train paths. The enhancements would include:

- lengthening of loops;
- removal of speed limits that are below 75mph for freight trains;
- increasing the loading gauge on the route; and
- increasing freight terminal capacity.

2.9.12 Further possibilities would include a new line between Mossend (Eurocentral) and Coatbridge, via an overbridge across the A8.

2.9.13 This project would improve and enhance current rail freight capacity between Scotland and England. This intervention would tie directly in with similar proposals developed for the line south of the border.

2.10 The TACTRAN Area

Overview

2.10.1 TACTRAN is one of the smaller RTP areas covering Angus, Dundee City, Perth and Kinross and Stirling Council areas. The region is both an important destination in its own right, with Dundee serving as an important attractor for goods and services, and a bridge between the central belt of Scotland and the north of Scotland. TACTRAN is host to a significant strategic road network, including the A90 and A9 trunk roads, linking in with the M90 at Perth and the A92 crossing the Firth of Tay.

2.10.2 In terms of rail, the region is well served from the south from Edinburgh through Fife and the south-west from Perth, Stirling and Glasgow. The two rail lines combine at Dundee to proceed along the coastal route to Arbroath, Montrose and north. Montrose harbour has a rail yard which is used to ship forestry products abroad, and the port of Dundee handles a range of general and bulk cargoes as well as being a forest product specialist and oil and offshore support facility.

Headline Indicators

2.10.3 Table 2.14 shows the overall freight tonnes.

Table 2.14: 2007 and 2020 Annual Tonnes in the TACTRAN Area

TACTRAN	Total Tonnes (x1000)	Tonnage by Mode			
		Road	Water	Air	Rail
2007 Base	26,617	24,567	1,621	0	429
2020 Low Growth	33,677	31,271	1,744	0	662
2020 High Growth	36,972	34,315	1,802	0	855

2.10.4 Key points to note are:

- total freight is projected to increase by 27% for the low growth scenario and 39% for the high growth scenario. These are higher values than the forecast increases in freight tonnes for Scotland as a whole, although they are starting from a modest base level;
- road freight tonnage is about 8% of the national total, which lies in the middle of the various RTP areas (only HITRANS and SWestrans are lower);
- the area also moves less freight by water than any other RTP area, and less by rail than any other RTP area other than ZetTrans; and
- those commodities experiencing a significant growth in freight are retail, minerals and other/miscellaneous cargoes.

Future Trends

2.10.5 Table 2.15 overleaf shows current and future forecasts of modal share for the area.

Table 2.15: 2007 and 2020 Modal Share in the TACTRAN Area

TACTRAN	Modal Shares			
	Road	Water	Air	Rail
2007 Base	92%	6%	0%	2%
2020 Low Growth	93%	5%	0%	2%
2020 High Growth	93%	5%	0%	2%

2.10.6 Key points to note are:

- out of all the RTPs, road freight in TACTRAN has the highest modal share and this is set to increase slightly, although the overall tonnage is relatively low; and
- while freight carried by water and rail are low compared to other RTPs, they are expected to experience modest grow in overall tonnage terms.

Emerging Findings

2.10.7 The above findings suggests the following:

- although water and rail freight is expected to grow, the overall impact on modal share of road freight is negligible;
- water freight accounts for less freight moved by this mode than for any of the other RTPs; and
- road is the overwhelmingly dominant mode for freight transport and this is likely to remain the case.

Planned Network Improvements

2.10.8 The Strategic Transport Projects Review[30] (STPR) has developed various transport proposals to be delivered by 2022 including the following projects for TACTRAN, set out below.

Intervention 16 – A9 Upgrading from Dunblane to Inverness

2.10.9 Intervention 16 will upgrade the A9 between Dunblane and Inverness. Implemented in phases the intervention would involve the construction of grade separated junctions, climbing lanes and 2+1 sections, with possible full dualling at strategic locations and also the removal of existing roundabouts. This would improve journey times and reliability for road freight.

Intervention 29 – Dundee Northern Relief Road

2.10.10 Intervention 29 involves improved road connections around Dundee, either in the form of a new Northern Peripheral Bypass road around the City or by upgrading roundabouts and associated junctions on the A90 Kingsway. This would aim to reduce the conflict between long distance traffic and local roads traffic, which includes road freight movements, improving journey times.

[30] Strategic Transport Projects Review, Transport Scotland, December 2008

2.11 The ZetTrans Area

Overview

2.11.1 Freight movements to and from ZetTrans are characterised by its marine links with Aberdeen and to a lesser extent Orkney, through which the vast majority of the Islands' freight requirements pass. A significant amount of freight moved is oil related, especially through Sullom Voe. However, the importance of this is set to decrease, partly a result of reduced oil supplies, but also because more oil will be moved by pipeline.

2.11.2 Within ZetTrans, all freight transport on the mainland is by road expect for the short ferry hops between the Islands of Shetland Mainland, Yell and Unst. Cargo will also be carried out to some of Shetland's Island communities, notably those on Bressay, Papa Stour, and Whalsay and Fetlar. The road network on Shetland is dominated by A970/A968 which links the southern half of the area, principally Lerwick and to a lesser extent Sumburgh, with the northern half of the island group, to Yell (the A970) and Unst (the A968).

Headline Indicators

2.11.3 Table 2.16 shows the overall freight tonnes.

Table 2.16: 2007 and 2020 Annual Tonnes in the ZetTrans Area

ZetTrans	Total Tonnes (x1000)	Tonnage by Mode			
		Road	Water	Air	Rail
2007 Base	23,157	3,175	19,981	1	0
2020 Low Growth	21,320	4,041	17,277	2	0
2020 High Growth**	20,719	4,435	16,282	2	0

Note: ** the high growth scenario assumes a higher take-up compared to the low growth situation by the petroleum industry of moving petroleum products by pipelines, which has resulted in a lower estimate of the total freight tonnes

2.11.4 Key points to note are:

- total freight is projected to decrease by 8% for the low growth scenario and 11% for the high growth scenario. This trend is directly related to the drop in oil freight due mainly to a higher up-take of piping oil rather than shipping in the high growth scenario;
- road freight tonnage is about 1% of the national total, very low as would be expected;
- water freight transport is relatively high, but is set to decrease; and
- key commodities experiencing a significant increase in freight are retail and other/miscellaneous cargoes. However, this is offset by the reduction in the oil-related commodities.

Future Trends

2.11.5 Table 2.17 overleaf shows current and future forecasts of modal share for the area.

Table 2.17: 2007 and 2020 Modal Share in the ZetTrans Area

ZetTrans	Modal Shares			
	Road	Water	Air	Rail
2007 Base	14%	86%	0.01%	0%
2020 Low Growth	19%	81%	0.01%	0%
2020 High Growth	21%	79%	0.01%	0%

2.11.6 Key points to note are:

- water freight transport is dominant because of the significance of the oil industry in the area;
- freight carried by road will increase from 14% in 2007 up to 21% by 2020 in the high growth scenario; and
- air freight is very low and there is no rail transport in the area.

Emerging Findings

2.11.7 The above findings suggests the following:

- freight transport in the region is highly skewed towards shipping on two accounts. Firstly, the dominance of the oil sector on Shetland, with the distribution network centred on Sullom Voe. Secondly, in common with the other island groups in Scotland, this region is almost entirely dependent on shipping for supplies, both imports and exports;
- with the decline and transformation of the oil sector in Shetland, water freight tonnes will correspondingly fall; and
- road freight is increasing and is expected to continue to grow.

Planned Network Improvements

2.11.8 There are no proposed improvements in the ZetTrans area set out in the Strategic Transport Projects Review[31] (STPR).

[31] Strategic Transport Projects Review, Transport Scotland, December 2008

2.12 External Connections

Overview

2.12.1 Scotland is peripheral to the EU as a whole, and with the expansion of the EU eastwards Scotland is effectively moving ever further from the EU centre of trade. Owing to the distances involved these expanding markets will be less accessible to firms in Scotland than to firms elsewhere in the EU.

2.12.2 Since the early 1990s, over 50 thousand Scottish registered, powered (i.e. accompanied) vehicles per annum travel to mainland Europe through the ports of the south and east of England[32].

2.12.3 There are also a significant number of EU hauliers carrying goods to and from Scotland. For the UK, the ratio in 2006 was 3 foreign to every 1 UK registered powered vehicle travelling to Europe[33].

2.12.4 Using an observed average load of 15 tonnes per inbound Ro-Ro vehicle to Scotland, this would translate to around 1.5 million tonnes of imported goods from Europe to Scotland through England with perhaps a lower volume of freight travelling in the outbound direction. This estimate excludes any unaccompanied vehicle movements through the English ports and hence is likely to be conservative.

Air Freight

2.12.5 There are two main airfreight categories in Scotland with distinct forms of operation and markets:

- airfreight in the bellyhold of passenger services:- Glasgow, Prestwick, Edinburgh and Aberdeen airports all have bellyhold freight operations. Both the Emirates service to Dubai from Glasgow airport and the Continental Airways service to Newark from Edinburgh airport carry volumes of bellyhold freight, serving inter-continental routes. In general, this market is expected to grow, however the practice within Europe has suffered from the rise of the low-cost airlines, which avoid carrying cargo so as to achieve fast turnaround times; and
- postal freight:- Edinburgh is the main postal hub for Scotland. The amount of parcel freight has grown rapidly in the last few years. However, the traditional airfreight consignments handled by the integrated express carriers (e.g. FedEx, TNT, UPS, etc) are mainly handled at Prestwick. Some of the services that are regional operate on a hub-spoke basis at a UK and European level. However, some services (e.g. those operated by Polar Air at Prestwick) are direct and tend to be long-haul, affording Prestwick a global reach in freight terms.

2.12.6 A substantial part of airfreight from Scotland to other parts of the UK and abroad travels by road to Heathrow and Manchester to meet the frequent direct services to a wide range of destinations these airports serve. This overland volume potentially makes it more difficult for carriers to maintain direct services to and from Scottish airports and can also carry a service penalty for users, which can be passed on as

[32] Ro-Ro Survey, Department for Transport 2007
[33] Ibid

an additional cost to customers. Routing freight traffic via Heathrow can add a day to travel times, which can be a handicap for some potential users.

Ports & Shipping

2.12.7 The container industry can boast remarkable growth over the last decade. For example, between 1996 and 2006 there was an estimated:

- 175% growth in port TEU[34] throughput;
- 134% growth in liner service capacity; and
- 217% growth in capacity of the three present largest lines.

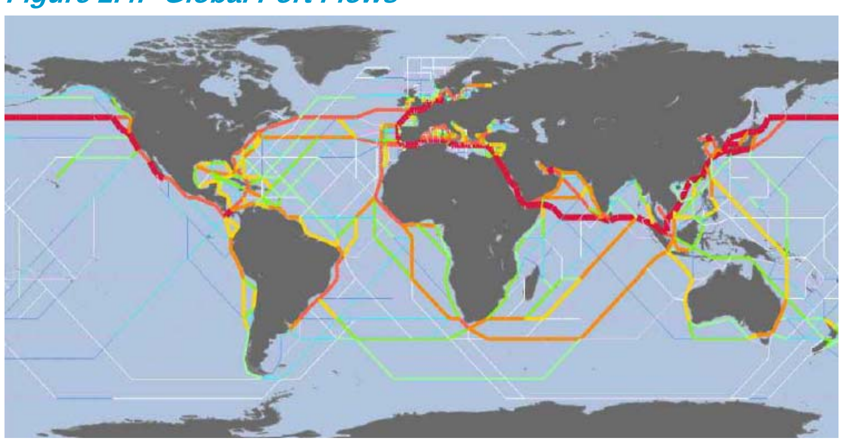
2.12.8 Global traffic demand has increased, including transhipments, from circa 155 million TEUs to almost 400 million TEUs by 2005. Much of this growth is uneven, as Table 2.18 shows. A large proportion of all TEU growth (35%) has been intra-regional rather than between major trading continents.

Table 2.18: Breakdown of Growth Rates

Principal Routes		Growth	% of all TEU growth
Far East	- Americas	181%	22%
	- Europe & Med	208%	19%
S.E.Asia	- Americas	144%	1%
	- Europe & Med	131%	3%
	- sub Saharan Africa	77%	2%
Australasia routes		109%	4%
Intra regional (e.g. within EU)		143%	35%
Other		121%	6%
Overall		***142%***	***100%***

2.12.9 One of the main drivers for growth and change has been globalisation, which in turn has been propelled by expanding international trade. The major global routes are illustrated in Figure 2.4, with the heaviest trade routes shown in red.

Figure 2.4: Global Port Flows



[34] TEU = twenty-foot equivalent units, a common measure of standardised container size

2.12.10 An effect of this growth has been increasing vessel sizes, partly to accommodate the rise in demand but also for economies of scale. This has been made possible with the availability of deeper berths at an increasing number of ports. The recent high fuel costs also favours using larger ships to reduce fuel costs per cargo unit.

2.12.11 Another consequence of this growth is the level of capacity now available at key ports. As growth continues, the lack of capacity could provide opportunities for Scotland to capture traffic from some ports. A recent study by MDS Transmodal[35] identified that 64 major ports handle 69% of global throughput. Table 2.19 summarises the MDS Transmodal analysis.

Table 2.19: Major Port[36] Capacity Analysis of Key Continents

Regions	2006 Major Ports		2014 Major Ports			Ratio of throughput to capacity
	Capacity	Throughput	Capacity	Throughput	Shortfall	
Asia	225	199	225	330	-105	147%
Europe/Med	95	61	95	98	-3	103%
Americas	70	43	70	68	2	97%
Africa	n/a	n/a	n/a	n/a	n/a	n/a
Australasia	7	4	7	6	1	86%
Total	***397***	***307***	***397***	***502***	***-105***	***126%***

Note: values are in million TEU

2.12.12 Table 2.19 suggests:

- by 2014 there will be a shortfall in capacity in Europe;
- the total shortfall by 2014 will be 105 million TEU handling capacity in the major ports by 2014;
- this includes 3 million TEUs in Europe. Assuming an observed tonnage of 20 tonnes per TEU, this equates to 60 million tonnes of freight in Europe; and
- the above analysis was carried out prior to the current economic climate, however this study is looking at long term issues. The above results are considered to be still applicable with only the timing likely to change.

Road Links

2.12.13 There are four principal road links between Scotland and the rest of the UK:

- A1:- this is the main link on the east side of the country;
- A7:- linking parts of the Scottish Borders with England;
- A75:- connecting England to the ports of Cairnryan and Stranraer, via Dumfries and the surrounding area; and
- M74:- the main road on the west side of Scotland to England.

2.12.14 Table 2.20 shows a summary of the annual average daily traffic (AADT) flows and ratio of flow-to-capacity (RFC) for the above main external road links. The RFC is especially useful as it shows the level of existing capacity on each road currently being used and how it is forecast to increase by 2020.

[35] Forecasting for Long Term Investment in the Container Shipping Industry – an Holistic Approach, MDS Transmodal, December 2006
[36] Defined as a port capable of discharging 100,000 tonnes of cargo per month (from the US Government, Department of Transport)

Table 2.20: Capacity Analysis of External Road Links

Roads	2007 AADT Flows	2007 RFC	2020 RFC
A1	9,091	34%	44%
A7	4,294	24%	31%
A75	4,830	27%	35%
M74	34,590	72%	93%

Notes: AADT = Annual Average Daily Traffic
RFC = ratio of flow-to-capacity

2.12.15 Table 2.20 suggests:

- all of the roads in the study show an increase in the RFC from 2007 to 2020;
- the M74 is the busiest road, with the RFC forecast to increase to 93% by 2020 (up by one-fifth from 2007 levels); and
- the A7 and A75 show modest increases over the same period, however these are difficult routes to use due to their alignments and other geometric factors. In particular, access to the ports of Stranraer / Cairnryan from England is restricted to the A75, which is single carriageway for substantial stretches and subject to vehicle platoons along sections causing delays.

2.12.16 The expected rise in traffic flows will result in slower journey speeds and reliability, making it more difficult to meet delivery requirements. Freight operators may in some cases need to re-time their journeys to avoid congestion periods, use less suitable roads or use more delivery vehicles. However, these measures can increase business costs.

Rail Freight

2.12.17 The main external rail links to/from Scotland are the East Coast Main Line (ECML) and the West Coast Main Line (WCML). There are a number of issues that constrain the development of rail freight:

- there are some loading gauge problems on key sections as well as speed restrictions; and
- with the projected rise in rail passenger demand, competition between passenger and freight paths from the rail network capacity will also increase.

2.12.18 Consequently, a number of improvement measures have been identified in the recent Scottish Route Utilisation Strategy (RUS)[37] and the Strategic Transport Projects Review (STPR)[38] including:

- lengthening of loops of track;
- removing speed limits below 75mph for freight trains;
- increasing the loading gauge; and
- increasing freight terminal capacity.

[37] Scottish Route Utilisation Strategy (RUS), Network Rail, March 2007
[38] Strategic Transport Projects Review (STPR), Scottish Government, December 2008

2.12.19 It should be noted, however, that our analysis suggests the future freight market is expected to contain a much greater proportion of high value, fast moving consumer goods, which require a flexible and responsive service. The rail freight services will need to adapt to the changing market if they are to win a growing share of this future freight market. Despite these issues, there is significant potential in the use of the rail freight network for transhipment operations.

2.13 Summary of Key Issues

2.13.1 The review above has identified a number of key issues. These are summarised in Table 2.21 below.

Table 2.21: Overview of Emerging Findings

Area	Summary of Emerging Findings
HITRANS	• the level of road freight tonnage is quite low (6%) compared to the national total, whereas a significant percentage of freight is transported by water (21% in 2007). This reflects the relatively sparse population of this area; • there is an estimated reduction in water freight, relating to the increased usage of pipelines in the oil industry and not to other primary commodities which are forecast to increase; • in this respect, decreasing tonnes of non-island water freight related to the oil sector could accelerate the share of freight carried by road; • the major ports used to serve the Western Isles or Orkney are not served by rail, limiting the potential of rail as a freight mode. However rail does link Invergordon, which is an important location for forestry and forestry products. Despite these limitation, rail freight is forecast to virtually double by 2020 in the high growth scenario; and • in terms of road freight, actual tonnes are the lowest of the RTP areas with the exception of ZetTrans (discussed later). However, actual growth in road freight is amongst the highest, increasing by up to 40% by 2020.
Nestrans	• road freight is about 12% of the national total and rail freight is about 9% of all rail movements in Scotland. Only the SPT and SEStran shares are higher; • rail freight is planned to grow substantially by 2020; • road transport will see the largest increase in tonnage terms. This is set to increase by up to 40% by 2020; • growth in freight moved by water is more modest with a 5% increase by 2020; and • road transport will remain the overwhelmingly dominant mode of freight transport despite gains made by other modes.

Area	Summary of Emerging Findings
SEStran	• the area has the highest proportion of freight transported by water compared with the other RTP areas, due to the significance of Grangemouth and Rosyth; • road freight tonnage is about 28% of the national total, with only SPT being higher; • the area is responsible for 31% (at 2007) of the total air freight tonnes in Scotland. Only SPT had more air freight (at 2007); • rail freight is planned to almost double by 2020. Similarly, road transport will see the largest increase in tonnage terms (up to 39%).
SPT	• compared to other RTP areas in Scotland, SPT has the highest levels of road freight tonnage (39%), rail freight (47%) and air freight tonnes (57%); • rail freight is expected to play an increasing role in the future; • road freight is the dominating mode for freight and will continue to dominate with the largest increase in tonnage terms; • water transport accounts for the second largest freight tonnes; and • air freight is dominated by Prestwick airport.
SWestrans	• the amount of freight moved in the area is amongst the lowest in Scotland, reflecting the rural nature; • road freight is the dominating mode for freight and will continue to dominate with the largest increase in tonnage terms; • the rate of increase in road freight means that it is unlikely that other modes will make a serious impression on reducing road freight tonnes. Although water and rail help to reduce the modal share of road, they only serve to slow not halt the increase in road freight in total tonnage terms.
TACTRAN	• the amount of freight moved in the area is modest compared to other parts of Scotland, although it is higher than HITRANS, SWestrans and ZetTrans; • although water and rail freight is expected to grow, the overall impact on modal share of road freight is negligible; • water freight accounts for less freight moved by this mode than for any of the other RTPs; and • road is the dominant mode for freight transport and this is likely to remain the case.

Area	Summary of Emerging Findings
ZetTrans	• the area has the lowest levels of freight tonnage, and is forecast to fall by 2020; • freight transport in the region is highly skewed towards shipping on two accounts. Firstly, the dominance of the oil sector on Shetland, with the distribution network centred on Sullom Voe. Secondly, in common with the other island groups in Scotland, this region is almost entirely dependent on shipping for supplies, both imports and exports; • with the decline and transformation of the oil sector in Shetland, water freight tonnes will correspondingly fall; and • road freight is increasing and is expected to continue to grow. However, this growth is offset by falls in other modes.
External Links	• significant volumes of airfreight to/from Scotland actually moves by road for the domestic leg to Heathrow or Manchester airports which may be cost effective for the freight company concerned but adds delay and service costs to customers; • global demand for marine freight services, including container traffic, has grown markedly since the mid-1990s. This has led to capacity constraint at many of the ports that have traditionally provided services. This increasing capacity constraint provides an opportunity for Scottish ports to capture an increasing share of these services; • road haulage is being increasingly constrained by road capacity, causing congestion and delays. The resulting reduction in journey speeds and reliability impacts on the ability of the road haulier industry to meet customer delivery schedules; and • there are opportunities for increasing the use of the rail freight to substitute for increasing road congestion. However, there are significant problems to be overcome before rail freight can realistically absorb more road freight traffic, in particular, finding sufficient infrastructure and capacity on the rail network in the south of Scotland.

3 Consultation and Identification of Options

3.1 Introduction

3.1.1 This chapter provides an overview of the consultation carried out, and the comments and views obtained from key stakeholders. It then goes on to identify the options that arose from both the consultation and the data collection for multi-modal locations. The data provided by the stakeholders is commercially sensitive and hence the consultation was carried out in accordance with the Market Research Society Code of Conduct (MRSCC) and the Interviewer Quality Control Scheme (IQCS). All information provided by stakeholders was treated in strict confidence, which was important since it facilitated a free and candid exchange of views, which otherwise might not have been available.

3.2 Consultation Process & Consultees

3.2.1 A 4-pronged approach to consultation was carried out, consisting of end-user telephone surveys, detailed surveys of operators and carriers, a series of workshops with key stakeholders and a targeted number of one-to-one meetings with those stakeholders who could not contribute to the other surveys.

3.2.2 The Computer Aided Telephone Interviews (CATI) were used to canvas the opinions of freight end user surveys, origin–destination (OD) surveys and a number of one–to–one interviews. The CATI surveys were undertaken in two waves, and the questionnaire design was agreed with the steering group. Table 3.1 shows the participation levels.

Table 3.1: Freight Survey Results

Survey Type	Approached	Contributed	Participation Rate
CATI End User	908	176	19%
CATI OD Surveys	169	33	20%
One-to-One	5	5	100%
Workshop Attendees	562	99	18%
Totals	***1,644***	***313***	***19%***

3.2.3 The above shows:

- there was a total of 313 participants, representing a 19% return; and
- this is in excess of our original target of 100 interviews to provide a statistically significant sample.

3.2.4 Some organisations contributed to more than one of the above forms of interviews, however this is still valid since the surveys asked different questions (e.g. the OD surveys focussed on freight movements while the end-user interviews looked at the decisions made by users). Furthermore, some of the large freight companies have different departments which deal with different stages of the distribution chain, hence representatives from these different departments were invited to interview.

3.2.5 To help identify key issues relating to multi-modal interchange, various workshops were carried out in two tranches and at different locations in Scotland to take account of the varying geographical needs of the country. The first tranche was held in March 2008 and the second was carried out in May 2008. At each workshop, attendees were split into focus groups which were chaired by members of the study team. Table 3.2 summarises the workshop details.

Table 3.2: Workshop Invitations and Participation

Location and date of workshops	Numbers of contacts invited	Numbers of contacts attended	Proportion of sample invited who attended
Edinburgh: 12th March	84	16	19%
Glasgow: 14th March	104	11	11%
Inverness: 12th May	79	27	34%
Aberdeen: 14th May	42	10	24%
Glasgow: 21st May	150	25	17%
Edinburgh: 22nd May	103	10	10%
Total	***562***	***99***	***18%***

3.3 Consultation Feedback and Survey Analysis

Key Issues Identified

3.3.1 Having processed the results of the consultation exercise, we have further distilled the main findings by discounting those issues that were not strictly multi-modal and therefore relevant to the study. We have also discounted those issues that have not been supported by the data obtained from other sources, including information gleaned from the analysis of our own surveys.

3.3.2 This led to 10 key issues being identified as relevant that fit the criteria outlined above, as shown in Table 3.3. It is emphasised that although there were more issues raised by the consultation process, it is only these 10 that are relevant to the focus of this study.

Table 3.3: Relevant Freight Issues Identified

Reference	Relevant Freight Issues
1	Lack of infrastructure for multi-modal freight interchange
2	Capacity constraints on key corridors
3	Costs significantly higher for some modes compared to others
4	More storage needed for interchanging at key locations
5	Using more than one mode incurs multiple handling charges
6	Access and delivery problems
7	Level of service and availability of alternatives
8	Open design standards to cater for multi-mode trips
9	Open access standards to allow as many potential freight users as possible
10	Procedures for using some modes more complicated than others

3.3.3 The above 10 issues have been corroborated by our own survey analysis. The overarching results show that:

- 22% of the sample said they faced capacity constraints which hindered their use of the multi-modal facilities;
- 17% of the sample indicated that the costs of using some modes were prohibitive which prevented them from using multi-modal facilities;
- 26% reported delivery problems were a critical weakness of using multi-modal facilities;
- 10% mentioned that the lack of services were preventing these potential users from using multi-modal facilities; and
- 25% mentioned other problems which constrained their use of multi-modal facilities.

3.3.4 Many of these issues are interrelated, as the detailed analysis of the data records shows. For example a large proportion of freight operators and end-users (21% of the sample) had to divert their cargo to an alternative facility from the one they normally use for storage and transhipment more than 5 times over the previous year, and a further 25% had to divert 3 to 5 times during the same period.

3.3.5 When pressed as to why they had to divert, the majority of freight users stressed that a lack of capacity at the facility was a critical factor. This seems to corroborate the issues in References 2 and 4 in Table 3.3. The lack of capacity appears to be a relatively frequent problem; 82% of users recorded that capacity constraints had affected their operations at the main facility they use for storage and transhipment at least once during the past year. In addition, of this proportion, nearly a third recorded this happening at least five times during this period.

3.3.6 Looking at the reasons as to why there is a capacity constraint, the majority of our sample (59% of freight operators and freight users) identified that the lack of infrastructure and inadequate access were the prime problems associated with capacity constraints, as noted in issue References 1 and 6 in Table 3.3. In fact nearly half (44%) of freight facility users reported that they have to negotiate relatively minor roads to gain access to their storage and transhipment facility. These problems are bound to hamper operations, not least by causing congestion, which was a specific problem mentioned by a number of freight operators and hauliers (13% of the sample).

3.3.7 Turning to the issues of costs and handling charges (References 3 and 5 respectively in Table 3.3) both high costs and, in particular, handling charges of current freight facilities were reported as problems facing users. This is borne out of our sample, which showed that of the costs applied, 48% were associated with handling and stevedoring charges (where applicable). Multi-modal facilities in particular are susceptible to high handling costs where intermodal freight movements often incur multi-handling charges, and these showed up as a significant issue in our surveys.

3.3.8 References 8, 9 and 10 in Table 3.3 were also raised frequently by stakeholders from different sectors, who seem to corroborate each other on these issues albeit this is difficult to quantify. However, from our experience, it seems sensible if facilities were designed to meet open standards as much as possible to allow a number of different freight modes to use them. Moreover, it seems logical to have open access arrangements wherever possible as this would widen the market for multi-modal facilities.

Geographical Spread of Key Issues

3.3.9 In keeping with the geographical perspective of the analysis, the issues identified above have been mapped to a number of geographical locations associated with the relevant Regional Transport Partnerships (RTPs). This allows the problems to be set against their geographical location across Scotland. The issues raised by stakeholders were checked against the modelling results obtained following the analysis of the trends summarised in Chapter 2. Only those statements and claims made by stakeholders during the consultations which were subsequently found to be supported by the analysis were included. Some of these issues were found to occur in more than one RTP. Table 3.4 shows the results.

Table 3.4: Geographical Locations of Multi-Modal Freight Issues

Issue	HITRANS	Nestrans	SEStran	SPT	SWestrans	TACTRAN	ZetTrans
1		●	●	●	●	●	
2	●		●	●		●	
3	●	●	●	●	●	●	●
4			●	●			
5	●	●	●	●			●
6			●	●	●	●	
7	●	●			●	●	●
8	●	●					
9	●	●		●			
10	●	●	●	●	●		●

Note: ● denotes issue significant at this location

3.4 Identification of Multi-Modal Freight Options / Locations

3.4.1 Following on from the identification of key issues and constraints, stakeholders were then asked for their thoughts on potential new facilities and/or locations for multi-modal options. The intention was to let stakeholders suggest a long list of potential new options/locations which would then be systematically appraised in later stages of the study (covered in the following Chapters of this report). This appraisal would include; comparisons with the results from the transport modelling to confirm if there is sufficient demand for any nominated facilities, capacity analysis to confirm whether existing infrastructure was sufficient to meet future needs or if additional investment was required, and financial appraisal to identify those options which could be pursued by the private sector without Government intervention.

3.4.2 To assist in identifying the long list of multi-modal options, each suggestion was categorised to reflect the following 3 categories of freight operations:

- national gateway providing direct access to/from international markets;
- regional gateway with some international connectivity but mainly serving local/regional markets; and
- freight distribution location serving the internal distribution of freight within Scotland.

3.4.3 A total of 17 options/locations were identified by stakeholders. These are shown in Table 3.5 (not in any order of importance) next to the relevant RTP and classified against the above category of freight facility.

Table 3.5: Identified Multi-Modal Options/Locations (Full List)

Region	Reference	Possible Locations	Category of Hub
HITRANS	1	Cromarty Firth	Freight Distribution Location
	2	Elgin / A96	Freight Distribution Location
	3	Inverness	Regional Gateway
	4	Loch Fyne	Freight Distribution Location
	5	Scapa Flow	National Gateway
Nestrans	6	Aberdeen	Regional Gateway
	7	Peterhead	Regional Gateway
SEStran	8	Cameron Bridge – Leven	Regional Gateway
	9	Grangemouth	National Gateway
	10	Rosyth	National Gateway
SPT	11	Coatbridge	National Gateway
	12	Hunterston	National Gateway
	13	Mossend	National Gateway
	14	Prestwick Airport	National Gateway
SWestrans	15	Lockerbie	Freight Distribution Location
TACTRAN	16	Dundee Harbour	Regional Gateway
ZetTrans	17	Lerwick	Freight Distribution Location

3.4.4 While most of the above were multi-modal locations or options, the suggestion for Scapa Flow was considered to be primarily single mode (i.e. ship to ship) and hence outwith the focus of this study. Consequently, the ***Scapa Flow option was discounted from further analysis*** in this appraisal.

3.4.5 The remaining 16 options/locations were taken forward into the rest of this study, and the following Chapter summarises the capacity analysis of each suggested location and relevant RTP.

3.4.6 It is worth noting that, due to the significant volumes of data collected and stakeholder consultation feedback during the course of this study, the analysis has taken some considerable time to complete. Since then there have been further developments which have led to additional options/locations being suggested which, if starting the appraisal from now, would have also been examined in more detail. However, the above list is considered to be a good range of options/locations for addressing the geographically wide range of issues identified in the study, and also provides a reasonable understanding of the type and size of freight facilities required to meet future demand estimates.

4 Capacity Appraisal and Option Development

4.1 Overview of the Appraisal Tests and their Rationale

4.1.1 The previous two chapters have been involved in addressing the first half of the study tasks, namely to:

- compile a baseline of existing freight movements in Scotland;
- analyse/quantify future demand for freight over a 10-20 year time frame; and
- identify options/locations for multi-modal freight facilities in Scotland.

4.1.2 The output from the above is effectively a baseline against which the various options identified during the stakeholder consultations can be tested. The study Inception Report set out a systematic process for testing these options using a STAG-based objective analysis of the data collected. This was based on version 1.0 (September 2003) of STAG and includes:

- Capacity Appraisal – this tests the estimated future freight demand levels against the available capacity of existing freight facilities. This identifies those locations which would require additional infrastructure or improved facilities in order to meet expected demands, and describes the form and type of the additional facilities/infrastructure with our estimate of their outline costs. Similarly, it identifies those locations where there is sufficient capacity and hence do not require any additional investment;
- Economic Analysis – the output from the above capacity investigation is a list of multi-modal freight improvements at various locations throughout Scotland. These are then examined using three economic tests based on Government economic appraisal theory and industry-standard procedures. The first test is a financial appraisal of the costs of each proposal against the revenues they generate, to identify those options which can provide a sufficient return in order for them to be pursued by the private sector. The second test is a cost/benefit analysis which quantifies the societal benefits of each option (e.g. network time savings, reduced road accidents, etc) in addition to the potential revenue streams and compares them to the costs. This identifies the options which, while they might not be able to provide sufficient revenues to cover their costs, they nonetheless provide other transport benefits to society which suggest there is merit for Government intervention. The third test estimates the wider economic benefits of a proposal in terms of the potential job impacts they can provide, to identify those options which might also warrant public sector support on the grounds of other economic benefits not captured in the other tests; and
- Other STAG-based Assessments – while the economic tests are intended to examine the potential impact of the identified options on Scotland's economic competitiveness, there are four other criteria considered in STAG. These include environmental impacts, safety implications, accessibility/connectivity and integration with the wider transport network, and other transport-related issues. Hence, the STAG-based assessment carries out a series of appraisals against all of the remaining STAG tests, to provide a fuller understanding of the impacts of each option.

4.1.3 In addition to estimating the benefits and impacts to Scotland of each option, the above tests also help identify those options which could be entirely private-sector driven and the role of the public sector in supporting other developments.

4.1.4 To make it easier to follow the various stages of the assessment, the appraisal is carried out over Chapters 4, 5 and 6. This chapter focuses on the first test, the analysis of the demand versus capacity for the identified locations. It also identifies the new infrastructure required and estimates their costs. This is an initial sift of options and those shown to have future demand are carried forward into the economic appraisal in Chapter 5. The other STAG-based tests are set out in Chapter 6, and all three chapters are linked and should be looked at collectively.

4.1.5 Before presenting the analysis, it is worth summarising the identified demand and suggested options for each RTP. These are outlined in Table 4.1.

Table 4.1: Identified Demand and Multi-Modal Options/Locations

RTP Area	Demand	Location(s)	Type
HITRANS	• total origins = 24.4m tons • total destinations = 16.2m tons ➢ road = 43% ➢ sea = 53% ➢ rail = 4% ➢ air < 0.1%	Cromarty Firth	Freight Distribution Location
		Elgin / A96	Freight Distribution Location
		Inverness	Regional Gateway
		Loch Fyne	Freight Distribution Location
Nestrans	• total origins = 20.8m tons • total destinations = 22.5m tons ➢ road = 82% ➢ sea = 13% ➢ rail = 5% ➢ air = 0%	Aberdeen	Regional Gateway
		Peterhead	Regional Gateway
SEStran	• total origins = 73.4m tons • total destinations = 49.6m tons ➢ road = 69% ➢ sea = 26% ➢ rail = 5% ➢ air < 0.1%	Cameron Bridge – Leven	Regional Gateway
		Grangemouth	National Gateway
		Rosyth	National Gateway
SPT	• total origins = 63.7 tons • total destinations = 79.0m tons ➢ road = 82% ➢ sea = 11% ➢ rail = 7% ➢ air < 0.1%	Coatbridge	National Gateway
		Hunterston	National Gateway
		Mossend	National Gateway
		Prestwick Airport	National Gateway
SWestrans	• total origins = 11.8m tons • total destinations = 11.7m tons ➢ road = 76% ➢ sea = 20% ➢ rail = 4% ➢ air = 0%	Lockerbie	Freight Distribution Location
TACTRAN	• total origins = 13.0m tons • total destinations = 13.6m tons ➢ road = 92% ➢ sea = 6% ➢ rail = 2% ➢ air = 0%	Dundee Harbour	Regional Gateway
ZetTrans	• total origins = 17.3m tons • total destinations = 5.8m tons ➢ road = 14% ➢ sea = 86% ➢ rail = n/a ➢ air < 0.1%	Lerwick	Freight Distribution Location

4.1.6 Table 4.1 shows that a relatively large number of ports and rail freight options are potentially suitable as multi-modal freight locations and worth further examination.

4.2 The HITRANS Area

Cromarty Firth (Freight Distribution Location)

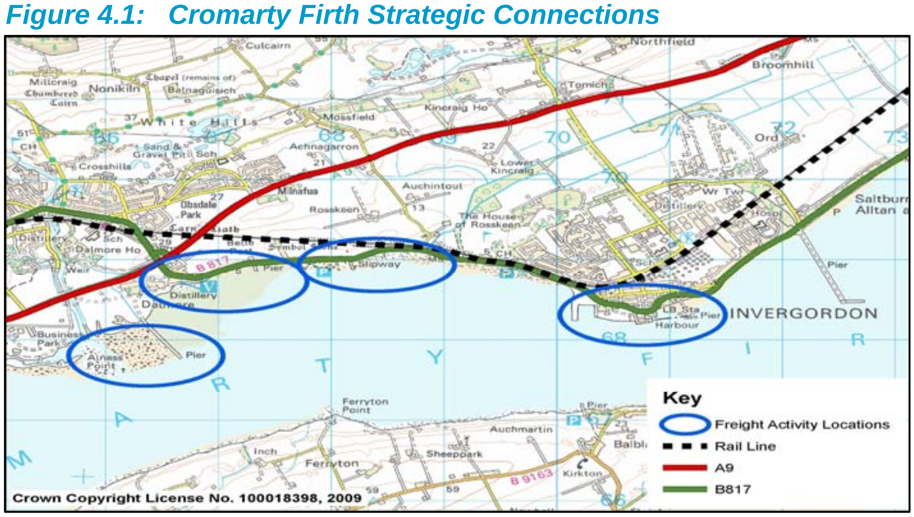
4.2.1 The facilities in the Cromarty Firth area are somewhat spread out with the principal one being the harbour at Invergordon; situated within the Moray Firth and 40 kilometres by road to the north of Inverness. It is connected to the rest of Scotland by road and rail and serves a relatively large catchment area including the offshore oil and gas industry, renewable energy sector, timber product and livestock sectors, and may also accommodate visits by cruise liners.

<u>Network and Existing Facilities</u>

4.2.2 The main characteristics of the regional transport network are:

- the A9 is the principal route connecting the Cromarty Firth with the surrounding area but other roads include the B817(see Figure 4.1), in addition to the A835 and A832 which are outwith the mapped area;
- rail route availability is RA10 between Inverness and Invergordon, but is highly restricted north of Invergordon, being only RA5 to both Wick and Thurso. Rail track is single and un-electrified, with passing loops and a maximum ruling line speed of 120kph (75mph). The Radio Electric Token Block (RETB) signalling system is operating close to its maximum limit, and the loading gauge from Inverness to Wick is W8, but is restricted to W7 between Georgemas and Thurso with train lengths limited to 50 standard loading units (SLUs);
- in terms of on-site rail facilities at Cromarty Firth, the track passes relatively close to the main port at Invergordon, and has a passenger terminal at Invergordon. However there is no dedicated freight spur to the port, nor are there any rail freight warehouse buildings or open cargo handling areas identified in the Cromarty Firth area; and
- the harbour is administered by the Cromarty Firth Port Authority. There are a number of piers at the harbour with depth availability of between 6 metres and 21 metres and allowing a vessel length of up to 295 metres. The Heavy Invergordon Service Base provides 30,000m^2 of hardstand and 4,000m^2 of warehouse and workshop. Cargo handling is available as is a track mounted electric grabbing crane for bulk cargo handling.

Figure 4.1: Cromarty Firth Strategic Connections



Capacity Analysis

4.2.3 The demand analysis has estimated an increase in freight tonnes through the area. This includes modest growths estimated for agriculture and other/miscellaneous goods. However, the overwhelming proportion of the increased freight is due to timber traffic which is related to the assumption that the regions forest clusters mature over the next 10 years, based on forestry production information supplied during the course of the study. Other timber production information supplied nationally corroborated the timber development assumptions in this area.

4.2.4 We have used geometric data and capacity information from the NESA Manual[39], the Scottish Route Utilisation Strategy[40] (RUS) and the Ports of Scotland[41] in order to estimate the current capacity levels of the facilities at this location. Table 4.2 shows the results of the capacity analysis.

Table 4.2: Capacity Utilisation by Mode (Current & Future Scenarios)

Utilisation	Road	Rail	Port	Air
Current utilisation (%)	35%	20%	56%	n/a
Future low growth utilisation (%) – 2020	52%	31%	86%	n/a
Future high growth utilisation (%) – 2020	67%	41%	97%	n/a

4.2.5 The above results of the capacity utilisation analysis can be compared to similar results from the Strategic Transport Projects Review (STPR)[42], and suggest:

- road utilisation for the Cromarty area, already relatively low in 2007, is likely to remain below capacity in the future;
- rail utilisation is projected to remain below capacity; and
- port utilisation in terms of berthing in 2007 was operating below capacity, however the estimated growth is projected to rise above current capacity. In terms of storage, there is 30,000m^2 of hardstand area currently available adjacent to Invergordon Service Base which will be able to accommodate 60,000 tonnes of freight at 2 tonnes per metre squared. Cargo handling is estimated to require 75 machines. However, from inspection of site plans, it is likely that more than the advised 30,000m^2 is currently being used to store materials in the open (circa 6,000 m^2 is available to the north) and therefore fewer machines will be required to handle the freight. For the utilisation figures in Table 4.2, we have therefore used both the area of the hardstand and the area of open ground.

Infrastructure Requirements and Costs

4.2.6 The appraisal above suggests that, although not quite reaching full utilisation, the future multi-modal port activity could be constrained and without investment port freight operations could be affected. Provision of further hardstand storage areas at

[39] NESA Manual, DMRB (Volume 15), April 2002
[40] Scottish Route Utilisation Strategy, Network Rail, March 2007
[41] Ports of Scotland, Maritime Publications Ltd, 2008 & 2009
[42] Figures 4.39, 4.40 and 4.44, Report 1 – Review of Current and Future Network Performance, Strategic Transport Projects Review, Transport Scotland, December 2008

the Invergordon Service Base could be restricted by the proximity to the town of Invergordon. The harbour is situated within a rural area and any large scale development would need to be carefully considered with respect to the surrounding environment.

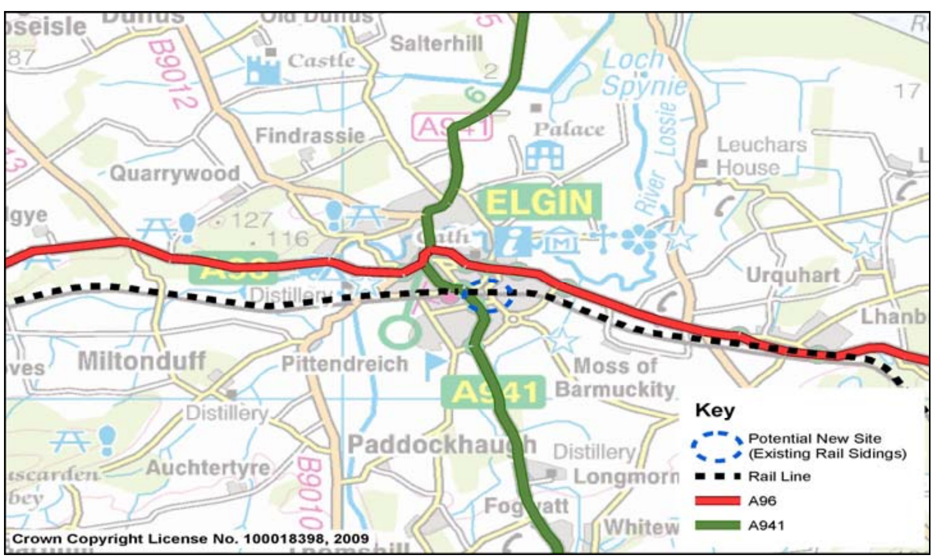
4.2.7 The outcome of the appraisal suggested that an additional 2 berths to accommodate 100m long vessels would ease constraints and help to meet the projected 2020 tonnages. These berths will require sufficient hardstand and machines to handle the freight. The cost of additional berthing is estimated at £60,000 per metre of vessel length required. Therefore the cost of additional infrastructure required to handle the year 2020 freight at Cromarty Firth is estimated to be £12 million. Although reduced costs could be achieved through reconfiguration or refocusing the use of existing jetties within the Harbour, we have used the upper value in the economic appraisal to err on the side of caution.

4.2.8 In terms of rail at the Cromarty Firth, the analysis has not identified sufficient demand for freight to transfer onto rail from the port. Road transport is likely to remain the dominant mode of access to/from the port, due to the distances travelled and costs. Hence, there would appear to be no case for providing on-site rail facilities. Furthermore, given that rail capacity utilisation for rail links to the Cromarty Firth are likely to remain very low, there is no anticipated requirement for new rail freight line improvements.

Elgin / A96 (Freight Distribution Location)

4.2.9 Elgin is located on the A96, the major trunk road which, together with the rail link, represents the Aberdeen to Inverness transport corridor (see Figure 4.2). The corridor is of regional strategic importance linking these major cities.

