OPPORTUNITIES FOR DEVELOPING SUSTAINABLE FREIGHT FACILITIES IN SCOTLAND

FINAL REPORT

MDS Transmodal Limited

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EXECUTIVE SUMMARY

Chapter 1 Introduction

MDS Transmodal was commissioned by the Scottish Executive to research opportunities for developing sustainable modes of freight transport in Scotland. The aim of the research has been to take a strategic view of the potential for developing sustainable freight movements across the whole of Scotland, with a view to prioritising potential investment projects which will promote modal shift from road transport to more sustainable modes. The research has also included a programme evaluation of the existing rail and inland waterway FFG scheme in Scotland. The relevant sustainable modes included within the study were the inland waterway, short sea shipping, coastal shipping and rail modes of transport.

The study has been completed in two stages. In the first stage an evaluation of the existing FFG scheme was carried out using information on the twelve awards made between 1993 and 2000. The results of the evaluation were used to develop conclusions and recommendations for the second stage of the study. This second stage was forward-looking to establish and prioritise the potential strategic investment projects that will promote a shift of freight traffic to more sustainable modes of transport during the period 2001-2015.

Chapter 2 Evaluation of the existing freight facilities grant scheme

Introduction

Freight facilities Grants are provided for rail freight and inland waterway projects at the discretion of Scottish Ministers, subject to certain terms and conditions of grant, and each application is considered on its merits. Applications are only made on the initiative of applicants. The objective of the grant scheme is to encourage the removal of lorries from the Scottish road network by helping applicants to invest in rail or inland waterway freight facilities. A wide range of rail freight and inland waterway facilities are eligible for grant. The award of grant is limited to capital expenditure and the amount of grant provided is determined by two main factors:

- The value of the potential environmental benefits generated by the project, calculated by ascribing monetary values to each lorry mile forecast to be saved over the lifetime of the project;
- The need for grant support, determined by a financial appraisal of the relative road and rail/waterway costs over the lifetime of the project, taking into account the capital costs of the facilities required to secure the traffic for the sustainable mode.

The grant is provided to the awardee in advance of any sustainable distribution traffic actually moving and is paid against invoices for the cost of developing the facilities. In administering the scheme, the Scottish Executive has to find a balance between, on the one hand, minimising the risk to the taxpayer as an investor in private freight facilities and maximising value for money where grant is paid in advance of traffic actually moving and, on the other hand, ensuring that the scheme remains attractive so that high quality applications are made and the objective of the scheme can be achieved.

FFG awards 1993-2000

Since 1993 there have been twelve grants awarded to eleven different organisations, with total committed expenditure of some £34.7 million, including £27.6 million provided by the Scottish Executive. The grantees have been from various industrial sectors and have been handling a diverse range of commodities. The grant-funded facilities have been equally diverse.

General conclusions of programme evaluation

After a complete lack of awards in the early to mid 1990s the Scottish Executive has made a number of FFG awards in the latter half of the 1990s. The Scottish Executive has shown itself to be flexible in its approach so that it has more than spent the budget available, with additional resources being found from other budgets when necessary.

When forecast lorry miles saved are compared with actual lorry miles saved the scheme has been reasonably successful in the two years for which the analysis was possible. However, a full analysis of the relative success of the scheme is not yet possible as most of the projects are in their early years and, for some projects, construction of the facilities is not complete. Based on an analysis of eleven of the twelve schemes, the total annual lorry mile savings are forecast to peak in 2002-2003 with 23.05 million lorry miles saved. In the year to 31 March 2002, the FFG awards are forecast to save 19.14 million lorry miles.

As a general rule the most successful FFG projects have been those where the awardee has a degree of control over the traffic upon which the applications are based. Due to the nature of the market structures these more successful FFG funded projects tend to relate to the distribution of bulk commodities. The least successful projects have been intermodal/general cargo facilities where the awardee has the least control over the traffics and the application is more “speculative” in nature.

The existing FFG scheme has been reasonably successful in achieving its objective, particularly in the context of a scheme that is not over-subscribed. However, it is likely in the future that awards will have to be prioritised due to demand for grant exceeding supply. In

our opinion, greater emphasis needs to be placed on funding projects which provide the best value for money in terms of environmental benefits per £ of FFG.