Figure 4.2: Elgin Strategic Connections



Network and Existing Facilities

4.2.10 The transport network of the surrounding area includes:

- the A96 travels through the town in an east-west line and the A941 passes through in a north–south direction. The A941 joins the Elgin area with the Moray coast to the north;
- railway route availability is RA10 between Inverness and Aberdeen. The rail network is constrained by being single line throughout apart from the Insch/Kennethmont section. There are limited freight services over the section, mostly for the movement of timber with a maximum ruling line speed of 75mph throughout. None of the track is electrified and the loading gauge is W7 throughout, with freight train length limits of 50 standard loading units (SLUs); and
- looking specifically at rail freight facilities at Elgin, these are located to the east of the passenger terminal, and are accessible from the A96 and the A941. The facilities include circa 6,000 square metres of closed storage spread over two buildings of which approximately 45% is likely to be used for storage. In addition, freight facilities include another 4,250 square metres of available open storage including hardstanding areas and railway sidings. Handling facilities include a reach stacker crane positioned within the goods yard.

Capacity Analysis

4.2.11 Table 4.3 shows the results of the capacity analysis, which can be compared to similar results from STPR[43].

Table 4.3: Capacity Utilisation by Mode (Current & Future Scenarios)

Utilisation	Road	Rail	Port	Air
Current utilisation (%)	62%	52%	n/a	n/a
Future low growth utilisation (%) – 2020	72%	80%	n/a	n/a
Future high growth utilisation (%) – 2020	79%	103%	n/a	n/a

4.2.12 Road utilisation is within capacity limits and this is expected to remain the case under future estimates. Therefore it is unlikely that a multi-modal freight facility at Elgin will be constrained by strategic road access.

4.2.13 Rail capacity analysis shows that there is available storage, both covered and open, for circa 0.47 million tonnes per annum assuming an average layover of two days and 300 working days per annum. Taking into account the future forecast demand for the facilities at 2020 this gives a capacity utilisation ratio of 80% and 103% for the low and high growth scenarios, respectively.

Infrastructure Requirements and Costs

4.2.14 During the stakeholder consultations, suggestions for a new rail/road freight site at Elgin were raised by some consultees, although no details were available. Given the potential future demand identified in our analysis, it is considered useful to test a modest-sized facility on the existing site rather than a more costly facility located

[43] Figures 4.39, 4.40 and 4.44, Report 1 – Review of Current and Future Network Performance, Strategic Transport Projects Review, Transport Scotland, December 2008

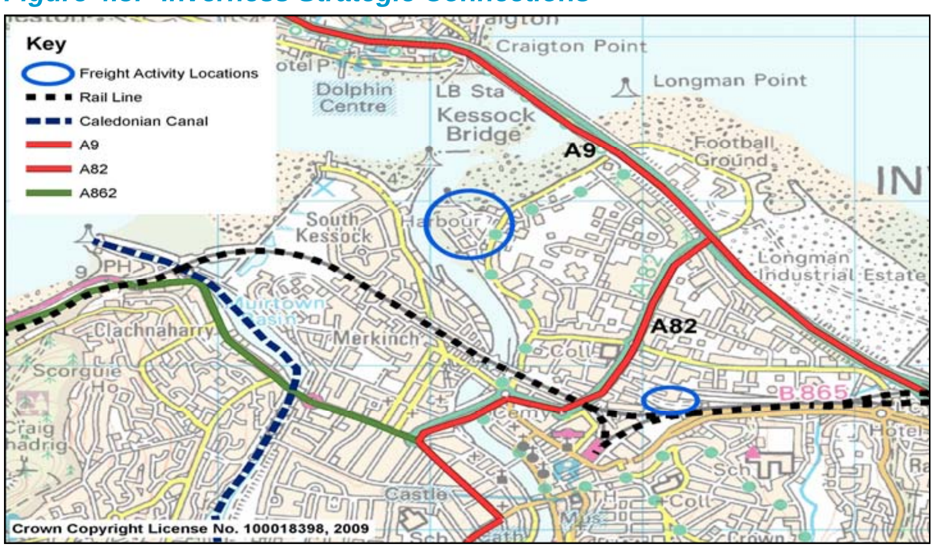
out-of-town which would also require new access arrangements. This cheaper option was discuss with the study Steering Group, and was considered a useful option to gauge whether such a facility would be able to provide sufficient return or benefits. Hence, we have allowed £1.93million for an expanded road/rail freight facility at the existing site based on recent cost estimates for similar facilities in Dundee[44]. This includes handling facilities, strengthened hardstanding, storage and signal equipment. However, the utilisation assessment results of the high growth scenario suggest the proposed size of the site could potentially limit the full potential of this option. For the purposes of the economic and STAG-based appraisals (described in the following Chapters of this report), we have capped the future demand under the high growth scenario to the estimated capacity. This assumption was also discussed with the study Steering Group.

4.2.15 It is also worth noting that there are proposals in the Strategic Transport Projects Review[45] (STPR) which would compliment the new rail freight facilities at Elgin. In particular, STPR Intervention 19 (Rail Service Enhancements between Aberdeen and Inverness) will help improve rail freight connections between Aberdeen and Inverness and includes installation of new loops in the area, improvements to line speeds and the provision of some dual tracking.

Inverness (Regional Gateway)

4.2.16 Inverness is at an important junction of major trunk routes within the HITRANS area, as Figure 4.3 illustrates. It also boasts port facilities, is the focus of the Highland rail network and has the largest regional airport located approximately 7 miles to the east of the city.

Figure 4.3: Inverness Strategic Connections



[44] Outline Business Case & Pre-Feasibility for Rail Freight Facilities in Tayside, Scottish Enterprise Tayside, 2007
[45] Strategic Transport Projects Review, Transport Scotland, December 2008

Network and Existing Facilities

4.2.17 The A9 is the main route linking the area with the central belt, and is a mixture of single and dual carriageway. The A96 provides an important corridor linking Inverness with Inverness Airport, Aberdeen, and the intervening towns. To the north west of Inverness the A9 joins up with the A835 and to the south west the A82 links Inverness with Fort William.

4.2.18 Inverness is also an important rail junction. Route availability is RA8 throughout the section between Inverness and Perth. The track is single (none of the track is electrified) with intermediate passing loops, apart from the Perth/Stanley junction, Blair Atholl/Dalwhinnie and Inverness/Culloden which are double track. The maximum ruling line speed is 80mph throughout, except for some small sections where it is between 80 and 100mph. Loading gauge is W8 throughout and freight train length limits are 50 SLUs.

4.2.19 The rail freight facilities at Inverness are located to the north east of the rail passenger terminal, with local access to the site just off the B865 distributor road. The facilities themselves include approximately 26,000 square metres of closed storage spread over five buildings of which approximately 30% is likely to be used for storage. In addition, freight facilities include another 9,100 square metres of available open storage including hardstanding areas and railway sidings.

4.2.20 Inverness Harbour is administered by the Inverness Harbour Trust and is located just to the west of the Kessock Bridge within the Moray Firth, at the mouth of the River Ness. The approach to the harbour is over 'Middle Bank' and under the main span of the Kessock Bridge. The approaches to the harbour restrict the size of vessel which can gain access to the berths. Current operational restrictions at the Harbour, limit commercial vessel movements to and from the harbour to two hours before high water. Vessels over 50m in length must use the pilotage service provided by the harbour. Nevertheless, in spite of these restrictions a total of 358 vessels visited Inverness Harbour in 2007.

4.2.21 Another key water-based facility is the Caledonian Canal, which starts in Inverness and runs to Fort William, spanning some 60 miles. The canal, operated by British Waterways Scotland (BWS), runs through the Great Glen, traversing many natural lochs including Loch Ness and Loch Dochfour. A trial on the potential for shipping freight via the canal was undertaken in 2005 by K.D. Marine (UK) Ltd with support from the Scottish Executive and BWS, which saw a vessel capable of carrying 1,000 tonne-loads pass along the waterway. Following on from this in 2008 HITRANS conducted a study into the potential for freight transport on the Canal concluding that the demand was not commercially viable at that time[46].

[46] Freight Potential on the Caledonian Canal, HITRANS, June 2008

Capacity Analysis

4.2.22 Table 4.4 shows the results of the capacity analysis.

Table 4.4: Capacity Utilisation by Mode (Current & Future Scenarios)

Utilisation	Road	Rail	Port	Air
Current utilisation (%)	21%	42%	32%	Negligible
Future low growth utilisation (%) – 2020	24%	65%	49%	Negligible
Future high growth utilisation (%) – 2020	26%	83%	55%	Negligible

4.2.23 The above results of the capacity utilisation analysis can be compared to similar results from STPR[47], and the implications on freight are:

- overall road capacity for the Inverness site is below capacity and forecast to remain so for the foreseeable future. There are, however, some road sections (e.g. the A96) which experience higher utilisation rates, especially at peak times;
- rail capacity analysis shows that there is available storage, both covered and open, for approximately 2.7 million tonnes per annum assuming an average layover of one day and 300 working days per annum. Comparing estimated demand in the future against capacity gives utilisation ratios of 65% and 83% for the low and high growth scenarios respectively;
- current and projected utilisation rates for the port of Inverness remain below the available capacity, assured by the expansion underway at the harbour where the principal docks can accommodate up to five 1,500 DWT vessels at the same time. Therefore, based on the harbour utilisation rate of 200 days per year this quay can handle 1,000 vessel-berth-days. An open storage area of 36,000m^2 is available and this area is also able to accommodate both the current and projected storage demand; and
- dry bulk is expected to increase, becoming the major type of freight. Container and general cargo should stay at low volumes.

Infrastructure Requirements and Costs

4.2.24 The projected future rail utilisation rates remain within the capacity of the local rail freight facilities, and the site will therefore be unlikely to require any substantial investment in freight storage and handling facilities in the near future.

4.2.25 Currently, all non-transhipment water freight in and out of Inverness Harbour either departs or arrives by road. As part of this study, we looked at the potential demand for a rail link which allowed for access to Inverness Harbour from the current rail freight terminal east of the station. This would allow water freight traffic arriving at the port of Inverness to be forwarded by rail to other parts of Scotland, England and even to continental Europe via the Channel Tunnel.

4.2.26 With the rail track and the required ancillary equipment at the port itself such as a single reach stacker crane and sidings at the port, the costs of this arrangement

[47] Figures 4.39, 4.40 and 4.44, Report 1 – Review of Current and Future Network Performance, Strategic Transport Projects Review, Transport Scotland, December 2008

are estimated to be approximately £3.6 million allowing for 800 metres of permanent way, signalling and general site earthworks. In terms of potential demand, the anticipated shift from road to rail for freight moved through Inverness Harbour is estimated to be up to 26,000 tonnes of freight per annum. In strict financial terms at least, this level of demand is unlikely to provide a sufficient financial return for the level of investment required. However, the rail site and harbour can effectively operate inter-modally on separate locations.

4.2.27 The current port storage area can handle 72,000 tonnes of freight. In order to handle this quantity of freight within the time available, the current number of 6 machines will need to increase to 11 by 2020.

4.2.28 The harbour is currently undergoing expansion which is now understood to be approaching completion. The capacity of this new facility has been included within the above appraisal. Additional canopy storage is also about to be constructed totalling 2,200m^2. Based on this assessment, Inverness Harbour would appear to have sufficient quayside infrastructure capacity to accommodate the increased freight demand. There are no known technical reasons which would prevent development of the site.

4.2.29 However, the planned increase in storage area and demand will mean the freight handling capacity will need to be increased with an additional five machines. Assuming each machine costs £100,000 this equates to £0.5 million.

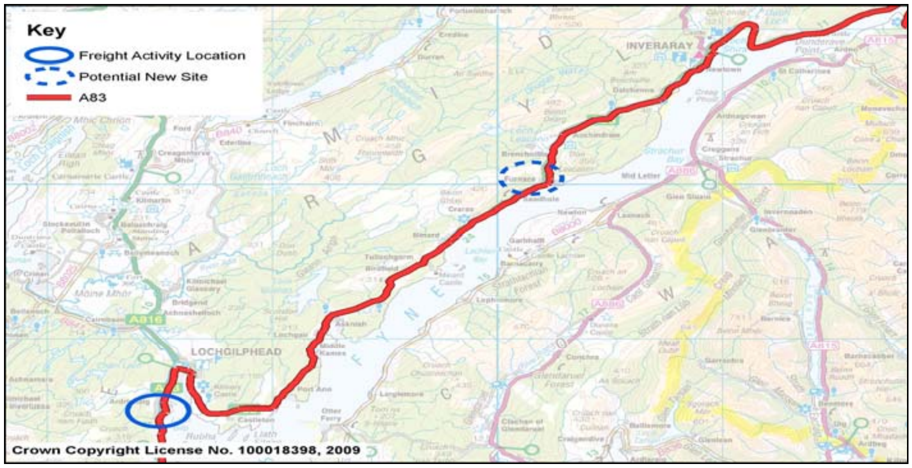
Loch Fyne (Freight Distribution Location)

4.2.30 Furnace Pier is situated about 10 miles southwest of Inveraray. The area is a major supply source of cut timber for processing industries, including paper and board manufacturing, carcasing, pallet and fencing timber products and biomass for energy generation. The movement of timber from the region is a significant generator of heavy goods vehicle (HGV) trips. Key stakeholders in the area have been successful in developing the use of non-roads based facilities for the movement of timber. Existing non-road based modes for timber movement include the port facilities at Ardrishaig which transports 160,000 tonnes per annum via the Timberlink vessel. However, this site has reached capacity and furthermore it is Loch Fyne and its surrounding forest clusters that are where the future forestry production is programmed to take place.

4.2.31 There are plans by Argyll & Bute Council along with the Argyll Timber Transport Group (ATTG) and a consortium of local freight operators to provide a new pier and associated storage/handling facilities to accommodate the expected expansion in timber from neighbouring forests. This includes constructing a new quay to accommodate vessels of 3,200 tonnes, either using the existing Timberlink vessel as an extension to the current service or providing another vessel. Figure 4.4 overleaf shows the location of the existing Ardrishaig site and the proposed Loch Fyne site.

4.2.32 The proposals have the potential to handle a growing trade in timber products between Argyll and other parts of the country, as well as meeting timber demand from the expanding markets in Europe. The new facilities would include a new pier plus associated hardstand, storage facilities and road access arrangements.

Figure 4.4: Loch Fyne Strategic Connections



Network and Existing Facilities

4.2.33 Key characteristics of the transport network are:

- the main trunk road in the area is the A83, joining the A82 at Loch Lomond, and continuing southbound, linking Furnace with Lochgilphead;
- new water freight facilities would be used for timber extraction, and most of this is directly shipped to other ports in Scotland and England. Therefore the road is of limited importance for this purpose and vehicular traffic is relatively light, although subject to difficult movements owing to the nature of the route; and
- there are no rail freight facilities in the Loch Fyne region.

Capacity Analysis

4.2.34 Table 4.5 shows the results of the capacity analysis, which can be compared to similar results from STPR[48].

Table 4.5: Capacity Utilisation by Mode (Current & Future Scenarios)

Utilisation	Road	Rail	Port	Air
Current utilisation (%)	1%	n/a	n/a	n/a
Future low growth utilisation (%) – 2020	2%	n/a	64%	n/a
Future high growth utilisation (%) – 2020	2%	n/a	80%	n/a

4.2.35 Potential investment in a new pier plus associated hardstand and storage space by 2020 would result in a forecast level of utilisation of 64% for the low growth scenario and 80% for the high growth scenario, mirroring the growth in timber throughput. This assumes an average stay of 2 days per vessel.

Infrastructure Requirements and Costs

4.2.36 The estimated investment for the new pier plus associated hardstand, storage and access arrangements, to accommodate the expected future freight flows through the site, is likely to cost circa £5.8 million (estimated by Scott Wilson).

[48] Figures 4.39, 4.40 and 4.44, Report 1 – Review of Current and Future Network Performance, Strategic Transport Projects Review, Transport Scotland, December 2008

4.3 The Nestrans Area

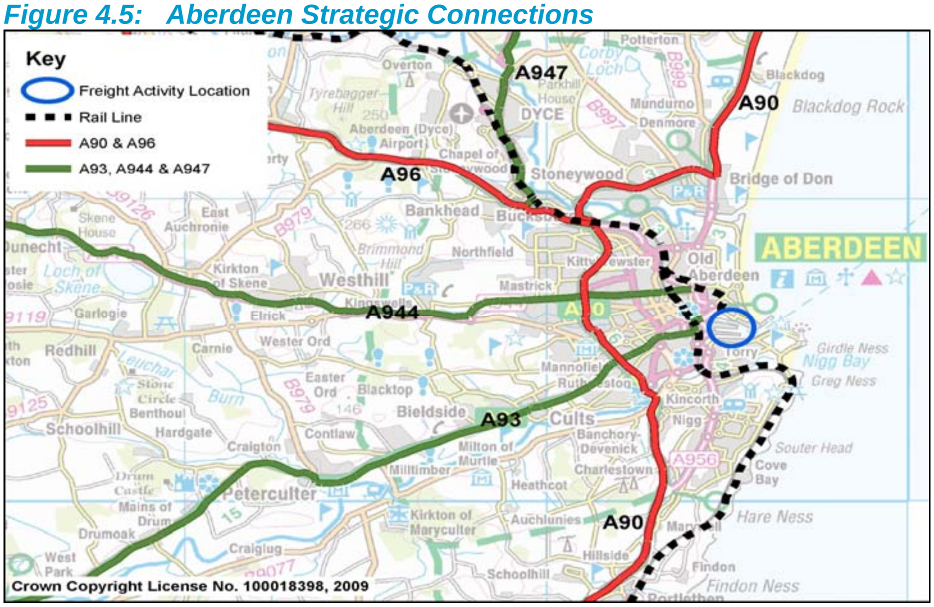
Aberdeen (Regional Gateway)

4.3.1 Aberdeen Harbour (administered by The Aberdeen Harbour Board) is the principal commercial port located on the north east of Scotland and serves a diverse range of industries. It is the centre of activity for marine support for the offshore oil and gas industry and also handles significant quantities of diverse commercial products.

<u>Network and Existing Facilities</u>

4.3.2 As shown in Figure 4.5, the principal road connections are the A90 linking Aberdeen with Peterhead (northward) and Montrose and Dundee (southward), and the A96 linking with Inverness to the west. Other major roads in the region are the A93, the A944 and the A947, all radial routes.

Figure 4.5: Aberdeen Strategic Connections



4.3.3 Aberdeen Harbour is connected to the rail network, although some rail capacity in the port area itself has been lost to development. Key features of the rail network are:

- route availability between Aberdeen and Dundee is RA10 throughout. The track is double throughout except for the section between Montrose and Usan, and the maximum ruling speed is 100mph throughout. In addition, the loading gauge is W7 throughout, and freight train length limits are 71 standard loading units (SLUs); and
- the freight terminal is owned by EWS (DB Schenker) and intermodal off loading facilities are operated by A.A.R Craib Ltd. The rail freight facilities at Aberdeen, located adjacent to Aberdeen harbour and the rail passenger

terminal, are accessible via the A93 and the A956. The facilities include approximately 5,450 square metres of closed storage over five large buildings of which approximately 50% is likely to be used for storage. In addition, freight facilities include approximately 3,400 square metres of available open storage all of which is hardstanding area as there are no rail sidings. Furthermore, circa 30% of space from Commercial Quay can also used for rail freight storage, as this quay is closest to the old rail yards. The area available for hardstanding at the rail site was much greater in the past, but significant parts of the old rail yards have been sold off to private developers, which limits the level of expansion.

4.3.4 The navigation channel approaching the harbour is 33.5m wide and provides a maximum depth of 10.3m at mean high water springs. With the exception of fishing vessels and smaller vessels, pilotage is required within the harbour. The recently completed Marine Operations Centre controls the flow of the 17,000 vessels which arrive and depart each year at the harbour.

4.3.5 Heavy lift cranes are available for hire and grabs of various types and capacities are also available within the harbour.

Capacity Analysis

4.3.6 The existing levels of freight capacity are:

- covered storage goods require 78 vessel-berth-days using a 6,000 DWT vessel on 36 hour stay. The covered storage area provides capacity for 156,000 m^2 of covered freight. Similarly, open storage goods require 552 vessel-berth-days using a 6,000 DWT vessel on 36 hour stay. This provides capacity for 1.1 million m^2 of open freight per year; and
- although the area available for rail freight was greater in the past, with a significant proportion of the old rail yards having been sold off to private developers, rail capacity is estimated at 3.3 million tonnes per annum, when 30% of space from Commercial Quay is also used for rail freight storage.

4.3.7 Table 4.6 below shows the results.

Table 4.6: Capacity Utilisation by Mode (Current & Future Scenarios)

Utilisation	Road	Rail	Port	Air
Current utilisation (%)	75%	45%	46%	n/a
Future low growth utilisation (%) – 2020	89%	69%	58%	n/a
Future high growth utilisation (%) – 2020	98%	89%	60%	n/a

4.3.8 The above results of the capacity utilisation analysis can be compared to similar results from STPR[49]. The implications for capacity at Aberdeen are:

- overall road access to and from the region is expected to get close to capacity by 2020. However, looking at key individual road sections, the A90 south is already very close to capacity (97% at peak times) and will be expected to exceed capacity by 2020;

[49] Figures 4.39, 4.40 and 4.44, Report 1 – Review of Current and Future Network Performance, Strategic Transport Projects Review, Transport Scotland, December 2008

- there is spare capacity for rail, port and air freight. The rail terminus and harbour could effectively operate on separate sites; and
- the anticipated drop in fuel transported by sea will lead to a decrease in this category, while general cargo will become the major type of freight.

Infrastructure Requirements and Costs

4.3.9 For closed storage requirements, the throughput of freight will require handling by 4 machines. Given projected future demands, at high growth, it is estimate that 6 machines will be needed. In terms of open storage, freight throughput will require handling by 29 machines, which is projected to grow to a need for 36 machines. No technical matters have been highlighted.

4.3.10 The close proximity to the City would constrain expansion of the harbour. However areas of development land may be available close to or within the harbour. Aberdeen would appear to have sufficient berthing capacity to meet the projected 2020 freight demand. However an allowance for increased levels of freight handling or increased areas of hardstand could be considered.

4.3.11 Based on the assessment above, an additional 9 machines would be required at a cost of £0.9 million.

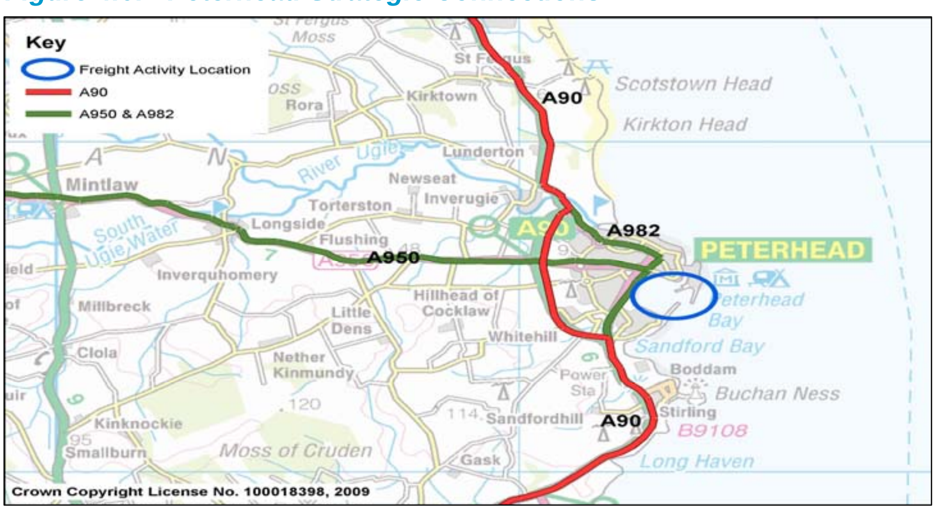
Peterhead (Regional Gateway)

4.3.12 Peterhead Harbour is located on the north east coast of Scotland, to the north of Aberdeen, and is administered by the Peterhead Port Authority. It is the UK’s largest white and pelagic (oily) fish port and it also acts as a base for services to the offshore oil and gas industry.

Network and Existing Facilities

4.3.13 Peterhead is served by the A90 trunk route linking the city to the main settlements to the south including Aberdeen, Montrose and Dundee. The A90 continues to the north of the city, linking Peterhead with Fraserburgh (see Figure 4.6). The city is also served by the A950 to the west, which connects the area to the Moray coast. There is no rail connection to Peterhead.

Figure 4.6: Peterhead Strategic Connections



Capacity Analysis

4.3.14 Table 4.7 shows the results of the capacity analysis, which can be compared to similar results from STPR[50].

Table 4.7: Capacity Utilisation by Mode (Current & Future Scenarios)

Utilisation	Road	Rail	Port	Air
Current utilisation (%)	32%	n/a	37%	n/a
Future low growth utilisation (%) – 2020	43%	n/a	64%	n/a
Future high growth utilisation (%) – 2020	51%	n/a	71%	n/a

4.3.15 Road capacity utilisation is projected to increase but is still within capacity.

4.3.16 In terms of the port, assuming that freight can be stacked within storage areas at an average density of 2 tonnes per square metre, the area currently required for storage is 164,500 m^2 per year, although information on areas suitable for open storage is not available. Problems with storage space availability and limited water depth for much of the infrastructure at Peterhead harbour restricts operations. Only one quay (Albert Quay) has the ability to handle significant amounts of freight. This quay is able to:

- accommodate up to three 1,500 DWT vessels at the same time;
- can handle 600 vessel-berth days based on the harbour utilisation rate of 200 days per year; and
- has an open storage area of 4,000 m^2, adequate to handle estimated tonnes of freight within this area.

Infrastructure Requirements and Costs

4.3.17 In order to handle the estimated quantities of freight within the time available 5 machines are currently required. By year 2020 this requirement will rise to 8 machines. Hence, although there is enough storage capacity, there will be a requirement for further machinery to handle the projected freight throughput. Using a machine cost rate of £100,000 this equates to £0.3 million of investment.

4.3.18 No other technical matters have been identified which would prevent development of this site.

[50] Figures 4.39, 4.40 and 4.44, Report 1 – Review of Current and Future Network Performance, Strategic Transport Projects Review, Transport Scotland, December 2008

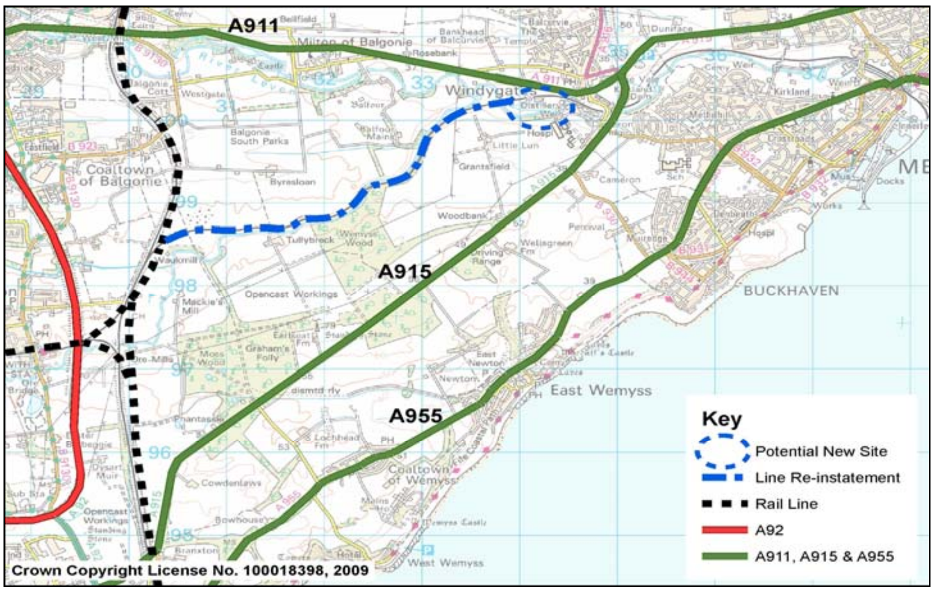
4.4 The SEStran Area

Cameron Bridge – Leven (Regional Gateway)

Network and Existing Facilities

4.4.1 Leven is served by the A911, the A915, and the A955. Both the A911 and A915 join with the A92, the main trunk route linking the area with the rest of Fife, and the Lothians. Cameron Bridge and Leven are not currently connected by rail to the main rail line. However, SEStran / Fife Council and some local industries have plans to connect Leven to the rail network (see Figure 4.7).

Figure 4.7: Cameron Bridge / Leven Strategic Connections



Capacity Analysis

4.4.2 Table 4.8 shows the results of the capacity analysis, both for road and rail. These can be compared to similar results from STPR[51].

Table 4.8: Capacity Utilisation by Mode (Current & Future Scenarios)

Utilisation	Road	Rail	Port	Air
Current utilisation (%)	43%	na	n/a	n/a
Future low growth utilisation (%) – 2020	46%	18%	n/a	n/a
Future high growth utilisation (%) – 2020	51%	19%	n/a	n/a

[51] Figures 4.39, 4.40 and 4.44, Report 1 – Review of Current and Future Network Performance, Strategic Transport Projects Review, Transport Scotland, December 2008

4.4.3 Capacity on the road network is below capacity and is estimated to remain below capacity in the foreseeable future. However, there is some evidence that there is some capacity problems on the A955 linking Leven with the A92 at peak times.

4.4.4 Although there is no current rail link to Leven, as noted above, there are plans to link the town by rail. On this basis, rail utilisation is predicted to grow but still remain below the projected capacity.

<u>Infrastructure Requirements and Costs</u>

4.4.5 The characteristics of the proposed railway line investment are as follows:

- where the proposed Leven rail line connects with the Fife Circle line, the track availability will be RA10 between Thornton Junction and Haymarket, and RA8 on the Cowdenbeath line west to the Forth Bridge and Kincardine;
- the track is planned to be double to Thornton Junction, and is double throughout most of the area with the exception of the freight lines in the Longannet and Rosyth areas;
- the maximum ruling line speed will be 60mph to Thornton Junction and 90mph elsewhere except the freight branch lines mentioned above. None of the track is electrified; and
- the loading gauge will be W8 to coincide with the loading gauge on the Fife Circle line via Dunfermline. Train length limits are likely to be in the region of 57–64 standard loading units (SLUs) in common with the lengths permitted at Thornton Junction.

4.4.6 There will be a mix of freight traffic over the Cameron Bridge – Thornton Junction section, primarily goods and materials transported to and from the Diageo facility and that required for construction. Other potential users of the rail line include Donaldsons and the Earls Seat Coal Company. A recent study by SEStran estimated there could be a reduction of up to 2.2 million veh-kms per annum due to freight being transferred from road to rail, with an estimated environmental benefit of £1.6 million per annum due to reductions in Sensitive Lorry Miles (SLMs)[52] – monetised environmental benefits that result from the removal of HGV freight traffic from the national, regional and local road networks.

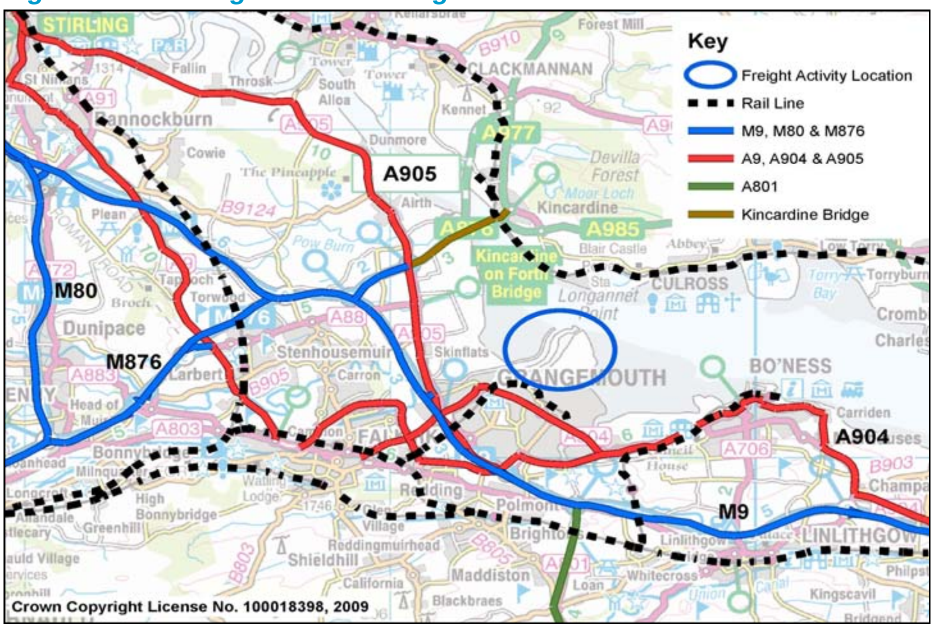
4.4.7 The likely costs of the total investment in re-commissioning the rail line with ancillary freight requirements were also considered in the SEStran study and are estimated to be in the region of £9 million, excluding investment in facilities for passengers.

[52] Levenmouth Sustainable Transport Study – STAG Part 2 Report, SEStran, November 2008

Grangemouth (National Gateway)

4.4.8 Grangemouth Harbour is administered by Forth Ports Plc and is located on the south shore of the Firth of Forth. The port is situated in the centre of the central belt of Scotland, close to the industrial heartland, with good links to road and rail networks in every direction (see Figure 4.8 overleaf).

Figure 4.8: Grangemouth Strategic Connections



Network and Existing Facilities

4.4.9 The key transport network characteristics of the area are as follows:

- Grangemouth is well served by the motorway system, particularly by the M9 motorway which passes close by. The area also has rapid connections to the rest of Scotland via the A80/M80 and the UK via the M73/M74. Other links include the M9/A9 for northern destinations and the A801 for southern destinations. The A904 and A905 provide direct access to the port from the south east and north west respectively;
- Grangemouth is connected to the main east–west rail line where the route availability is RA10 and the track is double but not electrified. Maximum ruling line speed is 100mph throughout except the Carmuirs/Polmont Junction and Grangemouth Branch where the max speeds are 60mph and 40mph respectively. The loading gauge is W8 between Dunblane and Carmuirs, and between Grangemouth and Polmont, and W9 between Greenhill and Grangemouth Junction and on the Grangemouth Branch, and freight train length limits are between 28 and 61 SLUs;

- in terms of on-site rail freight facilities at Grangemouth, these are located adjacent to Grangemouth Harbour, covering a considerable area with the main road access from the A904. Facilities include circa 2.5 hectares of closed storage spread over a number of buildings of which approximately 95% is likely to be used for storage, giving a net available storage capacity of nearly 24,000 square metres. In addition further freight facilities include 63,500 square metres of available open storage, including both hardstanding and rail sidings.
- there is a mix of rail freight traffic over this network, primarily coal, cement, petroleum, containers and mixed traffic;
- the port is also Scotland's main container handling port which processes 140,000 containers each year. The port also handles 250,000 tonnes of timber products each year. Various other commodities are also moved through Grangemouth;
- access to the harbour is through a lock entrance which is 237m long and 29m wide. This restricts the size of vessels which can access the harbour to 187m long by 27.4m wide and 7.7m draught. The docks are non tidal with the water level maintained within one metre of the quay surface; and
- a partially racked warehouse served by specialist forklift trucks allows freight to be moved between ships and daily operated rail services. Critical clearance beneath the Forth Road and Rail bridges is 49.3m and pilotage is compulsory for all vessels greater than 8,000 DWT.

Capacity Analysis

4.4.10 Table 4.9 shows the results of the capacity analysis, both for road, rail and port.

Table 4.9: Capacity Utilisation by Mode (Current & Future Scenarios)

Utilisation	Road	Rail	Port	Air
Current utilisation (%)	43%	34%	28%	n/a
Future low growth utilisation (%) – 2020	51%	52%	45%	n/a
Future high growth utilisation (%) – 2020	56%	68%	59%	n/a

4.4.11 The above results of the capacity utilisation analysis can be compared to similar results from STPR[53]. The principal results suggest:

- road capacity utilisation is projected to increase but overall this is still below theoretical design capacity. However, it is acknowledged that some road sections will experience significant delays at certain times of the day;
- rail capacity analysis shows that there is available storage, both covered and open, for over 13.5 million tonnes assuming an average layover of one day and 300 working days per annum. With projected levels of demand, the utilisation rates are estimated to remain below capacity for both the low and high growth scenarios; and

[53] Figures 4.39, 4.40 and 4.44, Report 1 – Review of Current and Future Network Performance, Strategic Transport Projects Review, Transport Scotland, December 2008

- the analysis also suggests that the port has approximately 2,775m of berth length, which is sufficient to accommodate the projected 2020 tonnage throughput and size of the vessels. However, the increase in tonnage throughput by 2020 means that the port will require an additional 20,000m² of hardstand for storage and 20 machines to handle this freight.

Infrastructure Requirements and Costs

4.4.12 Based on the assessment above, Grangemouth appears to have sufficient berthing capacity to meet projected 2020 freight demand. However, the ability of the port to accommodate the increased size of vessels projected to use the port may be restricted by the entrance locks to the port. This will need to be reviewed in more detail in future to ensure that lock size does not constrain the port's operational capacity in the future. No other technical matters have been highlighted.

4.4.13 There is an estimated need for an additional 20,000m² of hardstand and 20 machines required to handle the projected increase in tonnage of freight throughput. At £100 per sq.m of hardstand and using a handling machine cost rate of £100,000, the level of investment is likely to be in the region of £4 million.

4.4.14 The level of rail-port tonnage is currently over 4 million tonnes per annum, and is estimated to increase between 50% and 95% by 2020 for low and high growth scenarios, respectively. However, given the rail freight capacity is estimated at 13.5 million tonnes per annum, these levels of demand can be accommodated within existing rail freight facilities at the site and therefore there is no requirement for any substantial investment in storage and handling facilities in the near future.

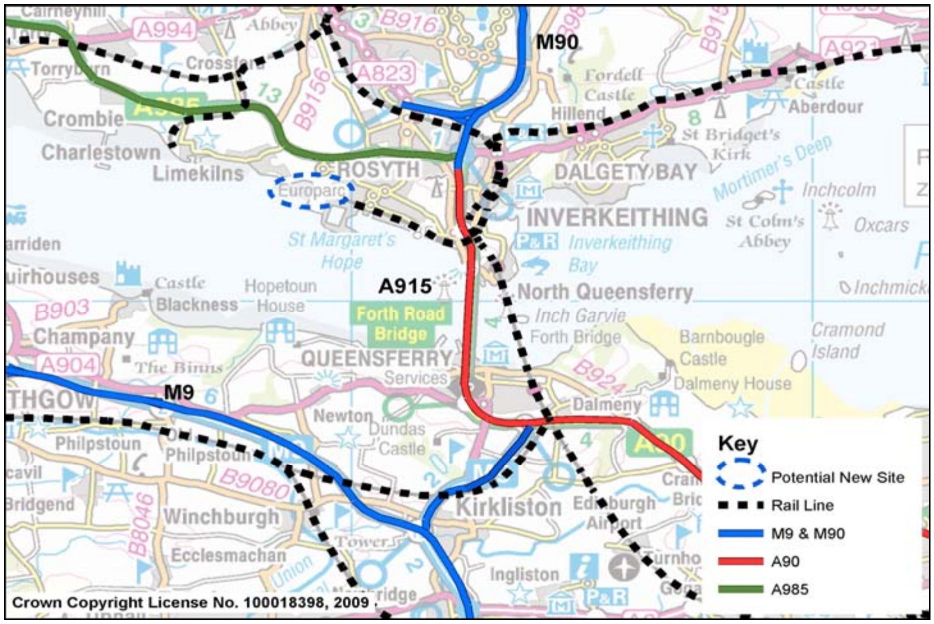
4.4.15 However, there is likely to be a need for improved access to/from Grangemouth and the Strategic Transport Projects Review[54] (STPR) has identified various proposals to improve links to/from the area. In particular, STPR Intervention 20 (Grangemouth Road and Rail Access Upgrades) includes improved road connections to the M8 and the M9. In terms of rail, access improvements would focus on increasing the numbers of freight trains able to run into Grangemouth terminal, electrification between Coatbridge and Grangemouth as well as increasing loading gauge to allow for access for larger containers. These road and rail measures would compliment the new freight facilities at Grangemouth.

Rosyth (National Gateway)

4.4.16 The Port of Rosyth (administered by Forth Ports Plc) is located on the north bank of the Firth of Forth; upstream of the Forth Road and Rail Bridges. The port is situated close to good road links with the rest of Scotland and is also connected to the rail system. Port activities include cargo handling of forestry products, dry bulks, heavy lifts and general cargo. Quayside facilities include hardstand, warehouse and bulk stores. Rosyth also attracts a number of cruise liners every year (see Figure 4.9 overleaf).

[54] Strategic Transport Projects Review, Transport Scotland, December 2008

Figure 4.9: Rosyth Strategic Connections



Network and Existing Facilities

4.4.17 Rosyth is well served by the regional trunk road and rail networks, in particular:

- the M90 from the north and the A90 across the Firth of Forth to the south which links in with the motorway network, and the A985 from the west, which connects the area with M9/A9 and M80;
- railway route availability in the vicinity of Rosyth is RA8 in common with the other major rail alignments and junctions in the area. The track is single on the Rosyth Branch as it is on the other local freight branches at Westfield, Longannet/Kincardine, Methil and Rosyth, but remains double throughout the rest of the region. The maximum ruling line speed is 60mph on the freight branches but 90mph throughout the rest of the region, and none of the track is electrified. The Forth Bridge has a 20mph speed restriction for freight traffic and there are capacity issues between Haymarket and Inverkeithing;
- the loading gauge is W7 on the Rosyth Branch and on the Fife Circle via Kirkcaldy, W6 on the Longannet and Westfield Branches and W7 on the Forth Bridge and Haymarket section. It is W8 on the Fife Circle via Dunfermline. Freight train length limits are approximately 64 SLUs for the Rosyth Branch;
- looking at rail facilities at the Rosyth site itself, the existing railway provides connections to the quayside. There is circa 12,500m^2 of covered storage and a further 82,000m^2 of storage area and warehousing at the former submarine refitting site which could provide additional transhipment storage. Further freight facilities include hardstanding and rail sidings;

- in terms of port facilities, pilotage is compulsory for vessels greater than 8,000 DWT. The approach channel is 8.8m below Chart Datum and there is 44m clearance above MHWS to underside of Forth Bridges. Critical clearance beneath the Forth Road and Rail bridges is 49.3m above CD. Port facilities consist of berths from 3.5 metres deep to over 8 metres deep, the latter representing the deep water capability at the port; and
- there are a number of large storage sheds at Rosyth harbour, and extensive hardstand adjacent to the quayside, with two mobile freight handling cranes.

Capacity Analysis

4.4.18 Table 4.10 shows the results of the capacity analysis.

Table 4.10: Capacity Utilisation by Mode (Current & Future Scenarios)

Utilisation	Road	Rail	Port	Air
Current utilisation (%)	55%	40%	62%	n/a
Future low growth utilisation (%) – 2020	65%	55%	90%	n/a
Future high growth utilisation (%) – 2020	71%	71%	111%	n/a

4.4.19 The above results of the analysis can be compared to similar results from STPR[55]. To summarise capacity utilisation:

- although the overall road capacity is within limit, this masks the fact that the M90 South has significant capacity problems, with a capacity utilisation rate of 85% in 2007, projected to rise to over 100% in the 2020 high growth scenario;
- rail utilisation is expected to grow by 2020, but remain below capacity;
- port utilisation rates also rise quickly up to 2020. Based on the harbour utilisation rate of 200 days per year the covered storage requirements currently and for the future demand will be less than one berth for a 100m long vessel. For the materials requiring open storage one berth is required to meet current demand and two berths are required to accommodate future demand. Liquid freight is expected to decrease in the future and dry bulk is expected to grow; and
- current quay provision is sufficient to accommodate the 132 vessel-berth-days required for both covered storage and goods stored in the open.

Infrastructure Requirements and Costs

4.4.20 Total transit shed storage area requires freight throughput handling by 6 machines. This need will rise to 7 machines by 2020. Although the area available for open storage here is undefined, there appears to be approximately 50,000m^2 of hardstand in proximity which could be used for storage, and could be available for projected 2020 freight flows. Currently this area requires 9 machines to cope with the freight throughput, although this is likely to rise to 15 machines by 2020.

[55] Figures 4.39, 4.40 and 4.44, Report 1 – Review of Current and Future Network Performance, Strategic Transport Projects Review, Transport Scotland, December 2008

4.4.21 As well as the above existing facilities, Babcock have plans, still being finalised, for developing 60 acres of land available to provide deep sea container facilities. Known as the Rosyth International Container Terminal (RICT) the facilities are planned to cater for up to 1,600 twenty-foot equivalent units (TEU) vessels.

4.4.22 These proposals are on an existing fully reclaimed site limiting environmental impacts. The site has been identified in the Fife Council Local Plan and the Finalised Fife Structure Plan 2006-2026. In addition, the RICT has been identified in the Draft NPF for Scotland 2 as National Development Project 5.

4.4.23 The RICT proposals would add infrastructure capacity of between 450,000 to 600,000 TEU per annum. The capital costs associated with this were estimated to be up to £52 million (supplied by Babcock). In addition, a further £20 million was estimated to cover the cost of the crane/port handling machines. The equipment would be procured over the first seven years of operation. Assuming throughput builds to 450,000 TEU per annum, this gives a total capital cost of £72 million.

4.4.24 Looking at the potential market for freight between port to rail, it will be necessary to provide direct access to and from the new Stirling Alloa Kincardine Railway by placing a new rail chord at the existing Charlestown Junction. A recent feasibility study for providing rail freight access to Rosyth Harbour has estimated the costs of establishing the chord and associated site terminal works to be approximately £6 million including track and permanent way, earthworks, site facilities and other infrastructure in addition to contingencies[56]. The demand modelling has estimated the potential freight volumes to be up to 99,000 tonnes per annum. In strict financial terms at least, this level of demand is unlikely to provide a sufficient financial return for the level of investment required.

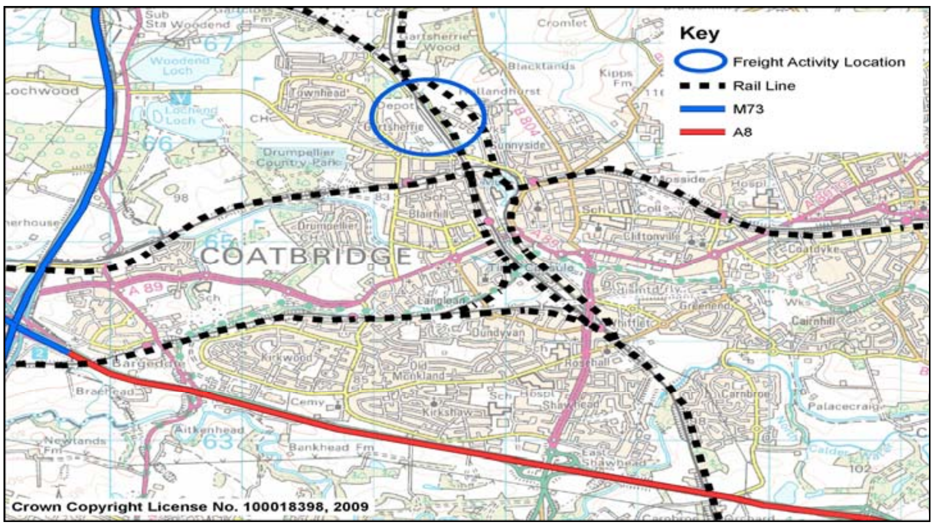
[56] Port of Rosyth – Rail Access Feasibility Study, Jacobs Babtie for Scottish Enterprise Fife, September 2006

4.5 The SPT Area

Coatbridge (National Gateway)

4.5.1 Along with Mossend, Coatbridge is largely perceived as a railhead terminus. However this facility is located to the east of Glasgow, close to the regional trunk road network, as Figure 4.10 illustrates. The site is operated by Freightliner and covers 35 acres and shipped around 76,000 containers in 2007/8. Freightliner now moves more maritime containers than any other haulier with some 22% of the deep-sea container market. The core services are to Southampton, Felixstowe, Tilbury and Thamesport via the West Coast Main Line, although there are sometimes diversions via the East Coast Main Line.

Figure 4.10: Coatbridge Strategic Connections



Network and Existing Facilities

4.5.2 The key characteristics of the transport network of the area are as follows:

- for rail transport, route availability is RA10 and there is dual track throughout. Maximum line speed is 70mph, loading gauge is W9 and the freight train length limit is 70 standard loading units (SLUs). There is a mix of freight traffic over this section including intermodal and mixed goods between the Mossend / Coatbridge / Grangemouth terminals and coal to Longannet power station;
- Coatbridge is well placed to intercept the A8/M8 trunk roads, and via the A8 the M73/M74 and A80/M80 strategic roads; and
- there are no port facilities at Coatbridge.

Capacity Analysis

4.5.3 Table 4.11 overleaf shows the results of the capacity analysis, for road and rail. These can be compared to similar results from STPR[57].

[57] Figures 4.39, 4.40 and 4.44, Report 1 – Review of Current and Future Network Performance, Strategic Transport Projects Review, Transport Scotland, December 2008

Table 4.11: Capacity Utilisation by Mode (Current & Future Scenarios)

Utilisation	Road	Rail	Port	Air
Current utilisation (%)	65%	30%	n/a	n/a
Future low growth utilisation (%) – 2020	73%	43%	n/a	n/a
Future high growth utilisation (%) – 2020	79%	60%	n/a	n/a

4.5.4 The above capacity analysis suggests:

- current road utilisation is within capacity limits and is expected to remain the case in the foreseeable future, although it is acknowledged that at certain times of the day congestion is problematic; and
- rail utilisation is forecast to grow from a relatively low base in 2007 to 2020, but is expected to remain within the capacity of the rail freight facilities at this site.

Infrastructure Requirements and Costs

4.5.5 The recently announced Scottish Transport Projects Review[58] (STPR) includes various proposed rail freight improvements. In particular, STPR Intervention 27 identified a new line between Mossend and Coatbridge to improve rail access to/from the site. This should provide sufficient capacity to meet future train paths. In terms of capacity at the site, apart from anecdotal evidence of a lack of freight handling equipment at the Coatbridge facility, no other infrastructure requirements have been identified.

Hunterston (National Gateway)

4.5.6 Hunterston Terminal is administered by Clydeport Operations Ltd and is located on the west coast of Scotland, to the south of the Firth of Clyde, on the east side of the Fairlie Roads. It is a deepwater berth principally handling dry bulk cargo and the import of coal.

4.5.7 In recent years there has been interest in developing a new deep sea container terminal to exploit the deep water anchorages available for the latest generation of container vessels during all tidal conditions. A recent study outlined proposals for a new facility with an initial depth of 16 metres and a one-off requirement for dredging[59].

4.5.8 The new terminal would absorb some of the predicted growth in container traffic at the south coast ports, therefore most of the throughput is expected to be destined for English markets. It will provide a container transhipment hub port for the western European markets (Atlantic Arc) as well as providing an intra-European (short sea) container terminal link for the Scottish markets and European trading partners. The Hunterston development will serve three functions (transhipment, interlining and direct calls) with capacity for up to 2 million twenty foot equivalent units (TEU) developed in phases, with the initial phase providing capacity for ½

[58] Strategic Transport Projects Review, Transport Scotland, December 2008
[59] Hunterston Economic Opportunities, Final Report, Steer Davies Gleave, October 2006

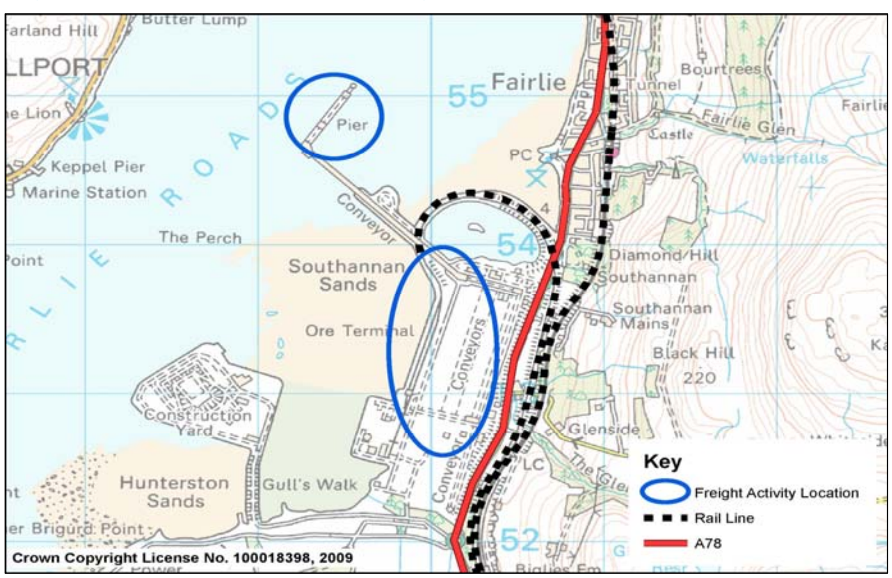
million TEU. Phase 1 will cost around £130 million, with a total requirement of £200 million for the full development if demand grew sufficiently.

<u>Network and Existing Facilities</u>

4.5.9 Figure 4.11 shows the key transport links. These can be summarised as:

- Hunterston is connected to the A78 trunk coastal road. The port is not particularly well connected by road with the rest of the SPT region, nor to Scotland as a whole;
- rail connections with the port are good. Route availability is RA10 from Glasgow to Ayr, but the Largs branch on which Hunterston is located is only RA5. The loading gauge is W9 to Hunterston and train length limits are from 47 SLUs at Stevenston DGL to 109 SLUs at Brownhill DPL/UPL. The track (which is electrified for most of the route) is twin from Glasgow to Ayr, but single track up to Largs via Hunterston. The rail network in the region is characterised by being four-track line between Glasgow Central and Bridge Street then two-track thereafter. The maximum ruling line speed is 90mph to Ayr, but 60mph to Hunterston and Largs;
- looking at rail facilities at the site, these are located at the end of a railway spur joining the Kilwinning to Largs rail line and ending at the Hunterston Coal Terminal. The facilities are only accessible by sea and by rail, there is no on-site road access, although the wider area is served by the A78 which links Hunterston with the Clyde estuary to the north and with the A737 to Glasgow. The coal terminal itself covers approximately 5,000 square metres, of which it is reasonable to assume that 95% is devoted to freight storage. In addition further freight facilities include 17,000 square metres of available open storage, net of rail lines and conveyors; and
- port facilities operate 24 hours a day, all year round. The approach channel depth is 26m and pilotage is compulsory.

Figure 4.11: Hunterston Strategic Connections



Capacity Analysis

4.5.10 Table 4.12 shows the results of the capacity analysis, for road, rail and port.

Table 4.12: Capacity Utilisation by Mode (Current & Future Scenarios)

Utilisation	Road	Rail	Port	Air
Current utilisation (%)	46%	44%	58%	n/a
Future low growth utilisation (%) – 2020	53%	68%	69%	n/a
Future high growth utilisation (%) – 2020	59%	87%	83%	n/a

4.5.11 The above results of the capacity utilisation analysis can be compared to similar results from STPR[60]. The analysis suggests:

- the overall road capacity is within current limits and is forecast to remain within capacity by 2020. However the area-wide estimates mask some significant constraints on the A78 north of the port, although it is unlikely that development at Hunterston will be constrained by strategic road access;
- rail capacity analysis shows that there is available storage, both covered and open, for approximately 3.4 million tonnes assuming an average layover of one day and 300 working days per annum. Estimated future demand would result in capacity utilisation rates of 68% and 87% for the low and high growth scenarios respectively;
- although rail utilisation is expected to rise by 2020, coal movements by rail from Hunterston to Longannet and Cockenzie run through a number of known pinch-points on the network. The Scottish Route Utilisation Strategy[61] (RUS) has identified a gap on the Larbert – Stirling route which should be addressed;
- rail freight growth in deep sea intermodal traffic is forecast, due to increased imports. This is likely to result in two or three additional trains per day from Central Scotland to England via the West Coast Main Line (WCML). Growth is also forecast in domestic intermodal traffic, albeit at a lower level; and
- port utilisation is expected to grow but is expected to remain below capacity.

Infrastructure Requirements and Costs

4.5.12 The main findings with respect to infrastructure requirements are:

- the economic study of the potential for the new deep sea container suggested potential annual demands of up to 0.5 million containers. The capital costs for meeting this demand were estimated at around £130 million;
- the level of rail-port tonnage is circa 1.5 million tonnes per annum, and is estimated to increase by up to 75% by 2020 for the high growth scenario. However, given the rail freight capacity is estimated at 3.4 million tonnes per annum, the level of demand can be accommodated within existing rail freight facilities; and

[60] Figures 4.39, 4.40 and 4.44, Report 1 – Review of Current and Future Network Performance, Strategic Transport Projects Review, Transport Scotland, December 2008

[61] Scottish Route Utilisation Strategy, Network Rail, March 2007

- there are constraints with hauling materials away from the site at the railhead. By 2020 handling capacity will need to increase by 38%. It is unclear how this can best be achieved, although it is possible that increasing the quantities of handling machines alone, with associated stock yard, will accommodate this increase. Hence, using rates for each stacker/reclaimer machine of £1 million and £25 per sq.m for additional stock yard, increasing the stacker/reclaimer/stockyard capacity by one third from three machines to four machines and the yard from 50 hectares to 67 hectares would cost in the order of £5.2m.

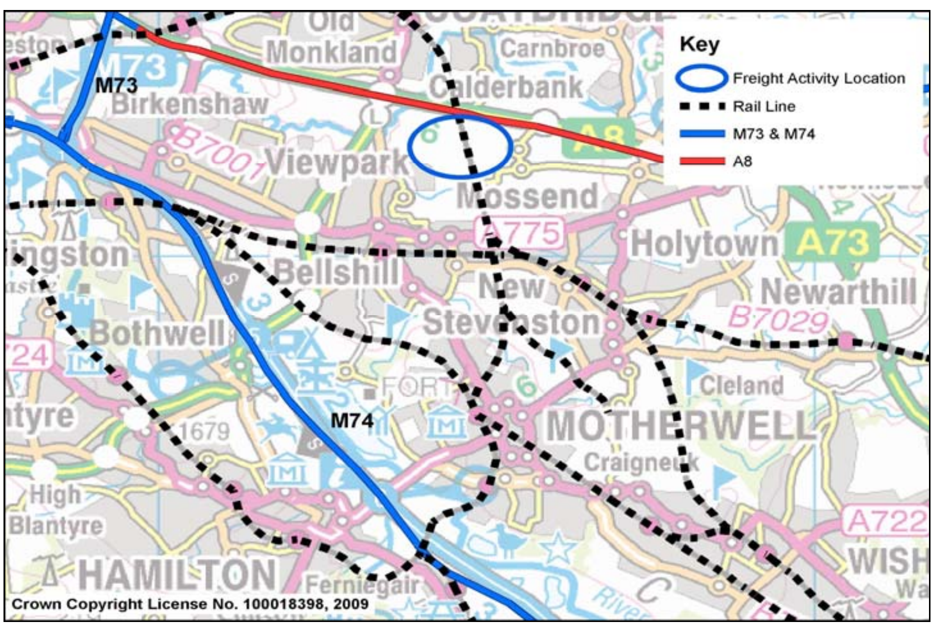
Mossend (National Gateway)

4.5.13 The Mossend area represents a cluster of strategic multi-modal freight activity incorporating a number of separate terminal activities including the Eurocentral Freight Village, the rail freight 'Euroterminal' and other independent freight facility providers in the immediate area. Covering an area of 2.6 million square meters, the overall effect is to create a focus of freight activity including manufacturing and distribution with access to rail freight, in a similar manner to a single strategic multi-modal interchange.

4.5.14 The intermodal terminal, 'Euroterminal', serves both non rail-connected warehousing in the Eurocentral and the wider region with rail borne freight traffic. It also provides capability to handle rail borne automotive traffic and a vehicle distribution company, fed by rail, operates from Eurocentral.

4.5.15 The location of the transport network of the area is shown in Figure 4.12.

Figure 4.12: Mossend Strategic Connections



Network and Existing Facilities

4.5.16 The key characteristics of the transport network are:

- Mossend is located close to Motherwell and the A8/M8 trunk road/motorway, the M73/M74 motorways and the A725 linking the area with the motorway network;
- railway route availability is RA10 on the West Coast Mainline (WCML), RA7 on the Hamilton Circle, RA5 on the Lanark Branch and RA10 between Mossend and Garnqueen, with a mix of rail freight traffic over these sections;
- rail is twin-tracked between Mossend and Garnqueen, 4-track between Bridge Street and Rutherglen East Junction and double track for the remainder of the route section. The maximum ruling line speed is 100mph on the WCML, 60mph on the Hamilton and Lanark Branches, and 70mph between Mossend and Garnqueen. The track is electrified at 25km AC between Mossend and Gartsherrie; and
- loading gauge is W9 between Mossend and Garnqueen, W7 between Glasgow Central and Eglinton Street, W8 Eglinton Street to Larkfield and on the Hamilton Circle, and W9 between Larkfield and Carstairs and at the Uddingston Junction / Holytown / Motherwell and Law Junction. Freight train length limits are up to 100 SLUs depending on exact location.

Capacity Analysis

4.5.17 Table 4.13 shows the results of the capacity analysis, for road and rail. These can be compared to similar results from STPR[62].

Table 4.13: Capacity Utilisation by Mode (Current & Future Scenarios)

Utilisation	Road	Rail	Port	Air
Current utilisation (%)	66%	54%	n/a	n/a
Future low growth utilisation (%) – 2020	74%	68%	n/a	n/a
Future high growth utilisation (%) – 2020	80%	88%	n/a	n/a

4.5.18 The capacity analysis suggests:

- current area-wide road utilisation is within capacity limits, and is expected to remain below capacity by 2020, although this analysis is an average over the day and there are expected to be congestion delays at certain times of the day along key road sections. Given the rise in general traffic these delays are also likely to increase; and
- rail utilisation shows significant growth by 2020. Under the high growth scenario there are likely to be capacity constraints on rail operations.

Infrastructure Requirements and Costs

4.5.19 There are a number of proposed network improvements identified in the Scottish Transport Projects Review (STPR) which are intended to provide additional

[62] Figures 4.39, 4.40 and 4.44, Report 1 – Review of Current and Future Network Performance, Strategic Transport Projects Review, Transport Scotland, December 2008

capacity to meet future demands[63]. STPR Intervention 27 identified the following plans to increase rail freight capacity:

- lengthening of loops;
- removal of speed limits that are below 75mph for freight trains;
- increasing the loading gauge on the route; and
- increasing freight terminal capacity.

4.5.20 This STPR intervention may also include a new line between Mossend and Coatbridge, which would involve providing an overbridge across the A8 and M8 when works are complete.

4.5.21 Consequently, given the above, we would suggest no other infrastructure requirements are needed at this stage.

Prestwick Airport (National Gateway)

4.5.22 Glasgow Prestwick has developed direct intercontinental freight services and currently handles 20 x 747 scheduled freighter services per week. The origin transit points for these services include New York, San Francisco, Guadalajara, Amsterdam, Paris and Luxembourg.

4.5.23 Numerous ad-hoc airfreight charter movements also utilise Glasgow Prestwick and a number of major forwarders are located at or close to the airport. Cargo operators are attracted by the airport's geographical location, fast turnaround times and ability to easily handle large and unusual items.

<u>Network and Existing Facilities</u>

4.5.24 Figure 4.13 shows the transport network around the airport.

Figure 4.13: Prestwick Airport Strategic Connections

[63] Strategic Transport Projects Review, Report 4: Summary, Transport Scotland, 2008

4.5.25 Key network characteristics include:

- the main roads connecting the airport are the A77 and A78, however routes into East Ayrshire and southwards include the A70 and A713;
- railway route availability is RA10 from Glasgow to Ayr. In addition, the track is twin from Glasgow to Ayr, with a maximum ruling line speed of 90mph throughout. The track is also electrified at 25kv AC;
- the loading gauge is W7 from Glasgow Central to Smithy Lye, W8 from Smithy Lye to Shields Junction, and from Kilwinning to Ayr. It is W8 or above for other lines in the area. Train length limits are between 47 SLUs and 109 SLUs depending on exact locations on the network;
- there is a mix of freight traffic over this section with coal, petroleum, containers and mixed traffic;
- to accommodate the requirements of Bond Operators, Freight Forwarders and H.M. Customs, a modern 115,000 sq.ft Freight Centre opened in 1999;
- Bond Operators at the airport provide services for pallet build up/breakdown, warehousing and trucking services to the airline and forwarding industries. This includes import/export freight carried on the scheduled 747F services and ad hoc charter movements; and
- the airport operates electronically through the BT cargo system CCS-UK which connects 16 of the UK's largest cargo airports together in an electronic exchange. Users of the system are also connected into CHIEF the national Customs system for clearing Import and Export freight.

<u>Capacity Analysis</u>

4.5.26 Table 4.14 shows the results of the capacity analysis, for road, rail and air.

Table 4.14: Capacity Utilisation by Mode (Current & Future Scenarios)

Utilisation	Road	Rail	Port	Air
Current utilisation (%)	46%	23%	n/a	<40%
Future low growth utilisation (%) – 2020	51%	36%	n/a	40% – 50%
Future high growth utilisation (%) – 2020	60%	46%	n/a	50% – 65%

4.5.27 The above results of the capacity utilisation can be compared to similar results from STPR[64]. The analysis suggests:

- road utilisation rates in 2007 were relatively low and are expected to grow, but are anticipated to remain below capacity;
- rail utilisation is forecast to grow to 2020, albeit from a relatively low base. However, rail freight demand is expected to remain within capacity; and
- air freight utilisation at Prestwick airport is within capacity levels.

<u>Infrastructure Requirements and Costs</u>

4.5.28 As there is excess capacity at Prestwick Airport in terms of freight services and infrastructure, no infrastructural requirements have been identified.

[64] Figures 4.39, 4.40 and 4.44, Report 1 – Review of Current and Future Network Performance, Strategic Transport Projects Review, Transport Scotland, December 2008

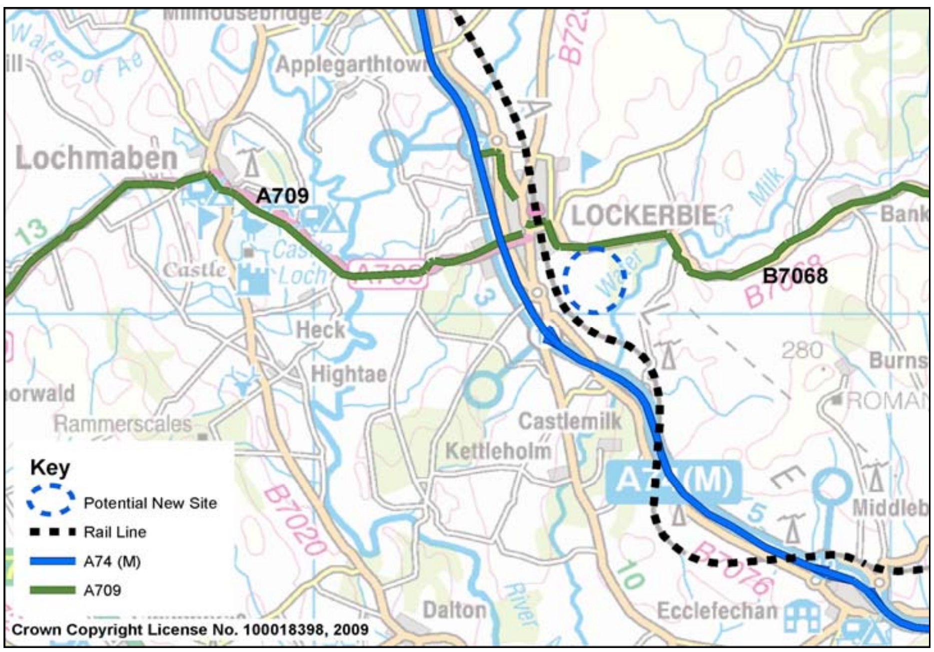
4.6 The SWestrans Area

Lockerbie (Freight Distribution Location)

<u>Network and Existing Facilities</u>

4.6.1 Lockerbie is situated on the M74 and on the A709 which links the M74 with the A75 through Dumfries. This is a particularly strong location for road distribution northwards to Glasgow and the rest of Scotland, and southwards to the rest of the UK, including Northern Ireland via the A75 (see Figure 4.14). In addition, the area is located next to the West Coats Main Line (WCML) which is also strong for rail connections to the rest of the country.

Figure 4.14: Lockerbie Strategic Connections



4.6.2 Key network characteristics include:

- route availability on the West Coast Main Line (WCML) is RA10 throughout, and the track is double throughout. The section between Carstairs and Gretna is electrified at 25kv AC. The ruling line speed is 110mph throughout for freight. The loading gauge is W9/W10 throughout. Freight train length limits are 84/101 SLUs (standard loading units) at Lockerbie itself, but longer on other parts of the route, up to 113 SLUs;
- the rail network in the region is constrained by being twin line between Carstairs and Gretna Junction, and there is a mixture of freight over this section with coal, cement, petroleum, containers and mixed traffic; and

- in terms of rail facilities at the site, there is no rail freight infrastructure including warehousing or open hardstanding yards. The transport modelling has shown there could be demand for a new road/rail interchange, consequently for the purposes of this study a new facility has been tested which is described below.

<u>Capacity Analysis</u>

4.6.3 Table 4.15 shows the results of the capacity analysis, which can be compared to similar results from STPR[65].

Table 4.15: Capacity Utilisation by Mode (Current & Future Scenarios)

Utilisation	Road	Rail	Port	Air
Current utilisation (%)	34%	n/a	n/a	n/a
Future low growth utilisation (%) – 2020	39%	77%	n/a	n/a
Future high growth utilisation (%) – 2020	43%	100%	n/a	n/a

4.6.4 The capacity analysis suggests:

- road utilisation in 2007 is within capacity limits and this is forecast to remain the case by 2020; and
- rail utilisation is also forecast to grow significantly by 2020. In particular, in the high growth scenario, there could be capacity constraints if the full demand materialises.

<u>Infrastructure Requirements and Costs</u>

4.6.5 There are various proposals for improvements identified in the Scottish Transport Projects Review[66] (STPR Intervention 27). These include lengthening of loops, increasing speed limits above 75mph and increasing loading gauge on the route. Hence, the identified network capacity constraints in the high growth scenario should be addressed by STPR Intervention 27.

4.6.6 In terms of a potential new rail freight facility to allow rail/road interchange at Lockerbie, discussions with Network Rail has advised an initial estimate of £3m-£6m for all main line track and signalling works to provide a double-ended connection. In addition, allowing for costs for sidings, hardstand, drainage, etc it is reasonable to assume a cost of £7.5 million would be required for the scheme.

[65] Figures 4.39, 4.40 and 4.44, Report 1 – Review of Current and Future Network Performance, Strategic Transport Projects Review, Transport Scotland, December 2008
[66] Strategic Transport Projects Review, Transport Scotland, December 2008

4.7 The TACTRAN Area

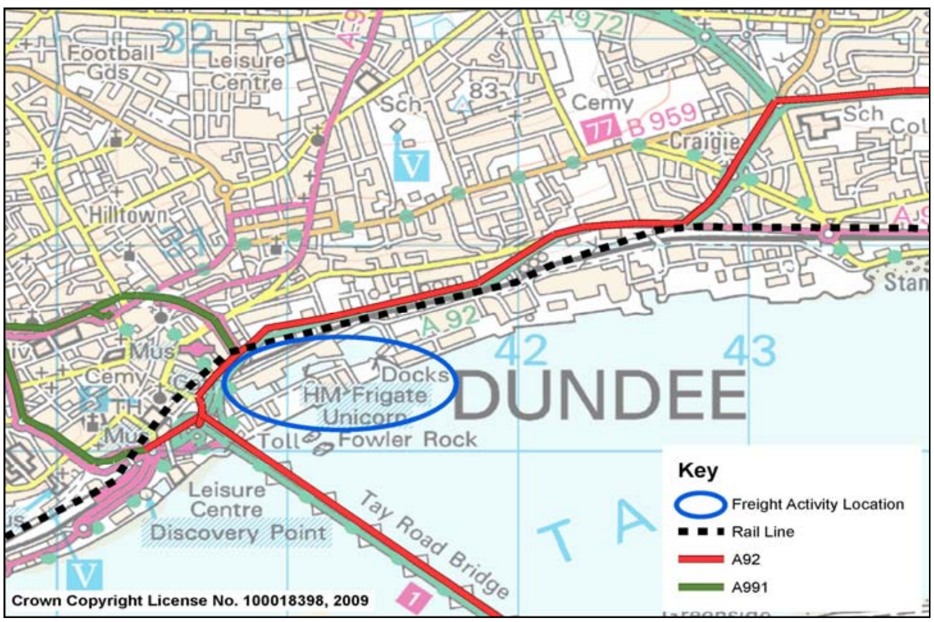
Dundee Harbour (Regional Gateway)

4.7.1 Dundee Harbour is administered by Forth Ports PLC and is located on the north side of the River Tay estuary. The port is strategically placed to serve the offshore oil and gas industry together with new emerging energy markets. The port has extensive land reserves available for development, principally at Prince Charles Wharf. The port handles a range of timber products, with timber treatment and storage facilities available at the western end of the port. It is also a major grain handling port as well as catering for general cargos.

<u>Network and Existing Facilities</u>

4.7.2 Dundee is at the centre of a number of converging trunk roads (see Figure 4.15). The area is well served by the A90 and A92 trunk roads, and also served by the A923 which links in with the A9 further north through Blairgowrie.

Figure 4.15: Dundee Strategic Connections



4.7.3 The transport network is characterised as follows:

- to the south and west of Dundee the railway route availability is RA10 between Thornton North and Hilton junction and also between Dundee and Dunblane. Between Ladybank and Dundee and also along the Methil Branch it is RA8. The track is double throughout apart for the section between Ladybank and Hilton where it is single. The maximum ruling line speed is 80mph apart from the Ladybank/Hilton junction section where it is 55mph max and the Methil Branch where it is 20mph max. However the ruling line speed is 100mph throughout between Dundee and Dunblane and none of the track is electrified;

- the loading gauge is W7 between Dundee and Ladybank, whereas it is W8 between Ladybank and Thornton South junction and also along the Ladybank – Hilton section and the Methil Branch. Freight train length limits are 71 standard loading units (SLUs) throughout. The loading gauge between Dundee and Dunblane is W8 throughout and freight train length limits are 71 SLUs throughout this section;
- although the main Perth/Fife to Aberdeen rail line passes close to the docks in the centre of Dundee, in terms of on-site rail freight facilities there is currently no identifiable rail freight infrastructure including warehousing or open rail freight hardstanding yards in the area. The rail freight capacity analysis shown below is based on links to/from the area;
- crane, grab facilities and grain handling elevators are available at the harbour and extensive transit sheds and hardstand is available at the harbour as well as storage for 100,000 tonnes of agricultural products; and
- vessels of more than 5.2m draught must approach the harbour on a high tide.

Capacity Analysis

4.7.4 Table 4.16 shows the results of the capacity analysis. These can be compared to similar results from STPR[67].

Table 4.16: Capacity Utilisation by Mode (Current & Future Scenarios)

Utilisation	Road	Rail	Port	Air
Current utilisation (%)	42%	37%	43%	n/a
Future low growth utilisation (%) – 2020	49%	58%	49%	n/a
Future high growth utilisation (%) – 2020	53%	75%	53%	n/a

4.7.5 A summary of the capacity analysis suggests:

- road capacity utilisation is within limits and is likely to remain under capacity, albeit with key road sections experiencing delays at peak times of the day;
- rail utilisation is forecast to grow by 2020, but still remain below capacity; and
- no capacity constraints at port facilities are envisaged, in terms of berthing. However, there is a need for additional hardstand storage and handling equipment for covered and open freight to meet future demands in these types of cargo. It is estimated that two additional freight handling machines and provision of 3,000m^2 of additional hardstand is required.

Infrastructure Requirements and Costs

4.7.6 The outcome of the appraisal suggested that no new berthing is required. However a refurbished quay side hardstand and freight handling machine may be required depending on existing provision. Allowing for two additional freight handling machines at £100,000 each and provision of 3,000m^2 of additional hardstand at £50 per metre squared the cost of additional infrastructure required to handle the year 2020 freight at Dundee is estimated to be £0.35million.

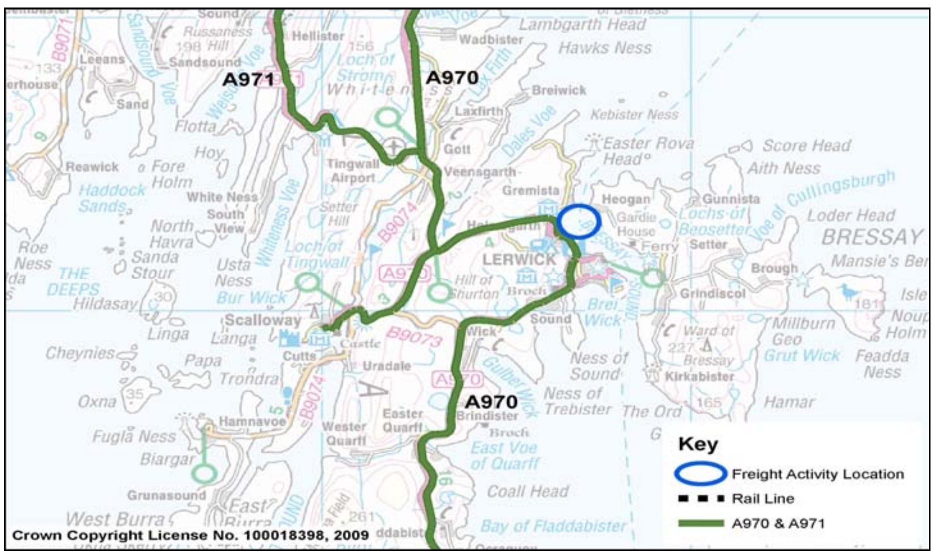
[67] Figures 4.39, 4.40 and 4.44, Report 1 – Review of Current and Future Network Performance, Strategic Transport Projects Review, Transport Scotland, December 2008

4.8 The ZetTrans Area

Lerwick (Freight Distribution Location)

4.8.1 The harbour is administered by Lerwick Port Authority and is the principal port in the Shetland isles (see Figure 4.16). It includes over 3,200 metres of quays and deep water berthing, handling around 5,500 vessels annually. The harbour is a major fishing port and important ferry port whilst also providing support for the offshore oil and gas and decommissioning industries. The harbour also acts as a freight facility handling a variety of cargoes including bulk, containerised, refrigerated and ro-ro traffic, and is an increasingly popular stop for cruise ships.

Figure 4.16: Lerwick Strategic Connections



Network and Existing Facilities

4.8.2 The key characteristics of the transport network are:

- the port is located about a third of the way up Shetland and is accessed via Bressay Sound;
- most freight traffic goes no further than Lerwick, but the small proportion that does will use the A970 which together with the A968 effectively joins up the whole island chain from Unst to Sumburgh;
- there is over 900 metres of deep-water berthing (7.5+ metres depth);
- there are over 10 quays with a total length of 3,200 metres; and
- other facilities include ship repair/maintenance equipment, warehousing and open storage, bunkering & stores, and waste disposal.

Capacity Analysis

4.8.3 Table 4.17 shows the results of the capacity analysis.

Table 4.17: Capacity Utilisation by Mode (Current & Future Scenarios)

Utilisation	Road	Rail	Port	Air
Current utilisation (%)	22%	n/a	35%	n/a
Future low growth utilisation (%) – 2020	29%	n/a	47%	n/a
Future high growth utilisation (%) – 2020	31%	n/a	52%	n/a

4.8.4 Since STPR did not include Lerwick Harbour, the above results can not be compared. The analysis suggests:

- utilisation rates for the road network are low and estimated to remain within capacity;
- Lerwick is used as both a conduit for the import of goods and supplies and export of local produce such as seafood; and
- in 2007, the harbour handled up to 605,000 tonnes of freight catering for dry bulk, containers and refrigerated goods, general freight and ro-ro traffic.

Infrastructure Requirements and Costs

4.8.5 Since the demand for petroleum and petroleum products is falling it is unlikely that there is a need for providing future additional infrastructure and capacity.

4.9 Summary of Findings

4.9.1 Based on the analysis in this Chapter, Table 4.18 shows a summary of the proposed requirements for infrastructure and facilities by multi-modal location and RTP area.

Table 4.18: Proposed Investment Requirement by Location

RTP Area	Multi-modal Location	Type	Proposed Infrastructure & Facilities
HITRANS	Cromarty Firth	Freight Distribution Location	There will be an additional berthing requirement, in the order of 2 new berths
	Elgin/A96	Freight Distribution Location	Potential for an enhanced rail/road freight site in Elgin, based at the existing rail terminal
	Inverness	Regional Gateway	There is a requirement to increase freight handling capacity to 5 port handling equipment machines
	Loch Fyne	Freight Distribution Location	New pier and associated storage/handling facilities, including constructing a new quay to accommodate vessels of 3,200 tonnes
Nestrans	Aberdeen	Regional Gateway	9 additional port handling equipment machine will be required
	Peterhead	Regional Gateway	3 additional port handling equipment machines will be required
SEStran	Cameron Bridge – Leven	Regional Gateway	Re-commissioning of rail line between Leven and Thornton Junction with additional freight handling facilities
	Grangemouth	National Gateway	Provision of an extra 20,000 sq. metres of hardstand and 20 handling machines.
	Rosyth	National Gateway	There are major plans underway to significantly increase the port's deep sea container ability using reclaimed land
SPT	Coatbridge	National Gateway	No new infrastructure or facilities proposed as there is sufficient capacity to accommodate predicted demand
	Hunterston	National Gateway	Major proposals to provide a deep sea container capability. In addition, investment to increase the rail stacker/reclaimer/stockyard area by one third to 670,000 sq. meters and also the number of handling machines from 3 to 4
	Mossend	National Gateway	No new infrastructure or facilities are proposed as there is sufficient capacity available, especially with the proposed developments designed to increased capacity utilisation
	Prestwick Airport	National Gateway	No new infrastructure or facilities proposed as there is sufficient capacity to accommodate predicted demand
SWestrans	Lockerbie	Freight Distribution Location	Potential for a new rail/road freight site
TACTRAN	Dundee	Regional Gateway	Requirement for 3,000 sq. meters of additional hardstanding will be required with 2 handling machines
ZetTrans	Lerwick	Freight Distribution Location	There is no investment in freight facilities identified as there is sufficient capacity

4.9.2 As illustrated in Table 4.18 above there are a number of locations where no investment in works is required, either because there is sufficient capacity or there is insufficient demand. As a consequence of this, these particular multi-modal locations are not being considered for further analysis. This resulted in 12 options/locations identified for taking forward for further appraisal in Chapter 5.

4.9.3 Table 4.19 shows both the estimated capital costs and the operating, maintenance and renewals (OMR) costs for each of the 12 options being considered. These costs do not include optimism bias (OB), which is taken into account in the economic analysis.

Table 4.19: Proposed Investment Capital & OMR Costs of Options

RTP Area	Location	Capital Costs	OMR Costs
HITRANS	Cromarty Firth	£12m	£0.6m per annum
	Elgin/A96	£1.9m	£0.1m per annum
	Inverness	£0.5m	£25k per annum
	Loch Fyne	£5.8m	£0.3m per annum
Nestrans	Aberdeen	£0.9m	£45k per annum
	Peterhead	£300k	£15k per annum
SEStran	Cameron Bridge – Leven	£9m	£0.5m per annum
	Grangemouth	£4m	£0.2m per annum
	Rosyth	£72m	£1.4m per annum
SPT	Hunterston	£135.2m	£6.7m per annum
SWestrans	Lockerbie	£7.5m	£0.4m per annum
TACTRAN	Dundee	£350k	£18k per annum

Note: figures do not include an element for optimism bias

4.9.4 OMR costs are important to include here as they are necessary in undertaking the transport economic efficiency (TEE) assessment, detailed in Chapter 5. The OMR costs are actual estimated costs or, where these are not available, assumed to be approximately 5% of capital costs.

5 Economic Appraisal

5.1 Background

5.1.1 As explained at the beginning of Chapter 4, there are three stages to the assessment of the options/locations identified during the stakeholder consultations, namely a capacity appraisal, an economic analysis and an assessment of the other STAG-based impacts. To provide a reasonably detailed description of each of these appraisal elements, the assessment is set out over three chapters and the findings are brought together in the conclusions at the end of this report.

5.1.2 Chapter 4 carried out the first test, the analysis of the demand versus capacity for each of the 16 original options/locations identified. This has resulted in an initial sift of the options, with four of them being found to have sufficient capacity to meet estimated future demand. Hence, for these four locations, no new facilities or infrastructure were identified as being necessary, apart from maintenance and renewals as part of the normal operations lifecycle. Consequently, these four options were discounted from the rest of the appraisal.

5.1.3 The remaining 12 options have been found to generate greater demand than current infrastructure can accommodate and Chapter 4 set out the necessary new freight facilities, along with their associated capital and operating costs, required to meet the anticipated future demand.

5.1.4 Consequently, these 12 remaining options have been carried forward into a detailed economic appraisal, which is set out in this Chapter.

5.1.5 The other STAG-based tests are set out in Chapter 6, and both chapters are linked and should be looked at collectively.

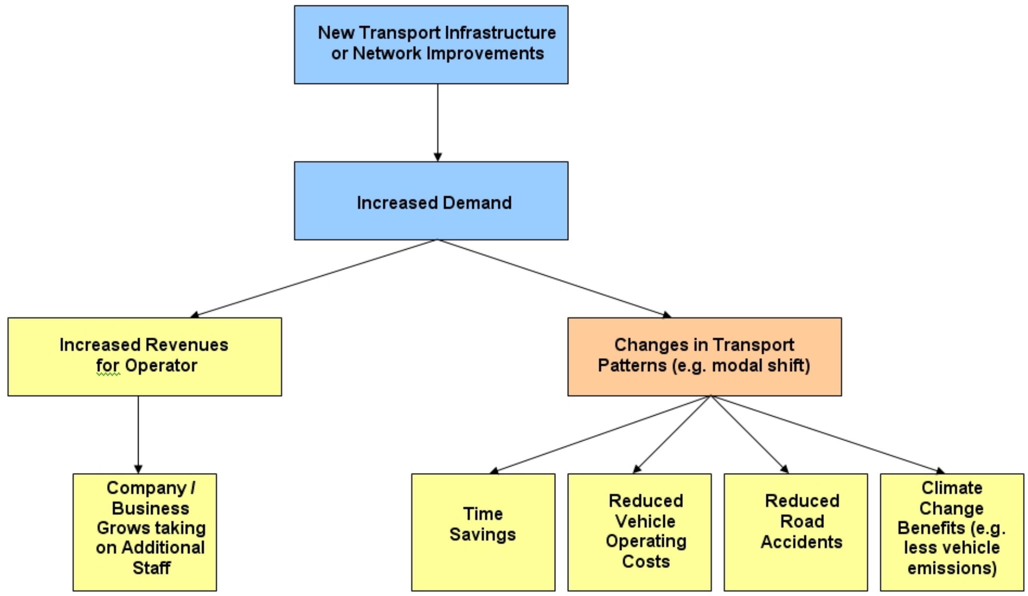
5.2 Overview of the Economic Appraisal Process

5.2.1 The output from the capacity analysis in Chapter 4 was a list of multi-modal freight improvements at various locations throughout Scotland. These are now examined using three economic tests based on Government economic appraisal theory and industry-standard procedures.

5.2.2 This is important as it shows which options can enhance Scotland's competitiveness by improving freight transport conditions (e.g. reduce delivery times, reduce transport costs) and also identify those options which provide wider socio-economic benefits (e.g. job impacts, environmental benefits). These benefits can be quantified and compared to the costs of constructing and maintaining the various options, thereby showing which interventions provide a reasonable level of return for their investment. Figure 5.1 shows the economic impacts due to improved transport infrastructure and facilities. This shows that there are key benefits which can be produced, namely:

- time savings;
- reduced vehicle operating costs;
- reduced road accidents;
- environmental benefits through less vehicle emissions;
- increased revenues for operators; and
- wider economic benefits such as job impacts.

Figure 5.1: Types of Economic Impacts



5.2.3 In order to capture the above economic impacts, three economic tests were carried out, namely:

- Financial Appraisals;
- Transport Economic Efficiency (TEE); and
- Employment Impacts and Gross Value Added (GVA).

5.2.4 The first economic appraisal test was a *financial appraisal* of the costs of each proposal against the revenues they generate. This test helps to identify those options which can provide a sufficient return in order for them to be pursued by the private sector.

5.2.5 The second test was a *Transport Economic Efficiency* appraisal to quantify the wider societal benefits of each option in addition to the potential revenue streams and compare them to their costs. This is intended to show those options which, while they might not be able to provide sufficient revenues to cover their own costs, they nonetheless provide other transport benefits to society which might warrant their implementation. This test also helps to identify whether there is merit for Government intervention for those options which could not be pursued by the private sector solely.

5.2.6 There might be situations where an option does not provide sufficient return or benefits identified in the first two tests, although it could provide wider economic impacts. The third test looks at each option in terms of the job impacts they can provide. This helps identify those options which might also warrant public sector intervention on the grounds of wider economic benefits.

5.2.7 Before the economic appraisal could commence, the cost estimates produced in Chapter 4 had to be adjusted to make them compatible with Government appraisal requirements. This is described in the following section.

5.3 Cost Estimates & Adjustments for Optimism Bias

5.3.1 Optimism Bias (OB) is the tendency for a project's costs to be underestimated and is defined as a measure of the extent to which actual project costs (capital and operating) exceed the expected benefits delivered by the project. Government appraisal practice is to include an appropriate allowance for OB and therefore suitable adjustments to the costs were identified and applied.

5.3.2 The appraisal has used the recommendations for the assessment of OB as set out in the HM Treasury's Guidance68. This has identified two types of projects:

- *Standard Civil Engineering* project – proposals which do not require any special design considerations due to space constraints, unusual output specifications or innovative construction methods. The Upper Boundary value of OB for this category of project is 44% for capital expenditure; and
- *Non-Standard Civil Engineering* project – proposals which are more technically challenging and riskier than the above. The Upper Boundary value of OB for this category of project is 66% for capital expenditure.

5.3.3 In both cases, an appropriate value of OB for operating, maintenance and renewal (OMR) costs is 42%.

5.3.4 For the most part, the types of options identified in this study would fall into the first category. The exception to this could be argued to be the deep sea container options.

5.3.5 Hence, most options had their costs adjusted using the default Standard Civil Engineering Upper Boundary values of OB, based on the assumption of no risk mitigation being carried out at this high-level of study.

5.3.6 The cost estimates for the deep sea container option at Hunterston and Rosyth can be assumed to require the default Non-Standard Civil Engineering Upper Boundary values of OB. However, the data supplied by Babcock has shown there has been some engineering appraisal undertaken which includes allowances for contingency and added costs for risks & uncertainty, two important elements in economic appraisal. These included a 25% allowance for Contingency and a 30% allowance for Risk & Uncertainty.

5.3.7 Consequently, for the costs of the Rosyth International Container Terminal (RICT) option we have applied the net of the OB Upper Boundary minus the allowances already included in the cost estimates supplied by Babcock. This gave an OB allowance figure of 11% (i.e. 66% minus 25% allowed for Contingency minus 30% allowed for Risk & Uncertainty).

5.3.8 Similarly, details for the proposals at Hunterston were also supplied to us, including previous study analysis. Given the similar nature of the engineering works we have applied the same level of OB as used for the Rosyth option.

[68] Review of Large Public Procurement in the UK, prepared for HM Treasury by Mott MacDonald, July 2002

5.3.9 However, in terms of a value of OB for OMR costs, for most options a value of 42% was applied as there was no previous engineering analysis with associated risks and contingency allocations. The exception was the Rosyth RICT option which, considering the level of engineering analysis already carried out, applied the OB Lower Boundary limit for Non-Standard Civil Engineering Works (i.e. 6%).