The existing scheme has no mechanism to ensure that freight facilities are located in strategic locations, so that demand can be met for general freight sustainable distribution services in particular regions of Scotland. The scheme is only designed to consider ad hoc applications from any company that takes the initiative to seek funding.

In some cases very high levels of grant have been provided compared to capital expenditure. This significantly reduces the risk for the recipient of grant of developing the facility.

A key point is that the administration of the FFG scheme needs to ensure there is a balance between, on the one hand, seeking to maximise VFM for the taxpayer and, on the other hand, maintaining the attractiveness of the scheme for applicants. In practice, maintaining this balance requires a high degree of judgement.

With the extension of the FFG scheme to short sea and coastal shipping, the Scottish Executive will need to take great care to ensure that the provision of FFG would not secure traffic for one sustainable mode (e.g. rail) at the expense of another (e.g. coastal or short sea shipping). It is also likely to be anti-competitive for FFG to be used to divert a significant volume of traffic in percentage terms from one port to another, even if this results in a reduction in lorry mileage.

Given the conclusions from the evaluation exercise, we would recommend that two separate schemes should be developed in the future: an FFG scheme, which would be very similar to the existing scheme; and a new strategic freight interchange scheme.

Strategic freight interchange scheme

The Scottish Executive should be more proactive in promoting and part-funding the development of new sustainable distribution facilities for general freight (whether waterborne or rail freight) in regions where there is a lack of existing capacity. The primary objective would be to secure environmental benefits, but other more strategic criteria should also be taken into account. The Scottish Executive could be more explicitly a risk taker in these projects (as effectively it is in the existing FFG scheme), based on the environmental benefits that should be secured by the availability of the new facility. The actual site and private sector partner could be selected on the basis of an open tender. These strategic freight interchanges would be limited in number.

The strategic approach would more explicitly recognise that such general freight facilities are more speculative in nature as the traffics that could be attracted to the facilities are less likely to be controlled by both the terminal operator and the sustainable transport operator. Facilities funded in this way would be those where the terminal operator who receives the funding has less control over the traffic flows, such as unit load short sea port terminals, intermodal rail terminals and rail-connected distribution facilities.

Freight Facilities Grant scheme

For all other sustainable distribution facilities the existing FFG scheme should continue to be available, essentially in the same form as it is now, with the onus on the applicant to justify forecast traffic volumes and the potential environmental benefits that could accrue.

Recommendations for the future FFG scheme are set out below:

- Maintaining attractiveness of scheme: as the scheme is applicant-led, it is essential that the scheme remains attractive so it can achieve its objectives; measures to reduce the risk to the taxpayer (set out below) should be balanced with the need to ensure that high quality applications are received.

- Prioritisation: given current demand for FFG and renewed awareness of the need for sustainable distribution in the future, resources may need to be prioritised; given two similar applications requiring the same level of grant, prioritisation on the basis of the NPV of the environmental benefits per £ FFG would maximise value for money and therefore this VFM measure should be taken into account when appraising an individual application.

- Grant rates: the level of grant funding for future FFG awards should not reach very high levels as a percentage of capital expenditure as this means that the public sector could be taking a high degree of risk when it may not be in a good position to judge the degree of commercial risk; the exact level of the maximum grant rate is difficult to judge, but it should probably be in the range 50-75% of the eligible capital expenditure.

- Other risk reduction measures: for future FFG awards, the Scottish Executive could introduce other measures to reduce the risk to the taxpayer; there could be a policy of providing 50% of the grant in advance and 50% in arrears as the forecast traffic is actually secured; another possibility would be to reduce the time period over which environmental benefits can be quantified to 5-7 years.

- Methodology for calculating environmental benefits: The existing methodology should remain as, despite its limitations, it is the best methodology available and it meets EC State Aid requirements to show that the grant is no greater than the net unpaid external costs of road transport.

Chapter 3 Public policy analysis

European and national policies are strongly supportive of the development of sustainable distribution, with the objective of reducing environmental pollution and road congestion. Major road-building programmes are no longer seen as a solution to general road congestion. A comprehensive and fair system of infrastructure charging for all modes may be introduced in the long term, which it is assumed, would raise the relative cost of road haulage. Such a development would remove the justification for public sector subsidy schemes such as FFG.