5.3.10 Table 5.1 shows the final capital and OMR costs used in the Financial and TEE Appraisal, after uplifting for OB.

Table 5.1: Capital & OMR Costs of Options (incl Optimism Bias)

RTP Area	Location	Capital Costs	OMR Costs
HITRANS	Cromarty Firth	£17.28m	£0.85m per annum
	Elgin/A96	£2.77m	£0.14m per annum
	Inverness	£0.72m	£36k per annum
	Loch Fyne	£8.35m	£0.41m per annum
Nestrans	Aberdeen	£1.30m	£64k per annum
	Peterhead	£0.43m	£21k per annum
SEStran	Cameron Bridge – Leven	£12.96m	£0.64m per annum
	Grangemouth	£5.76m	£0.28m per annum
	Rosyth	£79.92m	£1.53m per annum
SPT	Hunterston	£150.01m	£7.17m per annum
SWestrans	Lockerbie	£10.80m	£0.53m per annum
TACTRAN	Dundee	£0.50	£25k per annum

Note: values are in 2008 prices

5.4 Financial Appraisal

5.4.1 The Financial Appraisal considers which options can generate enough demand/revenue to cover their implementation and annual operating/maintenance costs. This is intended to show which options can provide sufficient return for their level of investment, and hence could be pursued by the private sector.

5.4.2 The appraisal was based on standard financial assessment procedures over a 15 year analysis period. This period of appraisal was adopted for all options so as to allow consistency when comparing the options together. The test compares the following benefit against costs for each option:

Costs

- capital costs of implementing each option; and
- annual operating, maintenance and renewal (OMR) costs.

Benefits

- annual revenues generated by each option.

5.4.3 The capital costs included the infrastructure and other facilities (e.g. handling equipment) required to implement each option. The annual OMR costs included the on-going annual operating/maintenance costs after the scheme is up and running. The annual revenues were forecast from the demand modelling results by applying industry-standard charges to the tonnages estimated for each option. Potential subsidy levels for those options which do not produce enough revenues to cover their annual running costs were identified by deducting annual OMR costs from the corresponding annual revenue streams.

5.4.4 The calculations are set out in Appendix B and the headline results summarised in Table 5.2. This includes the Internal Rate of Return (IRR) which is a measure of how much financial return an option produces on average per annum. The IRR is shown for each option under the two growth scenarios (Low and High Growth) to gauge the effects of variations in the levels of demand.

5.4.5 Also shown in the table is the ranking of options. This is based on the highest IRR results.

Table 5.2: Summary of Financial Appraisal

RTP Area	Location	Internal Rate of Return (IRR)		Ranking
		Low Growth	High Growth	
HITRANS	Cromarty Firth	2.7%	3.0%	11
	Elgin/A96	7.6%	8.3%	7
	Inverness	8.2%	9.0%	5
	Loch Fyne	0.9%	1.0%	12
Nestrans	Aberdeen	12.1%	13.3%	4
	Peterhead	25.2%	27.7%	1
SEStran	Cameron Bridge – Leven	2.9%	3.2%	10
	Grangemouth	15.3%	16.8%	3
	Rosyth	6.1%	6.7%	8
SPT	Hunterston	7.6%	8.4%	6
SWestrans	Lockerbie	4.4%	4.9%	9
TACTRAN	Dundee	22.0%	24.2%	2

5.4.6 The above results show the relative performance of the options in terms of the revenues only versus their costs. An IRR of greater than 5% for large infrastructure projects and 10% for small-scale facilities would suggest an option can be attractive enough for investors to pursue by themselves. The above suggests the following options provide a good to reasonable financial return:

- Elgin/A96 (HITRANS);
- Inverness (HITRANS);
- Aberdeen (Nestrans);
- Peterhead (Nestrans);
- Grangemouth (SEStran);
- Rosyth (SEStran);
- Hunterston (SPT); and
- Dundee (TACTRAN).

5.5 Transport Economic Efficiency

5.5.1 The Transport Economic Efficiency (TEE) appraisal has followed established analysis procedures as required by STAG. The economic framework was discussed with the Steering Group at a progress meeting to discuss the modelling results[69], for testing of the key inputs and assumptions for the TEE Appraisal. The headline results are presented in this section, but further indicators are shown in the TEE results presented in Appendix B which shows the analysis of all the options. The TEE assumptions were based on Government recommended values as set out in webTAG[70].

Development of the TEE Appraisal Model

5.5.2 In order to appraise the benefits and costs of the different options, the Department for Transport's Transport User Benefits Appraisal (TUBA) model was used[71]. This is a detailed TEE Model developed specifically for the appraisal of transport projects in the UK, and has been applied widely on many other projects and studies.

5.5.3 Standard default economic parameters and cost adjustments as contained in TUBA were used, and are consistent with the Scottish Government's STAG methodology. All monetary values estimated were in 2002 market prices, and values are discounted to the base year 2002, as per Government convention.

5.5.4 The appraisal was based on standard financial assessment procedures over a 60 year analysis period, which was adopted for all options so as to allow consistency when comparing the options together. The test compares the following benefit against costs for each option:

Costs

- capital costs of implementing each option; and
- annual operating, maintenance and renewal (OMR) costs.

Benefits

- annual revenues generated by each option;
- time savings;
- vehicle operating costs (VOCs);
- carbon savings (from less vehicle emissions); and
- accident savings.

5.5.5 The benefits of time, VOC, carbon and accident savings were converted to monetary values by the TUBA model using standard default factors as per Government guidance. The appraisal discount rate used was 3.5% for appraisal years 1 to 30, and 3% thereafter.

5.5.6 Current (2007 Base Year) and future (2020 Forecast Year) estimates of demand and associated network-wide travel patterns (including distances travelled and journey times) were sourced from the Scottish Freight Model (SFM). The model outputs for three time periods which make up the average day (AM Peak,

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69 Presentation of modelling results and subsequent progress meeting held on 9 October 2008
70 Web-based Transport Appraisal Guidance (webTAG), Department for Transport, 2008
71 TUBA version 1.7a, Department for Transport, 2007

Interpeak and PM Peak) were output from the SFM in origin-destination format and entered into the TUBA model.

5.5.7 Estimates of costs for each option were also entered into the TUBA model. In the TEE Appraisal, the capital expenditure profiles for the options have been assumed to be over two years, with a 40%:60% split. This allows for a reasonable spread of costs to simulate the effects of any construction or delivery programme.

Summary of TEE Appraisal Results

5.5.8 The results of the TEE appraisal are summarised in Table 5.3 below. This includes the tests of each option under the two growth scenarios (Low and High Growth) to gauge the effects of variations in the levels of demand. Appendix B contains the TEE model outputs and associated TUBA printouts showing the various benefits and cost streams.

5.5.9 The table shows the key headline indicators of TEE appraisal results, namely the net present value (NPV) and the benefit-to-cost ratio (BCR). The NPV is the monetary return produced by an option which is calculated by summing all the benefits and deducting all the costs (capital and OMR). The BCR is the ratio of all the benefits divided by all the costs, and a BCR of greater than 1.0 means an option produced more benefits than its costs.

5.5.10 Also shown in the table is the ranking of options. This is based on the highest BCR results. Where two options have the same BCR then the highest NPV is used to decide between them.

Table 5.3: Summary of TEE Appraisal

RTP Area	Location	Low Growth		High Growth		Ranking
		NPV	BCR	NPV	BCR	
HITRANS	Cromarty Firth	–£1.78m	0.9	£5.49m	1.1	11
	Elgin/A96	£11.97m	2.1	£15.31m	2.3	6
	Inverness	£4.87m	2.4	£6.17m	2.7	5
	Loch Fyne	–£12.40m	0.4	–£10.58m	0.5	12
Nestrans	Aberdeen	£13.771m	2.9	£17.19m	3.3	4
	Peterhead	£10.35m	3.3	£12.73m	3.6	3
SEStran	Cameron Bridge – Leven	–£0.13m	1.0	£5.52m	1.2	10
	Grangemouth	£47.06m	3.2	£58.05m	3.6	2
	Rosyth	£115.04m	1.7	£152.40m	1.8	7
SPT	Hunterston	£109.39m	1.4	£155.22m	1.5	9
SWestrans	Lockerbie	£15.04m	1.6	£21.66m	1.8	8
TACTRAN	Dundee	£10.06m	4.1	£12.42m	4.6	1

Note: all values are re-based and discounted to 2002 prices as per webTAG and STAG

5.5.11 Comparing the above results with the Financial Appraisal suggests:

- most options except Cromarty Firth, Cameron Bridge/Leven and Loch Fyne produce a positive return in the low growth scenario;
- Cromarty Firth and Cameron Bridge/Leven become positive in the high growth scenario; and
- those which do not produce a positive return should not be pursued unless there are other reasons for their implementation.

5.6 Employment Benefits

Overview of Appraisal Process

5.6.1 New multi-modal freight centres or the upgrading of existing freight facilities to handle multi-modal activities could have job impacts associated with those locations. The purpose of the employment appraisal is to estimate the long term direct job effects (i.e. jobs 'on-site' directly resulting from the investment) but does not attempt to estimate the short term construction employment impacts.

5.6.2 The net increase in employment generated by each facility can be viewed as a proxy indicator for the relative competitiveness of each option; the more competitive, the greater potential employment and additional income opportunities presented, which together represent additional Gross Value Added (GVA).

5.6.3 The intentions here are not to measure the wider expenditure and employment impacts that result from the additional employment generated by each facility, nor the wider benefits from businesses using the multi-modal centre, which although these will no doubt exist, are beyond the remit of this study.

5.6.4 With the exception of Rosyth and Hunterston, the starting point for this analysis is the discounted revenue stream generated by each of the multi-modal options identified in the TEE appraisal outputs, adjusted over a 30 rather than 60 year period. This shorter period is to provide a more robust estimate of job impacts by reducing the uncertainties surrounding a 60 year appraisal.

5.6.5 This process has been applied to all facilities except Rosyth and Hunterston, owing to their respective size and complexity. The employment impacts for both Rosyth and Hunterston are based on a study which examined a number of case studies of investment in ports of a similar size and character[72].

Employment Impacts by Multi-Modal Location

5.6.6 Appendix C shows the calculations and Table 5.4 summarises the estimated gross direct employment generated for each of these scenarios, by option, in Full Time Equivalent (FTE) terms.

Table 5.4: Gross Direct Employment Impacts (FTEs)

RTP Area	Location	Low Growth Estimated Increase in Direct Employment	High Growth Estimated Increase in Direct Employment
HITRANS	Cromarty Firth	150	165
	Elgin/A96	67	74
	Inverness	19	21
	Loch Fyne	24	27
Nestrans	Aberdeen	51	56
	Peterhead	34	38
SEStran	Cameron Bridge – Leven	120	132
	Grangemouth	281	309
	Rosyth	524	637
SPT	Hunterston	437	529
SWestrans	Lockerbie	152	168
TACTRAN	Dundee	35	39

[72] Hunterston Economic Opportunities – Final Report, Steer Davies Gleave, October 2006

Displacement, Substitution and Leakage

5.6.7 Table 5.4 shows the value of the revenue benefits from the TEE appraisal as equivalent to the number of jobs in the transport sector. These estimates are the gross job impacts, however there could be situations where there is displacement, substitution and/or leakage. Therefore, the gross impacts need to be adjusted to take these effects into account. However, before we present these adjustments, it is worth explaining the nature of these impacts.

5.6.8 Displacement refers to employment required for the options drawn from similar (competing) facilities elsewhere, reducing the scale of additional employment generated by the new investment.

5.6.9 Substitution refers to the possibility for the multi-modal centres modifying their existing employment to take advantage of new public investment (i.e. switching employees around).

5.6.10 Leakage refers to expenditure lost to a competing region or area, in this context lost to Scotland, due to the improvement of facilities elsewhere. For instance, the degree of leakage likely to occur reduces with the replacement of HGV drivers for other more sedentary forms of employment on the site of each multi-modal option, and where long-distance lorry drivers tend to be a major source of expenditure leakage.

5.6.11 In terms of all the options identified in this appraisal, it is reasonable to assume there will be some displacement because of the differential wage structures and the skilled nature of employment requirements, at the multi-modal option. In addition, substitution effects are also likely where the degree of modal shift results in a drop in the demand for heavy goods drivers in favour of other types of employment at the respective multi-modal freight location. In terms of leakage, it would be expected that the greatest impact occurs with those multi-modal options that are national gateways or those that are closer to the border with England.

5.6.12 Therefore to address the above effects, we have considered each option in turn, using data from our surveys and comparisons from case studies. A summary of the assumptions are set out below:

- ***Aberdeen**, **Inverness*** and ***Peterhead*** – the investment is largely in providing additional modest handling equipment, which is likely to draw on existing employment on site for the majority of requirements. Hence, there is unlikely to be any real increase in the level of employment and therefore we have assumed there would be no additional job impacts;
- ***Rosyth***, ***Hunterston*** and ***Grangemouth*** – the investment is in these sites will provide a greater working area, to handle significant increases in demand. The greater size of these facilities significantly increases capacity and permits a greater opportunity for increasing freight turnover, requiring additional labour. Our surveys suggest there could be as much as 30% displacement and 20% substitution, since employment is likely to be sourced from similar sites elsewhere. In addition, these sites are national gateways and there are likely to

be significant levels of leakage. Using data from the Scottish Value of Freight Study[73] we have assumed 30% for leakage;

- ***Cameron Bridge/Leven***, ***Lockerbie*** and ***Elgin*** – the proposals at these sites are new or significantly enhanced rail termini, which includes new infrastructure and handling facilities, which would require specialist staff. The surveys have suggested there would be some displacement but lower levels of substitution. We have used 50% and 10% for displacement and substitution, respectively based on discussions with rail freight operators. In terms of leakage, data from the Scottish Value of Freight Study has suggested a value of 10% would be reasonable; and
- ***Cromarty Firth***, ***Dundee*** and ***Loch Fyne*** – the investment will provide improved port facilities such as hardstanding, berths/quay and handling equipment. Our surveys with operators have suggested it is reasonable to assume 40% and 50% for displacement and substitution, respectively. In terms of leakage, data from the Scottish Value of Freight Study has suggested a value of 10% would be suitable.

Estimated Impacts

5.6.13 The above assumptions for displacement, substitution and leakage were applied to the estimated gross employment impacts of each option, shown in Table 5.4, to derive the net job impacts. These produced the net number of jobs in the transport sector equivalent to the value of the revenue benefits from the TEE appraisal.

5.6.14 Additional expenditure associated with these job impacts was then estimated by applying a weighted average per capita wage of £20,678 (in 2007 prices) in the transport sector. This weighted average wage was sourced from the Government's employment data. The weighting was estimated based on the proportion of total additional revenues that represents GVA at basic prices (approximately 49%) and the proportion of GVA represented by salaries and wages in the transport sector (circa 51%)[74].

5.6.15 A summary of the net direct employment impacts and net increase in income is shown in Table 5.5 overleaf, and the calculations are set out in Appendix C. The locations have been ranked according to size of net employment impacts.

[73] Measuring the Value of Freight to the Scottish Economy, Scottish Government, October 2006
[74] Office of National Statistics – Annual Business Inquiry, reproduced by the Scottish Government, 2007

Table 5.5: Net Direct Employment Impacts (FTEs) & Net Increase in Regional Income (2007 prices)

RTP Area	Location	Employment Impact (low growth – high growth)	Increase in Income (low growth – high growth)	Ranking
HITRANS	Cromarty Firth	15 – 16	£0.28m – £0.31m	7
	Elgin/A96	27 – 29	£0.50m – £0.55m	6
	Inverness	0	0	10=
	Loch Fyne	2 – 3	£0.04m – £0.05m	9
Nestrans	Aberdeen	0	0	10=
	Peterhead	0	0	10=
SEStran	Cameron Bridge – Leven	48 – 53	£0.89m – £0.98m	5
	Grangemouth	140 – 155	£2.03m – £2.24m	3
	Rosyth	262 – 319	£3.79m – £4.61m	1
SPT	Hunterston	219 – 265	£3.16m – £3.83m	2
SWestrans	Lockerbie	61 – 67	£1.13m – £1.25m	4
TACTRAN	Dundee	4 – 4	£0.07m – £0.07m	8

5.6.16 The greatest additional employment potential and regional expenditure would be offered by investment in multi-modal facilities at Rosyth, Hunterston and Grangemouth, in that order. Two of these are in the SEStran area, and one in the SPT area.

6 Appraisal Against Other STAG-Based Criteria

6.1 Introduction

6.1.1 This chapter summarises the findings of the assessment of the identified options against other STAG-based criteria. The quantitative economic evaluation has already been undertaken in Chapter 5, and is therefore not repeated here. This appraisal is qualitative and follows the STAG process albeit with some minor adjustments to match the structure of this study. Although environmental impacts of the proposed options have been covered as required by STAG, no Strategic Environmental Assessment (SEA) has been carried out, as this is outwith the terms of reference of this study. In addition, the accessibility and social inclusion parts of the STAG appraisal have been replaced by a more suitable assessment based on the relative connectivity of each option.

6.1.2 With the exception of the above, the STAG headings used in this Chapter closely follow those for a STAG Part 1 Appraisal (based on version 1.0 of STAG[75], which was relevant at the time of this study), and are as follows:

- Environment;
- Safety (excluding personal security);
- Connectivity; and
- Integration.

Appraisal Process

6.1.3 The appraisal of impacts is based on a standard seven-point scale as outlined below:

✓✓✓	major beneficial impact	✗✗✗	major adverse impact
✓✓	moderate beneficial impact	✗✗	moderate adverse impact
✓	minor beneficial impact	✗	minor adverse impact

O neutral impact

6.1.4 A score is assigned to each STAG sub-criteria to indicate the likely impact.

6.2 Environmental Appraisal

Overview of Environmental Appraisal

6.2.1 As a mechanism for promoting sustainable development, the proposals offer the opportunity to improve local and strategic environmental objectives. The proposals would encourage a more efficient use of freight transport generally, and should assist in modal shift, removing significant lorry miles from Scotland's roads and encouraging greater use of rail and shipping.

[75] Scottish Transport Appraisal Guidance, Version 1.0, Scottish Government, September 2003

Summary of Environmental Appraisal Results

6.2.2 Table 6.1 overleaf summarises the results of the environmental appraisals for each of the options identified in Chapter 4 (Table 4.19). In conclusion, the following issues have been raised:

- there are likely to be significant environmental issues associated with the development of transport options through existing rural areas. Any of the new deep sea container options or rail/road options are likely to have landscape and visual effects of varying degrees. There are also likely to be significant effects on biodiversity, with respect to both species and habitats, such as the local wildlife;
- construction disruption is likely to affect properties in the nearby area, including commercial and industrial properties, though this will be temporary and will not result in any permanent effects;
- there may be a number of direct and indirect impacts on cultural heritage and landscape features by some options;
- other impacts, during both construction and operation, are likely to be experienced with respect to air quality, noise and vibration, water quality, and geology and soils. However, some of these impacts could be suitably mitigated; and
- some of the building work associated with Grangemouth and Rosyth may impact upon the Firth of Forth SPA/SSSI with the potential for significant impacts upon wildlife. However, some of these impacts could be suitably mitigated and should be examined in an Environmental Impact Assessment.

Table 6.1: Summary of Environmental Appraisal Results

RTP Area	Location	Noise and Vibration	Air Quality	Water Quality, Drainage and Flood Defence	Geology and Soils	Biodiversity	Landscape	Visual Amenity	Land Use	Cultural Heritage
HITRANS	Cromarty Firth	Modal shift of 5.5m HGV-kms saved pa giving moderate benefits	Low benefits (Carbon PVB = £1.5m over 60-year)	Some impacts likely as the option requires landtake	Groundbreaking works could affect the geology & soils	Impacts minimal as the port is in an urban environment	Landscaping could be an issue due to new infrastructure	Limited visual impacts	Could have some land loss due to new works	None
	Elgin/A96	Modal shift of 3.8m HGV-kms saved pa giving moderate benefits	Low benefits (Carbon PVB = £1.0m over 60-year)	As above	Potential effects on geology and soils due to groundbreaking works	Potential Impacts as the site is in a rural environment	As Above	Potential visual impacts in rural setting	As above	As above
	Inverness	Low benefits expected	Low benefits (Carbon PVB = £0.4m over 60-year)	Impacts on water resources are minimal	Effects on geology and soils are minimal	Potential impacts on animal populations through loss or disturbance of areas are minimal	Landscape impacts in loss of green space are minimal	Limited impacts anticipated	None	As above
	Loch Fyne	As above	Low benefits (Carbon PVB = £0.3m over 60-year)	As above	As above	As above	As above	As above	As above	As above
Nestrans	Aberdeen	As above	Low benefits (Carbon PVB = £0.8m over 60-year)	As above	As above	As above	As above	As above	As above	As above
	Peterhead	As above	Low benefits (Carbon PVB = £0.6m over 60-year)	As above	As above	As above	As above	As above	As above	As above

Table 6.1 (Contd): Summary of Environmental Appraisal Results

RTP Area	Proposals	Noise and Vibration	Air Quality	Water Quality, Drainage and Flood Defence	Geology and Soils	Biodiversity	Landscape	Visual Amenity	Land Use	Cultural Heritage
SEStran	Grangemouth	Modal shift of 6.7m HGV-kms saved pa gives moderate benefits	Low benefits (Carbon PVB = £1.8m over 60-year)	Likely to be some impact as investment requires additional land	Potential effects on geology and soils due to groundbreaking works	Impacts minimal as the port is in an urban environment	Landscaping could be an issue due to infrastructure works	Limited visual impacts	Could have some loss of land due to new works	None
	Rosyth	Modal shift of 49.4m HGV-kms saved annually giving large noise benefits	Large benefits (Carbon PVB = £13.1m over 60-year)	Likely to be some impact as the investment requires new build	As above	As above	As above	Visual impact on skyline depends on type/size of new cranes	Most land already reclaimed	As above
	Leven/Cameron Bridge	Low benefits expected	Low benefits (Carbon PVB = £0.6m over 60-year)	Impacts on water resources are minimal	Effects on geology and soils are minimal	Potential impact on animal populations through loss or disturbance of areas are minimal	Landscape impacts in loss of green space are minimal	Limited impacts anticipated	None	As above
SPT	Hunterston	Modal shift of 28.3m HGV-kms saved pa give large noise benefits	Large benefits (Carbon PVB = £7.5m over 60-year)	Likely to be some impact as the investment requires additional land	Potential effects on geology and soils due to groundbreaking works	Impacts minimal as the port is in an urban environment	Landscaping could be an issue due to infrastructure works	As above	Could have some loss of land due to new works	As above
SWestrans	Lockerbie	Modal shift of 3.9m HGV-kms saved pa give moderate benefits	Low benefits (Carbon PVB = £1.0m over 60-year)	Some impacts likely as the option requires landtake	As above	Potential Impacts as the site is in a rural environment	As above	Potential visual impacts in rural setting	As above	New site could influence the rural setting
TACTRAN	Dundee	Low benefits expected	Low benefits (Carbon PVB = £0.4m over 60-year period)	Impacts on water resources are minimal	Effects on geology and soils are minimal	Potential impact on animal populations through loss or disturbance of areas are minimal	Landscape impacts in loss of green space are minimal	Limited impacts anticipated	None	None

6.3 Safety Appraisal

Overview of the Safety Appraisal

6.3.1 STAG emphasises the need to *"consider the impact of the proposal under consideration on accidents"*[76]. 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. These 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 guidance[77] and which STAG suggests *"should be adopted"*.

6.3.2 A high-level analysis of the potential demand for each of the options identified in this study has been carried out using the freight transport demand model, described in Chapter 2, and accident information from the NESA Manual. The analysis includes an estimate of the annual HGV veh-kms saved for each option. Default accident rates were used from Table 6/5/1 of the NESA Manual and applied to the veh-kms saved. This has allowed for an estimation of the potential monetised accident benefits, and therefore this has been used as the basis for appraising the impact scores in this test.

Summary of Safety Appraisal Results

6.3.3 Table 6.2 summarises the results of the safety appraisals for each of the options. These are for high growth, as these would be the maximum potential benefits which each option could realise. In conclusion, very few options produce modest accidents benefits.

Table 6.2: Summary of Safety Appraisal Results

RTP Area	Location	Savings Estimates (60-years)	
		PVB	STAG Score
HITRANS	Cromarty Firth	£0.34m	o
	Elgin/A96	£0.24m	o
	Inverness	£0.08m	o
	Loch Fyne	£0.07m	o
Nestrans	Aberdeen	£0.19m	o
	Peterhead	£0.14m	o
SEStran	Cameron Bridge – Leven	£0.14m	o
	Grangemouth	£0.42m	o
	Rosyth	£3.08m	✓
SPT	Hunterston	£1.76m	✓
SWestrans	Lockerbie	£0.25m	o
TACTRAN	Dundee	£0.09m	o

Note: all values are re-based and discounted to 2002 prices as per webTAG and STAG

[76] Section 7.2 in Chapter 7 of STAG
[77] Sensitive Lorry Miles, SRA/DfT, May 2003 and also the NESA Manual, DMRB (Volume 15), April 2002

6.4 Connectivity Appraisal

Overview of the Integration Appraisal

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

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

Transport Integration

6.4.2 STAG makes clear that the TEE Appraisal will capture most of the 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)[78].

6.4.3 Transport Interchange as it affects freight is subdivided into:

- services and opportunities to interchange; and
- infrastructure and information.

Services and Opportunities

6.4.4 The concept accepted within STAG relates to 'seamlessness' of movement. This must confer benefits additional to those of simple savings of time or money, such as greater convenience. STAG emphasises that the extent of this integration must be considerable.

6.4.5 The options being appraised in this report will have an impact in terms of the integration of services with the network. Opportunities will arise within the relevant areas to share infrastructure, logistic arrangements and to 'dove-tail' services with existing timetables, and this is true for all the options being considered.

Infrastructure and Information

6.4.6 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.

6.4.7 The options involving new infrastructure and storage facilities will increase the opportunity for modal switch. The same is potentially true of the options involving only additional handling equipment, although the scale of opportunity for interchanges are likely to be smaller. Those options which have significant new infrastructure, such as the deep sea container facilities, are likely to have added benefits due to the volumes of freight they can handle.

6.4.8 In terms of information, if it assumed any new facilities will be marketed by the private sector operators as would be expected, then there are likely to be some

[78] STAG, section 9.2.1

modest benefits in terms of promoting the capabilities of Scotland to other parts of the UK and internationally.

Appraisal of Transport Integration

6.4.9 The methodology adopted for the appraisal is similar to that set out in GOMMMS[79], with the analysis based on an extension of GOMMMS Worksheet 8.1 to incorporate the characteristics of the freight options examined in this study. Table 6.3 shows the appraisal results.

Table 6.3: Transport Integration Appraisal

RTP Area	Location	Services & Interchange		Infrastructure & Information		Overall Assessment
		Added Opportunity	Seamless Interchange	Level of Facilities	Level of Information	
HITRANS	Cromarty Firth	Moderate	Moderate	Large	Large	✓✓
	Elgin/A96	Moderate	Moderate	Moderate	Moderate	✓✓
	Inverness	Minor	Minor	Minor	Minor	✓
	Loch Fyne	Minor	Minor	Minor	Minor	✓
Nestrans	Aberdeen	Minor	Minor	Minor	Minor	✓
	Peterhead	Minor	Minor	Minor	Minor	✓
SEStran	Cameron Bridge – Leven	Minor	Moderate	Moderate	Moderate	✓✓
	Grangemouth	Large	Moderate	Large	Large	✓✓✓
	Rosyth	Large	Large	Large	Large	✓✓✓
SPT	Hunterston	Large	Large	Large	Large	✓✓✓
SWestrans	Lockerbie	Moderate	Moderate	Moderate	Large	✓✓
TACTRAN	Dundee	Minor	Minor	Minor	Moderate	✓

Appraisal of Transport Land Use Integration

6.4.10 Given this level of appraisal is to STAG Part 1 level, STAG requires *"a preliminary appraisal of the proposal's fit with established land use policy and environmental designations at a local, and where appropriate, national level … [to] allow any serious conflicts to be identified early and so avoid any wasted effort in working up a proposal which is not viable"*[80].

6.4.11 This section identifies the potential land use impacts of the proposals. It includes baseline information and an assessment of the potential to promote connections between different land uses whilst promoting sustainable development principles.

6.4.12 There are a variety of different land uses across the various areas within which the proposed transport schemes are situated. Although the proposed transport improvements address the requirements of the predicted freight demand, each

[79] GOMMMS Volume 2, section 8.2
[80] STAG, sections 9.3.1 & 9.3.2

option would be expected to have a different scale of impact with respect to planned and committed developments.

6.4.13 The larger scale options involving significant new infrastructure will undoubtedly require the greatest amount of land for implementation, but in some cases the land has already been reclaimed (e.g. at Rosyth) or is available within the site boundary (e.g. Cromarty Firth). Some options also involve the construction of new storage areas, which require a considerable amount of land.

6.4.14 For most of the options, any new facilities will be on existing land within the boundaries of the relevant sites. Hence, for these locations, it is reasonable to assume there are likely to be no discernable conflicts between those options, development options and other identified land uses. However, the proximity of enhanced freight facilities to new residential and retail land-use could be expected to provide benefits as construction materials and plant machinery could be transported to the proposed new development areas via the new freight options/locations, thereby providing some benefits. In such cases, it is reasonable to expect this to have a *minor to moderate beneficial impact*, depending on the volumes of freight predicted.

6.4.15 Some options only propose modest new handling equipment rather than any physical build. Clearly, in such cases there would be no land take required and hence their appraisal could be considered to be of a *neutral impact*.

6.4.16 The possible exceptions to the above are the options for Loch Fyne, Leven and Lockerbie, all of which involve significant infrastructure on rural/semi-urban areas. In the case of Loch Fyne, our consultations and site visit suggest the planned new infrastructure would be on available (vacant) land and hence the impacts can be considered to be of a *neutral impact*. In the case of Leven, our consultations and site visit suggest the plans are strongly supported by Fife Council and are being safeguarded in the planned revisions of the Local Plan. Consequently, this too can be considered to have a *neutral impact*. As for the site at Lockerbie, we have seen no information to suggest there would be an impact either way – namely either positive or negative. Since the option is intended to serve the existing regional agricultural economy it is reasonable to assume it would need to be located reasonably close to its users which in this case is likely to result in some land take, albeit modest amounts. Hence, to err on the side of caution, we feel it is reasonable to score this option as a *minor adverse impact*.

Policy Integration

6.4.17 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*[81]". The options have been considered against central government policies, before then turning to look at regional policies such as the appropriate Regional Transport Strategy. The following was therefore considered:

- Scottish Planning Policy statement (SPP) 17;
- SPP1;
- National Planning Framework 2 (NPF2); and
- Regional Transport Strategies.

[81] STAG, section 9.4.2

6.4.18 As well as looking at policies, we also considered other relevant documents such as the Scottish Route Utilisation Strategy[82] (RUS) and the Strategic Transport Projects Review[83] (STPR). The following text summarises the findings.

6.4.19 Transport improvements in the relevant areas offer major opportunities to implement local and strategic planning and transport policies, as a mechanism for promoting sustainable development. The proposals examined in this appraisal would generally encourage a modal shift away from highway modes and improve the quality of the environment.

6.4.20 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;
- Facilitates movement by sustainable transport including provision of interchange facilities between modes;
- Encourages and facilitates freight servicing by rail or water; and
- Allows effective management of motorised travel, within a context of sustainable transport objectives.

6.4.21 In addition, transport improvements identified in this study 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;
- 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.

6.4.22 From the above policy review, it is clear that all options identified can be reasonably expected to compliment national policies. However, some options provide further opportunities to satisfy additional policy objectives identified above:

- the option at Rosyth is specifically highlighted as a key priority in NPF2;
- improvements to Grangemouth have also been suggested in STPR Intervention 20;

[82] Scottish Route Utilisation Strategy, Network Rail, 2007
[83] Strategic Transport Projects Review, Report 4: Summary, Transport Scotland, 2008

- Hunterston has been identified in the Scottish RUS as requiring investment in terms of rail capacity enhancements, hence the option identified in this study is complementary;
- the option for Leven is mentioned in the SEStran Regional Transport Strategy (Policy 16) and is also strongly supported by Fife Council;
- the same is true for the option at Dundee, which is supported by the TACTRAN Regional Transport Strategy (proposed interventions IV_J1 and IV_J3); and
- the sites at Inverness and Cromarty Firth are supported in the HITRANS Regional Transport Strategy (policies H31b and H31f).

6.4.23 Hence, it is reasonable to assume that those options will have *major beneficial impacts*, whereas the other options would have *moderate beneficial impacts*.

Overall Appraisal against Government Objective for Integration

6.4.24 Taking account of the discussions set out so far in this Chapter, Table 6.4 summarises the results of the integration appraisals to present a matrix of conclusions for the Government Objective.

Table 6.4: Overall Integration Appraisal

RTP Area	Location	Transport Integration	Land-Use Transport Integration	Policy Integration	Overall Average Appraisal
HITRANS	Cromarty Firth	✓✓	✓	✓✓✓	✓✓
	Elgin/A96	✓✓	✓	✓✓	✓✓
	Inverness	✓	O	✓✓✓	✓
	Loch Fyne	✓	✓	✓✓	✓
Nestrans	Aberdeen	✓	O	✓✓	✓
	Peterhead	✓	O	✓✓	✓
SEStran	Cameron Bridge – Leven	✓✓	O	✓✓✓	✓✓
	Grangemouth	✓✓✓	✓✓	✓✓✓	✓✓✓
	Rosyth	✓✓✓	✓✓	✓✓✓	✓✓✓
SPT	Hunterston	✓✓✓	✓✓	✓✓✓	✓✓✓
SWestrans	Lockerbie	✓✓	✗	✓✓	✓
TACTRAN	Dundee	✓	✓	✓✓✓	✓

6.5 Connectivity Appraisal

Overview of the Connectivity Appraisal

6.5.1 STAG includes an assessment against Accessibility and Social Integration, however for this study it was felt that this was better replaced with an appraisal against connectivity. This has been included in the appraisal as it was considered more relevant and better at highlighting the benefits of improved connections to/from the locations which the options might have. The appraisal has focussed on:

- Connectivity within the local area; and
- Connectivity to/from the wider area.

6.5.2 STAG states that *"quite simple measurement approaches should be adequate"* for appraising 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.

Connectivity within the Local Area

6.5.3 This element of appraisal allows a focus on operating conditions within the site area that the relevant option is located. For STAG Part 1 purposes a qualitative approach is adopted, looking at the potential benefits (or disbenefits) for transport network coverage resulting from the provision of the various options. The appraisal for each option is set out below:

- ***Aberdeen***, ***Inverness*** and ***Peterhead*** – additional handling equipment will improve port throughput and reduce operating congestion, so facilitate multi-modal freight operations and movements at the site. However, this level of impact is likely to be limited in terms of connections to/from these sites. Hence, it is reasonable to score these sites as *Minor Beneficial;*

- ***Grangemouth*** – increased capacity will have a potentially positive benefit from easing of freight congestion, especially given the volumes of freight forecasted to use the site. Therefore, it is reasonable to score this option as *Moderate Beneficial*;

- ***Rosyth*** and ***Hunterston*** – additional storage space and handling equipment will improve port capacity and reduce operating congestion at these ports. Data supplied by Babcock suggests each new crane could handle up to 150,000 TEU[84] per annum, and so it is reasonable to assume the overall impact within the local area is likely to be *Large Beneficial*;

- ***Cameron Bridge/Leven*** – re-opening the rail line will facilitate multi-modal freight operations and movements on, and close to the site. This has been scored as being *Moderate Beneficial*;

- ***Dundee*** – greater capacity provided by additional hardstanding and equipment will reduce operating congestion on the site, easing multi-modal freight operations and movements. Given the volumes predicted, the impact is likely to be *Minor Beneficial;*

- ***Cromarty Firth*** – the existing port is constrained by lack of berths, and additional berths will in effect increase capacity and reduce operating constraints and congestion, permitting faster throughput of goods and materials on and close to the site. Given the estimated volumes, this has been scored as being *Moderate Beneficial*;

- ***Loch Fyne*** – the pier is relatively small and poorly served by local access, so investment in increasing pier size, storage capacity and most of all internal

[84] TEU = Twenty-foot Equivalent Units

arrangements will improve existing conditions and so permit more efficient throughput of timber materials. The impact is likely to be *Minor Beneficial*; and

- ***Lockerbie*** and ***Elgin / A96*** – establishing additional multi-modal freight facilities will facilitate freight operations and movements. However, given the level of volumes, this is likely to be *Minor Beneficial.*

Connectivity to/from the Wider Area

6.5.4 This element of appraisal looks at the potential for improved connections to/from each location, in terms of the added benefits brought about to the regions and Scotland as a whole. As per previous appraisals, a qualitative approach is adopted, highlighting the potential benefits the various options provide. The appraisal for each option is set out below:

- ***Aberdeen***, ***Inverness*** and ***Peterhead*** – providing additional handling equipment will not change the level of connectivity to/from these sites. Hence, the level of impact is likely to be *Neutral;*

- ***Grangemouth*** – the additional facilities will have a potentially positive benefit from easing of freight congestion, but this is anticipated to be somewhat mitigated by the additional freight movements expected to occur on the local road network. Therefore, it is reasonable to score this option as *Minor Beneficia*l;

- ***Rosyth*** and ***Hunterston*** – the opportunities for attracting large shipping vessels from international destinations is a major benefit brought about by these options. As ports in Europe reach capacity it is possible for each of these sites to be used by trans-Atlantic journeys instead of other ports in the EU (for example, journeys from North America to the Baltic Region/Scandinavia). Given the potential volumes involved, it is reasonable to assume the overall impact is likely to be *Major Beneficial;*

- ***Cameron Bridge/Leven*** – most of the demand forecast to use this new facility are estimated to be medium trips (e.g. Grangemouth) to long distance journeys (e.g. Manchester) and hence the site offers good connectivity. The overall impact is likely to be *Moderate Beneficial;*

- ***Dundee*** – providing greater capacity, additional hardstanding and new handling equipment will not change the level of connectivity to/from these sites. Hence, the level of impact is likely to be *Neutral;*

- ***Cromarty Firth*** – additional berths will allow the site to attract new trade, including servicing the timber sector. This opens up the area to new business although in the case of the forestry industry any new exports from Scotland could be captured from other areas of the country, currently serviced elsewhere. However, there are some significant volumes predicted. Hence, given the potential for offsetting between the two identified issues it is reasonable to score this option as *Minor Beneficial;*

- ***Loch Fyne*** – the proposals for the new pier and associated infrastructure are intended to service primarily the local timber forests. The primary function of the site is to export timber and pulp to other parts of the country, including destinations in England. This would suggest the potential for improved connections is somewhat limited due to the local nature of the market, but given the fact that some destinations are in England it is reasonable to assume the impact is *Minor Beneficial;* and

- ***Lockerbie*** and ***Elgin / A96*** – establishing the new road/rail connections at these sites would allow for medium to long distance journeys to be made. However, the same arguments apply as with the site at Loch Fyne, namely the proposals are intended to serve the local economy and hence could be somewhat limited. Given the fact that some destinations could be long-distance it is reasonable to assume the impact is *Minor Beneficial.*

6.5.5 From the above arguments, it is reasonable to assume the appraisal results described in Table 6.5.

Table 6.5: Summary of Connectivity Appraisal

RTP Area	Location	Within Local Area	To/From Wider Area	Overall Average Appraisal
HITRANS	Cromarty Firth	✓✓	✓	✓
	Elgin/A96	✓	✓	✓
	Inverness	✓	o	✓
	Loch Fyne	✓	✓	✓
Nestrans	Aberdeen	✓	o	✓
	Peterhead	✓	o	✓
SEStran	Cameron Bridge – Leven	✓✓	✓✓	✓✓
	Grangemouth	✓✓	✓	✓
	Rosyth	✓✓✓	✓✓✓	✓✓✓
SPT	Hunterston	✓✓✓	✓✓✓	✓✓✓
SWestrans	Lockerbie	✓	✓	✓
TACTRAN	Dundee	✓	o	✓

6.6 Summary of Appraisal

6.6.1 Similar to normal STAG practice short Appraisal Summary Tables (ASTs) have been prepared and are presented in Appendix D. The results are summarised in Table 6.6.

Table 6.6: Summary of STAG Assessment

RTP Area	Location	Air Quality & Noise	Other Environment	Safety	Integration	Connectivity
HITRANS	Cromarty Firth	✓✓	✗	O	✓✓	✓
	Elgin/A96	✓	✗	O	✓✓	✓
	Inverness	✓	O	O	✓	✓
	Loch Fyne	✓	✗	O	✓	✓
Nestrans	Aberdeen	✓	O	O	✓	✓
	Peterhead	✓	O	O	✓	✓
SEStran	Cameron Bridge – Leven	✓	✓✓	O	✓✓	✓✓
	Grangemouth	✓✓	✗	O	✓✓✓	✓
	Rosyth	✓✓✓	✗✗	✓	✓✓✓	✓✓✓
SPT	Hunterston	✓✓✓	✗✗✗	✓	✓✓✓	✓✓✓
SWestrans	Lockerbie	✓	✗✗	O	✓	✓
TACTRAN	Dundee	✓	O	O	✓	✓

Key:

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

6.6.2 The economic appraisal results are presented separately in Chapter 5, and hence are not repeated in the above table.

6.6.3 The following Chapter distils the above findings, along with the results from previous sections of this report, and discusses the implications.

7 Conclusions and Discussion

7.1 Introduction

7.1.1 This Chapter seeks to summarise the results of the study and then discuss these in terms of addressing the sixth aim of the study, namely identify those options which could be entirely private-sector driven and the role of the public sector in supporting other developments.

7.1.2 Table 7.1 provides an overview of the locations and the levels of investment required for each of the 16 options identified. This is a simplified version of Table 4.18 in Chapter 4.

7.1.3 The criteria for categorising the level of investment in Table 7.1 was based on the estimated capital costs of the relevant option. A capital cost of less than £2m was classed as minor, a capital cost of between £2m and £20m was categorised as moderate and a capital cost of over £20m was ranked as major.

Table 7.1: Location and Level of Investment Required

RTP Area	Multi-modal Location	Type	Level of Investment Required
HITRANS	Cromarty Firth	Freight Distribution Location	Moderate
	Elgin/A96	Freight Distribution Location	Minor
	Inverness	Regional Gateway	Minor
	Loch Fyne	Freight Distribution Location	Moderate
Nestrans	Aberdeen	Regional Gateway	Minor
	Peterhead	Regional Gateway	Minor
SEStran	Cameron Bridge – Leven	Regional Gateway	Moderate
	Grangemouth	National Gateway	Moderate
	Rosyth	National Gateway	Major
SPT	Coatbridge	National Gateway	No Change
	Hunterston	National Gateway	Major
	Mossend	National Gateway	No Change
	Prestwick Airport	National Gateway	No Change
SWestrans	Lockerbie	Freight Distribution Location	Moderate
TACTRAN	Dundee	Regional Gateway	Minor
ZetTrans	Lerwick	Freight Distribution Location	No Change

7.2 Options Discounted in Initial Sifting

7.2.1 Of the 16 options identified in this study, as being potential locations for a multi-modal facility, the demand analysis in Chapter 4 identified which of these have sufficient capacity to meet current and forecast future demands, although there might be a need for on-going maintenance. These are (not in any specific order):

- Coatbridge (National Gateway);
- Lerwick (Local Distribution Centre);
- Mossend (National Gateway); and
- Prestwick Airport (National Gateway).

7.2.2 This was for a variety of reasons including the fact that future demand levels can be accommodated within existing facilities. In addition, some of the above sites have experienced reductions in their freight throughput over the last few years and in those cases, the future forecasts of freight are mainly a return to their previous levels rather than an overall increase in demand. Either way, the above sites have been considered as not requiring any major intervention, however there is likely to be some form of maintenance as part of the normal lifecycle of operations.

7.3 Economic and STAG Results

7.3.1 Having eliminated the above options, 12 options/locations remain from the original list of 16. A summary of the economic impacts and STAG-based assessments for the remaining 12 options is shown in Tables 7.2 and 7.3 respectively.

Table 7.2: Summary of Economic Impacts (Low Growth Scenario)

RTP Area	Location	Financial	Economic		Estimated Net Job impacts
		IRR	NPV	BCR	
HITRANS	Cromarty Firth	2.7%	–£1.78m	0.9	15
	Elgin/A96	7.6%	£11.97m	2.1	27
	Inverness	8.2%	£4.87m	2.4	0
	Loch Fyne	0.9%	–£12.40m	0.4	2
Nestrans	Aberdeen	12.1%	£13.77m	2.9	0
	Peterhead	25.2%	£10.35m	3.3	0
SEStran	Cameron Bridge – Leven	2.9%	–£0.13m	1.0	48
	Grangemouth	15.3%	£47.06m	3.2	140
	Rosyth	6.1%	£115.04m	1.7	262
SPT	Hunterston	7.6%	£109.39m	1.4	219
SWestrans	Lockerbie	4.4%	£15.04m	1.6	61
TACTRAN	Dundee	22.0%	£10.06m	4.1	4

7.3.2 Table 7.2 summarises the economic and financial performance of the options considered. These results are at the low growth scenario and clearly they improve when considered under the high growth scenario.

7.3.3 However, even at the low growth scenario, the appraisal identified a number of options which produce good economic returns. Some of these are largely because they require a limited amount of investment in order to promote multi-modal activities and the benefits that result. However, investment in these options is not likely to have a significant national impact in terms of job creation.

7.3.4 In terms of larger impacts, Grangemouth, Hunterston and Rosyth all show a reasonable to good level of economic return in terms of NPV and BCR values but also have a significant impact with regards to job impacts.

Table 7.3: Summary of STAG Assessment

RTP Area	Location	Air Quality & Noise	Other Environment	Safety	Integration	Connectivity
HITRANS	Cromarty Firth	✓✓	✘	O	✓✓	✓
	Elgin/A96	✓	✘	O	✓✓	✓
	Inverness	✓	O	O	✓	✓
	Loch Fyne	✓	✘	O	✓	✓
Nestrans	Aberdeen	✓	O	O	✓	✓
	Peterhead	✓	O	O	✓	✓
SEStran	Cameron Bridge – Leven	✓	✓✓	O	✓✓	✓✓
	Grangemouth	✓✓	✘	O	✓✓✓	✓
	Rosyth	✓✓✓	✘✘	✓	✓✓✓	✓✓✓
SPT	Hunterston	✓✓✓	✘✘✘	✓	✓✓✓	✓✓✓
SWestrans	Lockerbie	✓	✘✘	O	✓	✓
TACTRAN	Dundee	✓	O	O	✓	✓

Key:

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

7.3.5 Table 7.3, which summarises the STAG-based assessment, shows that the options which demonstrate the strongest benefits, interpreted as the higher number of ticks in the Table, for the majority of the criteria tested, are (in no particular order):

- Cameron Bridge/Leven;
- Cromarty Firth;
- Grangemouth;
- Hunterston; and
- Rosyth.

7.3.6 These options, especially Grangemouth, Hunterston and Rosyth, perform well with regards to integration and with connectivity, which have particular relevance to multi-modal freight operations.

7.3.7 The flip side, however, is that care will be needed in order to minimise environmental impacts which are caused by significant construction works.

Competition between Options

7.3.8 In keeping with the STAG-based procedures, the impacts of the options identified in this appraisal have been assessed individually. While this is useful when looking at which options could provide the highest levels of return, it is also worth considering the potential for competition between some of the options.

7.3.9 The demand analysis has identified the types of cargoes which the options could serve and hence the nature of the demand levels at each site. Comparing these types of freight and the locations of the sites, it is possible to identify which options could potentially compete with each other and therefore reduce the level of benefits. Our review has highlighted the following options as potentially being in competion with each other:

- Cromarty Firth and Inverness; and
- Rosyth and Grangemouth.

7.4 Discussion on Findings

Financially Viable Options

7.4.1 From the analysis we can see that the following eight options were found to be financially viable (not in any specific order):

- Aberdeen;
- Dundee;
- Elgin;
- Grangemouth;
- Hunterston;
- Inverness;
- Peterhead; and
- Rosyth.

7.4.2 This suggests that all these options should be implemented by the private sector with little or no need for Government intervention. It should be borne in mind that any option being considered for development will be constrained by private sector initiative and their desire to carry out the required investment.

7.4.3 However, Government intervention can be indirect. In particular planning permission can be assisted by projects being included in strategic plans. This includes the National Planning Framework[85] (NPF2) which provides a national context for development plans and assists with wider government programmes. The Government can recognize those options listed above, subject to the required statutory processes.

7.4.4 A further form of Government involvement is with improving the transport accessibility links within the vicinity of the relevant sites. For example, a number of the interventions in the Strategic Transport Projects Review (STPR) compliment the identified options. Delivery of the STPR interventions would also assist the options identified in this study.

7.4.5 Finally, Government can also assist with the supply of information on freight, planning applications and projected land-use/demographic changes, which are all useful in estimating future demand for freight services.

[85] National Planning Framework 2, Scottish Government, Consultation Draft, January 2008

Non Viable Options

7.4.6 From the analysis, it is clear that the following options do not provide sufficient societal benefits[86] and therefore it could be argued that these options do not warrant Government intervention:

- Cromarty Firth; and
- Loch Fyne.

7.4.7 Hence the above options should not be considered for implementation based purely on economic, financial and STAG-based appraisal criteria.

Other Options

7.4.8 Following on from the above, there are two remaining options which could still be implemented and would provide wider economic and environmental benefits, but do not have sufficient demand/revenue to cover both their implementation and running costs. These are:

- Cameron Bridge/Leven; and
- Lockerbie.

7.4.9 These could be delivered with the assistance of Government support, although there are some important points to highlight. We have discussed these below in turn.

Conflicts between the Types of Cargoes

7.4.10 The freight demands at the Cameron Bridge/Leven site include the aspirations of key local stakeholders to transfer significant volumes of materials using rail/road freight services. The types of cargoes include Whisky, Malt and other cased goods. The Lockerbie option includes a rail/road interchange site to serve the agricultural economy. The variation in the two types of cargoes suggests there is little conflict between the two options and a situation whereby one location is simply abstracting freight from the other is unlikely to occur. This is beneficial and important as the Government can safely support these options, should it find it reasonable to do so, with comfort that there would not be any impacts to the overall levels of benefits identified in the STAG-based appraisal.

Residual Value

7.4.11 There are likely to be significant levels of Residual Value (RV) for the suggested infrastructure proposed. This applies to all the proposals identified in this report (not just the two identified here) and hence their associated cost estimates. Consequently, any Government intervention should consider the RV in our cost estimates, since this is a potential asset transferred to the private sector.

State Aids Conditions

7.4.12 If the Government were to give support to the private sector then this is considered a State Aid. The Government can only support projects through approved schemes. Within the Highlands and Islands there is an approved scheme to support potential projects.

[86] This includes benefits from Sensitive Lorry Miles

7.4.13 If assistance is granted to any of the options identified, there are various tests which should be considered.

7.4.14 The options must be investigated to check whether any assistance will provide an economic advantage that the relevant business would not have received in the normal course of its activities. Our review of the financial tests suggests that additional funding is unlikely to be attractive to normal lenders and hence it is unlikely to be encountered in normal trade activity.

7.4.15 The effect on competition and trade should also be considered if there is a distortion of competition which benefits one company over its competitors. Most transport interventions have the potential to distort competition. However, given the support by stakeholders during the consultation process for open-access and open design arrangements for new facilities, this potential impact could be mitigated if the new options were made available to any relevant potential user. This could be achieved through some form of Quality Partnership whereby users can also be encouraged to meet certain quality criteria.

7.5 Concluding Remarks

7.5.1 Table 7.4 summarises the results from this STAG-based appraisal[87].

Table 7.4: Summary of Conclusions

RTP Area	Location	Type	Level of Investment Required	Key Findings
HITRANS	Cromarty Firth	Freight Distribution Location	Moderate	Might not be viable
	Elgin/A96	Freight Distribution Location	Minor	Could be pursued by the private sector
	Inverness	Regional Gateway	Minor	Could be pursued by the private sector
	Loch Fyne	Freight Distribution Location	Moderate	Might not be viable
Nestrans	Aberdeen	Regional Gateway	Minor	Could be pursued by the private sector
	Peterhead	Regional Gateway	Minor	Could be pursued by the private sector
SEStran	Cameron Bridge – Leven	Regional Gateway	Moderate	Requires public sector intervention
	Grangemouth	National Gateway	Moderate	Could be pursued by the private sector
	Rosyth	National Gateway	Major	Could be pursued by the private sector
SPT	Coatbridge	National Gateway	No Change	Sufficient capacity to meet demands
	Hunterston	National Gateway	Major	Could be pursued by the private sector
	Mossend	National Gateway	No Change	Sufficient capacity to meet demands
	Prestwick Airport	National Gateway	No Change	Sufficient capacity to meet demands
SWestrans	Lockerbie	Freight Distribution Location	Moderate	Requires public sector intervention
TACTRAN	Dundee	Regional Gateway	Minor	Could be pursued by the private sector
ZetTrans	Lerwick	Freight Distribution Location	No Change	Sufficient capacity to meet demands

7.5.2 Four locations were found to have sufficient capacity to meet their current and future demands. In addition, eight options were found to be financially viable and could be pursued by the private sector. Two further options were found to provide wider socio-economic benefits which could warrant public sector intervention.

[87] These results are based on the Transport Benefits and there might be other reasons for considering the implementation of these options which are not covered in STAG

Freedom of Information Statement

Scottish Government, Scottish Enterprise and Highlands & Islands Enterprise (HIE) will respect the confidentiality of any commercially sensitive information that they have access to as a result of this study.

Notwithstanding the above, we may disclose any information as required by law or judicial order. All information submitted to the Scottish Ministers may need to be disclosed and/or published by the Scottish Ministers. Without prejudice to the foregoing generality, the Scottish Ministers may disclose information in compliance with the Freedom of Information (Scotland) Act 2002, any other law, or, as a consequence of judicial order, or order by any court or tribunal with the authority to order disclosure.

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Appendix A

- *Model Technical Note*

Scottish Intermodal Freight Locations Study

Modelling Estimates Technical Note

Final Version

April 2009

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Contents

1 Introduction

1.1 Background

1.1.1 Scottish Enterprise, Scottish Government and Highlands & Islands Enterprise (HIE) appointed Scott Wilson to conduct research into the need for and potential economic contribution of multi-modal freight locations in Scotland.

1.1.2 Part of the remit was to estimate future levels of freight demand and associated freight traffic patterns to test options emerging from the stakeholder consultations carried out in previous stages of the study. Various multi-modal locations/options were identified to be appraised in the study, but before the assessment could begin it was necessary to understand how freight traffic movements will develop over time.

1.1.3 This note summarises the high-level results of the modelling exercise.

1.2 Presentation of Data

1.2.1 To help identify future freight patterns, a Scottish Freight Model (SFM) was built and calibrated to 2007 conditions using observed data collected from a series of surveys, existing databases and supplied from key stakeholders including operators consulted during the course of the study.

1.2.2 A significant element of the data provided is commercially sensitive and hence, as per our study approach, the surveys were carried out in accordance with the Market Research Society Code of Conduct (MRSCC) and the Interviewer Quality Control Scheme (IQCS), which stated all information provided by stakeholders would be treated in strict confidence and only used for this study. This is important since it facilitates a free and candid exchange of information and views from stakeholders, including operators and end-users, which would otherwise not have been available.

1.2.3 Consequently, the information can not be presented in a very detailed level, but it is possible to present information in an outline format and aggregated for the main regions across Scotland. The SFM was used under those conditions of operation and has produced estimates of future levels of freight demand and traffic patterns to take forward into the rest of the study. The estimates are for an appraisal year of 2020, which was previously discussed and agreed with the study Steering Group[1].

1.3 About this Note

1.3.1 The overall structure of this Technical Note is as follows:

- *Chapter 2 –* Outlines the freight categories coded and the modelling scenarios used;
- *Chapter 3 –* A short description of the calibration/validation results of the base model;
- *Chapter 4 –* Summarises the modelling assumptions used;
- *Chapter 5 –* High-level presentation of the modelling results produced;
- *Chapter 6 –* Sets out the estimated current and future tonnage forecasts; and
- *Chapter 7 –* Provides concluding remarks.

[1] Meeting with the Study Steering Group on 31st July 2008

2 Data Analysis and Modelling Scenarios

2.1 Analysis of Freight Data on Scotland's Priority Industries

2.1.1 Different areas of Scotland have distinct freight characteristics, patterns of movements and priorities. This is particularly relevant given the country's varying economic sectors which are the focus of the study. This includes the key priority industries. Hence, the data collected for the model has included a 4-pronged approach to gathering new information in recognition of the variations across the country and the various economic sectors.

2.1.2 Data was collected using end-user telephone surveys, origin/destination (OD) surveys of operators and carriers, a series of workshops with key stakeholders, and a targeted number of one-to-one meetings with those stakeholders who could not contribute to the other surveys.

2.1.3 To balance against the key priority industries, data was cross-referenced with the following economic sector groupings [based on the Standard Index Classifications (SIC) codes]:

1. Agriculture, Fishing and Foodstuffs;
2. Forestry and Forestry Products (timber/furniture/paper);
3. Solid Fuels and Petroleum Products;
4. Minerals, Building Materials and Construction;
5. Metal Products, Machinery and Transport Equipment;
6. Leather and Textiles, and Retail/Wholesale;
7. Fertilizers and Chemicals;
8. Electronic (white) Goods; and
9. Other/Miscellaneous.

2.1.4 Data was processed and coded into the model separately for each of the above freight commodities, allowing for a more refined analysis of future freight demands. In addition to relating to the key priority industries, the above commodity categories will also provide sufficient information for the economic analysis.

2.2 Modelling Scenarios

2.2.1 Any model is prone to variations in forecasts due to the different set of assumptions input into the model. Given the wide potential for variance, two scenarios were modelled under a series of assumptions discussed and agreed with the Steering Group for the study. These represent low growth and high growth assumptions of how the economy will develop over time, how background road traffic flows increase, the increase in the value of fuel prices over time, and other relevant factors affecting freight transport.

2.2.2 The result was a wide set of assumptions, which are set out in Chapter 4 of this report.

3 Model Validation

3.1 Introduction

3.1.1 Before we present the results of the modelling and the subsequent future demand forecasts, it is worth presenting the results of the model validation exercises carried out. This Chapter sets out the various statistical goodness-of-fit tests carried out on the developed Scottish Freight Model (SFM). In the model, there are different sizes of freight facilities. Because of the varying characteristics and in order to apply Government modelling procedures, the estimated freight tonnes are converted into Freight Carrying Units (FCUs) which standardise the containers/methods of modelling freight movements. These are then factored back into tonnes when the forecast flows are output from the model for use in the more detailed analysis. However, for the purposes of computing the calibration accuracy of the model, the validation statistical goodness-of-fit tests presented in this chapter are shown as FCUs. The exception to this is the road freight model tests which are in vehicles since they also include car trips, which are necessary to take into account the effects of highway congestion.

3.2 Trip Distribution and Mode Split Validation

3.2.1 In order to validate the trip distribution across the network for all four modes (road, sea, air and rail freight), demand matrices were contracted to sector level to reflect freight movements from and to the seven Regional Transport Partnership (RTP) areas. This also allowed validating the modal split between these sectors. Table 3.1 shows the observed total yearly tonnage of freight from/to each RTP area, for each mode of transport, compared to the values given by the model.

Table 3.1: 2007 Annual Tonnage Distribution Validation

Modelled Distribution									
RTP Area	**Total Tonnes** (x1000)	**Mode**							
		Road		**Sea**		**Air**		**Rail**	
HITRANS	40,569	17,556	*6%*	21,380	*21%*	2	*3%*	1,631	*8%*
Nestrans	43,312	35,515	*12%*	5,845	*6%*	4	*6%*	1,948	*9%*
SEStran	123,040	85,803	*28%*	31,409	*31%*	20	*31%*	5,808	*28%*
SPT	142,695	117,884	*39%*	14,993	*15%*	37	*58%*	9,782	*47%*
SWestrans	23,460	17,806	*6%*	4,610	*5%*	0	*0%*	1,044	*5%*
TACTRAN	26,617	24,567	*8%*	1,621	*2%*	0	*0%*	429	*2%*
ZetTrans	23,157	3,175	*1%*	19,981	*20%*	1	*2%*	0	*0%*
Total	**422,851**	**302,306**		**99,839**		**64**		**20,642**	
Observed Distribution									
RTP Area	**Total Tonnes** (x1000)	**Mode**							
		Road		**Sea**		**Air**		**Rail**	
HITRANS	41,460	14,454	*5%*	24,690	*23%*	2	*3%*	2,313	*11%*
Nestrans	47,118	39,018	*13%*	5,745	*5%*	4	*5%*	2,351	*11%*
SEStran	115,400	74,926	*25%*	35,073	*32%*	30	*40%*	5,372	*26%*
SPT	146,999	121,724	*40%*	16,426	*15%*	38	*51%*	8,810	*42%*
SWestrans	19,507	13,748	*5%*	4,595	*4%*	0	*0%*	1,164	*6%*
TACTRAN	37,157	34,873	*12%*	1,274	*1%*	0	*0%*	1,010	*5%*
ZetTrans	24,926	3,839	*1%*	21,086	*19%*	1	*1%*	0	*0%*
Total	**432,567**	**302,582**		**108,889**		**75**		**21,020**	

3.2.2 Results in Table 3.1 show that the modelled distribution for each mode closely replicates the observed distribution.

3.2.3 It can be seen that there is a decrease in the total number of tonnes carried by air freight, from 75 thousand tonnes observed to 64 thousand tonnes in the model. However, the most recently available observed air freight movements were for 2006 whereas the model is based on data collected for 2007, and it should be noted that the total air freight carried in Scotland actually decreased to 62 thousand tonnes in 2007, which corresponds to the modelled value.

3.2.4 Once it was ascertained that the freight distribution in the model was correct, it was then necessary to validate that the modal split is a good match to the observed mode shares. For this validation, the same matrices aggregated to sector level were used in order to obtain a representation of mode shares for flows between RTPs. The resulting mode split is illustrated in Table 3.2.

Table 3.2: 2007 Annual Modal Split Validation

RTP Area	Modelled				Observed			
	Road	Sea	Air	Rail	Road	Sea	Air	Rail
HITRANS	43%	53%	0.01%	4%	35%	59%	0.01%	6%
Nestrans	82%	13%	0.01%	4%	83%	12%	0.01%	5%
SEStran	70%	26%	0.03%	5%	65%	30%	0.02%	5%
SPT	83%	11%	0.03%	7%	83%	11%	0.03%	6%
SWestrans	76%	20%	0%	4%	70%	24%	0%	6%
TACTRAN	92%	6%	0%	2%	94%	3%	0%	3%
ZetTrans	14%	86%	0.01%	0%	15%	85%	0.01%	0%
Total Scotland	**71%**	**24%**	**0.02%**	**5%**	**70%**	**25%**	**0.02%**	**5%**

3.2.5 As can be seen from Table 3.2, the modelled split between road, sea, air and rail freight corresponds to the observed mode shares.

3.2.6 The rest of this Chapter shows the tests of the freight movement estimates across the network.

3.3 Road Freight Assignment Validation

3.3.1 Highway congestion can have a significant effect on the decision to use road transport as it can severely impact on travel time. In addition, road transport accounts for the largest share of freight distribution in Scotland. It was therefore deemed necessary for the model to accurately replicate observed levels of road freight traffic on the Scottish strategic road network.

3.3.2 To reflect better the variations of congestion throughout the day, the model was set up to assign freight over 3 time periods during an average weekday (the AM peak period, the inter-peak and the PM peak period). Applying appropriate expansion factors to each modelled period and adding together provides daily and annual flows.

3.3.3 Modelled traffic for all three periods was compared to observed flows using the GEH statistic, as recommended in Government Guidance. The form of the statistic is:

$$GEH = \sqrt{\frac{(V_2 - V_1)^2}{(V_1 + V_2)/2}}$$

where V1 is the observed value and V2 is the modelled value.

3.3.4 The recommended level of fit for a transport model is for 85% of all GEH measurements to be less than the required criteria. For strategic models covering a large area such as the Scottish Freight Model, a GEH criteria value of 10.0 is a suitable level of accuracy and was therefore used to validate the model.

3.3.5 This statistical goodness-of-fit test was carried out on all the main strategic links across the network. Table 3.3 below shows the results of the calibration for the morning peak, inter-peak and evening peak periods. In summary, the results show the following:

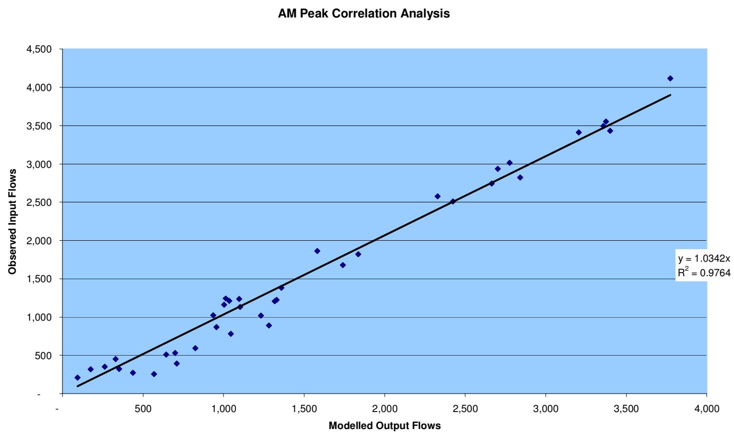
- there are 38 calibration sites in each time period;
- 92% sites are calibrated during the AM Peak using the criteria defined above;
- 87% sites are calibrated during the Inter Peak;
- 89% sites are calibrated during the PM Peak; and
- the average GEH across the network is 3.2 for the AM peak, 4.0 for the Inter Peak and 3.9 for the PM Peak period.

3.3.6 The above results are all above the required validation criteria.

Table 3.3: 2007 Road Freight Assignment Validation Tests

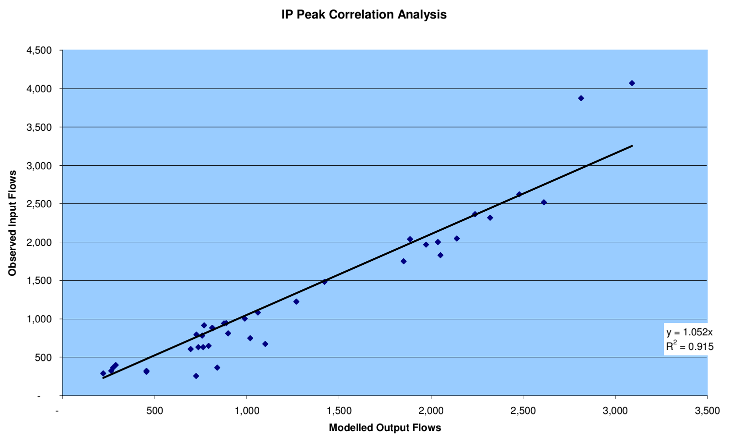
Road	Direction	AM Peak			Inter Peak			PM Peak		
		Flow (veh)		GEH	Flow (veh)		GEH	Flow (veh)		GEH
		Observed	Modelled		Observed	Modelled		Observed	Modelled	
A9	Northbound	322	351	**1.6**	309	455	**7.5**	387	4367	**2.5**
A9	Southbound	274	437	**8.7**	321	456	**6.8**	422	507	**4.0**
A96	Westbound	254	568	**15.5**	364	840	**19.4**	888	1,062	**5.6**
A96	Eastbound	392	709	**13.5**	257	724	**21.1**	225	698	**22.0**
A90	Northbound	890	1280	**11.8**	674	1099	**14.3**	901	1,531	**18.1**
A90	Southbound	782	1045	**8.7**	750	1019	**9.0**	886	1,264	**11.5**
A9	Northbound	509	644	**5.6**	608	695	**3.4**	723	796	**2.6**
A9	Southbound	532	699	**6.7**	631	736	**4.0**	649	843	**7.1**
A9	Northbound	1131	1102	**0.9**	1001	990	**0.4**	1238	1,405	**4.6**
A9	Southbound	1206	1318	**3.1**	1084	1061	**0.7**	1358	1,252	**2.9**
A82	Northbound	352	262	**5.1**	397	287	**5.9**	528	503	**1.1**
A82	Southbound	453	329	**6.3**	365	274	**5.1**	491	367	**6.0**
A8	Westbound	1862	1582	**6.7**	877	815	**2.1**	1372	1,144	**6.4**
A8	Eastbound	1213	1034	**5.3**	916	768	**5.1**	1429	1,171	**7.2**
A737	Northbound	1384	1359	**0.7**	632	763	**5.0**	634	883	**9.1**
A737	Southbound	594	823	**8.6**	647	792	**5.4**	1423	1,653	**5.9**
A77	Northbound	1243	1014	**6.8**	941	876	**2.2**	957	927	**1.0**
A77	Southbound	1024	936	**2.8**	946	887	**1.9**	1494	1,172	**8.8**
M8	Westbound	3552	3373	**3.0**	4073	3092	**16.4**	3308	3,159	**2.6**
M8	Eastbound	4117	3772	**5.5**	3874	2815	**18.3**	4926	3,534	**21.4**
A80	Northbound	2576	2328	**5.0**	2040	1887	**3.5**	2421	2,335	**1.8**
A80	Southbound	2824	2841	**0.3**	2048	2139	**2.0**	2470	2,423	**0.9**
A8	Westbound	3411	3205	**3.6**	2517	2612	**1.9**	3326	3,205	**2.1**
A8	Eastbound	3016	2774	**4.5**	2317	2321	**0.1**	3122	2,879	**4.4**
M74	Northbound	3497	3357	**2.4**	2362	2238	**2.6**	2471	2,477	**0.1**
M74	Southbound	2937	2703	**4.4**	2622	2479	**2.8**	3699	3,373	**5.5**
M9	Westbound	1236	1097	**4.1**	880	811	**2.4**	1755	1,645	**2.7**
M9	Eastbound	1679	1739	**1.5**	812	898	**2.9**	1146	1,255	**3.1**
A90 (Forth Br.)	Northbound	2742	2664	**1.5**	1749	1851	**2.4**	3092	3,015	**1.4**
A90 (Forth Br.)	Southbound	2511	2423	**1.8**	1967	1972	**0.1**	2776	2,920	**2.7**
M8	Westbound	1822	1836	**0.3**	1999	2036	**0.8**	3339	3,205	**2.3**
M8	Eastbound	3432	3399	**0.6**	1830	2052	**5.0**	1892	2,037	**3.3**
M74	Northbound	1021	1231	**6.3**	1481	1422	**1.6**	1308	1,410	**2.8**
M74	Southbound	1222	1329	**3.0**	1226	1268	**1.2**	1269	1,279	**0.3**
A1	Westbound	208	93	**9.4**	323	264	**3.4**	344	234	**6.4**
A1	Eastbound	320	174	**9.3**	291	220	**4.4**	255	177	**5.3**
A701	Northbound	870	955	**2.8**	782	758	**0.9**	1040	959	**2.6**
A701	Southbound	1160	1003	**4.8**	795	727	**2.5**	801	803	**0.1**
Total		58,570	57,790	**3.2**	46,700	45,838	**4.0**	59,111	58,174	**3.9**

3.3.7 Additionally to the GEH criteria, a comparison of observed and modelled flows using regression analysis was undertaken. For this analysis, the more R^2 (the correlation coefficient) tends to 1, the more accurate the result. Given the scale of the model, it was considered than any value above 0.75 could be considered suitable.

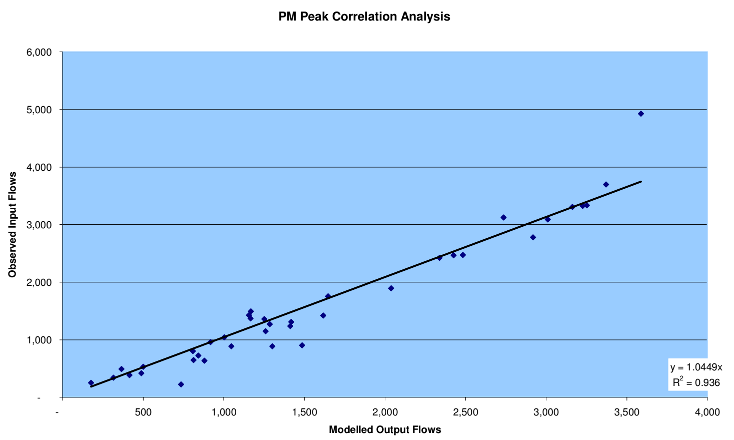


3.3.8 The results are shown in the figures to the right, which plot the regression analysis for the three modelled periods, with the best-fit straight line and the R^2 value.

3.3.9 As can be seen on these plots, there is a close fit between the data points and the curve, with R^2 above 0.90 for all three periods. The regression analysis thus confirms the good correlation between modelled and observed values of traffic.



3.3.10 Calibration of the road assignment, through both GEH criteria and regression analysis, shows that the model is a good representation of traffic observed on the Scottish strategic road network. This will consequently ensure that levels of congestion and the resulting journey times are accurately reproduced in the model and that any future congestion forecast will be based on an adequate base model.

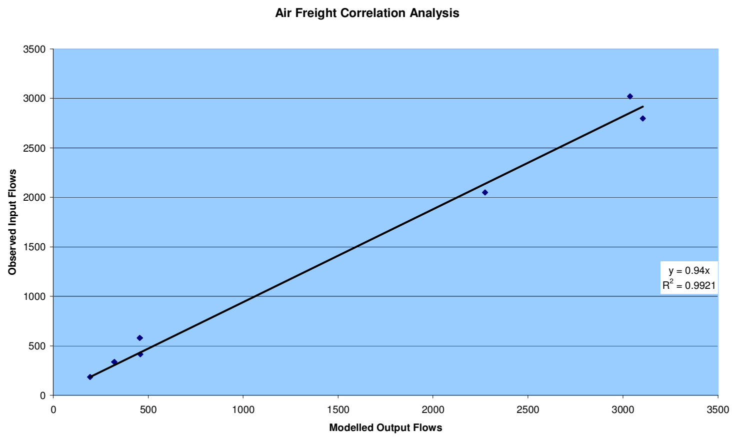


3.4 Air Freight Assignment Validation

3.4.1 As for the road freight assignment, the GEH criteria analysis was undertaken for the validation of the air freight assignment on major air freight services. Results are illustrated in the following table.

Table 3.4: Air Freight Assignment Validation Tests

Service	Flows (FCUs)		GEH Stat.
	Observed	Modelled	
Edinburgh-Europe	3019	3037	**0.3**
Prestwick-Europe	2049	2273	**4.8**
Edinburgh-London	335	321	**0.8**
Prestwick-Ireland	414	459	**2.2**
Prestwick-Rest of the World	2798	3104	**5.6**
Glasgow-Rest of the World	580	456	**5.4**
Aberdeen-Europe	185	194	**0.7**
Total	9,380	9,844	**4.7**



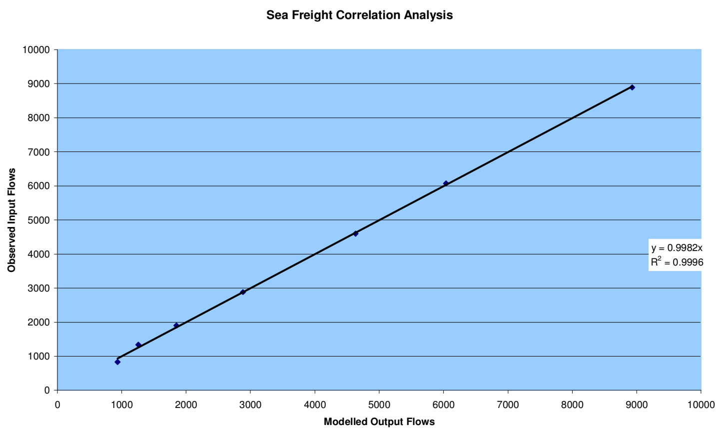
3.4.2 GEH statistics show that assigned flows of air freight are a good replication of values observed on the main services. In addition, regression analysis was also carried out and the plots are shown in the figure above. The results show an R^2 value of 0.992 which is significantly above the goodness-of-fit threshold of 0.75.

3.5 Sea Freight Assignment Validation

3.5.1 In terms of sea freight validation, analysis of the total amount of freight to and from the major ports in Scotland was undertaken, as well as movements between Scotland and Continental Europe, Ireland and the rest of the world. Results are illustrated in the following table.

Table 3.5: Sea Freight Assignment Tests

Service	Daily Flows (FCU)		GEH Stat.
	Observed	Modelled	
From/to Aberdeen	834	933	**3.3**
From/to Rosyth & Grangemouth	6067	6040	**0.3**
From/to Inverness, Cromarty Forth, Glensanda	1900	1849	**1.2**
From/to Glasgow & Clyde	2881	2883	**0.0**
Between Scotland and Europe	8892	8931	**0.5**
Between Scotland and Rest of the World	4594	4633	**0.6**
Between Scotland and Ireland	1334	1258	**2.1**
Total	26,502	26,527	**0.2**



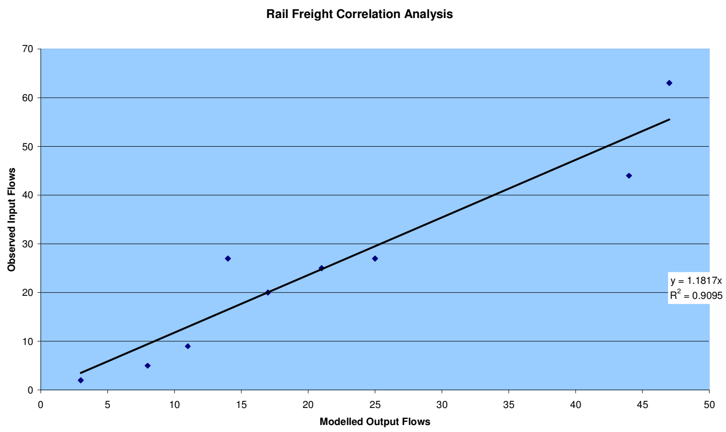
3.5.2 GEH statistics show that assigned amounts of sea freight replicate closely observed values, with a maximum GEH of 3.3. Regression analysis was also carried out and can be seen in the figure above. The R^2 value of 0.9996 is significantly above the threshold of 0.75.

3.6 Rail Freight Assignment Validation

3.6.1 For rail freight validation, the number of daily services on strategic railway links was compared to the number of services per day in the model. Results are illustrated in the following table.

Table 3.6: Rail Freight Assignment Validation Tests

Link	Daily Services (FCUs-Trains)		GEH Stat.
	Observed	Modelled	
Perth-Aberdeen	9	11	**0.7**
Perth-Inverness	5	8	**1.2**
Aberdeen-Inverness	2	3	**0.6**
Northeast Glasgow	44	44	**0.0**
West Coast Main Line Corridor	63	47	**2.1**
East Coast Main Line Corridor	25	21	**0.8**
Grangemouth-Perth	27	25	**0.4**
Edinburgh-Grangemouth	27	14	**2.9**
Glasgow Southwest (GSW Line)	20	17	**0.8**
Total	222	190	**2.2**



3.6.2 GEH statistics show that assigned rail freight services replicate closely observed values, with a maximum GEH of 2.9. As with the other modes, regression analysis was carried out and produced a statistically significant R^2 of 0.9095.

4 Modelling Assumptions

4.1 Introduction

4.1.1 A meeting was held with the Study Steering Group on 31 July 2008 to discuss and agree the modelling assumptions. This chapter sets out these assumptions.

4.2 Reference Case schemes

4.2.1 In order to model future scenarios across the transport network, it is important to compare against a Reference Case (or Do-Minimum Scenario). This takes into account planned and committed schemes which will occur and allow for comparison against the future state of the network. The most recent version of the Transport Model for Scotland[2] at the time of the study had defined the following Reference Case of committed transport schemes for inclusion in future demand modelling:

By 2012

- M74 Completion;
- M9 Spur Extension;
- Finnieston Bridge;
- A68 Northern Bypass;
- Ferrytoll Link Road;
- New Forth Crossing;
- Alloa – Stirling – Glasgow Rail Service;
- M8 Upgrade;
- Airdrie – Bathgate Rail Reopening;
- Edinburgh Tram Lines;
- Edinburgh Airport Rail Link (removed – see paragraph 4.2.2);
- Glasgow Airport Rail Link;
- Borders Rail Service;
- M80 Upgrade;
- A801 Upgrade; and
- Aberdeen Western Peripheral Road.

By 2022

- Rosyth Bypass.

[2] Transport Model for Scotland (TMfS:05a,) Transport Scotland 2008

4.2.2 Originally the Reference Case included the Edinburgh Airport Rail Link which is no longer being pursued in its previous form, and hence was removed from the Reference Case.

4.2.3 It was also agreed the schemes entered into the model should not include any outputs from Strategic Transport Projects Review[3].

4.2.4 Consideration was also given to Road Pricing but that was also ruled out of the assumptions.

4.3 Economic and Population Growth Rates

4.3.1 Unit 3.5.6 of the DfT's WebTAG[4] sets out assumptions for future growth scenarios. Scottish Government have adopted these for transport modelling. These include forecasts for GDP which are produced by HM Treasury. Table 4.1 below sets out the Government values.

Table 4.1: Government Growth Rates

Range of Years	GDP Growth (%pa)	Population Growth (%pa)
2002-2003	2.25	0.27
2003-2004	2.50	0.27
2004-2005	3.50	0.28
2005-2006	3.25	0.28
2006-2007	2.75	0.28
2007-2011	2.50	0.29
2011-2021	2.25	0.31
2021-2031	1.75	0.20
2031-2051	2.00	0.01
2051-2061	1.75	-0.06
2061 onwards	2.00	0.00

4.3.2 Base population and employment data is sourced from the DfT's TEMPRO database, as per standard Government modelling guidance. Version 5.3 of TEMPRO (October 2006) has been used which had the most recent database at the time of the study.

4.3.3 Government's NRTF Guidance (November 2005) assumes the average household size falling by 17% between 1996 to 2031. This was used when required.

4.4 Growth in Values of Time

4.4.1 Economic assessments and transport modelling require average values of time for different modes to input into estimating the attractiveness of one mode against another, thereby identifying modal choice and routeing. Base values of time to be used in the modelling are those set out in Unit 3.5.6 of WebTAG, as per Government standards. This also includes the growths in future values of time shown in Table 4.2.

[3] Strategic Transport Projects Review, Transport Scotland, December 2008
[4] WebTAG, Department for Transport, 2005

Table 4.2: Forecast Growth in Values of Time

Range of Years	Work VOT Growth (%pa)	Non-Work VOT Growth (%pa)
2002-2003	1.98	1.58
2003-2004	2.22	1.78
2004-2005	3.21	2.57
2005-2006	2.96	2.37
2006-2007	2.46	1.97
2007-2011	2.20	1.76
2011-2021	1.94	1.55
2021-2031	1.55	1.24
2031-2051	1.99	1.59
2051-2061	1.81	1.45
2061 onwards	2.00	1.60

4.5 Growth Rates of Road Traffic

4.5.1 Government National Road Traffic Forecasts (November 2005) set out forecasts of road traffic growth for national appraisal. These are summarised in Table 4.3 for different vehicle types.

Table 4.3: Traffic Growth by Vehicle Types

	Cars			LGVs			Rigid HGVs			Artic HGVs			PSVs			Total traffic		
	Low	[1]Cen	High	Low	[1]Cen	High	Low	[1]Cen	High	Low	[1]Cen	High	Low	[1]Cen	High	Low	[1]Cen	High
A: 1996 traffic (bn kms)		362.3			40.4			19.0			11.7			4.9			438.3	
1996 = 100		100			100			100			100			100			100	
2001	103	109	114	109	115	121	98	104	109	108	114	120	98	103	109	103	109	115
2006	110	118	126	120	129	138	100	108	115	120	129	138	100	107	114	110	119	127
2011	116	127	137	131	144	156	103	112	122	133	146	158	101	111	120	117	128	139
2016	122	136	149	145	161	177	106	117	129	148	165	181	104	115	127	124	138	151
2021	126	143	159	158	179	200	109	123	137	164	186	207	106	120	134	129	146	163
2026	128	148	167	172	198	225	112	129	146	180	208	235	109	126	143	132	153	173
2031	130	153	175	185	218	251	115	136	156	196	231	265	113	133	153	136	160	184

B: Annual %	Cars			LGVs			Rigid HGVs			Artic HGVs			PSVs			Total traffic		
growth rates	Low	Cen	High	Low	Cen	High	Low	Cen	High	Low	Cen	High	Low	Cen	High	Low	Cen	High
1996 - 2001	0.56%	1.65%	2.69%	1.77%	2.87%	3.93%	-0.35%	0.72%	1.76%	1.53%	2.63%	3.68%	-0.39%	0.68%	1.72%	0.65%	1.74%	2.79%
2001 - 2006	1.31%	1.65%	1.95%	1.93%	2.27%	2.58%	0.43%	0.77%	1.07%	2.21%	2.55%	2.85%	0.34%	0.68%	0.98%	1.35%	1.69%	1.99%
2006 - 2011	1.11%	1.46%	1.76%	1.82%	2.17%	2.48%	0.46%	0.80%	1.10%	2.09%	2.44%	2.74%	0.34%	0.69%	0.99%	1.18%	1.53%	1.83%
2011 - 2016	1.01%	1.37%	1.67%	1.92%	2.29%	2.59%	0.55%	0.91%	1.20%	2.15%	2.52%	2.82%	0.41%	0.77%	1.07%	1.12%	1.48%	1.78%
2016 - 2021	0.64%	1.01%	1.31%	1.83%	2.21%	2.51%	0.57%	0.94%	1.24%	2.01%	2.39%	2.69%	0.50%	0.87%	1.17%	0.81%	1.19%	1.49%
2021 - 2026	0.30%	0.69%	0.98%	1.67%	2.06%	2.36%	0.60%	0.99%	1.29%	1.89%	2.27%	2.58%	0.59%	0.97%	1.27%	0.53%	0.91%	1.21%
2026 - 2031	0.28%	0.67%	0.97%	1.49%	1.89%	2.19%	0.60%	1.00%	1.30%	1.73%	2.13%	2.44%	0.66%	1.06%	1.36%	0.49%	0.89%	1.19%

[1]Cen = central most-likely forecast

4.5.2 The National Road Traffic Forecasts consider the Central Scenario as being the most likely and should be adopted.

4.6 Growth in Fuel Costs

4.6.1 Fuel costs have changed dramatically in recent months. Growths in fuel prices are monitored for the Government in the Baxter Indices for DERV fuel website and are shown in Table 4.4.

Table 4.4: Recent Changes in Fuel Prices

Base:	June 1990 = 100		On Year	On Quarter	On Month
Date	Index	Status			
Jan-07	257	Firm	-5.9	-2.7	-3
Feb-07	260	Firm	-3.7	-0.8	1.2
Mar-07	264	Firm	-3.3	-0.4	1.5
Apr-07	271	Firm	-1.8	5.4	2.7
May-07	271	Firm	-3.2	4.2	0
Jun-07	277	Firm	-0.7	4.9	2.2
Jul-07	278	Firm	-1.4	2.6	0.4
Aug-07	279	Revised	-1.1	3	0.4
Sep-07	286	Firm	5.1	3.2	2.5
Oct-07	295	Firm	11.7	6.1	3.1
Nov-07	312	Firm	19.1	11.8	5.8
Dec-07	311	Firm	17.4	8.7	-0.3
Jan-08	313	Firm	21.8	6.1	0.6
Feb-08	318	Firm	22.3	1.9	1.6
Mar-08	329	Provisional	24.6	5.8	3.5
Apr-08	338	Provisional	24.7	8	2.7
May-08	357	Provisional	31.7	12.3	5.6

Time of Update : (at time of study) 16 June 2008

4.6.2 The recent observed changes in fuel can be compared to the assumptions and future forecasts set out in the Government's WebTAG modelling guidance, shown in Table 4.5.

Table 4.5: Forecast Growth in the Cost of Fuel

Range of Years	Petrol (%pa)	Diesel (%pa)
2005 - 2006	8.12	6.53
2006 - 2007	-6.37	-6.30
2007 - 2008	-7.46	-7.33
2008 - 2009	-8.06	-7.91
2009 - 2010	-6.93	-6.79
2010 - 2015	0.80	0.78
2015 - 2020	0.86	0.84
2020 +	0	0

4.6.3 The assumption is fuel prices have grown significantly recently but will revert back to previous levels and grow at a modest level until 2020 when they will level off.

4.7 Rates of Change in Non-Fuel vehicle operating costs (VOCs)

4.7.1 Government WebTAG circular Unit 3.5.6 advises non-fuel VOCs are assumed to remain constant in real terms over the forecast period. This assumption is made because the main elements which make up non-fuel VOCs are subject to less volatility than fuel VOCs.

5 Future Forecasts

5.1 Introduction

5.1.1 In order to assess the changes of freight movements in the future, a horizon year of 2020 was discussed with the Steering Group as being a suitable future modelling year. There was a need to model two extreme scenarios to take into account the wide range of potential assumptions. In particular, two different scenarios were appraised:

- 2020 with low level of freight growth; and
- 2020 with high level of freight growth.

5.1.2 The Low Growth Scenario was based on all the assumptions in Chapter 4, except fuel prices were assumed to be higher than default values in WebTAG to reflect the spike in prices observed at the time of the analysis (July 2008). Therefore the observed fuel prices in Table 4.4 were used. The High Growth Scenario, however, assumed fuel prices would be lower and therefore there would be a higher propensity to travel. Hence, the default (lower) values from WebTAG were used as per Table 4.5. In addition, in the High Growth Scenario it was assumed there would be a higher uptake of piping fuel rather than transporting by sea. The default rate of piping fuel was sourced from the Scottish Transport Statistics[5].

5.2 Overall Freight Demand

5.2.1 Before looking at individual RTP areas, the overall changes in the demand for freight, by commodity based on the categories outlined in Chapter 2, are highlighted. Table 5.1 shows the 2007 levels and estimated changes by 2020 for both low and high growth scenarios.

Table 5.1: Forecast Annual Freight Tonnage per Commodity

Commodity	Tonnes (x1000)					
	2007*		2020 Low Growth		2020 High Growth	
Agriculture, Fishing & foodstuffs	11,923	*3%*	15,864	*3%*	17,941	*3%*
Forestry and forestry products	31,899	*8%*	54,053	*10%*	64,358	*11%*
Solid Fuel & petroleum** products	122,133	*29%*	82,672	*16%*	60,037	*11%*
Minerals, building materials & construction	31,465	*7%*	44,570	*9%*	51,518	*9%*
Metal products, machinery & transport equipments	1,765	*0.4%*	2,533	*0.5%*	2,928	*0.5%*
Leather, textiles & retail/wholesale	31,476	*7%*	45,497	*9%*	54,640	*10%*
Fertilisers & chemicals	1,781	*0.4%*	2,172	*0.4%*	2,393	*0.4%*
Electronics goods	21	*0%*	29	*0%*	38	*0%*
Other/Miscellaneous	190,388	*45%*	272,089	*52%*	314,999	*55%*
Total	**422,851**	**100%**	**519,479**	**100%**	**568,852**	**100%**
Index	*100*		*123*		*135*	

Note: * includes intra-zonal and OD double-counting
** the petroleum industry is assumed to continue its current trend of increasing movement of petroleum products by pipelines and the high growth assumes a higher take-up compared to the low growth

[5] Scottish Transport Statistics, No27, Scottish Government, December 2008.

5.2.2 These growth rates are different for each transport mode, resulting in an altered 2020 mode split. Additionally, these rates are different for all commodities which results in a modified distribution between sectors, the composition of freight being different between each RTP.

5.3 Forecast by RTP Area

5.3.1 The 2020 trip distribution and mode split for both low and high growth scenarios are illustrated in the following tables, with the 2007 figures for comparison.