In the interim period public sector support for more sustainable modes of transport can be justified under EC State Aid rules. This public sector support, subject to EC State Aid clearance, can be provided as subsidy towards sustainable distribution facilities and services and this is the fundamental rationale for the existing FFG schemes for rail and inland waterways and the extension of the latter to coastal and short sea shipping.

The Scottish Executive has set objectives for increasing the volume of freight traffic of an additional 18 million lorry miles removed from Scottish roads by March 2002 and progress against this objective has been assessed in the evaluation of the existing FFG scheme in Chapter 2.

The SRA is developing new schemes for subsidising rail freight in the UK and the Scottish Executive will have an input into the development of these schemes. The SRA has indicated that subsidy for rail freight interchanges for intermodal and conventional wagonload traffic may, in the future, take a more strategic approach and this ties in with our recommendation that there should be a strategic freight interchange scheme for both waterborne and rail facilities in Scotland.

Chapter 4 Market analysis & infrastructure capacity

Road haulage and rail freight

As a general rule, conventional trainload flows can be competitive against road without public subsidy over distances of 90 kilometres, or even less under certain circumstances,

due to the economies of scale that are available.The cost of road haulage distribution at each end of an intermodal rail-based transport chain has a considerable impact on the economic distance for intermodal rail services. Where neither end of the transport chain is rail-connected (so that road distribution is required at each end), rail can be competitive against road over a distance of about 450 kilometres. If one end of the transport chain is rail-connected, at a port or a rail-connected distribution site, for example, the break-even distance can be reduced to as little as 200 kilometres and even less in some cases. Intermodal rail services should therefore be competitive between the Central Belt of Scotland and the Midlands south if neither end of the transport chain is rail-connected. If one end of the transport chain is rail-connected (at a rail-connected distribution centre in the Central Belt of Scotland, for example) then services should be competitive from NW England and Yorkshire and Humberside south. However, while cost is the major determinant of modal choice, other criteria are also important: availability of suitable rail-connected facilities; quality of service and flexibility.

Rail freight services in Scotland

Rail freight services with origins and destinations in Scotland are dominated, in terms of volume lifted, by “traditional” rail freight services - trainload bulk services between private sidings. Coal movements, for example, were about 10 million tonnes in 2000, which accounted for some 56% of total rail freight traffic with origins or destinations in Scotland. In the intermodal market, Freightliner has significant volumes of traffic in the maritime container distribution market between Scotland and the deep sea container ports in South East England. Channel Tunnel services are operated by EWS International via their Mossend terminal.

Rail freight network

Scotland is located at the northern end of the two main strategic rail freight routes in Great Britain. The West Coast Main Line (WCML) is the most important rail freight route in the UK in terms of traffic carried, but is also the major fast passenger rail link between London, the West Midlands, Liverpool/Manchester and Glasgow. It is particularly important for intermodal traffic as it provides the main link between Scotland and the Channel Tunnel and the link between the Freightliner hub at Crewe and its Coatbridge terminal to the east of Glasgow. The East Coast Main Line (ECML) provides the other strategic rail freight route, linking Edinburgh with the North East of England, Yorkshire and London. While further gauge enhancement on these lines might be desirable in the future, the loading gauge between the Central Belt and England and the Channel Tunnel could be considered to be adequate, apart from the need to up-grade links in England to the major deep sea container ports.

On lines to the north of the Central Belt train weight and length restrictions reduce the potential for both conventional and intermodal rail services to provide the economies of scale for viable rail freight services. This issue will need to be addressed alongside the development of new conventional rail freight opportunities along the routes and would be suitable for FFG funding in the future.

There are likely to be opportunities to re-open or create new private sidings for conventional rail freight traffic throughout Scotland. In the Highlands, these new connections are likely to provide the major contribution to modal shift from road to rail over the next 15 years and should be suitable projects to be funded by the FFG scheme. Any industrial site in Scotland which has a requirement for regular shipments of a bulk commodity and which is adjacent to, or close to, a railway line could be suitable for a new rail connection.