Table 5.2: 2020 Forecasts by Distribution & Mode Split – Low and High Growth Scenarios

Base 2007													
RTP	Tonnes	Distribution per Mode								Mode Split			
	(x1000)	Road		Sea		Air		Rail		Road	Sea	Air	Rail
HITRANS	40,569	17,556	*6%*	21,380	*21%*	2	*3%*	1,631	*8%*	43%	53%	0.01%	4%
Nestrans	43,312	35,515	*12%*	5,845	6%	4	*6%*	1,948	*9%*	82%	13%	0.01%	4%
SEStran	123,040	85,803	*28%*	31,409	*31%*	20	*31%*	5,808	*28%*	70%	26%	0.02%	5%
SPT	142,695	117,884	*39%*	14,993	*15%*	37	*58%*	9,782	*47%*	83%	11%	0.03%	7%
SWestrans	23,460	17,806	*6%*	4,610	*5%*	0	*0%*	1,044	*5%*	76%	20%	0%	4%
TACTRAN	26,617	24,567	*8%*	1,621	*2%*	0	*0%*	429	*2%*	92%	6%	0%	2%
ZetTrans	23,157	3,175	*1%*	19,981	*20%*	1	*2%*	0	*0%*	14%	86%	0.01%	0%
Total	**422,851**	**302,306**		**99,839**		**64**		**20,642**		**71%**	**24%**	**0.02%**	**4.9%**

2020 – Low Growth Hypothesis													
RTP	Tonnes	Distribution per Mode								Mode Split			
	(x1000)	Road		Sea		Air		Rail		Road	Sea	Air	Rail
HITRANS	47,473	22,346	*6%*	22,599	*22%*	3	*4%*	2,525	*8%*	47%	48%	0.01%	5%
Nestrans	54,185	45,209	*12%*	5,957	*6%*	5	*6%*	3,014	*9%*	83%	11%	0.01%	6%
SEStran	147,437	109,224	*28%*	29,198	*28%*	27	*32%*	8,989	*28%*	74%	20%	0.02%	6%
SPT	185,106	150,060	*39%*	19,860	*19%*	47	*56%*	15,139	*47%*	81%	11%	0.03%	8%
SWestrans	30,280	22,667	*6%*	5,997	*6%*	0	*0%*	1,616	*5%*	75%	20%	0%	5%
TACTRAN	33,677	31,271	*8%*	1,744	*2%*	0	*0%*	662	*2%*	93%	5%	0%	2%
ZetTrans	21,320	4,041	*1%*	17,277	*17%*	2	*2%*	0	*0%*	19%	81%	0.01%	0%
Total Scotland	**519,479**	**384,818**		**102,632**		**84**		**31,947**		**74%**	**20%**	**0.02%**	**6%**

2020 – High Growth Hypothesis													
RTP	Tonnes	Distribution per Mode								Mode Split			
	(x1000)	Road		Sea		Air		Rail		Road	Sea	Air	Rail
HITRANS	50,919	24,522	*6%*	23,132	*22%*	4	*4%*	3,261	*8%*	48%	45%	0.01%	6%
Nestrans	59,647	49,612	*12%*	6,135	*6%*	7	*6%*	3,892	*9%*	83%	10%	0.01%	7%
SEStran	160,029	119,858	*28%*	28,529	*27%*	38	*33%*	11,605	*28%*	75%	18%	0.02%	7%
SPT	206,062	164,669	*39%*	21,784	*21%*	63	*55%*	19,546	*47%*	80%	11%	0.03%	9%
SWestrans	34,503	24,874	*6%*	7,542	*7%*	0	*0%*	2,087	*5%*	72%	22%	0%	6%
TACTRAN	36,972	34,315	*8%*	1,802	*2%*	0	*0%*	855	*2%*	93%	5%	0%	2%
ZetTrans	20,719	4,435	*1%*	16,282	*15%*	2	*2%*	0	*0%*	21%	79%	0.01%	0%
Total Scotland	**568,852**	**422,285**		**105,206**		**114**		**41,246**		**74%**	**18%**	**0.02%**	**7%**

5.3.2 Results show that there is a 23% overall increase in freight in the Low Growth scenario and a 35% increase in the High Growth scenario (modal split totals in the growth scenario tables above may not add up to 100% due to rounding).

5.3.3 The large majority of this increase in freight concerns road transport, with a growth of 27% in the Low Growth scenario and 40% in the High Growth scenario (i.e. 384,818 divided by 302,306 equals 1.27 and similarly 422,285 divided by 302,306 equals 1.40). As a result, the proportion of freight being carried by road rises from 71% in 2007 to 74% in both 2020 scenarios.

5.3.4 The share of sea freight decreases slightly because of the drop in fuel transported by ship. The total decrease in sea freight is 4% in the Low Growth scenario and 6% in the High Growth scenario.

5.3.5 Rail freight experiences significant growth; 50% in the Low Growth scenario and 100% in the High Growth scenario. The latter is comparable to the Scottish RUS[6] which estimated a 90% increase over 10 years (our forecasts are over 13 years). This results in a marginal increase in mode share, from 5% in 2007 to 6% and 7% in 2020 for Low Growth and High Growth respectively.

5.3.6 The amount of air freight rises, particularly in the High Growth scenario, but stays at a low level compared with other modes and its share consequently remains low.

[6] Scottish Route Utilisation Strategy (RUS), Network Rail, 2006

6 Current & Estimated Tonnage Forecasts by RTP

6.1 Introduction

6.1 The current and estimated tonnage forecasts by Regional Transport Partnership (RTP) were then computed. In terms of origins/destinations, the largest freight flows both within Scotland and external to the country are to and from the SPT and SEStran RTP areas. This is seen in Figures 6.1 to 6.4.

Figure 6.1: Domestic Freight by Origin – 2007 Annual Tonnage

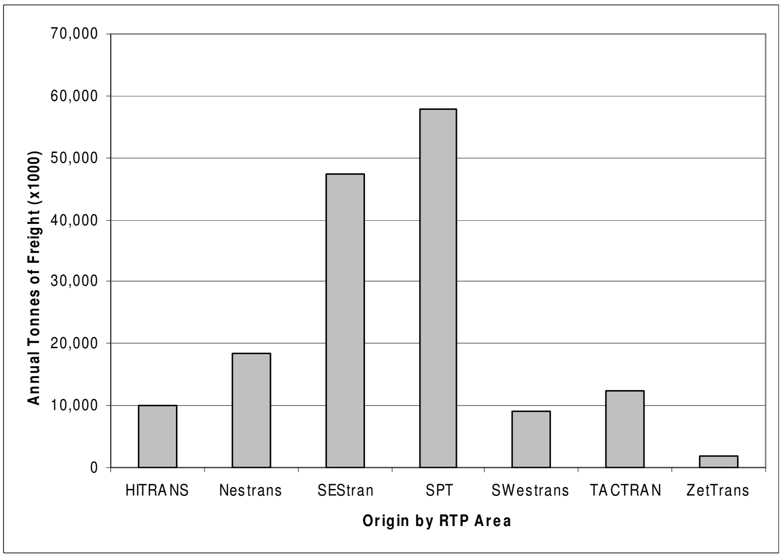


Figure 6.2: Domestic Freight by Destination– 2007 Annual Tonnage

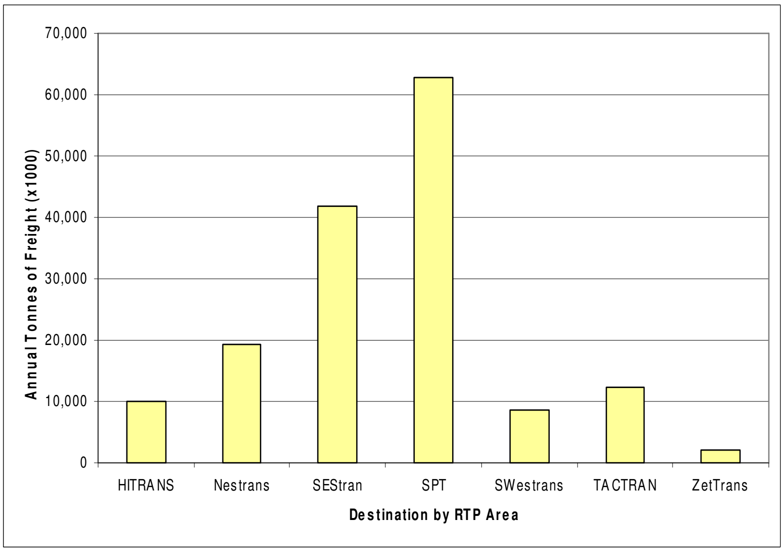


Figure 6.3: Exported Freight by Origin– 2007 Annual Tonnage

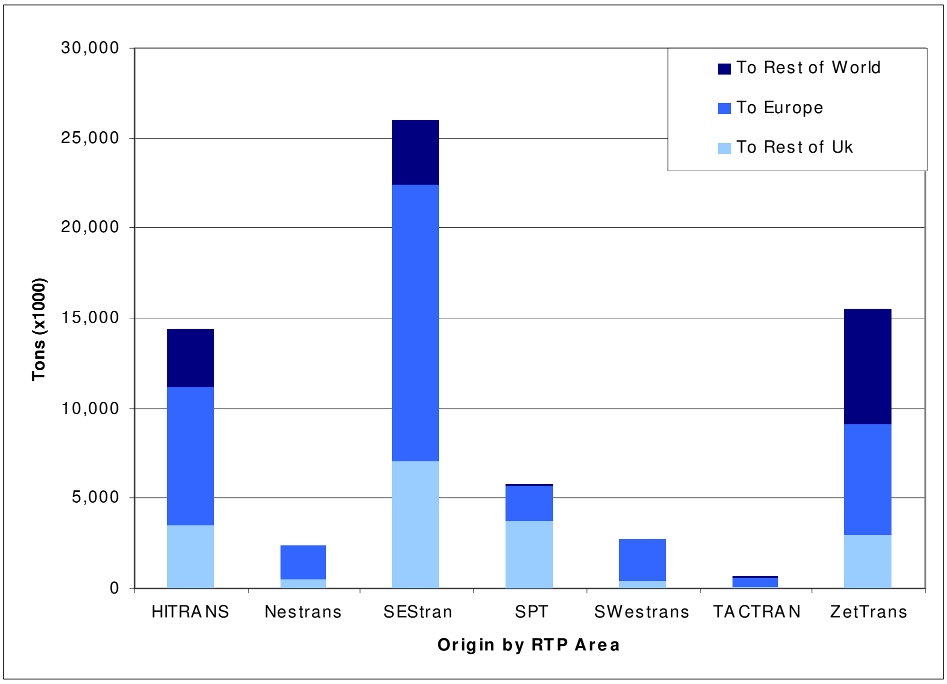
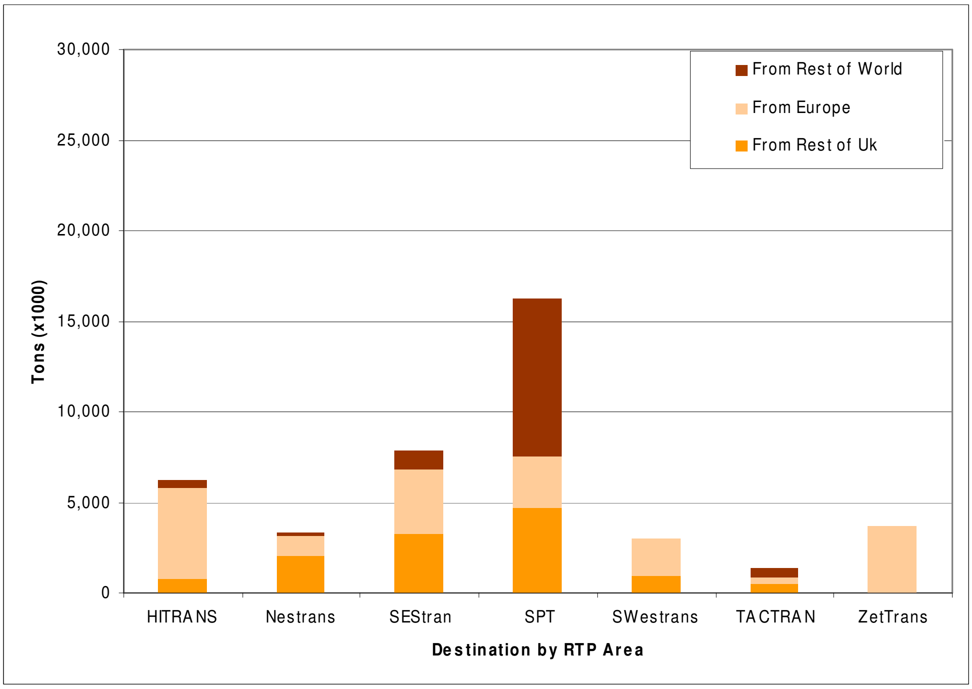


Figure 6.4: Exported Freight by Destination– 2007 Annual Tonnage



6.2 Figures 6.1 to 6.4 suggest the origin/destination of freight tonnage is highest:

- from SEStran to the rest of the UK and Europe;
- from the rest of the UK to SPT;
- between SPT and SEStran and to other parts Scotland to/from these RTPs;
- from ZetTrans to Europe and the rest of the world, signifying flows of oil and oil-based products (water freight only); and
- from HITRANS to Europe, indicating the importance of freight flows of forestry and forestry products between the region and areas such as Scandinavia.

6.3 Table 6.1 overleaf shows the breakdown of these movements for 2007 and 2020 Low and High Growth Scenarios.

Table 6.1: Annual Freight Movements

2007 Annual Freight Movements (x1000 Tonnes)

	Within Scotland		To/From Scotland						Total
	Origin	Destination	Origin			Destination			
			Rest of UK	Europe	Rest of World	Rest of UK	Europe	Rest of World	
HITRANS	10,010	9,974	3,493	7,646	3,230	782	5,025	410	40,569
Nestrans	18,355	19,209	519	1,828	77	2,009	1,145	171	43,312
SEStran	47,442	41,770	7,109	15,268	3,590	3,250	3,600	1,011	123,040
SPT	57,893	62,784	3,772	1,969	38	4,715	2,803	8,722	142,695
SWestrans	9,000	8,686	465	2,289	0	933	2,087	0	23,460
TACTRAN	12,313	12,313	72	527	57	476	406	454	26,617
ZetTrans	1,854	2,132	3,019	6,115	6,353	0	3,683	0	23,157
Total	**156,867**	**156,867**	**18,450**	**35,642**	**13,344**	**12,165**	**18,749**	**10,769**	**422,851**

2020 Low Growth Annual Freight Movements (x1000 Tonnes)

	Domestic		International						Total
	Origin	Destination	Origin			Destination			
			Rest of UK	Europe	Rest of World	Rest of UK	Europe	Rest of World	
HITRANS	12,955	12,462	4,363	9,017	2,796	1,128	4,394	359	47,473
Nestrans	23,379	24,403	669	2,024	88	2,152	1,264	206	54,185
SEStran	60,301	53,624	6,822	13,568	3,135	4,292	4,278	1,416	147,437
SPT	74,317	80,760	5,202	2,516	38	6,709	3,013	12,552	185,106
SWestrans	11,566	11,060	651	2,977	0	1,311	2,715	0	30,280
TACTRAN	15,671	15,652	85	539	86	708	521	415	33,677
ZetTrans	2,264	2,493	2,609	5,283	5,489	0	3,182	0	21,320
Total	**200,452**	**200,452**	**20,400**	**35,925**	**11,632**	**16,301**	**19,367**	**14,948**	**519,479**

2020 High Growth Annual Freight Movements (x1000 Tonnes)

	Domestic		International						Total
	Origin	Destination	Origin			Destination			
			Rest of UK	Europe	Rest of World	Rest of UK	Europe	Rest of World	
HITRANS	14,394	13,649	4,756	9,561	2,638	1,418	4,164	340	50,919
Nestrans	25,802	26,859	797	2,170	95	2,340	1,358	225	59,647
SEStran	66,466	59,355	6,860	13,017	2,969	5,081	4,705	1,576	160,029
SPT	82,239	89,524	6,082	2,739	40	8,119	3,267	14,052	206,062
SWestrans	12,835	12,162	778	3,741	0	1,573	3,414	0	34,503
TACTRAN	17,195	17,168	90	544	96	900	575	403	36,972
ZetTrans	2,451	2,663	2,458	4,978	5,172	0	2,998	0	20,719
Total	**221,381**	**221,381**	**21,821**	**36,750**	**11,011**	**19,430**	**20,481**	**16,597**	**568,852**

7 Concluding Remarks

7.1 Introduction

7.1.1 This modelling note has outlined the development and validation of the Scottish Freight Model, used in the study into the need for and potential economic contribution of multi-modal freight locations in Scotland, and also presented some of the estimates produced.

7.2 Data Collection Process

7.2.1 Different areas of Scotland have distinct freight characteristics, patterns of movements and priorities. This is particularly relevant given the country's varying economic sectors which are the focus of the study. Hence, the data collected for the model has included a 4-pronged approach to gathering new information in recognition of the variations across the country and the various economic sectors.

7.2.2 Data was collected using end-user telephone surveys, origin/destination (OD) surveys of operators and carriers, a series of workshops with key stakeholders, and a targeted number of one-to-one meetings with those stakeholders who could not contribute to the other surveys. Data was also supplied from some operators.

7.3 Model Validation Results

7.3.1 Having developed the model various adjustments were made to calibrate the model to observed demand and movement patterns. In addition, a number of rigorous statistical goodness-of-fit tests were carried out on the model to confirm it reasonably represented freight transport conditions.

7.3.2 In order to validate the trip distribution across the network for all four modes (road, sea, air and rail freight), demand matrices were contracted to sector level to reflect freight movements from and to the seven Regional Transport Partnership (RTP) areas. This also allowed validating the modal split between these sectors.

7.3.3 A number of tests were carried out for road, rail, air and water including GEH statistics and regression analysis producing R^2 values, with R^2 values being required to meet a goodness-of-fit threshold of 0.75. The recommended level of fit for a transport model is for 85% of all GEH measurements to be less than the required criteria. For strategic models covering a large area such as the Scottish Freight Model, a GEH criteria value of 10.0 is a suitable level of accuracy and was therefore used to validate the model. Each of the modes fitted the required criteria of GEH statistics and R^2 values and confirmed it would provide a suitable base for forecasting of future scenarios.

7.4 Assumptions

7.4.1 Any model is prone to variations in forecasts due to the different set of assumptions being used. Given the wide potential for variance, two scenarios were modelled under a series of assumptions discussed and agreed with the Steering Group for the study. These represent low growth and high growth assumptions of how the economy and the transport network will develop over time, how background road traffic flows increase, the increase in the value of fuel prices over time, and other relevant factors affecting freight transport.

7.5 Forecasts and Results

7.5.1 Forecasts were produced for commodities for both Low and High growth scenarios and also broken down into Regional Transport Partnership (RTP) area by mode. These were then further defined to show freight flows within Scotland and links to outside. The results for each mode can be summarised as follows:

- overall, the results show that there is a 23% increase in freight in the Low Growth scenario and a 35% increase in the High Growth scenario;
- the large majority of this increase in freight concerns road transport, with a growth of 27% in the Low Growth scenario and 40% in the High Growth scenario. As a result, the proportion of freight being carried by road rises from 71% in 2007 to 74% in both 2020 scenarios;
- the share of water freight decreases slightly because of the drop in fuel transported by ship. The total decrease in sea freight is 4% in the Low Growth scenario and 6% in the High Growth scenario;
- rail freight experiences significant growth; 50% in the Low Growth scenario and 100% in the High Growth scenario. This results in a marginal increase in mode share, from 5% in 2007 to respectively 6% and 7% in 2020; and
- the amount of air freight rises, particularly in the High Growth scenario, but stays at a low level compared with other modes and its share consequently remains low.

7.5.2 In terms of major origins/destinations, the largest freight flows both within Scotland and external to the country are to and from the SPT and SEStran RTP areas. Breaking this down into RTP areas, freight flows are highest:

- from SEStran to the rest of the UK and Europe;
- from the rest of the UK to SPT;
- between SPT and SEStran and to other parts Scotland to/from these RTPs;
- from ZetTrans to Europe and the rest of the world, signifying flows of oil and oil-based products (water freight only); and
- from HITRANS to Europe, indicating the importance of freight flows of forestry and forestry products between the region and areas such as Scandinavia.

Appendix B

Financial and TEE Appraisal Results

- Financial Appraisal Tables
- TEE Tables
- - TUBA Printouts

Scottish Multi-Modal Freight Locations Study

Financial Appraisal - Low Growth Scenario

Aberdeen	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Constant prices	Year 0/0	Year 0/1	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Investment costs	£520,000	£780,000															
OMR	-	-	£67,240	£68,921	£70,644	£72,410	£74,220	£76,076	£77,978	£79,927	£81,925	£83,974	£86,073	£88,225	£90,430	£92,691	£95,008
Revenues	-	-	£234,722	£242,938	£251,441	£260,241	£269,349	£278,777	£288,534	£298,633	£309,085	£319,903	£331,099	£342,688	£354,682	£367,096	£379,944
Net Cash Flow	-£520,000	-£780,000	£167,482	£174,017	£180,797	£187,831	£195,129	£202,701	£210,556	£218,705	£227,159	£235,929	£245,026	£254,463	£264,251	£274,405	£284,936
Cumulative Cash Flow	**-£520,000**	**-£1,300,000**	**-£1,132,518**	**-£958,501**	**-£777,704**	**-£589,873**	**-£394,744**	**-£192,043**	**£18,513**	**£237,218**	**£464,377**	**£700,306**	**£945,333**	**£1,199,796**	**£1,464,047**	**£1,738,452**	**£2,023,387**
IRR	**12.05%**																

Peterhead	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Constant prices	Year 0/0	Year 0/1	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Investment costs	£172,000	£258,000															
OMR	-	-	£22,063	£22,615	£23,180	£23,760	£24,354	£24,962	£25,586	£26,226	£26,882	£27,554	£28,243	£28,949	£29,672	£30,414	£31,175
Revenues	-	-	£161,607	£167,263	£173,117	£179,176	£185,447	£191,938	£198,656	£205,609	£212,805	£220,253	£227,962	£235,941	£244,199	£252,746	£261,592
Net Cash Flow	-£172,000	-£258,000	£139,543	£144,648	£149,937	£155,416	£161,094	£166,975	£173,069	£179,383	£185,923	£192,699	£199,719	£206,992	£214,526	£222,331	£230,417
Cumulative Cash Flow	**-£172,000**	**-£430,000**	**-£290,457**	**-£145,809**	**£4,128**	**£159,545**	**£320,639**	**£487,614**	**£660,683**	**£840,066**	**£1,025,989**	**£1,218,688**	**£1,418,408**	**£1,625,400**	**£1,839,926**	**£2,062,257**	**£2,292,674**
IRR	**25.18%**																

Grangemouth	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Constant prices	Year 0/0	Year 0/1	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Investment costs	£2,304,000	£3,456,000															
OMR	-	-	£298,378	£305,837	£313,483	£321,320	£329,353	£337,587	£346,026	£354,677	£363,544	£372,633	£381,948	£391,497	£401,285	£411,317	£421,600
Revenues	-	-	£1,318,680	£1,364,834	£1,412,603	£1,462,044	£1,513,216	£1,566,178	£1,620,994	£1,677,729	£1,736,450	£1,797,225	£1,860,128	£1,925,233	£1,992,616	£2,062,358	£2,134,540
Net Cash Flow	-£2,304,000	-£3,456,000	£1,020,302	£1,058,997	£1,099,120	£1,140,724	£1,183,863	£1,228,591	£1,274,968	£1,323,052	£1,372,906	£1,424,593	£1,478,180	£1,533,736	£1,591,331	£1,651,041	£1,712,940
Cumulative Cash Flow	**-£2,304,000**	**-£5,760,000**	**-£4,739,698**	**-£3,680,701**	**-£2,581,581**	**-£1,440,856**	**-£256,994**	**£971,598**	**£2,246,566**	**£3,569,618**	**£4,942,523**	**£6,367,116**	**£7,845,296**	**£9,379,032**	**£10,970,363**	**£12,621,404**	**£14,334,344**
IRR	**15.27%**																

Leven	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Constant prices	Year 0/0	Year 0/1	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Investment costs	£5,184,000	£7,776,000															
OMR	-	-	£671,349	£688,133	£705,336	£722,970	£741,044	£759,570	£778,559	£798,023	£817,974	£838,423	£859,384	£880,869	£902,890	£925,463	£948,599
Revenues	-	-	£564,450	£584,205	£604,653	£625,815	£647,719	£670,389	£693,853	£718,138	£743,272	£769,287	£796,212	£824,079	£852,922	£882,775	£913,672
Net Cash Flow	-£5,184,000	-£7,776,000	-£106,900	-£103,928	-£100,684	-£97,154	-£93,325	-£89,181	-£84,707	-£79,886	-£74,702	-£69,136	-£63,172	-£56,789	-£49,968	-£42,688	-£34,927
Cumulative Cash Flow	**-£5,184,000**	**-£12,960,000**	**-£13,066,900**	**-£13,170,827**	**-£13,271,511**	**-£13,368,665**	**-£13,461,991**	**-£13,551,172**	**-£13,635,878**	**-£13,715,764**	**-£13,790,465**	**-£13,859,602**	**-£13,922,774**	**-£13,979,563**	**-£14,029,531**	**-£14,072,219**	**-£14,107,146**
IRR	**2.90%**																

Rosyth	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Constant prices	Year 0/0	Year 0/1	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Investment costs	£31,968,000	£47,952,000															
OMR	-	-	£1,603,674	£1,643,766	£1,684,860	£1,726,981	£1,770,156	£1,814,410	£1,859,770	£1,906,264	£1,953,921	£2,002,769	£2,052,838	£2,104,159	£2,156,763	£2,210,682	£2,265,949
Revenues	-	-	£5,165,282	£5,346,066	£5,533,179	£5,726,840	£5,927,279	£6,134,734	£6,349,450	£6,571,681	£6,801,689	£7,039,749	£7,286,140	£7,541,155	£7,805,095	£8,078,273	£8,361,013
Net Cash Flow	-£31,968,000	-£47,952,000	£3,561,608	£3,702,301	£3,848,319	£3,999,858	£4,157,123	£4,320,324	£4,489,680	£4,665,416	£4,847,768	£5,036,979	£5,233,301	£5,436,995	£5,648,332	£5,867,591	£6,095,064
Cumulative Cash Flow	**-£31,968,000**	**-£79,920,000**	**-£76,358,392**	**-£72,656,092**	**-£68,807,773**	**-£64,807,915**	**-£60,650,791**	**-£56,330,467**	**-£51,840,787**	**-£47,175,371**	**-£42,327,603**	**-£37,290,624**	**-£32,057,322**	**-£26,620,327**	**-£20,971,995**	**-£15,104,404**	**-£9,009,340**
IRR	**6.11%**																

Dundee	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Constant prices	Year 0/0	Year 0/1	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Investment costs	£201,600	£302,400															
OMR	-	-	£26,108	£26,761	£27,430	£28,115	£28,818	£29,539	£30,277	£31,034	£31,810	£32,605	£33,420	£34,256	£35,112	£35,990	£36,890
Revenues	-	-	£166,070	£171,882	£177,898	£184,124	£190,569	£197,239	£204,142	£211,287	£218,682	£226,336	£234,258	£242,457	£250,943	£259,726	£268,816
Net Cash Flow	-£201,600	-£302,400	£139,962	£145,121	£150,468	£156,009	£161,750	£167,700	£173,865	£180,253	£186,872	£193,731	£200,837	£208,201	£215,830	£223,735	£231,926
Cumulative Cash Flow	**-£201,600**	**-£504,000**	**-£364,038**	**-£218,917**	**-£68,449**	**£87,560**	**£249,310**	**£417,010**	**£590,875**	**£771,128**	**£957,999**	**£1,151,730**	**£1,352,567**	**£1,560,768**	**£1,776,598**	**£2,000,333**	**£2,232,259**
IRR	**21.97%**																

Hunterston	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Constant prices	Year 0/0	Year 0/1	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Investment costs	£60,028,800	£90,043,200															
OMR	-	-	£7,528,359	£7,716,567	£7,909,482	£8,107,219	£8,309,899	£8,517,647	£8,730,588	£8,948,852	£9,172,574	£9,401,888	£9,636,935	£9,877,859	£10,124,805	£10,377,925	£10,637,373
Revenues	-	-	£16,811,654	£17,400,062	£18,009,064	£18,639,381	£19,291,760	£19,966,971	£20,665,815	£21,389,119	£22,137,738	£22,912,559	£23,714,498	£24,544,506	£25,403,563	£26,292,688	£27,212,932
Net Cash Flow	-£60,028,800	-£90,043,200	£9,283,295	£9,683,494	£10,099,582	£10,532,163	£10,981,860	£11,449,325	£11,935,227	£12,440,266	£12,965,164	£13,510,671	£14,077,563	£14,666,647	£15,278,758	£15,914,763	£16,575,559

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Cumulative Cash Flow	-£60,028,800	-£150,072,000	-£140,788,705	-£131,105,210	-£121,005,628	-£110,473,465	-£99,491,605	-£88,042,280	-£76,107,053	-£63,666,787	-£50,701,622	-£37,190,952	-£23,113,389	-£8,446,742	£6,832,016	£22,746,779	£39,322,338
IRR	7.59%																

Inverness	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Constant prices	Year 0/0	Year 0/1	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Investment costs	£288,000	£432,000															
OMR	-	-	£37,297	£38,230	£39,185	£40,165	£41,169	£42,198	£43,253	£44,335	£45,443	£46,579	£47,744	£48,937	£50,161	£51,415	£52,700
Revenues	-	-	£88,261	£91,350	£94,547	£97,856	£101,281	£104,826	£108,495	£112,293	£116,223	£120,291	£124,501	£128,858	£133,368	£138,036	£142,867
Net Cash Flow	-£288,000	-£432,000	£50,964	£53,120	£55,362	£57,691	£60,112	£62,628	£65,242	£67,958	£70,780	£73,711	£76,757	£79,921	£83,208	£86,622	£90,167
Cumulative Cash Flow	-£288,000	-£720,000	-£669,036	-£615,916	-£560,554	-£502,862	-£442,750	-£380,122	-£314,880	-£246,923	-£176,143	-£102,431	-£25,674	£54,247	£137,455	£224,076	£314,244
IRR	8.18%																

Loch Fyne	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Constant prices	Year 0/0	Year 0/1	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Investment costs	£3,340,800	£5,011,200															
OMR	-	-	£432,647	£443,464	£454,550	£465,914	£477,562	£489,501	£501,738	£514,282	£527,139	£540,317	£553,825	£567,671	£581,863	£596,409	£611,319
Revenues	-	-	£113,431	£117,402	£121,511	£125,763	£130,165	£134,721	£139,436	£144,316	£149,368	£154,595	£160,006	£165,606	£171,403	£177,402	£183,611
Net Cash Flow	-£3,340,800	-£5,011,200	-£319,216	-£326,062	-£333,040	-£340,150	-£347,397	-£354,780	-£362,302	-£369,965	-£377,771	-£385,722	-£393,819	-£402,064	-£410,460	-£419,007	-£427,709
Cumulative Cash Flow	-£3,340,800	-£8,352,000	-£8,671,216	-£8,997,278	-£9,330,318	-£9,670,468	-£10,017,865	-£10,372,644	-£10,734,947	-£11,104,912	-£11,482,683	-£11,868,405	-£12,262,224	-£12,664,289	-£13,074,748	-£13,493,756	-£13,921,464
IRR	0.91%																

Cromarty Firth	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Constant prices	Year 0/0	Year 0/1	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Investment costs	£6,912,000	£10,368,000															
OMR	-	-	£895,133	£917,511	£940,449	£963,960	£988,059	£1,012,760	£1,038,079	£1,064,031	£1,090,632	£1,117,898	£1,145,845	£1,174,491	£1,203,854	£1,233,950	£1,264,799
Revenues	-	-	£702,458	£727,044	£752,490	£778,827	£806,086	£834,299	£863,500	£893,722	£925,003	£957,378	£990,886	£1,025,567	£1,061,462	£1,098,613	£1,137,064
Net Cash Flow	-£6,912,000	-£10,368,000	-£192,675	-£190,467	-£187,958	-£185,132	-£181,972	-£178,461	-£174,579	-£170,309	-£165,629	-£160,520	-£154,959	-£148,924	-£142,392	-£135,337	-£127,734
Cumulative Cash Flow	-£6,912,000	-£17,280,000	-£17,472,675	-£17,663,142	-£17,851,100	-£18,036,233	-£18,218,205	-£18,396,666	-£18,571,246	-£18,741,554	-£18,907,184	-£19,067,704	-£19,222,663	-£19,371,588	-£19,513,980	-£19,649,317	-£19,777,051
IRR	2.71%																

Elgin	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Constant prices	Year 0/0	Year 0/1	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Investment costs	£1,108,800	£1,663,200															
OMR	-	-	£143,594	£147,184	£150,864	£154,635	£158,501	£162,464	£166,525	£170,688	£174,956	£179,329	£183,813	£188,408	£193,118	£197,946	£202,895
Revenues	-	-	£314,549	£325,559	£336,953	£348,747	£360,953	£373,586	£386,662	£400,195	£414,202	£428,699	£443,703	£459,233	£475,306	£491,942	£509,159
Net Cash Flow	-£1,108,800	-£1,663,200	£170,955	£178,375	£186,090	£194,111	£202,452	£211,122	£220,136	£229,506	£239,246	£249,369	£259,890	£270,825	£282,188	£293,995	£306,265
Cumulative Cash Flow	-£1,108,800	-£2,772,000	-£2,601,045	-£2,422,670	-£2,236,580	-£2,042,469	-£1,840,017	-£1,628,895	-£1,408,759	-£1,179,252	-£940,006	-£690,637	-£430,747	-£159,922	£122,266	£416,261	£722,526
IRR	7.57%																

Lockerbie	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Constant prices	Year 0/0	Year 0/1	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Investment costs	£4,320,000	£6,480,000															
OMR	-	-	£559,458	£573,444	£587,780	£602,475	£617,537	£632,975	£648,800	£665,020	£681,645	£698,686	£716,153	£734,057	£752,409	£771,219	£790,499
Revenues	-	-	£715,106	£740,135	£766,040	£792,851	£820,601	£849,322	£879,048	£909,815	£941,659	£974,617	£1,008,728	£1,044,034	£1,080,575	£1,118,395	£1,157,539
Net Cash Flow	-£4,320,000	-£6,480,000	£155,649	£166,691	£178,259	£190,376	£203,064	£216,347	£230,249	£244,795	£260,014	£275,930	£292,575	£309,977	£328,166	£347,176	£367,040
Cumulative Cash Flow	-£4,320,000	-£10,800,000	-£10,644,351	-£10,477,661	-£10,299,401	-£10,109,025	-£9,905,961	-£9,689,614	-£9,459,365	-£9,214,569	-£8,954,556	-£8,678,625	-£8,386,051	-£8,076,074	-£7,747,908	-£7,400,732	-£7,033,692
IRR	4.42%																

Scottish Multi-Modal Freight Locations Study

Financial Appraisal - High Growth Scenario

Aberdeen	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Constant prices	Year 0/0	Year 0/1	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Investment costs	£520,000	£780,000															
OMR	-	-	£67,240	£68,921	£70,644	£72,410	£74,220	£76,076	£77,978	£79,927	£81,925	£83,974	£86,073	£88,225	£90,430	£92,691	£95,008
Revenues	-	-	£258,590	£267,641	£277,008	£286,704	£296,738	£307,124	£317,874	£328,999	£340,514	£352,432	£364,767	£377,534	£390,748	£404,424	£418,579
Net Cash Flow	-£520,000	-£780,000	£191,350	£198,720	£206,364	£214,294	£222,518	£231,048	£239,896	£249,072	£258,589	£268,459	£278,694	£289,309	£300,317	£311,733	£323,570
Cumulative Cash Flow	-£520,000	-£1,300,000	-£1,108,650	-£909,930	-£703,565	-£489,272	-£266,754	-£35,705	£204,191	£453,263	£711,851	£980,310	£1,259,004	£1,548,314	£1,848,631	£2,160,364	£2,483,934
IRR	13.28%																

Peterhead	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Constant prices	Year 0/0	Year 0/1	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Investment costs	£172,000	£258,000															
OMR	-	-	£22,063	£22,615	£23,180	£23,760	£24,354	£24,962	£25,586	£26,226	£26,882	£27,554	£28,243	£28,949	£29,672	£30,414	£31,175
Revenues	-	-	£178,040	£184,271	£190,720	£197,396	£204,305	£211,455	£218,856	£226,516	£234,444	£242,650	£251,142	£259,932	£269,030	£278,446	£288,192
Net Cash Flow	-£172,000	-£258,000	£155,976	£161,656	£167,540	£173,636	£179,951	£186,493	£193,270	£200,290	£207,562	£215,096	£222,900	£230,984	£239,358	£248,032	£257,017
Cumulative Cash Flow	-£172,000	-£430,000	-£274,024	-£112,367	£55,173	£228,809	£408,760	£595,253	£788,523	£988,813	£1,196,375	£1,411,471	£1,634,371	£1,865,354	£2,104,712	£2,352,744	£2,609,761
IRR	27.74%																

Grangemouth	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Constant prices	Year 0/0	Year 0/1	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Investment costs	£2,304,000	£3,456,000															
OMR	-	-	£298,378	£305,837	£313,483	£321,320	£329,353	£337,587	£346,026	£354,677	£363,544	£372,633	£381,948	£391,497	£401,285	£411,317	£421,600
Revenues	-	-	£1,452,771	£1,503,618	£1,556,244	£1,610,713	£1,667,088	£1,725,436	£1,785,826	£1,848,330	£1,913,022	£1,979,977	£2,049,277	£2,121,001	£2,195,236	£2,272,070	£2,351,592
Net Cash Flow	-£2,304,000	-£3,456,000	£1,154,393	£1,197,781	£1,242,761	£1,289,393	£1,337,735	£1,387,849	£1,439,800	£1,493,653	£1,549,478	£1,607,345	£1,667,328	£1,729,504	£1,793,952	£1,860,753	£1,929,992
Cumulative Cash Flow	-£2,304,000	-£5,760,000	-£4,605,607	-£3,407,826	-£2,165,065	-£875,672	£462,063	£1,849,912	£3,289,712	£4,783,365	£6,332,843	£7,940,187	£9,607,515	£11,337,020	£13,130,971	£14,991,724	£16,921,717
IRR	16.82%																

Leven	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Constant prices	Year 0/0	Year 0/1	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Investment costs	£5,184,000	£7,776,000															
OMR	-	-	£671,349	£688,133	£705,336	£722,970	£741,044	£759,570	£778,559	£798,023	£817,974	£838,423	£859,384	£880,869	£902,890	£925,463	£948,599
Revenues	-	-	£621,846	£643,611	£666,137	£689,452	£713,583	£738,558	£764,408	£791,162	£818,853	£847,512	£877,175	£907,876	£939,652	£972,540	£1,006,579
Net Cash Flow	-£5,184,000	-£7,776,000	-£49,503	-£44,522	-£39,199	-£33,518	-£27,461	-£21,012	-£14,152	-£6,862	£879	£9,089	£17,791	£27,008	£36,762	£47,077	£57,980
Cumulative Cash Flow	-£5,184,000	-£12,960,000	-£13,009,503	-£13,054,026	-£13,093,225	-£13,126,743	-£13,154,204	-£13,175,216	-£13,189,368	-£13,196,230	-£13,195,351	-£13,186,262	-£13,168,471	-£13,141,463	-£13,104,701	-£13,057,623	-£12,999,644
IRR	3.20%																

Rosyth	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Constant prices	Year 0/0	Year 0/1	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Investment costs	£31,968,000	£47,952,000															
OMR	-	-	£1,603,674	£1,643,766	£1,684,860	£1,726,981	£1,770,156	£1,814,410	£1,859,770	£1,906,264	£1,953,921	£2,002,769	£2,052,838	£2,104,159	£2,156,763	£2,210,682	£2,265,949
Revenues	-	-	£5,690,516	£5,889,684	£6,095,823	£6,309,177	£6,529,998	£6,758,548	£6,995,097	£7,239,926	£7,493,323	£7,755,589	£8,027,035	£8,307,981	£8,598,761	£8,899,717	£9,211,207
Net Cash Flow	-£31,968,000	-£47,952,000	£4,086,842	£4,245,918	£4,410,963	£4,582,196	£4,759,842	£4,944,138	£5,135,327	£5,333,661	£5,539,402	£5,752,820	£5,974,197	£6,203,822	£6,441,997	£6,689,035	£6,945,258
Cumulative Cash Flow	-£31,968,000	-£79,920,000	-£75,833,158	-£71,587,239	-£67,176,276	-£62,594,081	-£57,834,239	-£52,890,100	-£47,754,773	-£42,421,112	-£36,881,710	-£31,128,889	-£25,154,693	-£18,950,871	-£12,508,873	-£5,819,838	£1,125,420
IRR	6.74%																

Dundee	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Constant prices	Year 0/0	Year 0/1	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Investment costs	£201,600	£302,400															
OMR	-	-	£26,108	£26,761	£27,430	£28,115	£28,818	£29,539	£30,277	£31,034	£31,810	£32,605	£33,420	£34,256	£35,112	£35,990	£36,890
Revenues	-	-	£182,957	£189,360	£195,988	£202,847	£209,947	£217,295	£224,900	£232,772	£240,919	£249,351	£258,078	£267,111	£276,460	£286,136	£296,151
Net Cash Flow	-£201,600	-£302,400	£156,848	£162,599	£168,558	£174,732	£181,128	£187,756	£194,623	£201,738	£209,109	£216,746	£224,658	£232,855	£241,347	£250,146	£259,261
Cumulative Cash Flow	-£201,600	-£504,000	-£347,152	-£184,552	-£15,994	£158,737	£339,866	£527,622	£722,245	£923,982	£1,133,091	£1,349,837	£1,574,494	£1,807,349	£2,048,697	£2,298,843	£2,558,103
IRR	24.21%																

Hunterston	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Constant prices	Year 0/0	Year 0/1	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Investment costs	£60,028,800	£90,043,200															
OMR	-	-	£7,528,359	£7,716,567	£7,909,482	£8,107,219	£8,309,899	£8,517,647	£8,730,588	£8,948,852	£9,172,574	£9,401,888	£9,636,935	£9,877,859	£10,124,805	£10,377,925	£10,637,373
Revenues	-	-	£18,521,157	£19,169,397	£19,840,326	£20,534,738	£21,253,453	£21,997,324	£22,767,231	£23,564,084	£24,388,827	£25,242,436	£26,125,921	£27,040,328	£27,986,739	£28,966,275	£29,980,095
Net Cash Flow	-£60,028,800	-£90,043,200	£10,992,798	£11,452,830	£11,930,844	£12,427,519	£12,943,554	£13,479,678	£14,036,643	£14,615,231	£15,216,253	£15,840,547	£16,488,985	£17,162,469	£17,861,934	£18,588,350	£19,342,721

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Cumulative Cash Flow	-£60,028,800	-£150,072,000	-£139,079,202	-£127,626,372	-£115,695,528	-£103,268,009	-£90,324,454	-£76,844,777	-£62,808,134	-£48,192,903	-£32,976,650	-£17,136,103	-£647,117	£16,515,352	£34,377,286	£52,965,636	£72,308,357
IRR	8.36%																

Inverness	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Constant prices	Year 0/0	Year 0/1	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Investment costs	£288,000	£432,000															
OMR	-	-	£37,297	£38,230	£39,185	£40,165	£41,169	£42,198	£43,253	£44,335	£45,443	£46,579	£47,744	£48,937	£50,161	£51,415	£52,700
Revenues	-	-	£97,236	£100,639	£104,161	£107,807	£111,580	£115,486	£119,528	£123,711	£128,041	£132,522	£137,161	£141,961	£146,930	£152,072	£157,395
Net Cash Flow	-£288,000	-£432,000	£59,939	£62,409	£64,976	£67,642	£70,411	£73,287	£76,274	£79,376	£82,598	£85,943	£89,417	£93,024	£96,769	£100,658	£104,695
Cumulative Cash Flow	-£288,000	-£720,000	-£660,061	-£597,652	-£532,676	-£465,034	-£394,623	-£321,336	-£245,061	-£165,685	-£83,087	£2,856	£92,273	£185,298	£282,067	£382,725	£487,420
IRR	9.01%																

Loch Fyne	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Constant prices	Year 0/0	Year 0/1	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Investment costs	£3,340,800	£5,011,200															
OMR	-	-	£432,647	£443,464	£454,550	£465,914	£477,562	£489,501	£501,738	£514,282	£527,139	£540,317	£553,825	£567,671	£581,863	£596,409	£611,319
Revenues	-	-	£124,966	£129,340	£133,866	£138,552	£143,401	£148,420	£153,615	£158,991	£164,556	£170,316	£176,277	£182,446	£188,832	£195,441	£202,281
Net Cash Flow	-£3,340,800	-£5,011,200	-£307,682	-£314,124	-£320,684	-£327,362	-£334,161	-£341,081	-£348,123	-£355,290	-£362,583	-£370,002	-£377,549	-£385,225	-£393,031	-£400,968	-£409,038
Cumulative Cash Flow	-£3,340,800	-£8,352,000	-£8,659,682	-£8,973,806	-£9,294,489	-£9,621,851	-£9,956,012	-£10,297,093	-£10,645,216	-£11,000,507	-£11,363,089	-£11,733,091	-£12,110,640	-£12,495,865	-£12,888,895	-£13,289,864	-£13,698,902
IRR	1.00%																

Cromarty Firth	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Constant prices	Year 0/0	Year 0/1	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Investment costs	£6,912,000	£10,368,000															
OMR	-	-	£895,133	£917,511	£940,449	£963,960	£988,059	£1,012,760	£1,038,079	£1,064,031	£1,090,632	£1,117,898	£1,145,845	£1,174,491	£1,203,854	£1,233,950	£1,264,799
Revenues	-	-	£773,887	£800,974	£829,008	£858,023	£888,054	£919,136	£951,305	£984,601	£1,019,062	£1,054,729	£1,091,645	£1,129,852	£1,169,397	£1,210,326	£1,252,687
Net Cash Flow	-£6,912,000	-£10,368,000	-£121,245	-£116,537	-£111,441	-£105,937	-£100,005	-£93,625	-£86,774	-£79,430	-£71,570	-£63,169	-£54,201	-£44,639	-£34,457	-£23,624	-£12,111
Cumulative Cash Flow	-£6,912,000	-£17,280,000	-£17,401,245	-£17,517,782	-£17,629,223	-£17,735,160	-£17,835,165	-£17,928,790	-£18,015,564	-£18,094,994	-£18,166,564	-£18,229,733	-£18,283,933	-£18,328,572	-£18,363,029	-£18,386,653	-£18,398,764
IRR	2.99%																