Road haulage traffic volumes

The total Scottish road market size amounts to about 310 million tonnes lifted, of which some 264 million (85%) is transported within Scotland. The next largest flow of about 12 million tonnes is with the neighbouring English Northern region. Sustainable distribution will be viable for some flows within Scotland and to the northern counties of England, particularly for bulk commodities, but most intra-Scotland flows of general cargo are likely to be over distances which are too short to be viable for intermodal rail services (e.g. within the Central Belt). The key target market for intermodal transport in Scotland should be the GB domestic general cargo market between Scotland and many of the English regions and Wales, given the economic distances for rail discussed above. The size of this market was about 13.4 million tonnes in 2000. At present very little general freight traffic of this kind is being carried by rail. The other key market is likely to be Scottish trade with the Continent of Europe. Our analysis suggests that some 2.8 million tonnes of trade in beverages, food and manufactures passed through ports in the range between Hull and Plymouth in 2000, with 72% of this volume passing through South East English ports.

Scottish ports and bulk shipping flows

Scottish ports handled some 130 million tonnes of cargo in 1999, 81% of which was bulk fuels such as crude oil, coal and refined petroleum products. The vast majority of Scottish port traffic is “captive” to maritime transport as it is only practical or economic to use this mode of transport.

Almost all Scottish ports of varying sizes handle dry bulk/general cargo commodities with origins/destinations in their immediate hinterlands, such as fertilisers, scrap metal and animal feedstuffs. These commodities are generally low value and will not justify significant

inland distribution costs. They are, however, ideal cargoes to be handled by small and medium sized ports, where road mileages can be minimised by taking cargoes to the port closest to the inland origin or destination of the cargo. Ports of almost all sizes have potential to handle these types of cargo.

A major issue in the short sea and coastal shipping market is the trend in the size of short sea dry cargo vessels in NW Europe. These vessels are generally getting larger, driven by shipowners seeking operational economies of scale as well as some demand from shippers for larger consignments. This means that ports need to have an adequate depth of water to be able to accommodate the increasing ship sizes. Another major issue is that, although there are a large number of small piers and harbours in Scotland, some of the basic infrastructure is in need of repair. Although there is not a shortage of port infrastructure capacity in Scotland as a whole, there may therefore be a case for FFG funding to be used to repair existing facilities to handle specific traffics which are currently being carried by road. This would have particular benefits for the handling of bulk cargoes such as construction materials and timber.

- EC state aid approval has been given by the European Commission to the extension of the existing inland waterways scheme to include short sea and coastal shipping, with the following exceptions: the capital cost of vessels should not be an eligible cost under the scheme; if the Scottish Executive is minded to award a grant of greater than 50% of the eligible costs of a scheme, then the individual award must be notified to the European Commission.

Unit load waterborne services: short sea services

A short sea or coastal shipping solution for general freight between Scotland and Ireland and Scotland and the Continental mainland is most likely in the next 15 years to be provided by the new generation of fast conventional ferries, which are operating successfully in the Mediterranean, the North Sea and the Irish Sea. The concept will soon be extended to the Baltic. They provide fast transit times, comparable with road haulage, and allow the operator to utilise their vessels more efficiently. It is this type of vessel that will be deployed on the direct Scotland-Continent service, which Superfast Ferries have announced they will be launching in May 2002 between Rosyth and Zeebrugge in Belgium, and could also be used on longer distance Atlantic Arc services. In the future, these vessels could also provide coastal distribution of unit loads from the Forth to SE England.

Inland waterways

There is currently no freight traffic being carried on any of the four Scottish canals (Caledonian Canal, Crinan Canal, Union Canal and the Forth & Clyde Canal), which is likely

to be mainly due to restrictions on the type of vessels that can access the canals as well as the natural advantages of road transport. The Caledonian Canal, with its less restricted access and existing freight facilities may provide some potential for transporting slow-moving bulk, non-time sensitive cargo by barge in the next 15 years.

However, there are significant flows of freight on Scottish inland waterways when movements up major river estuaries, such as the River Forth, the River Clyde and the Firth of Tay, are taken into account. We estimate the volume of traffic using inland waterways to access Scottish ports in 1999 as 10.8 million tonnes in 1999 Inland waterways, if not canals as such, are expected to play a major role in reducing lorry mileage by securing coastal shipping movements at the expense of road haulage and by taking cargo closer to its inland origins and destinations.

Conclusion

Based on the above analysis, strategic freight interchanges are likely to be required to support the following kinds of general freight services over the next 15 years:

- Longer distance unitised freight ferry services between Scotland and the near Continent, Ireland and the rest of the Atlantic Arc, using fast conventional ferry technology from ferry ports located close to the Central Belt of Scotland.