Elgin	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Constant prices	Year 0/0	Year 0/1	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Investment costs	£1,108,800	£1,663,200															
OMR	-	-	£143,594	£147,184	£150,864	£154,635	£158,501	£162,464	£166,525	£170,688	£174,956	£179,329	£183,813	£188,408	£193,118	£197,946	£202,895
Revenues	-	-	£346,535	£358,663	£371,217	£384,209	£397,656	£411,574	£425,979	£440,889	£456,320	£472,291	£488,821	£505,930	£523,638	£541,965	£560,934
Net Cash Flow	-£1,108,800	-£1,663,200	£202,940	£211,479	£220,353	£229,574	£239,155	£249,111	£259,454	£270,200	£281,364	£292,962	£305,009	£317,522	£330,519	£344,019	£358,039
Cumulative Cash Flow	-£1,108,800	-£2,772,000	-£2,569,060	-£2,357,580	-£2,137,227	-£1,907,654	-£1,668,498	-£1,419,387	-£1,159,933	-£889,733	-£608,368	-£315,407	-£10,398	£307,124	£637,643	£981,662	£1,339,701
IRR	8.34%																

Lockerbie	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Constant prices	Year 0/0	Year 0/1	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Investment costs	£4,320,000	£6,480,000															
OMR	-	-	£559,458	£573,444	£587,780	£602,475	£617,537	£632,975	£648,800	£665,020	£681,645	£698,686	£716,153	£734,057	£752,409	£771,219	£790,499
Revenues	-	-	£787,822	£815,396	£843,935	£873,473	£904,044	£935,686	£968,435	£1,002,330	£1,037,412	£1,073,721	£1,111,301	£1,150,197	£1,190,454	£1,232,120	£1,275,244
Net Cash Flow	-£4,320,000	-£6,480,000	£228,365	£241,952	£256,155	£270,998	£286,508	£302,711	£319,635	£337,311	£355,767	£375,035	£395,148	£416,140	£438,045	£460,901	£484,745
Cumulative Cash Flow	-£4,320,000	-£10,800,000	-£10,571,635	-£10,329,684	-£10,073,529	-£9,802,531	-£9,516,023	-£9,213,313	-£8,893,677	-£8,556,367	-£8,200,600	-£7,825,565	-£7,430,417	-£7,014,278	-£6,576,233	-£6,115,332	-£5,630,587
IRR	4.86%																

Scottish Multi-Modal Freight Locations Study

Economic Appraisal of Options - Low Growth Scenario

Capital and OMR Costs per option

	Capital Costs	Operating, Maintenance & Renewals Costs p.a.	Capital Costs including Optimism Bias	OMR including Optimism Bias p.a.
Aberdeen Harbour	£900k	£45k	£1296k	£64k
Peterhead Harbour	£300k	£15k	£432k	£21k
Grangemouth	£4000k	£200k	£5760k	£284k
Leven	£9000k	£450k	£12960k	£639k
Rosyth	£72000k	£1440k	£79920k	£1526k
Dundee Harbour	£350k	£18k	£504k	£25k
Hunterston	£135200k	£6760k	£150072k	£7166k
Inverness	£500k	£25k	£720k	£36k
Loch Fyne	£5800k	£290k	£8352k	£412k
Cromarty Firth	£12000k	£600k	£17280k	£852k
Elgin	£1925k	£96k	£2772k	£137k
Lockerbie	£7500k	£375k	£10800k	£533k

Optimism Bias is 44% for Capital Costs and 42% for OMR Costs, with the exception of Rosyth which is considered to be Non-Standard Civil Engineer works but has been through a limited design process and the costs supplied by the scheme promoter includes an allowance for Contingency and Risk & Uncertainty. As a result, values of 11% and 6% were used, respectively for the Capital Costs and OMR Costs for the Rosyth option. In addition, since the Hunterston proposals would be of a similar nature to Rosyth, and have been the subject of previous studies by the promoter, we have also assumed the Optimism Bias for this option would be similar to Rosyth

Total Present Value of Benefits (PVB) estimated from the TUBA Model

Time Savings (60-yr PVB)	VOC (60-yr PVB)	Carbon (60-yr PVB)
£309,834,000	£221,148,000	£28,112,000

Other Present Value of Benefits (PVB) estimated from the Data Supplied by Stakeholders

Revenues (per annum) = £26,398,553

Accidents (per annum) = £351,955

Revenue was estimated by multiplying the tonnage demand by a value of £43 per TEU (sourced from the average of fees charged, obtained from stakeholder surveys)
Accidents was estimated by multiplying the Lorry-km savings by a rate of 0.28766 PIAs per million.veh.km and cost of £115,000 per PIA (sourced from the NESA Manual)

Scottish Multi-Modal Freight Locations Study

Transport Economic Efficiency (TEE) Table - Low Growth Scenario

			Aberdeen	Peterhead	Grangemouth	Leven	Rosyth	Dundee
Accidents	Reduced Accident Collisions Savings	PB1	£0.17m	£0.13m	£0.38m	£0.13m	£2.79m	£0.08m
Benefits	Times Savings	PB2	£10.28m	£7.08m	£30.23m	£12.94m	£89.33m	£7.28m
	Vehicle Operating Costs (VOC) Savings	PB3	£5.50m	£4.31m	£12.72m	£4.18m	£93.23m	£2.67m
	Revenues	PB4	£4.23m	£2.84m	£23.18m	£9.92m	£90.79m	£2.92m
	Carbon Savings	PB5	£0.70m	£0.55m	£1.62m	£0.53m	£11.85m	£0.34m
	Present Value of Benefits (PB1 ... PB5)	**PVB**	**£20.88m**	**£14.91m**	**£68.12m**	**£27.70m**	**£287.99m**	**£13.29m**
Costs	Investment (Capital) Costs	PC1	-£1.00m	-£0.33m	-£4.44m	-£9.98m	-£61.54m	-£0.39m
	Operating, Maintenance & Renewals Costs	PC2	-£1.23m	-£0.40m	-£5.35m	-£12.03m	-£28.74m	-£0.47m
	Indirect Tax Revenues	PC3	-£4.88m	-£3.82m	-£11.28m	-£3.71m	-£82.66m	-£2.37m
	Subsidy	PC4	£0.00m	£0.00m	£0.00m	-£2.11m	£0.00m	£0.00m
	Present Value of Costs (PC1 … PC4)	**PVC**	**-£7.11m**	**-£4.56m**	**-£21.06m**	**-£27.83m**	**-£172.95m**	**-£3.22m**
Returns	*Net Present Value (NPV = PVB + PVC)*		£13.77m	£10.35m	£47.06m	-£0.13m	£115.04m	£10.06m
	Benefit to Cost Ratio (BCR = PVB / -PVC)		2.9	3.3	3.2	1.0	1.7	4.1

			Hunterston	Inverness	Loch Fyne	:romarty Firt	Elgin	Lockerbie
Accidents	Reduced Accident Collisions Savings	PB1	£1.60m	£0.07m	£0.06m	£0.31m	£0.22m	£0.22m
Benefits	Times Savings	PB2	£49.92m	£3.87m	£4.97m	£16.10m	£9.19m	£18.80m
	Vehicle Operating Costs (VOC) Savings	PB3	£53.45m	£2.49m	£2.14m	£10.39m	£7.24m	£7.44m
	Revenues	PB4	£295.50m	£1.55m	£1.99m	£12.35m	£5.53m	£12.57m
	Carbon Savings	PB5	£6.79m	£0.32m	£0.27m	£1.32m	£0.92m	£0.95m
	Present Value of Benefits (PB1 ... PB5)	**PVB**	**£407.26m**	**£8.30m**	**£9.43m**	**£40.47m**	**£23.10m**	**£39.97m**
Costs	Investment (Capital) Costs	PC1	-£115.56m	-£0.55m	-£6.43m	-£13.31m	-£2.13m	-£8.32m
	Operating, Maintenance & Renewals Costs	PC2	-£134.92m	-£0.67m	-£7.75m	-£16.04m	-£2.57m	-£10.03m
	Indirect Tax Revenues	PC3	-£47.39m	-£2.21m	-£1.89m	-£9.21m	-£6.42m	-£6.60m
	Subsidy	PC4	£0.00m	£0.00m	-£5.76m	-£3.70m	£0.00m	£0.00m
	Present Value of Costs (PC1 … PC4)	**PVC**	**-£297.87m**	**-£3.43m**	**-£21.84m**	**-£42.26m**	**-£11.13m**	**-£24.94m**
Returns	*Net Present Value (NPV = PVB + PVC)*		£109.39m	£4.87m	-£12.40m	-£1.78m	£11.97m	£15.04m
	Benefit to Cost Ratio (BCR = PVB / -PVC)		1.4	2.4	0.4	1.0	2.1	1.6

Notes: all monetary values are discounted to 2002 prices

Scottish Multi-Modal Freight Locations Study

Economic Appraisal of Options - High Growth Scenario

Capital and OMR Costs per option

	Capital Costs	Operating, Maintenance & Renewals Costs p.a.	Capital Costs including Optimism Bias	OMR including Optimism Bias p.a.
Aberdeen Harbour	£900k	£45k	£1296k	£64k
Peterhead Harbour	£300k	£15k	£432k	£21k
Grangemouth	£4000k	£200k	£5760k	£284k
Leven	£9000k	£450k	£12960k	£639k
Rosyth	£72000k	£1440k	£79920k	£1526k
Dundee Harbour	£350k	£18k	£504k	£25k
Hunterston	£135200k	£6760k	£150072k	£7166k
Inverness	£500k	£25k	£720k	£36k
Loch Fyne	£5800k	£290k	£8352k	£412k
Cromarty Firth	£12000k	£600k	£17280k	£852k
Elgin	£1925k	£96k	£2772k	£137k
Lockerbie	£7500k	£375k	£10800k	£533k

Optimism Bias is 44% for Capital Costs and 42% for OMR Costs, with the exception of Rosyth which is considered to be Non-Standard Civil Engineer works but has been through a limited design process and the costs supplied by the scheme promoter includes an allowance for Contingency and Risk & Uncertainty. As a result, values of 11% and 6% were used, respectively for the Capital Costs and OMR Costs for the Rosyth option. In addition, since the Hunterston proposals would be of a similar nature to Rosyth, and have been the subject of previous studies by the promoter, we have also assumed the Optimism Bias for this option would be similar to Rosyth

Total Present Value of Benefits (PVB) estimated from the TUBA Model

Time Savings (60-yr PVB)	VOC (60-yr PVB)	Carbon (60-yr PVB)
£392,086,000	£248,727,000	£31,097,000

Other Present Value of Benefits (PVB) estimated from the Data Supplied by Stakeholders

Revenues (per annum) = £29,082,905

Accidents (per annum) = £387,744

Revenue was estimated by multiplying the tonnage demand by a value of £43 per TEU (sourced from the average of fees charged, obtained from stakeholder surveys)
Accidents was estimated by multiplying the Lorry-km savings by a rate of 0.28766 PIAs per million.veh.km and cost of £115,000 per PIA (sourced from the NESA Manual)

Scottish Multi-Modal Freight Locations Study

Transport Economic Efficiency (TEE) Table - High Growth Scenario

			Aberdeen	Peterhead	Grangemouth	Leven	Rosyth	Dundee
Accidents	Reduced Accident Collisions Savings	PB1	£0.19m	£0.14m	£0.42m	£0.14m	£3.08m	£0.09m
Benefits	Times Savings	PB2	£13.01m	£8.96m	£38.25m	£16.37m	£113.04m	£9.21m
	Vehicle Operating Costs (VOC) Savings	PB3	£6.19m	£4.85m	£14.30m	£4.70m	£104.85m	£3.00m
	Revenues	PB4	£4.66m	£3.13m	£25.54m	£10.93m	£100.02m	£3.22m
	Carbon Savings	PB5	£0.77m	£0.61m	£1.79m	£0.59m	£13.11m	£0.38m
	Present Value of Benefits (PB1 ... PB5)	**PVB**	**£24.82m**	**£17.69m**	**£80.30m**	**£32.73m**	**£334.10m**	**£15.89m**
Costs	Investment (Capital) Costs	PC1	-£1.00m	-£0.33m	-£4.44m	-£9.98m	-£61.54m	-£0.39m
	Operating, Maintenance & Renewals Costs	PC2	-£1.23m	-£0.40m	-£5.35m	-£12.03m	-£28.74m	-£0.47m
	Indirect Tax Revenues	PC3	-£5.39m	-£4.23m	-£12.47m	-£4.10m	-£91.41m	-£2.62m
	Subsidy	PC4	£0.00m	£0.00m	£0.00m	-£1.10m	£0.00m	£0.00m
	Present Value of Costs (PC1 … PC4)	**PVC**	**-£7.63m**	**-£4.96m**	**-£22.25m**	**-£27.21m**	**-£181.70m**	**-£3.48m**
Returns	*Net Present Value (NPV = PVB + PVC)*		£17.19m	£12.73m	£58.05m	£5.52m	£152.40m	£12.42m
	Benefit to Cost Ratio (BCR = PVB / -PVC)		3.3	3.6	3.6	1.2	1.8	4.6

			Hunterston	Inverness	Loch Fyne	Cromarty Firt	Elgin	Lockerbie
Accidents	Reduced Accident Collisions Savings	PB1	£1.76m	£0.08m	£0.07m	£0.34m	£0.24m	£0.25m
Benefits	Times Savings	PB2	£63.18m	£4.89m	£6.29m	£20.38m	£11.63m	£23.79m
	Vehicle Operating Costs (VOC) Savings	PB3	£60.11m	£2.81m	£2.40m	£11.68m	£8.15m	£8.37m
	Revenues	PB4	£325.54m	£1.71m	£2.20m	£13.60m	£6.09m	£13.85m
	Carbon Savings	PB5	£7.52m	£0.35m	£0.30m	£1.46m	£1.02m	£1.05m
	Present Value of Benefits (PB1 ... PB5)	**PVB**	**£458.11m**	**£9.84m**	**£11.26m**	**£47.47m**	**£27.12m**	**£47.29m**
Costs	Investment (Capital) Costs	PC1	-£115.56m	-£0.55m	-£6.43m	-£13.31m	-£2.13m	-£8.32m
	Operating, Maintenance & Renewals Costs	PC2	-£134.92m	-£0.67m	-£7.75m	-£16.04m	-£2.57m	-£10.03m
	Indirect Tax Revenues	PC3	-£52.41m	-£2.45m	-£2.09m	-£10.19m	-£7.10m	-£7.29m
	Subsidy	PC4	£0.00m	£0.00m	-£5.56m	-£2.44m	£0.00m	£0.00m
	Present Value of Costs (PC1 … PC4)	**PVC**	**-£302.89m**	**-£3.67m**	**-£21.84m**	**-£41.97m**	**-£11.81m**	**-£25.64m**
Returns	*Net Present Value (NPV = PVB + PVC)*		£155.22m	£6.17m	-£10.58m	£5.49m	£15.31m	£21.66m
	Benefit to Cost Ratio (BCR = PVB / -PVC)		1.5	2.7	0.5	1.1	2.3	1.8

Notes: all monetary values are discounted to 2002 prices

Transport User Benefit Appraisal TUBA v1.7a
Program run on Friday, 19 December 2008 at 11:40:06

INPUT_SUMMARY

Run name	SFM (Low Growth)
DM scheme	Do Minimum
DS scheme	Do Soemthing (Low Growth)

Economic parameter file T:\MOU10 RJB\TrP\000 - Projects\S101046 ScotEnt Freight Study\TUBA\RUN\std_economics_1.7 SFM.txt
Scheme parameter file T:\MOU10 RJB\TrP\000 - Projects\S101046 ScotEnt Freight Study\TUBA\RUN\SFM (LG adj tm).txt

First year of scheme costs	2007
First Appraisal Year	2007
Last Appraisal Year	2066
Modelled years	2007 2020

Time period	Total hours
AM peak	759
PM peak	1518
Inter-peak	759
Total	3036

Note: All monetary values are in 2002 market prices. All monetary values discounted to 2002 unless otherwise stated.

TRIP_MATRIX_TOTALS
Annualised total trip numbers(thousands)

Submode	Year	Time period	DO MIN	DO SOM
Car	2007	AM peak	34216	34216
Car	2007	PM peak	52757	52757
Car	2007	Inter-peak	36884	36884
Car	2007	All	123857	123857
Car	2020	AM peak	39178	39178
Car	2020	PM peak	60406	60406
Car	2020	Inter-peak	42233	42233
Car	2020	All	141817	141817
OGV1	2007	AM peak	4562	4562
OGV1	2007	PM peak	6306	6306
OGV1	2007	Inter-peak	3023	3023
OGV1	2007	All	13890	13890
OGV1	2020	AM peak	5806	5394
OGV1	2020	PM peak	8026	7924
OGV1	2020	Inter-peak	3847	3435
OGV1	2020	All	17679	16753
OGV2	2007	AM peak	6843	6843
OGV2	2007	PM peak	9458	9458
OGV2	2007	Inter-peak	4534	4534
OGV2	2007	All	20835	20835
OGV2	2020	AM peak	8710	8091
OGV2	2020	PM peak	12039	11886
OGV2	2020	Inter-peak	5771	5152
OGV2	2020	All	26519	25129
All	2007	AM peak	45621	45621
All	2007	PM peak	68521	68521
All	2007	Inter-peak	44441	44441
All	2007	All	158582	158582
All	2020	AM peak	53694	52663
All	2020	PM peak	80471	80217
All	2020	Inter-peak	51850	50819
All	2020	All	186015	183699

DM&DS_USER_COSTS
Total value of user costs, DM and DS. £000s.

Mode	Year	DMtot_time	DMtot_charge	DMtot_fuel	DMtot_nonfuel

DStot_time DStot_charge DStot_fuel DStot_nonfuel

Road	2007	1560399	0	806121	538207	1560399	0	806121	538207
Road	2020	1489523	0	516177	409770	1473549	0	506544	403385

FUEL_CONSUMPTION

Total fuel consumption, DM and DS. kilolitres.

		Do minimum		Do something	
Submode	Year	petrol	diesel	petrol	diesel
Car	2007	559466	156855	559466	156855
Car	2020	444141	229739	444684	229993
OGV1	2007	0	155849	0	155849
OGV1	2020	0	189363	0	181539
OGV2	2007	0	314950	0	314950
OGV2	2020	0	383114	0	367539
All	2007	559466	627655	559466	627655
All	2020	444141	802216	444684	779071
Car	Total	26200234	14331811	26227994	14346280
OGV1	Total	0	11098899	0	10684176
OGV2	Total	0	22452495	0	21626984
All	Total	26200234	47883205	26227994	46657440

CARBON_EMISSION

		Emissions (tonnes)			cost (£000s, low)			cost (£000s, central)			cost (£000s, high)		
Submode	Year	DM	DS	Increase	DM	DS	Increase	DM	DS	Increase	DM	DS	Increase
Car	2007	463593	463593	0	16970	16970	0	31108	31108	0	59387	59387	0
Car	2020	426668	427171	503	13077	13092	15	21397	21422	25	38039	38083	45
OGV1	2007	111767	111767	0	4091	4091	0	7500	7500	0	14318	14318	0
OGV1	2020	130652	125253	-5398	4004	3839	-165	6552	6281	-271	11648	11167	-481
OGV2	2007	225867	225867	0	8268	8268	0	15156	15156	0	28934	28934	0
OGV2	2020	264330	253585	-10746	8101	7772	-329	13256	12717	-539	23566	22608	-958
All	2007	801227	801227	0	29329	29329	0	53763	53763	0	102639	102639	0
All	2020	821650	806009	-15641	25183	24703	-479	41204	40420	-784	73252	71858	-1394
Car	Total	25765530	25792288	26759	615289	615888	600	962531	963444	913	1657110	1658650	1540
OGV1	Total	7672322	7386034	-286288	180563	174175	-6388	280788	271082	-9706	481267	464924	-16343
OGV2	Total	15520686	14950827	-569860	365249	352533	-12715	567976	548656	-19320	973487	940956	-32531
All	Total	48958538	48129149	-829389	1161100	1142596	-18503	1811295	1783183	-28112	3111864	3064530	-47333

MODE

SFM (LG adj tm).OUT

User benefits and changes in revenues by mode, all years. £000s.

Mode	Year	User Time	User_Charges PT_fares_(pri	Vehicle_Operating_Cost Fuel	Vehicle_Operating_Cost Non_fuel	Operator_Rev PT_fares_(pri	Indirect Taxes
Road	2007	0	0	0	0	0	0
Road	2008	764	0	-73	30	0	-738
Road	2009	1504	0	-135	57	0	-1408
Road	2010	2220	0	-188	83	0	-2016
Road	2011	2913	0	-241	107	0	-2599
Road	2012	3575	0	-289	129	0	-3141
Road	2013	4213	0	-332	149	0	-3644
Road	2014	4826	0	-372	168	0	-4109
Road	2015	5416	0	-408	186	0	-4540
Road	2016	5983	0	-441	202	0	-4938
Road	2017	6528	0	-470	217	0	-5304
Road	2018	7051	0	-496	231	0	-5641
Road	2019	7553	0	-519	243	0	-5949
Road	2020	8036	0	-539	254	0	-6230
Road	2021	7891	0	-520	246	0	-6020
Road	2022	7722	0	-502	237	0	-5817
Road	2023	7557	0	-485	229	0	-5621
Road	2024	7396	0	-468	222	0	-5431
Road	2025	7238	0	-451	214	0	-5248
Road	2026	7084	0	-436	207	0	-5071
Road	2027	6933	0	-421	200	0	-4899
Road	2028	6785	0	-407	193	0	-4733
Road	2029	6640	0	-393	187	0	-4573
Road	2030	6499	0	-380	180	0	-4419
Road	2031	6360	0	-367	174	0	-4269
Road	2032	6250	0	-355	168	0	-4125
Road	2033	6141	0	-343	163	0	-3985
Road	2034	6034	0	-331	157	0	-3851
Road	2035	5929	0	-320	152	0	-3720
Road	2036	5826	0	-309	147	0	-3595
Road	2037	5745	0	-300	142	0	-3490
Road	2038	5664	0	-291	138		

						0	-3388
Road	2039	5585	0	-283	134	0	-3290
Road	2040	5507	0	-275	130	0	-3194
Road	2041	5430	0	-267	127	0	-3101
Road	2042	5354	0	-259	123	0	-3010
Road	2043	5279	0	-251	119	0	-2923
Road	2044	5205	0	-244	116	0	-2838
Road	2045	5132	0	-237	112	0	-2755
Road	2046	5060	0	-230	109	0	-2675
Road	2047	4989	0	-223	106	0	-2597
Road	2048	4920	0	-217	103	0	-2521
Road	2049	4851	0	-210	100	0	-2448
Road	2050	4783	0	-204	97	0	-2376
Road	2051	4716	0	-198	94	0	-2307
Road	2052	4644	0	-193	91	0	-2240
Road	2053	4573	0	-187	89	0	-2175
Road	2054	4503	0	-182	86	0	-2111
Road	2055	4434	0	-176	84	0	-2050
Road	2056	4366	0	-171	81	0	-1990
Road	2057	4299	0	-166	79	0	-1932
Road	2058	4233	0	-161	77	0	-1876
Road	2059	4168	0	-157	74	0	-1821
Road	2060	4105	0	-152	72	0	-1768
Road	2061	4042	0	-148	70	0	-1717
Road	2062	3986	0	-143	68	0	-1667
Road	2063	3931	0	-139	66	0	-1618
Road	2064	3876	0	-135	64	0	-1571
Road	2065	3822	0	-131	62	0	-1525
Road	2066	3769	0	-127	60	0	-1481
Road	Total	309834	0	-17049	8008	0	-196091

SUBMODE
User benefits and changes in revenues by submode/vehicle type, modelled years and total. £000s.

Submode	Year	User	User_Charges	Vehicle_Operating_Cost		Operator_Rev	Indirect
		Time	PT_fares_(pri	Fuel	Non_fuel	PT_fares_(pri	Taxes
Car	2007	0	0	0	0		

						0	0
Car	2020	7536	0	-322	119	0	212
OGV1	2007	0	0	0	0	0	0
OGV1	2020	200	0	-86	35	0	-2154
OGV2	2007	0	0	0	0	0	0
OGV2	2020	299	0	-131	101	0	-4288
All	2007	0	0	0	0	0	0
All	2020	8036	0	-539	254	0	-6230
Car	Total	289919	0	-10240	3742	0	6748
OGV1	Total	7969	0	-2700	1097	0	-67827
OGV2	Total	11946	0	-4108	3169	0	-135011
All	Total	309834	0	-17049	8008	0	-196091

PERSON_TYPES
User benefits and changes in revenues by person type, modelled years and total.
£000s.

Person_type	Year	User Time	User_Charges PT_fares_(pri	Vehicle_Operating_Cost Fuel	Non_fuel	Operator_Rev PT_fares_(pri	Indirect Taxes
All	2007	0	0	0	0	0	0
All	2020	8036	0	-539	254	0	-6230
All	Total	309835	0	-17049	8008	0	-196091

PURPOSE
User benefits and changes in revenues by trip purpose, modelled years and total.
£000s.

Purpose	Year	User Time	User_Charges PT_fares_(pri	Vehicle_Operating_Cost Fuel	Non_fuel	Operator_Rev PT_fares_(pri	Indirect Taxes
Business	2007	0	0	0	0	0	0
Business	2020	4391	0	-278	254	0	-6401
Commuting	2007	0	0	0	0	0	0
Commuting	2020	949	0	-76	0	0	50
Other	2007	0	0	0	0	0	0
Other	2020	2695	0	-185	0	0	121
Business	Total	174443	0	-8764	8008	0	-201535
Commuting	Total	35698	0	-2425	0	0	1593
Other	Total	99693	0	-5860	0	0	3851

PERIOD
User benefits and changes in revenues by time period, modelled years and total.
£000s.

Period Year User User_Charges Vehicle_Operating_Cost

		Time	PT_fares_(pri	Fuel	Non_fuel	Operator_Rev PT_fares_(pri	Indirect Taxes
AM peak	2007	0	0	0	0	0	0
AM peak	2020	2644	0	-180	101	0	-2748
PM peak	2007	0	0	0	0	0	0
PM peak	2020	667	0	-67	25	0	-697
Inter-peak	2007	0	0	0	0	0	0
Inter-peak	2020	4725	0	-293	128	0	-2786
AM peak	Total	102228	0	-5666	3171	0	-86508
PM peak	Total	25641	0	-2111	795	0	-21921
Inter-peak	Total	181966	0	-9272	4041	0	-87662

SENSITIVITY
Total user benefits as a percentage of total DM user costs

	Modelled Years	
Mode	2007	2020
Road	0.00%	0.32%

Economy:Economic Efficiency of the Transport System(TEE)

Consumers	ALL MODES	Road
User benefits	TOTAL	
Travel Time	135391	135391
Vehicle operating costs	8285	8285
User charges	0	0
During Construction & Maintenance	0	0
NET CONSUMER BENEFITS	143676	143676

Business			
User benefits		Personal	Freight
Travel Time	174443	154528	19915
Vehicle operating costs	4330	1787	2543
User charges	0	0	0
During Construction & Maintenance	0	0	0
Subtotal	178773	156315	22458

Other business Impacts		
Developer contributions	0	0
NET BUSINESS IMPACT	178773	

TOTAL
Present Value of Transport Economic
Efficiency Benefits (PVB) 322449

Note: Benefits appear as positive numbers, while costs appear as negative numbers.
Note: All entries are present values discounted to 2002, in 2002 prices

Analysis of Monetised Costs and Benefits

Non-Exchequer Impacts	
Consumer User Benefits	143676
Business User Benefits	178773
Private Sector Provider Impacts	0
Other Business Impacts	0

Accident Benefits Not assessed by TUBA

Carbon Benefits	28112
Net present Value of Benefits (PVB)	350561
Local Government Funding	0
Central Government Funding	196091
Net present Value Costs (PVC)	196091
Overall Impact	
Net present Value (NPV)	154470
Benefit to Cost Ratio (BCR)	1.787
Appraisal Period	2007 to 2066

Note: There may also be other significant costs and benefits, some of which cannot be presented in monetised form. Where this is the case, the analysis presented above does NOT provide a good measure of value for money and should not be used as the sole basis for decisions.

Transport User Benefit Appraisal TUBA v1.7a
Program run on Monday, 15 December 2008 at 15:03:27

INPUT_SUMMARY

Run name	SFM (High Growth)
DM scheme	Do Minimum
DS scheme	Do Something (High Growth)

Economic parameter file T:\MOU10 RJB\TrP\000 - Projects\S101046 ScotEnt Freight Study\TUBA\std_economics_1.7 SFM.txt
Scheme parameter file T:\MOU10 RJB\TrP\000 - Projects\S101046 ScotEnt Freight Study\TUBA\SFM (HG adj tm).txt

First year of scheme costs	2007
First Appraisal Year	2007
Last Appraisal Year	2066
Modelled years	2007 2020

Time period	Total hours
AM peak	759
PM peak	1518
Inter-peak	759
Total	3036

Note: All monetary values are in 2002 market prices. All monetary values discounted to 2002 unless otherwise stated.

TRIP_MATRIX_TOTALS
Annualised total trip numbers(thousands)

Submode	Year	Time period	DO MIN	DO SOM
Car	2007	AM peak	34216	34216
Car	2007	PM peak	52757	52757
Car	2007	Inter-peak	36884	36884
Car	2007	All	123857	123857
Car	2020	AM peak	43181	43181
Car	2020	PM peak	66579	66579
Car	2020	Inter-peak	46548	46548
Car	2020	All	156307	156307
OGV1	2007	AM peak	4562	4562
OGV1	2007	PM peak	6306	6306
OGV1	2007	Inter-peak	3023	3023
OGV1	2007	All	13890	13890
OGV1	2020	AM peak	6372	5912
OGV1	2020	PM peak	8807	8695
OGV1	2020	Inter-peak	4222	3767
OGV1	2020	All	19401	18375
OGV2	2007	AM peak	6843	6843
OGV2	2007	PM peak	9458	9458
OGV2	2007	Inter-peak	4534	4534
OGV2	2007	All	20835	20835
OGV2	2020	AM peak	9555	8876
OGV2	2020	PM peak	13211	13043
OGV2	2020	Inter-peak	6333	5651
OGV2	2020	All	29099	27570
All	2007	AM peak	45621	45621
All	2007	PM peak	68521	68521
All	2007	Inter-peak	44441	44441
All	2007	All	158582	158582
All	2020	AM peak	59108	57969
All	2020	PM peak	88597	88318
All	2020	Inter-peak	57102	55966
All	2020	All	204807	202252

DM&DS_USER_COSTS
Total value of user costs, DM and DS. £000s.
Mode Year DMtot_time DMtot_charge DMtot_fuel DMtot_nonfuel DStot_time DStot_charge DStot_fuel DStot_nonfuel

Road	2007	1560399	0	806121	538207	1560399	0	806121	538207
Road	2020	1652846	0	567010	451541	1633777	0	556355	444371

FUEL_CONSUMPTION
Total fuel consumption, DM and DS. kilolitres.

		Do minimum		Do something	
Submode	Year	petrol	diesel	petrol	diesel
Car	2007	559466	156855	559466	156855
Car	2020	488948	252914	489669	253285
OGV1	2007	0	155849	0	155849
OGV1	2020	0	207369	0	198554
OGV2	2007	0	314950	0	314950
OGV2	2020	0	419945	0	402679
All	2007	559466	627655	559466	627655
All	2020	488948	880228	489669	854518
Car	Total	28490197	15651398	28527023	15672521
OGV1	Total	0	12053258	0	11586037
OGV2	Total	0	24404711	0	23489521
All	Total	28490197	52109367	28527023	50748079

CARBON_EMISSION

		Emissions (tonnes)			cost (£000s, low)			cost (£000s, central)			cost (£000s, high)		
Submode	Year	DM	DS	Increase	DM	DS	Increase	DM	DS	Increase	DM	DS	Increase
Car	2007	463593	463593	0	16970	16970	0	31108	31108	0	59387	59387	0
Car	2020	469711	470402	691	14396	14417	21	23555	23590	35	41876	41938	62
OGV1	2007	111767	111767	0	4091	4091	0	7500	7500	0	14318	14318	0
OGV1	2020	143075	136993	-6082	4385	4199	-186	7175	6870	-305	12755	12213	-542
OGV2	2007	225867	225867	0	8268	8268	0	15156	15156	0	28934	28934	0
OGV2	2020	289742	277829	-11913	8880	8515	-365	14530	13933	-597	25831	24769	-1062
All	2007	801227	801227	0	29329	29329	0	53763	53763	0	102639	102639	0
All	2020	902528	885224	-17304	27661	27131	-530	45260	44393	-868	80463	78920	-1543
Car	Total	28059900	28096728	36829	666702	667527	825	1040782	1042038	1256	1789043	1791161	2118
OGV1	Total	8331128	8008599	-322528	195262	188066	-7197	303123	292189	-10935	518875	500463	-18412
OGV2	Total	16868324	16236557	-631767	395318	381222	-14097	613665	592246	-21419	1050417	1014352	-36065
All	Total	53259351	52341885	-917466	1257282	1236815	-20468	1957570	1926473	-31097	3358335	3305977	-52358

MODE
User benefits and changes in revenues by mode, all years. £000s.

Mode	Year	User Time	User_Charges PT_fares_(pri	Vehicle_Operating_Cost Fuel	Non_fuel	Operator_Rev PT_fares_(pri	Indirect Taxes
Road	2007	0	0	0	0	0	0
Road	2008	966	0	-92	38	0	-815
Road	2009	1902	0	-170	74	0	-1556
Road	2010	2808	0	-238	107	0	-2228
Road	2011	3685	0	-305	137	0	-2872
Road	2012	4523	0	-365	166	0	-3471
Road	2013	5330	0	-421	192	0	-4027
Road	2014	6106	0	-471	217	0	-4542
Road	2015	6852	0	-517	240	0	-5019
Road	2016	7570	0	-557	260	0	-5459
Road	2017	8259	0	-594	279	0	-5865
Road	2018	8921	0	-626	297	0	-6238
Road	2019	9557	0	-656	313	0	-6579
Road	2020	10168	0	-681	328	0	-6891
Road	2021	9985	0	-658	317	0	-6658
Road	2022	9772	0	-635	306	0	-6434
Road	2023	9563	0	-613	296	0	-6217
Road	2024	9359	0	-591	286	0	-6007
Road	2025	9159	0	-571	276	0	-5804
Road	2026	8963	0	-552	267	0	-5608
Road	2027	8772	0	-533	258	0	-5418
Road	2028	8585	0	-515	249	0	-5235
Road	2029	8403	0	-498	240	0	-5058
Road	2030	8224	0	-481	232	0	-4887
Road	2031	8049	0	-464	224	0	-4722
Road	2032	7909	0	-449	217	0	-4562
Road	2033	7771	0	-434	210	0	-4408
Road	2034	7636	0	-419	202	0	-4259
Road	2035	7503	0	-405	196	0	-4115
Road	2036	7373	0	-391	189	0	-3975
Road	2037	7270	0	-380	183	0	-3860
Road	2038	7168	0	-369	178	0	-3747

Road	2039	7068	0	-358	173	0	-3638
Road	2040	6969	0	-347	168	0	-3532
Road	2041	6871	0	-337	163	0	-3429
Road	2042	6775	0	-328	158	0	-3329
Road	2043	6680	0	-318	154	0	-3232
Road	2044	6587	0	-309	149	0	-3138
Road	2045	6495	0	-300	145	0	-3047
Road	2046	6404	0	-291	141	0	-2958
Road	2047	6315	0	-283	137	0	-2872
Road	2048	6226	0	-274	133	0	-2788
Road	2049	6139	0	-266	129	0	-2707
Road	2050	6054	0	-259	125	0	-2628
Road	2051	5969	0	-251	121	0	-2552
Road	2052	5878	0	-244	118	0	-2477
Road	2053	5788	0	-237	114	0	-2405
Road	2054	5699	0	-230	111	0	-2335
Road	2055	5612	0	-223	108	0	-2267
Road	2056	5526	0	-217	105	0	-2201
Road	2057	5441	0	-210	102	0	-2137
Road	2058	5358	0	-204	99	0	-2075
Road	2059	5276	0	-198	96	0	-2014
Road	2060	5195	0	-192	93	0	-1956
Road	2061	5116	0	-187	90	0	-1899
Road	2062	5045	0	-181	88	0	-1843
Road	2063	4975	0	-176	85	0	-1790
Road	2064	4906	0	-171	83	0	-1738
Road	2065	4838	0	-166	80	0	-1687
Road	2066	4771	0	-161	78	0	-1638
Road	Total	392087	0	-21566	10316	0	-216845

SUBMODE
User benefits and changes in revenues by submode/vehicle type, modelled years and total. £000s.

Submode	Year	User	User_Charges	Vehicle_Operating_Cost		Operator_Rev	Indirect
		Time	PT_fares_(pri	Fuel	Non_fuel	PT_fares_(pri	Taxes
Car	2007	0	0	0	0	0	0

Car	2020	9514	0	-442	150	0	290
OGV1	2007	0	0	0	0	0	0
OGV1	2020	261	0	-99	46	0	-2427
OGV2	2007	0	0	0	0	0	0
OGV2	2020	392	0	-141	132	0	-4754
All	2007	0	0	0	0	0	0
All	2020	10168	0	-681	328	0	-6891
Car	Total	366027	0	-14048	4734	0	9247
OGV1	Total	10427	0	-3094	1435	0	-76413
OGV2	Total	15633	0	-4424	4147	0	-149678
All	Total	392087	0	-21566	10316	0	-216845

PERSON_TYPES
User benefits and changes in revenues by person type, modelled years and total. £000s.

Person_type	Year	User Time	User_Charges PT_fares_(pri	Vehicle_Operating_Cost Fuel	Non_fuel	Operator_Rev PT_fares_(pri	Indirect Taxes
All	2007	0	0	0	0	0	0
All	2020	10168	0	-681	328	0	-6891
All	Total	392087	0	-21566	10316	0	-216845

PURPOSE
User benefits and changes in revenues by trip purpose, modelled years and total. £000s.

Purpose	Year	User Time	User_Charges PT_fares_(pri	Vehicle_Operating_Cost Fuel	Non_fuel	Operator_Rev PT_fares_(pri	Indirect Taxes
Business	2007	0	0	0	0	0	0
Business	2020	5578	0	-321	328	0	-7127
Commuting	2007	0	0	0	0	0	0
Commuting	2020	1188	0	-110	0	0	72
Other	2007	0	0	0	0	0	0
Other	2020	3402	0	-251	0	0	164
Business	Total	221580	0	-10101	10316	0	-224371
Commuting	Total	44653	0	-3499	0	0	2296
Other	Total	125853	0	-7966	0	0	5230

PERIOD
User benefits and changes in revenues by time period, modelled years and total. £000s.

Period	Year	User	User_Charges	Vehicle_Operating_Cost	Operator_Rev	Indirect

		Time	PT_fares_(pri	Fuel	Non_fuel	PT_fares_(pri	Taxes
AM peak	2007	0	0	0	0	0	0
AM peak	2020	3388	0	-193	132	0	-3112
PM peak	2007	0	0	0	0	0	0
PM peak	2020	734	0	-121	27	0	-737
Inter-peak	2007	0	0	0	0	0	0
Inter-peak	2020	6046	0	-367	168	0	-3042
AM peak	Total	131008	0	-6089	4169	0	-97966
PM peak	Total	28213	0	-3848	861	0	-23159
Inter-peak	Total	232865	0	-11628	5286	0	-95720

SENSITIVITY
Total user benefits as a percentage of total DM user costs

	Modelled Years	
Mode	2007	2020
Road	0.00%	0.37%

Economy:Economic Efficiency of the Transport System(TEE)

Consumers	ALL MODES	Road
User benefits	TOTAL	
Travel Time	170506	170506
Vehicle operating costs	11465	11465
User charges	0	0
During Construction & Maintenance	0	0
NET CONSUMER BENEFITS	159041	159041

Business			
User benefits		Personal	Freight
Travel Time	221580	195521	26060
Vehicle operating costs	4087	2151	1936
User charges	0	0	0
During Construction & Maintenance	0	0	0
Subtotal	225667	197672	28016

Other business Impacts		
Developer contributions	0	0
NET BUSINESS IMPACT	221795	

TOTAL
Present Value of Transport Economic
Efficiency Benefits (PVB) 384708

Note: Benefits appear as positive numbers, while costs appear as negative numbers.
Note: All entries are present values discounted to 2002, in 2002 prices

Analysis of Monetised Costs and Benefits

Non-Exchequer Impacts	
Consumer User Benefits	159041
Business User Benefits	225667
Private Sector Provider Impacts	0
Other Business Impacts	0

Accident Benefits Not assessed by TUBA

Carbon Benefits	31097
Net present Value of Benefits (PVB)	415805
Local Government Funding	0
Central Government Funding	216845
Net present Value Costs (PVC)	216845
Overall Impact	
Net present Value (NPV)	198960
Benefit to Cost Ratio (BCR)	1.918
Appraisal Period	2007 to 2066

Note: There may also be other significant costs and benefits, some of which cannot be presented in monetised form. Where this is the case, the analysis presented above does NOT provide a good measure of value for money and should not be used as the sole basis for decisions.