- Rail services carrying intermodal and general freight traffic between Scotland and the Midlands south if neither end of the transport chain is rail-connected and to NW England/Yorkshire and Humberside south if one end of the transport chain is rail-connected.

- Rail services carrying intermodal and general freight traffic between Scotland and the Continent via the Channel Tunnel, particularly to France and Italy.

- Rail services carrying intermodal and general freight traffic between points north of the Central Belt and the Central Belt itself and beyond, particularly to secure environmental benefits.

There are numerous other areas of potential for sustainable distribution relating to bulk traffics, which do not require such a strategic approach, but which would be suitable for FFG funding. These include: projects to reconnect industrial premises to the rail network for conventional trainload or wagon load services between private sidings; projects to develop the sustainable distribution of timber; projects to develop short sea and coastal shipping flows, generally but not exclusively, of bulk commodities to and from Scottish port facilities.

Chapter 5 Analysis of potential strategic investment projects

Introduction and methodology

The objective of this Chapter is to establish the location, nature and scale of the strategic freight interchanges that should be developed in Scotland over the next 15 years to allow the development of sustainable distribution for general freight. The conclusions set out in this chapter were developed making extensive use of computer modelling techniques. The computer model was used to determine the theoretically optimum location of strategic freight interchanges in Scotland. From this starting point, the practical issues connected with the potential strategic freight interchanges were examined by means of a high level appraisal of the theoretically optimum locations to take account of issues such as rail and maritime accessibility and existing capacity. The appraisal concluded with recommendations as to which of the locations should be regarded as potential strategic investment projects in the short term (to be completed by 2005), in the medium-term (by 2010) and in the long-term (by 2015).

Optimum network of facilities: modelled outputs

The theoretically optimum number of facilities in Scotland and Northern England, based on certain assumptions, was twelve. The optimum network in Scotland would be: Aberdeen area; Dundee area; Dumfries area; Edinburgh area; Grangemouth area; Glasgow area; Inverness area. All of these locations in Scotland are on the railway network and at least four of them provide the potential for waterborne/rail/road tri-modal facilities.

Strategic appraisal and prioritisation of projects

A strategic appraisal of the above locations was carried out to establish whether they should be considered as having potential as strategic freight interchanges. These could become strategic investment projects for the Scottish Executive over the next 15 years. An indication of the prioritisation of these strategic investment projects has been included. Inevitably the conclusions are based on judgements made without the benefit of detailed feasibility work on individual schemes. More detailed work may result, in particular, in a different prioritisation. The conclusions from the strategic appraisal are summarised in the following table:

Summary of strategic facilities, with suggested prioritisation

AREA	NATURE OF FACILITY	PRIORITY
Aberdeen	Additional general cargo sustainable distribution facilities, (probably intermodal rail), preferably with	Medium term

	maritime access.	
Dumfries	General cargo sustainable distribution facilities (probably an intermodal rail terminal)	Long term
Dundee	General cargo sustainable distribution facilities, (probably intermodal rail), preferably with maritime access.	Medium term
Edinburgh	General cargo sustainable distribution facilities, (probably intermodal rail and rail-connected distribution warehousing), preferably with maritime access.	Short term
Glasgow	Additional general cargo sustainable distribution facilities, (probably intermodal rail and rail-connected warehousing), possibly with maritime access.	Short term
Inverness	General cargo sustainable distribution facilities, (probably intermodal rail), preferably with maritime access.	Long term

In addition, the development of long distance ferry services from the east coast of Scotland to the Continental mainland and from SW Scotland to the Atlantic Arc should be considered potential strategic investment projects.

Outputs from the modelling work suggest that while the industry and government actions implicit in the Government's 10 Year Plan would generate the most environmental benefits, the development of the above facilities and the long distance ferry services would add about £16.3 million of environmental benefits each year from 2005, £44 million of environmental benefits per annum from 2010 and £59 million of environmental benefits per annum from 2015.

1. INTRODUCTION

1.1 Scope of study

MDS Transmodal was commissioned by the Scottish Executive to research opportunities for developing sustainable modes of freight transport in Scotland. The aim of the research has been to take a strategic view of the potential for developing sustainable freight movements across the whole of Scotland, with a view to prioritising potential investment projects which will promote modal shift from road transport to more sustainable modes. The research has also included a programme evaluation of the existing rail and inland waterway FFG scheme in Scotland.