Appendix C

GVA Spreadsheet Calculations

High Growth Scenario	Total Revenues	Proportion is GVA at basic prices	Proportion is Gross Wages and Salaries	Estimated increase in Gross Direct Employment (FTEs)	Employment Net of Displacement & Substitution	Gross Additional Expenditure	Additional Expenditure Net of Leakage
Aberdeen	£4,660,000	£2,318,304	£1,166,731	56	0	£0	£0
Peterhead	£3,130,000	£1,557,144	£783,662	38	0	£0	£0
Grangemouth	£25,540,000	£12,705,896	£6,394,485	309	155	£3,197,243	£2,238,070
Leven	£10,930,000	£5,437,566	£2,736,559	132	53	£1,094,624	£985,161
Rosyth				637	319	£6,586,007	£4,610,205
Dundee	£3,220,000	£1,601,918	£806,196	39	4	£80,620	£72,558
Hunterston				529	265	£5,469,384	£3,828,569
Inverness	£1,710,000	£850,708	£428,135	21	0	£0	£0
Loch Fyne	£2,200,000	£1,094,478	£550,817	27	3	£55,082	£49,574
Cromarty Firth	£13,600,000	£6,765,865	£3,405,051	165	16	£340,505	£306,455
Elgin	£6,090,000	£3,029,714	£1,524,762	74	29	£609,905	£548,914
Lockerbie	£13,850,000	£6,890,237	£3,467,644	168	67	£1,387,057	£1,248,352

Low Growth Scenario	Total Revenues	Proportion is GVA at basic prices	Proportion is Gross Wages and Salaries	Estimated increase in Gross Direct Employment (FTEs)	Employment Net of Displacement & Substitution	Gross Additional Expenditure	Additional Expenditure Net of Leakage
Aberdeen	£4,230,000	£2,104,383	£1,059,071	51	0	£0	£0
Peterhead	£2,840,000	£1,412,872	£711,055	34	0	£0	£0
Grangemouth	£23,180,000	£11,531,819	£5,803,609	281	140	£2,901,804	£2,031,263
Leven	£9,920,000	£4,935,101	£2,483,684	120	48	£993,474	£894,126
Rosyth				524	262	£5,417,688	£3,792,382
Dundee	£2,920,000	£1,452,671	£731,084	35	4	£73,108	£65,798
Hunterston				437	219	£4,518,187	£3,162,731
Inverness	£1,555,000	£773,597	£389,328	19	0	£0	£0
Loch Fyne	£1,990,000	£990,005	£498,239	24	2	£49,824	£44,842
Cromarty Firth	£12,350,000	£6,144,002	£3,092,087	150	15	£309,209	£278,288
Elgin	£5,530,000	£2,751,120	£1,384,554	67	27	£553,822	£498,439
Lockerbie	£12,570,000	£6,253,450	£3,147,168	152	61	£1,258,867	£1,132,981

Rates used	Type	Displacement	Substitution	Leakage (rate)	
Rosyth	National Gateway	30%	20%	30%	High
Hunterston	National Gateway	30%	20%	30%	High
Grangemouth	National Gateway	30%	20%	30%	High
Leven	Regional Gatewa	50%	10%	10%	Medium
Lockerbie	Freight Distributic	50%	10%	10%	Medium
Elgin/A96	Freight Distributic	50%	10%	10%	Medium
Aberdeen	Regional Gatewa	10%	90%	10%	Medium
Peterhead	Regional Gatewa	10%	90%	10%	Medium
Inverness	Regional Gatewa	10%	90%	10%	Medium
Dundee	Regional Gatewa	40%	50%	10%	Low
Cromarty Firth	Freight Distributic	40%	50%	10%	Low
Loch Fyne	Freight Distributic	40%	50%	10%	Low

Appendix D

Short Appraisal Summary Tables (ASTs)

Short Appraisal Summary Table (SAST)

Option/Location	Aberdeen	**Type**	Regional Gateway
RTP Area	NESTRAN Regional Transport Area		
Proposal description	This option, which is a port situated in the north east of Scotland and linked by road and rail operating freight services mainly to the Northern Isles and to the North Sea Oil Industry requires upgrading 9 additional port handling equipment machines		
Estimated costs • Capital	£1.30m (including OB)	• OMR (per annum)	£64k

Implementability Appraisal	
Technical feasibility	Achievable and realistic
Operational feasibility	Feasible and results in modest increase in freight throughput in a given period
Technical risks	Capital cost estimates include an allowance for optimism bias of 44% and operating cost estimates of 42%

Objective	**Sub objective**	**Impacts of Option**	
Environment	Air Quality (CO_2)	Low air quality benefits are expected. Carbon PVB at high growth is estimated at £0.70m over 60-year period	
	Noise	Modal shift of 2.9m HGV-kilometres saved annually suggesting low noise benefits can be expected	
	Others	Potential impacts on water resources (-) Minimal – investment concerns machinery only Potential effects on geology and soils as a result of groundbreaking works (-) Minimal – investment concerns machinery only Potential impact on animal populations through loss or disturbance of areas (-) Minimal for same reason Potential landscape impacts in loss of green space (-) Minimal as machinery will be on-site Potential for environmental improvements (+) None Unlikely to require an Environmental Impact Assessment	
Safety	Accidents	Road Safety benefits	PB1 = £0.17m
Economy	Private Sector Impacts	Times Savings	PB2 = £10.28m
		Vehicle Operating Costs (VOC) Savings	PB3 = £5.50m
		Revenues	PB4 = £4.23m
		Carbon Savings	PB5 = £0.70m
		Present Value of Benefits (PB1 ... PB5)	PVB = £20.88m
	Costs	Investment Costs	PC1 = -£1.00m
		Operating, Maintenance & Renewals Costs	PC2 = -£1.23m
		Indirect Tax Revenues	PC3 = -£4.88m
		Subsidy	PC4 = £0.00m
		Present Value of Costs (PC1 … PC4)	PVC = -£7.11m
	TEE	*Net Present Value (NPV = PVB – PVC)* = £13.77m *Benefit to Cost Ratio (BCR = PVB / PVC)* = 2.9	
Connectivity	Within local area	Additional handling equipment will improve port throughput and reduce operating congestion, so facilitate multimodal freight operations and movements at the site. However, this level of impact is likely to be limited in terms of connections to/from these sites. Hence, it is reasonable to score these sites as Minor Positive	
	To/from local area	Providing additional handling equipment will not change the level of connectivity to/from these sites. However, this level of impact is likely to be Neutral	
Integration	Transport integration	Increased capacity means potential benefits for quicker and more efficient multimodal freight transfer operations from road to rail, road to sea and rail to sea at the port, resulting in the scale of benefits as potentially ***Large Positive***	
	Land-use and Policy integration	This option is included in the NESTRAN Regional Transport Strategy, IP06, and therefore is in line with Policy. It is considered as a ***Moderate Positive*** impact	

Short Appraisal Summary Table (SAST)				
Option/location	Peterhead	**Type**	Regional Gateway	
RTP Area	NESTRAN Regional Transport Area			
Proposal description	This option, which is a port situated in the north east of Scotland is linked to the rest of the region only by road operating freight services between the Northern Isles, the local fishing industry and the rest of the country, and to the North Sea Oil Industry, requires upgrading 3 additional port handling equipment machines			
Estimated costs • Capital	£0.43m (including OB)	• OMR (per annum)	£21.3k	
Implementability Appraisal				
Technical feasibility	Achievable and realistic			
Operational feasibility	Feasible and results in modest increase in freight throughput in a given period			
Technical risks	Capital cost estimates include an allowance for optimism bias of 44% and operating cost estimates of 42%			
Objective	**Sub objective**	**Impacts of Option**		
Environment	Air Quality (CO_2)	Low air quality benefits are expected. Carbon PVB at high growth is estimated at £0.55m over 60-year period		
	Noise	Modal shift of 2.3m HGV-kilometres saved annually suggesting low noise benefits can be expected		
	Others	Potential impacts on water resources (-) Minimal – investment concerns machinery only Potential effects on geology and soils as a result of groundbreaking works (-) Minimal – investment concerns machinery only Potential impact on animal populations through loss or disturbance of areas (-) Minimal for same reason Potential landscape impacts in loss of green space (-) Minimal as machinery will be on-site Potential for environmental improvements (+) None Unlikely to require an Environmental Impact Assessment		
Safety	Accidents	Road Safety benefits	PB1 = £0.13m	
Economy	Private Sector Impacts	Times Savings	PB2 = £7.08m	
		Vehicle Operating Costs (VOC) Savings	PB3 = £4.31m	
		Revenues	PB4 = £2.84m	
		Carbon Savings	PB5 = £0.55m	
		Present Value of Benefits (PB1 ... PB5)	PVB = £14.91m	
	Costs	Investment Costs	PC1 = -£0.33m	
		Operating, Maintenance & Renewals Costs	PC2 = -£0.40m	
		Indirect Tax Revenues	PC3 = -£3.82m	
		Subsidy	PC4 = £0.00m	
		Present Value of Costs (PC1 … PC4)	PVC = -£4.56m	
	TEE	*Net Present Value (NPV = PVB – PVC)* = £10.35m *Benefit to Cost Ratio (BCR = PVB / PVC)* = 3.3		
Connectivity	Within local area	Additional handling equipment will improve port throughput and reduce operating congestion, so facilitate multimodal freight operations and movements at the site. However, this level of impact is likely to be limited in terms of connections to/from these sites. Hence, it is reasonable to score these sites as Minor Positive		
	To/from local area	Providing additional handling equipment will not change the level of connectivity to/from these sites. However, this level of impact is likely to be Neutral		
Integration	Transport integration	Increased capacity means potential benefits from quicker and more efficient multimodal freight transfer operations from road to sea at the port, resulting in the scale of benefits as potentially ***Moderate Positive***		
	Land-use and Policy integration	This option is included in the NESTRAN Regional Transport Strategy, IP06, and therefore is in line with Government Policy. It is considered as a ***Moderate Positive*** impact		

Short Appraisal Summary Table (SAST)

Option/location	Grangemouth	**Type**	National Gateway
RTP Area	SEStran Regional Transport Area		
Proposal description	This option, which is a port situated on the south side of the Firth of Forth, is linked to the rest of the region by road and rail services and operates freight services between the Europe and other parts of the UK and the whole of Scotland, but it is capacity constrained and requires another 20,000 sq. meters of hardstanding		
Estimated costs • Capital	£5.76m (including OB)	• OMR (per annum)	£0.28m

Implementability Appraisal	
Technical feasibility	Achievable and realistic
Operational feasibility	Feasible and results in modest increase in freight throughput in a given period
Technical risks	Capital cost estimates include an allowance for optimism bias of 44% and operating cost estimates of 42%

Objective	**Sub objective**	**Impacts of Option**	
Environment	Air Quality (CO2)	Low air quality benefits are expected. Carbon PVB at high growth is estimated at £1.62m over 60-year period	
	Noise	Modal shift of 6.7m HGV-kilometres saved annually suggesting moderate noise benefits can be expected	
	Others	Potential impacts on water resources (-) There is likely to be some as the investment is likely to require additional land Potential effects on geology and soils as a result of groundbreaking works (-)There is likely to be some as the investment is likely to require additional land Potential impact on animal populations through loss or disturbance of areas (-)There is likely to be some as the investment is likely to require additional land Potential landscape impacts in loss of green space (-) This is not expected to occur to any significant extent as the port is in an urban environment Potential for environmental improvements (+) None This option is likely to require an Environmental Impact Assessment	
Safety	Accidents	Road Safety benefits	PB1 = £0.38m
Economy	Private Sector Impacts	Times Savings	PB2 = £30.23m
		Vehicle Operating Costs (VOC) Savings	PB3 = £12.72m
		Revenues	PB4 = £23.18m
		Carbon Savings	PB5 = £1.62m
		Present Value of Benefits (PB1 ... PB5)	PVB = £68.12m
	Costs	Investment Costs	PC1 = -£4.44m
		Operating, Maintenance & Renewals Costs	PC2 = -£5.35m
		Indirect Tax Revenues	PC3 = -£11.28m
		Subsidy	PC4 = £0.00m
		Present Value of Costs (PC1 … PC4)	PVC = -£21.06m
	TEE	*Net Present Value (NPV = PVB – PVC)* = £47.06m *Benefit to Cost Ratio (BCR = PVB / PVC)* = 3.2	
Connectivity	Within local area	Increased capacity will have a potentially positive benefit from easing of freight congestion, especially given the volumes of freight forecasted to use the site. Therefore, it is reasonable to score this option as Moderate Positive	
	To/from local area	The additional facilities will have a potentially positive benefit from easing of freight congestion, especially on the congested Forth Bridge, but this is anticipated to be somewhat mitigated by the additional freight movements expected to occur on the local road network. Therefore, it is reasonable to score this option as Minor Positive	
Integration	Transport integration	Increased capacity means potential benefits from quicker and more efficient multimodal freight transfer operations from both rail and road, rail and sea and road and sea at the port, resulting in potentially ***Large Positive*** benefits	

	Land-use and Policy integration	Multimodal freight development at Grangemouth aimed at modal shift out of road transport to alternative is in line with Government Policy (Scotland National Freight Strategy pp 169/170). It is considered as a ***Major Positive*** impact

<table>
<tr><th colspan="5">Short Appraisal Summary Table (SAST)</th></tr>
<tr><td>Option/location</td><td colspan="2">Rosyth</td><td>Type</td><td>National Gateway</td></tr>
<tr><td>RTP Area</td><td colspan="4">SEStran Regional Transport Area</td></tr>
<tr><td>Proposal description</td><td colspan="4">This option, which is a port situated on the south side of the Firth of Forth, is linked to the rest of the region by road and rail services and operates freight services between the Europe and other parts of the UK and the whole of Scotland, but it is capacity constrained and requires additional deep water container storage and handling facilities</td></tr>
<tr><td>Estimated costs
• Capital</td><td colspan="2">£79.92m (including OB)</td><td>• OMR (per annum)</td><td>£1.53m</td></tr>
<tr><td colspan="5">Implementability Appraisal</td></tr>
<tr><td>Technical feasibility</td><td colspan="4">Achievable and realistic</td></tr>
<tr><td>Operational feasibility</td><td colspan="4">Feasible and results in large increase in freight throughput in a given period</td></tr>
<tr><td>Technical risks</td><td colspan="4">Capital cost estimates include an allowance for optimism bias of 11% and operating cost estimates of 6%, as previous engineering work has allowed for high levels of contingency and risk & uncertainty</td></tr>
<tr><td>Objective</td><td>Sub objective</td><td colspan="3">Impacts of Option</td></tr>
<tr><td rowspan="3">Environment</td><td>Air Quality (CO2)</td><td colspan="3">Large air quality benefits are expected. Carbon PVB at high growth is estimated at £11.85m over 60-year period</td></tr>
<tr><td>Noise</td><td colspan="3">Modal shift of 49.4m HGV-kilometres saved annually suggesting large noise benefits can be expected</td></tr>
<tr><td>Others</td><td colspan="3">Potential impacts on water resources (-) There is not likely to be a significant impact as site is already on reclaimed land
Potential effects on geology and soils as a result of groundbreaking works (-). There is not likely to be a significant impact as site is already on reclaimed land
Potential impact on animal populations through loss or disturbance of areas (-). There is not likely to be a significant impact as site is already on reclaimed land
Potential landscape impacts in loss of green space (-). There is not likely to be a significant impact as site is already on reclaimed land
Potential for environmental improvements (+) None
This option is not likely to require an Environmental Impact Assessment</td></tr>
<tr><td>Safety</td><td>Accidents</td><td colspan="2">Road Safety benefits</td><td>PB1 = £2.79m</td></tr>
<tr><td rowspan="12">Economy</td><td rowspan="5">Private Sector Impacts</td><td colspan="2">Times Savings</td><td>PB2 = £89.33m</td></tr>
<tr><td colspan="2">Vehicle Operating Costs (VOC) Savings</td><td>PB3 = £93.23m</td></tr>
<tr><td colspan="2">Revenues</td><td>PB4 = £90.79m</td></tr>
<tr><td colspan="2">Carbon Savings</td><td>PB5 = £11.85m</td></tr>
<tr><td colspan="2">Present Value of Benefits (PB1 ... PB5)</td><td>PVB = £287.99m</td></tr>
<tr><td rowspan="5">Costs</td><td colspan="2">Investment Costs</td><td>PC1 = -£61.54m</td></tr>
<tr><td colspan="2">Operating, Maintenance & Renewals Costs</td><td>PC2 = -£28.74m</td></tr>
<tr><td colspan="2">Indirect Tax Revenues</td><td>PC3 = -£82.66m</td></tr>
<tr><td colspan="2">Subsidy</td><td>PC4 = £0.00m</td></tr>
<tr><td colspan="2">Present Value of Costs (PC1 … PC4)</td><td>PVC = -£172.95m</td></tr>
<tr><td>TEE</td><td colspan="3">Net Present Value (NPV = PVB – PVC) = £115.04m
Benefit to Cost Ratio (BCR = PVB / PVC) = 1.7</td></tr>
</table>

Connectivity	Within local area	Additional storage space and handling equipment will improve port capacity and reduce operating congestion at these ports. Data supplied by Babcock suggests each new crane could handle up to 150,000 TEU per annum, and so it is reasonable to assume the overall impact within the local area is likely to be Large Positive
	To/from local area	The opportunities for attracting large shipping vessels from international destinations is a major benefit brought about by this option. As ports in Europe reach capacity it is possible for each of these sites to be used by trans-Atlantic journeys instead of other ports in the EU (for example, journeys from North America to the Baltic Region/Scandinavia). Given the potential volumes involved, it is reasonable to assume the overall impact is likely to be Large Positive
Integration	Transport integration	Increased capacity means potential benefits from quicker and more efficient multimodal freight transfer operations from both rail and road, rail and sea and road and sea at the port, resulting in potentially ***Large Positive*** benefits
	Land-use and Policy integration	Multimodal freight development at Rosyth aimed at modal shift out of road transport to alternative is in line with Government Policy (Scotland National Freight Strategy pp 169/170). The site is also designated in the Fife Structure Plan. In addition, the site is also in the National Planning Framework 2 (NPF2) under priority number 5. It is considered as a ***Large Positive*** impact

Short Appraisal Summary Table (SAST)			
Option/location	Leven	**Type**	Regional Gateway
RTP Area	SEStran Regional Transport Area		
Proposal description	This option, based in Fife, on the north side of the Firth of Forth, is to be developed as a railhead for the local industrial base which has as nationwide distribution operation currently only accessible by road. This option requires re-commissioning of the rail line between Leven and Thornton Junction with additional freight handling facilities		
Estimated costs • Capital	£12.96m (including OB)	• OMR (per annum)	£0.64m

Implementability Appraisal	
Technical feasibility	Achievable and realistic
Operational feasibility	Feasible and results in modal shift in freight throughput in a given period
Technical risks	Capital cost estimates include an allowance for optimism bias of 44% and operating cost estimates of 42%

Objective	**Sub objective**	**Impacts of Option**	
Environment	Air Quality (CO_2)	Low air quality benefits are expected. Carbon PVB at high growth is estimated at £0.53m over 60-year period	
	Noise	Modal shift of 2.2m HGV-kilometres saved annually suggesting low noise benefits can be expected	
	Others	Potential impacts on water resources (-) Minimal – investment concerns re-opening line only Potential effects on geology and soils as a result of groundbreaking works (-) Minimal – investment concerns re-opening line only Potential impact on animal populations through loss or disturbance of areas (-)Minimal as investment concerns re-opening line and freight facilities are in an urban area Potential landscape impacts in loss of green space (-) Minimal as investment concerns re-opening line and freight facilities are in an urban area Potential for environmental improvements (+) None Unlikely to require an Environmental Impact Assessment	
Safety	Accidents	Road Safety benefits	PB1 = £0.13m
Economy	Private Sector Impacts	Times Savings	PB2 = £12.94m
		Vehicle Operating Costs (VOC) Savings	PB3 = £4.18m
		Revenues	PB4 = £9.92m
		Carbon Savings	PB5 = £0.53m
		Present Value of Benefits (PB1 ... PB5)	PVB = £27.70m
	Costs	Investment Costs	PC1 = -£9.98m
		Operating, Maintenance & Renewals Costs	PC2 = -£12.03m
		Indirect Tax Revenues	PC3 = -£3.71m
		Subsidy	PC4 = -£2.11m
		Present Value of Costs (PC1 … PC4)	PVC = -£27.83m
	TEE	*Net Present Value (NPV = PVB – PVC) =* -£0.13m *Benefit to Cost Ratio (BCR = PVB / PVC) = 1.0*	
Connectivity	Within local area	Re-opening the rail line will facilitate multimodal freight operations and movements on, and close to the site. This has been scored as being Moderate Positive	
	To/from local area	Most of the users forecast to use this new facility are estimated to be medium trips (e.g. Grangemouth) to long distance journeys (e.g. Manchester) and hence the site offers good connectivity. The overall impact is likely to be Moderate Positive	
Integration	Transport integration	Re-opening rail line and attendant freight facilities offer the potential benefits for quicker and more efficient multimodal freight transfer operations between road and rail, and which in turn will speed up freight distribution both locally and regionally, so the scale of benefits are potentially ***Moderate Positive***	
	Land-use and Policy integration	Freight multi-modal shift from road to other modes is in the SEStran Regional Transport Strategy, (Policy 16) and therefore is in line with Government Policy. The project is also strongly supported by Fife Council. It is considered as a ***Moderate Positive*** impact	

<table>
<tr><th colspan="5">Short Appraisal Summary Table (SAST)</th></tr>
<tr><td colspan="2">Option/location</td><td>Dundee</td><td>Type</td><td>Regional Gateway</td></tr>
<tr><td colspan="2">RTP Area</td><td colspan="3">TACTRAN Regional Transport Area</td></tr>
<tr><td colspan="2">Proposal description</td><td colspan="3">This option, which is a port with rail access is situated on the north side of the Firth of Tay, is linked by road and rail to the north east of Scotland and to the central and southern parts of Scotland, but is capacity constrained and requires 3,000 sq. meters of additional hardstanding and 2 freight handling machines</td></tr>
<tr><td colspan="2">Estimated costs
• Capital</td><td>£0.50m (including OB)</td><td>• OMR (per annum)</td><td>£25k</td></tr>
<tr><td colspan="5">Implementability Appraisal</td></tr>
<tr><td colspan="2">Technical feasibility</td><td colspan="3">Achievable and realistic</td></tr>
<tr><td colspan="2">Operational feasibility</td><td colspan="3">Feasible and results in modest increase in freight throughput in a given period</td></tr>
<tr><td colspan="2">Technical risks</td><td colspan="3">Capital cost estimates include an allowance for optimism bias of 44% and operating cost estimates of 42%</td></tr>
<tr><td>Objective</td><td>Sub objective</td><td colspan="3">Impacts of Option</td></tr>
<tr><td rowspan="3">Environment</td><td>Air Quality (CO2)</td><td colspan="3">Low air quality benefits are expected. Carbon PVB at high growth is estimated at £0.34m over 60-year period</td></tr>
<tr><td>Noise</td><td colspan="3">Modal shift of 1.4m HGV-kilometres saved annually suggesting low noise benefits can be expected</td></tr>
<tr><td>Others</td><td colspan="3">Potential impacts on water resources (-) Moderate – investment requires additional land
Potential effects on geology and soils as a result of groundbreaking works (-)Moderate – investment requires additional land
Potential impact on animal populations through loss or disturbance of areas (-) Moderate – investment requires additional land
Potential landscape impacts in loss of green space (-) Minimal as additional land requirement is within an urban environment
Potential for environmental improvements (+) None
Likely to require an Environmental Impact Assessment</td></tr>
<tr><td>Safety</td><td>Accidents</td><td colspan="2">Road Safety benefits</td><td>PB1 = £0.08m</td></tr>
<tr><td rowspan="12">Economy</td><td rowspan="6">Private Sector Impacts</td><td colspan="2">Times Savings</td><td>PB2 = £7.28m</td></tr>
<tr><td colspan="2">Vehicle Operating Costs (VOC) Savings</td><td>PB3 = £2.67m</td></tr>
<tr><td colspan="2">Revenues</td><td>PB4 = £2.92m</td></tr>
<tr><td colspan="2">Carbon Savings</td><td>PB5 = £0.34m</td></tr>
<tr><td colspan="2">Present Value of Benefits (PB1 ... PB5)</td><td>PVB = £13.29m</td></tr>
<tr><td colspan="2"></td><td></td></tr>
<tr><td rowspan="5">Costs</td><td colspan="2">Investment Costs</td><td>PC1 = -£0.39m</td></tr>
<tr><td colspan="2">Operating, Maintenance & Renewals Costs</td><td>PC2 = -£0.47m</td></tr>
<tr><td colspan="2">Indirect Tax Revenues</td><td>PC3 = -£2.37m</td></tr>
<tr><td colspan="2">Subsidy</td><td>PC4 = £0.00m</td></tr>
<tr><td colspan="2">Present Value of Costs (PC1 … PC4)</td><td>PVC = -£3.22m</td></tr>
<tr><td>TEE</td><td colspan="3">Net Present Value (NPV = PVB – PVC) = £10.06m
Benefit to Cost Ratio (BCR = PVB / PVC) = 4.1</td></tr>
<tr><td rowspan="2">Connectivity</td><td>Within local area</td><td colspan="3">Greater capacity provided by additional hardstanding and equipment will reduce operating congestion on the site, easing multimodal freight operations and movements. Given the volumes predicted, the impact is likely to be Minor Positive</td></tr>
<tr><td>To/from local area</td><td colspan="3">Providing greater capacity, additional hardstanding and new handling equipment will not change the level of connectivity to/from these sites. However, this level of impact is likely to be Neutral</td></tr>
<tr><td rowspan="2">Integration</td><td>Transport integration</td><td colspan="3">Increased capacity means potential benefits for quicker and more efficient multimodal freight transfer operations from road to rail, road to sea and rail to sea at the port, resulting in the scale of benefits as potentially Large Positive</td></tr>
<tr><td>Land-use and Policy integration</td><td colspan="3">The multi-modal shift is included in the TACTRAN Regional Transport Strategy, as expressed in proposed interventions IV_J1 and IV_J3, and therefore is in line with Government Policy. It is considered as a Moderate Positive impact</td></tr>
</table>

<table>
<tr><th colspan="5">Short Appraisal Summary Table (SAST)</th></tr>
<tr><td colspan="2">Option/location</td><td>Hunterston</td><td>Type</td><td>National Gateway</td></tr>
<tr><td colspan="2">RTP Area</td><td colspan="3">SPT Regional Transport Area</td></tr>
<tr><td colspan="2">Proposal description</td><td colspan="3">This option, which is a port situated on the west coast of Ayr, west of Glasgow, is linked to the rest of the region by both road and rail services and operates freight services between the whole of Scotland and the rest of the UK, Europe, and North America, but it is capacity constrained and requires investment to increase the stacker/reclaimer/stockyard area by one third from 500,000 sq. meters capacity to 670,000 sq. meters and a larger number of handling machines from 3 to 4</td></tr>
<tr><td colspan="2">Estimated costs
• Capital</td><td>£150.01m (including OB)</td><td>• OMR (per annum)</td><td>£7.17m</td></tr>
<tr><td colspan="5">Implementability Appraisal</td></tr>
<tr><td colspan="2">Technical feasibility</td><td colspan="3">Achievable and realistic</td></tr>
<tr><td colspan="2">Operational feasibility</td><td colspan="3">Feasible and results in an increase in freight throughput in a given period</td></tr>
<tr><td colspan="2">Technical risks</td><td colspan="3">Capital cost estimates include an allowance for optimism bias of 44% and operating cost estimates of 42%</td></tr>
<tr><td>Objective</td><td>Sub objective</td><td colspan="3">Impacts of Option</td></tr>
<tr><td rowspan="3">Environment</td><td>Air Quality (CO2)</td><td colspan="3">Large air quality benefits are expected. Carbon PVB at high growth is estimated at £6.79m over 60-year period</td></tr>
<tr><td>Noise</td><td colspan="3">Modal shift of 28.3m HGV-kilometres saved annually suggesting moderate noise benefits can be expected</td></tr>
<tr><td>Others</td><td colspan="3">Potential impacts on water resources (-) There is likely to be a moderate impact on these as some new land is required
Potential effects on geology and soils as a result of groundbreaking works (-)There is likely to be a moderate impact on these as some new land is required
Potential impact on animal populations through loss or disturbance of areas (-)There is likely to be a moderate impact on these as some new land is required
Potential landscape impacts in loss of green space (-)There is likely to be a moderate impact on this as some new land is required and the site is largely rural in nature
Potential for environmental improvements (+) None
This option is likely to require an Environmental Impact Assessment</td></tr>
<tr><td>Safety</td><td>Accidents</td><td colspan="2">Road Safety benefits</td><td>PB1 = £1.60m</td></tr>
<tr><td rowspan="12">Economy</td><td rowspan="5">Private Sector Impacts</td><td colspan="2">Times Savings</td><td>PB2 = £49.92m</td></tr>
<tr><td colspan="2">Vehicle Operating Costs (VOC) Savings</td><td>PB3 = £53.45m</td></tr>
<tr><td colspan="2">Revenues</td><td>PB4 = £295.50m</td></tr>
<tr><td colspan="2">Carbon Savings</td><td>PB5 = £6.79m</td></tr>
<tr><td colspan="2">Present Value of Benefits (PB1 ... PB5)</td><td>PVB = £407.26m</td></tr>
<tr><td rowspan="5">Costs</td><td colspan="2">Investment Costs</td><td>PC1 = -£115.56m</td></tr>
<tr><td colspan="2">Operating, Maintenance & Renewals Costs</td><td>PC2 = -£134.92m</td></tr>
<tr><td colspan="2">Indirect Tax Revenues</td><td>PC3 = -£47.39m</td></tr>
<tr><td colspan="2">Subsidy</td><td>PC4 = £0.00m</td></tr>
<tr><td colspan="2">Present Value of Costs (PC1 … PC4)</td><td>PVC = -£297.87m</td></tr>
<tr><td>TEE</td><td colspan="3">Net Present Value (NPV = PVB – PVC) = £109.39m
Benefit to Cost Ratio (BCR = PVB / PVC) = 1.4</td></tr>
</table>

Connectivity	Within local area	Additional storage space and handling equipment will improve port capacity and reduce operating congestion at these ports. Data supplied by Babcock suggests each new crane could handle up to 150,000 TEU per annum, and so it is reasonable to assume the overall impact within the local area is likely to be Large Positive
	To/from local area	The opportunities for attracting large shipping vessels from international destinations is a major benefit brought about by this option. As ports in Europe reach capacity it is possible for each of these sites to be used by trans-Atlantic journeys instead of other ports in the EU (for example, journeys from North America to the Baltic Region/Scandinavia). Given the potential volumes involved, it is reasonable to assume the overall impact is likely to be Large Positive
Integration	Transport integration	Increased capacity means potential benefits from quicker and more efficient multimodal freight transfer operations from both rail and road, rail and sea and road and sea at the port, resulting in potentially ***Large Positive*** benefits
	Land-use and Policy integration	Improvements to this site/location are mentioned in the Scottish Rail Utilisation Study and is in line with Government Policy. It is considered as a ***Slight Positive*** impact

Short Appraisal Summary Table (SAST)

<table>
<tr><td>Option/location</td><td>Inverness</td><td>Type</td><td colspan="2">Regional Gateway</td></tr>
<tr><td>RTP Area</td><td colspan="4">HITRANS Regional Transport Area</td></tr>
<tr><td>Proposal description</td><td colspan="4">This option, which is situated at the head of the Moray Firth, is linked to the rest of the region by both road and rail services, but the port is capacity constrained in handling equipment, and requires investment to increase the number of handling machines to 4 port handling machines</td></tr>
<tr><td>Estimated costs
• Capital</td><td>£0.72m (including OB)</td><td>• OMR (per annum)</td><td colspan="2">£36k</td></tr>
<tr><td colspan="5">Implementability Appraisal</td></tr>
<tr><td>Technical feasibility</td><td colspan="4">Achievable and realistic</td></tr>
<tr><td>Operational feasibility</td><td colspan="4">Feasible and results in an increase in freight throughput in a given period</td></tr>
<tr><td>Technical risks</td><td colspan="4">Capital cost estimates include an allowance for optimism bias of 44% and operating cost estimates of 42%</td></tr>
<tr><td>Objective</td><td>Sub objective</td><td colspan="3">Impacts of Option</td></tr>
<tr><td rowspan="3">Environment</td><td>Air Quality (CO2)</td><td colspan="3">Low air quality benefits are expected. Carbon PVB at high growth is estimated at £0.32m over 60-year period</td></tr>
<tr><td>Noise</td><td colspan="3">Modal shift of 1.3m HGV-kilometres saved annually suggesting low noise benefits can be expected</td></tr>
<tr><td>Others</td><td colspan="3">Potential impacts on water resources (-) There is likely to be no impact as only plant is required
Potential effects on geology and soils as a result of groundbreaking works (-)There is likely to be no impact as only plant is required
Potential impact on animal populations through loss or disturbance of areas (-)There is likely to be no impact as only plant is required
Potential landscape impacts in loss of green space (-). There is likely to be no impact as only plant is required
Potential for environmental improvements (+) None
This option is not likely to require an Environmental Impact Assessment</td></tr>
<tr><td>Safety</td><td>Accidents</td><td colspan="2">Road Safety benefits</td><td>PB1 = £0.07m</td></tr>
<tr><td rowspan="11">Economy</td><td rowspan="5">Private Sector Impacts</td><td colspan="2">Times Savings</td><td>PB2 = £3.87m</td></tr>
<tr><td colspan="2">Vehicle Operating Costs (VOC) Savings</td><td>PB3 = £2.49m</td></tr>
<tr><td colspan="2">Revenues</td><td>PB4 = £1.55m</td></tr>
<tr><td colspan="2">Carbon Savings</td><td>PB5 = £0.32m</td></tr>
<tr><td colspan="2">Present Value of Benefits (PB1 ... PB5)</td><td>PVB = £8.30m</td></tr>
<tr><td rowspan="5">Costs</td><td colspan="2">Investment Costs</td><td>PC1 = -£0.55m</td></tr>
<tr><td colspan="2">Operating, Maintenance & Renewals Costs</td><td>PC2 = -£0.67m</td></tr>
<tr><td colspan="2">Indirect Tax Revenues</td><td>PC3 = -£2.21m</td></tr>
<tr><td colspan="2">Subsidy</td><td>PC4 = £0.00m</td></tr>
<tr><td colspan="2">Present Value of Costs (PC1 … PC4)</td><td>PVC = -£3.43m</td></tr>
<tr><td>TEE</td><td colspan="3">Net Present Value (NPV = PVB – PVC) = £4.87m
Benefit to Cost Ratio (BCR = PVB / PVC) = 2.4</td></tr>
<tr><td rowspan="2">Connectivity</td><td>Within local area</td><td colspan="3">Additional handling equipment will improve port throughput and reduce operating congestion, so facilitate multimodal freight operations and movements at the site. However, this level of impact is likely to be limited in terms of connections to/from these sites. Hence, it is reasonable to score these sites as Minor Positive</td></tr>
<tr><td>To/from local area</td><td colspan="3">Providing additional handling equipment will not change the level of connectivity to/from these sites. However, this level of impact is likely to be Neutral</td></tr>
<tr><td rowspan="2">Integration</td><td>Transport integration</td><td colspan="3">Increased capacity means potential benefits from quicker and more efficient multimodal freight transfer operations from both rail and road, rail and sea and road and sea, resulting in potentially Moderate Positive benefits</td></tr>
<tr><td>Land-use and Policy integration</td><td colspan="3">The objective of this option to facilitate modal shift from road to other modes of transport is included in the HITRANS Regional Transport Strategy, H31b and H31f, and therefore is in line with Government Policy. It is considered as a Moderate Positive impact</td></tr>
</table>

Short Appraisal Summary Table (SAST)

Option/location	Cromarty Firth	**Type**	Regional Gateway
RTP Area	HITRANS Regional Transport Area		
Proposal description	This option, which is situated on the east coast of Scotland, north of Inverness, is linked to the rest of the region by both road and rail services. It has significant if declining throughput of oil related freight, and some timber and livestock freight movements through the port. However, the port capacity constrained by the lack of adequate berthing facilities, hence the proposal is for 3 additional berths.		
Estimated costs • Capital	£17.28m (including OB)	• OMR (per annum)	£0.85m

Implementability Appraisal	
Technical feasibility	Achievable and realistic
Operational feasibility	Feasible and results in an increase in freight throughput in a given period
Technical risks	Capital cost estimates include an allowance for optimism bias of 44% and operating cost estimates of 42%

Objective	**Sub objective**	**Impacts of Option**
Environment	Air Quality (CO2)	Low air quality benefits are expected. Carbon PVB at high growth is estimated at £1.3 mover 60-year period
	Noise	Modal shift of 5.5m HGV-kilometres saved annually suggesting moderate noise benefits can be expected
	Others	Potential impacts on water resources (-) There is unlikely as existing port area is expected to be re-used Potential effects on geology and soils as a result of groundbreaking works (-) There is likely to be some impact for construction of now berths Potential impact on animal populations through loss or disturbance of areas (-)There is likely to be some impact for construction of now berths Potential landscape impacts in loss of green space (-)This is unlikely as re-use of redundant port land is a probability Potential for environmental improvements (+) None This option is likely to require an Environmental Impact Assessment

Objective	**Sub objective**	**Impacts of Option**	
Safety	Accidents	Road Safety benefits	PB1 = £0.31m
Economy	Private Sector Impacts	Times Savings	PB2 = £16.10m
		Vehicle Operating Costs (VOC) Savings	PB3 = £10.39m
		Revenues	PB4 = £12.35m
		Carbon Savings	PB5 = £1.32m
		Present Value of Benefits (PB1 ... PB5)	PVB = £40.47m
	Costs	Investment Costs	PC1 = -£13.31m
		Operating, Maintenance & Renewals Costs	PC2 = -£16.04m
		Indirect Tax Revenues	PC3 = -£9.21m
		Subsidy	PC4 = -£3.70m
		Present Value of Costs (PC1 … PC4)	PVC = -£42.26m
	TEE	*Net Present Value (NPV = PVB – PVC) =* -£1.78m *Benefit to Cost Ratio (BCR = PVB / PVC) =* 1.0	

Connectivity	Within local area	The existing port is severely constrained by lack of berths, and additional berths will in effect increase capacity and reduce operating constraints and congestion, permitting faster throughput of goods and materials on and close to the site. Given the estimated volumes, this has been scored as being Moderate Positive
	To/from local area	Additional berths will allow the site to attract new trade, including servicing the timber sector. This opens up the area to new business although in the case of the forestry industry any new exports from Scotland could be captured from other areas of the country, currently servived elsewhere. However, there are some significant volumes predicted. Hence, given the potential for offsetting between the two identified issues it is reasonable to score this option as Minor Positive
Integration	Transport integration	Increased capacity means potential benefits from quicker and more efficient multimodal freight transfer operations from both rail and road, rail and sea and road and sea, resulting in potentially ***Moderate Positive*** benefits
	Land-use and Policy integration	The objective of this option to facilitate modal shift from road to other modes of transport is included in the HITRANS Regional Transport Strategy, H31b and H31f, and therefore is in line with Government Policy. It is considered as a ***Moderate Positive*** impact

Short Appraisal Summary Table (SAST)

<table>
<tr><td>Option/location</td><td>Loch Fyne</td><td>Type</td><td>Local Distribution Centre</td></tr>
<tr><td>RTP Area</td><td colspan="3">HITRANS Regional Transport Area</td></tr>
<tr><td>Proposal description</td><td colspan="3">This option, essentially a pier, situated on the west side of Loch Fyne, and is linked to the rest of the region only by road, effectively only the A83. It has significant throughput of timber that is sourced locally and a sizeable proportion of which is transferred from road to vessel through the pier for onward transport to Troon and other ports in Ayr and beyond. It is however constrained by current facilities and investment is proposed in investment is in a new (larger) pier, storage and access road.</td></tr>
<tr><td>Estimated costs
• Capital</td><td>£8.35m (including OB)</td><td>• OMR (per annum)</td><td>£0.41m</td></tr>
<tr><td colspan="4">Implementability Appraisal</td></tr>
<tr><td>Technical feasibility</td><td colspan="3">Achievable and realistic</td></tr>
<tr><td>Operational feasibility</td><td colspan="3">Feasible and results in an increase in freight throughput in a given period</td></tr>
<tr><td>Technical risks</td><td colspan="3">Capital cost estimates include an allowance for optimism bias of 44% and operating cost estimates of 42%</td></tr>
</table>

<table>
<tr><th>Objective</th><th>Sub objective</th><th colspan="2">Impacts of Option</th></tr>
<tr><td rowspan="3">Environment</td><td>Air Quality (CO_2)</td><td colspan="2">Low air quality benefits are expected. Carbon PVB at high growth is estimated at £0.3m over 60-year period</td></tr>
<tr><td>Noise</td><td colspan="2">Modal shift of 1.1m HGV-kilometres saved annually suggesting moderate noise benefits can be expected</td></tr>
<tr><td>Others</td><td colspan="2">Potential impacts on water resources (-) There is likely to be some impact as additional land is required for storage and access
Potential effects on geology and soils as a result of groundbreaking works (-)There is likely to be some impact as additional land is required for storage and access
Potential impact on animal populations through loss or disturbance of areas (-)There is likely to be some impact as additional land is required for storage and access
Potential landscape impacts in loss of green space (-)There is likely to be some impact as additional land is required for storage and access
Potential for environmental improvements (+) None
This option is likely to require an Environmental Impact Assessment</td></tr>
<tr><td>Safety</td><td>Accidents</td><td>Road Safety benefits</td><td>PB1 = £0.06m</td></tr>
<tr><td rowspan="12">Economy</td><td rowspan="6">Private Sector Impacts</td><td>Times Savings</td><td>PB2 = £4.97m</td></tr>
<tr><td>Vehicle Operating Costs (VOC) Savings</td><td>PB3 = £2.14m</td></tr>
<tr><td>Revenues</td><td>PB4 = £1.99m</td></tr>
<tr><td>Carbon Savings</td><td>PB5 = £0.27m</td></tr>
<tr><td>Present Value of Benefits (PB1 ... PB5)</td><td>PVB = £9.43m</td></tr>
<tr><td rowspan="5">Costs</td><td>Investment Costs</td><td>PC1 = -£6.43m</td></tr>
<tr><td>Operating, Maintenance & Renewals Costs</td><td>PC2 = -£7.75m</td></tr>
<tr><td>Indirect Tax Revenues</td><td>PC3 = -£1.89m</td></tr>
<tr><td>Subsidy</td><td>PC4 = -£5.76m</td></tr>
<tr><td>Present Value of Costs (PC1 … PC4)</td><td>PVC = -£21.84m</td></tr>
<tr><td>TEE</td><td colspan="2">Net Present Value (NPV = PVB – PVC) = -£12.40m
Benefit to Cost Ratio (BCR = PVB / PVC) = 0.4</td></tr>
</table>

Connectivity	Within local area	The pier is relatively small and poorly served by local access, so investment in increasing pier size, storage capacity and most of all internal arrangements will improve existing conditions and so permit more efficient throughput of timber materials. The impact is likely to be Slight Positive
	To/from local area	The proposals for the new pier and associated infrastructure are intended to servce primarily the local timber forests. The primary function of the site is to export timber and pulp to other parts of the country, including destinations in England. This would suggest the potential for improved connections is somewhat limited due to the local nature of the market, but given the fact that some destinations are in England it is reasonable to assume the impact is Slight Positive
Integration	Transport integration	Increased capacity means potential benefits from quicker and more efficient multimodal freight transfer operations between road and sea, resulting in potential ***Moderate Positive*** benefits
	Land-use and Policy integration	The objective of this option to facilitate modal shift from road to other modes of transport is included in the HITRANS Regional Transport Strategy, H31b and H31f, and therefore is in line with Government Policy. It is considered as a ***Slight Positive*** impact

Short Appraisal Summary Table (SAST)

Option/location	Elgin / A96	**Type**	Local Distribution Centre
RTP Area	HITRANS Regional Transport Area		
Proposal description	This option is located in the Aberdeen to Inverness Corridor, with transport connections by road and rail, mainly in an east – west orientation. However, the rail freight capacity and facilities are relatively poor, so there are proposals for a new rail/road freight site based in Elgin		
Estimated costs • Capital	£2.77m (including OB)	• OMR (per annum)	£0.14m

Implementability Appraisal	
Technical feasibility	Achievable and realistic
Operational feasibility	Feasible and results in and increase modal shift in freight operations in a given period
Technical risks	Capital cost estimates include an allowance for optimism bias of 44% and operating cost estimates of 42%

Objective	**Sub objective**	**Impacts of Option**	
Environment	Air Quality (CO_2)	Low air quality benefits are expected. Carbon PVB at high growth is estimated at £0.9m over 60-year period	
	Noise	Modal shift of 3.8m HGV-kilometres saved annually suggesting moderate noise benefits can be expected	
	Others	Potential impacts on water resources (-) There will be some potential impacts where new land is required Potential effects on geology and soils as a result of groundbreaking works (-)There will be some potential impacts where new land is required Potential impact on animal populations through loss or disturbance of areas (-)There will be some potential impacts where new land is required Potential landscape impacts in loss of green space (-)There will be some potential impacts where new land is required Potential for environmental improvements (+) None This option is likely to require an Environmental Impact Assessment	
Safety	Accidents	Road Safety benefits	PB1 = £0.22m
Economy	Private Sector Impacts	Times Savings	PB2 = £9.19m
		Vehicle Operating Costs (VOC) Savings	PB3 = £7.24m
		Revenues	PB4 = £5.53m
		Carbon Savings	PB5 = £0.92m
		Present Value of Benefits (PB1 … PB5)	PVB = £23.10m
	Costs	Investment Costs	PC1 = -£2.13m
		Operating, Maintenance & Renewals Costs	PC2 = -£2.57m
		Indirect Tax Revenues	PC3 = -£6.42m
		Subsidy	PC4 = £0.00m
		Present Value of Costs (PC1 … PC4)	PVC = -£11.13m
	TEE	*Net Present Value (NPV = PVB – PVC)* = £11.97m *Benefit to Cost Ratio (BCR = PVB / PVC)* = 2.1	
Connectivity	Within local area	Establishing additional multimodal freight facilities will facilitate freight operations and movements. However, given the level of volumes, this is likely to be Slight Positive	
	To/from local area	Establishing the new road/rail connections at these sites would allow for medium to long distance journeys to be made. However, the same arguments apply as with the site at Loch Fyne, namely the proposals are intended to serve the local economy and hence could be somewhat limited. Given the fact that some destinations could be long-distance it is reasonable to assume the impact is Slight Positive	

Integration	Transport integration	The new road/rail freight site will offer a real alternative to road freight movements by providing an opportunity to articulate and integrate road and rail freight activities within the Aberdeen – Inverness corridor, and therefore the benefits are considered potentially ***Moderate Positive***
	Land-use and Policy integration	The objective of this option to facilitate modal shift from road to other modes of transport is included in the HITRANS Regional Transport Strategy, H31b and H31f, and therefore is in line with Government Policy. It is considered as a ***Moderate Positive*** impact

Short Appraisal Summary Table (SAST)

Option/location	Lockerbie	**Type**	Local Distribution Centre
RTP Area	SWetrans		
Proposal description	This option is located adjacent to the M74, the main trunk route connecting England with Scotland and pivotal in the movement of road freight between the two countries, however, this option is constrained by a lack of road/rail multimodal freight interchange facilities, and new facilities these are being proposed for Lockerbie		
Estimated costs • Capital	£10.80m (including OB)	• OMR (per annum)	• £0.53m
Implementability Appraisal			
Technical feasibility	Achievable and realistic		
Operational feasibility	Feasible and results in increase in modal shift in freight operations in a given period		
Technical risks	Capital cost estimates include an allowance for optimism bias of 44% and operating cost estimates of 42%		

Objective	**Sub objective**	**Impacts of Option**	
Environment	Air Quality (CO_2)	Low air quality benefits are expected. Carbon PVB at high growth is estimated at £1.0m over 60-year period	
	Noise	Modal shift of 3.9m HGV-kilometres saved annually suggesting moderate noise benefits can be expected	
	Others	Potential impacts on water resources (-) There will be some potential impacts as new land is required Potential effects on geology and soils as a result of groundbreaking works (-)There will be some potential impacts as new land is required Potential impact on animal populations through loss or disturbance of areas (-)There will be some potential impacts as new land is required Potential landscape impacts in loss of green space (-)There will be some potential impacts as new land is required, and Lockerbie is situated in a rural area Potential for environmental improvements (+) None This option is likely to require an Environmental Impact Assessment	
Safety	Accidents	Road Safety benefits	PB1 = £0.22m
Economy	Private Sector Impacts	Times Savings	PB2 = £18.80m
		Vehicle Operating Costs (VOC) Savings	PB3 = £7.44m
		Revenues	PB4 = £12.57m
		Carbon Savings	PB5 = £0.95m
		Present Value of Benefits (PB1 ... PB5)	PVB = £39.97m
	Costs	Investment Costs	PC1 = -£8.32m
		Operating, Maintenance & Renewals Costs	PC2 = -£10.03m
		Indirect Tax Revenues	PC3 = -£6.60m
		Subsidy	PC4 = £0.00m
		Present Value of Costs (PC1 … PC4)	PVC = -£24.94m
	TEE	*Net Present Value (NPV = PVB – PVC)* = £15.04m *Benefit to Cost Ratio (BCR = PVB / PVC)* = 1.6	

Connectivity	Within local area	Establishing additional multimodal freight facilities will facilitate freight operations and movements. However, given the level of volumes, this is likely to be Slight Positive
	To/from local area	Establishing the new road/rail connections at these sites would allow for medium to long distance journeys to be made. However, the same arguments apply as with the site at Loch Fyne, namely the proposals are intended to serve the local economy and hence could be somewhat limited. Given the fact that some destinations could be long-distance it is reasonable to assume the impact is Slight Positive
Integration	Transport integration	The new road/rail freight site will offer a real alternative to road freight movements by providing an opportunity to articulate and integrate road and rail freight activities within the Dumfries and Galloway area, and therefore the benefits are considered potentially ***Moderate Positive***
	Land-use and Policy integration	Multimodal freight development aimed at modal shift out of road transport to alternative is in line with Government Policy (Scotland National Freight Strategy pp 169/170). It is considered as a ***Slight Positive*** impact

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