The relevant sustainable modes of transport are:

- Rail, both intermodal and conventional

- Inland waterway: the definition used was that included within Freight Facilities Grant (FFG) guidance – "in addition to a canal, an inland waterway is considered to be upstream of any point where a river, or sea inlet, first narrows so that the opposite banks are no more than 5km apart at high water spring tide, or 3 km apart at low water spring tide". This definition means that, apart from the Caledonian Canal, the Crinan Canal, the Forth and Clyde Canal and the Union Canal, much of the Clyde, Forth and Tay estuaries, Loch Linnhe, Loch Lochy and Loch Ness are inland waterways.

- Short sea shipping: the movement of cargo by sea between a Scottish port and other ports outside the United Kingdom which are situated in geographical Europe and non-European countries bordering the Mediterranean Sea.

- Coastal shipping: the movement of cargo by sea between a Scottish port and another port in the United Kingdom.

The Terms of Reference for the study requested that recommendations should be made for the best opportunities for achieving modal shift from road transport to more sustainable modes in the short term, medium term and long term. The time horizons used have been up to 2005, (short term), 2006-2010 (medium term) and 2011-2015 (long term).

The scope of the study did not include detailed examination of the future potential for modal shift from road to more sustainable modes related to the distribution requirements of individual economic sectors. However, where results were available from more detailed research (e.g. on the timber industry) they were used to inform the results of the study.

1.2 Phasing of study and outline methodology

The study has been completed in two stages. In the first stage an evaluation of the existing FFG scheme was carried out using information on the twelve awards made between 1993 and 2000. Most of the information for the evaluation was obtained from the Scottish Executive, but additional information on actual traffic volumes achieved through the FFG-funded facilities was sought from the grant recipients. An application of the *MDS Transmodal GB Freight Model* (a freight demand model) was used to compare forecast with actual environmental benefits secured by the twelve awards. The results of the evaluation, which are provided in Chapter 2, were used to develop conclusions and recommendations for the second stage of the study.

The second stage was forward-looking to establish and prioritise the potential strategic investment projects that will promote a shift of freight traffic to more sustainable modes of transport. The work involved an analysis of the policy environment (Chapter 3) and the relevant market environment (Chapter 4) to establish key policy and market trends. Analysis of the market was completed using government and in-house statistical sources and an interview programme. The Appendix shows all the organisations contacted during the study. Two further applications of freight demand model were used in Chapter 5 to establish the theoretically optimum location for strategic general freight facilities in Scotland and to calculate the environmental benefits that could be secured if suitable strategic investments projects were completed. The second of these applications informed a strategic appraisal of the opportunities identified. The opportunities were then prioritised as either short-term priorities (to be completed by 2005), medium-term priorities (by 2010) or long-term priorities (by 2015).

More information is provided on the computer modelling work in Section 1.3 below.

1.3 Computer modelling methodology

An up-graded version of the *MDS Transmodal GB Freight Model* was used to inform three areas of the analysis:

- To assist in the evaluation of the FFG scheme (Application 1);
- To determine the theoretically optimum structure of a strategic network of general freight facilities, assuming there are no existing facilities available (Application 2) and;
- To estimate the environmental benefits of developing services on this network (Application 3).

Each application of the freight model required a different approach, but the fundamentals of the methodologies underpinning them are internally consistent. They use the same transport cost models, origin destination matrices, short path algorithms, zoning structures and classifications. The specifications of the model are provided below.

GIS Data: The models are built upon a set of Geographic Information System (GIS) databases containing spatial information about the UK and the road network. These were sourced from the Automobile Association (AA) as vector maps.

Zoning: From the vector maps it was possible to construct a zoning system containing 2,900 UK regions, based on Postcode Districts (AB10, IV1 etc).

Network: The road network was built from the AA's definition of road types, namely:

- Motorways;
- Primary Roads, including Dual Carriageway Roads;
- Other A Roads, and;
- B Roads

These four layers were combined into a network of vectors with 40,000 nodes in the UK, and 89,000 links. This network structure was used to:

- Calculate journey times, distances, user costs and external costs;
- Store information about traffic patterns;
- Visualise traffic flows;
- Analyse routes by Sensitive Lorry Mile (SLM) value, road type, and impact on Scotland.

Short Path Algorithm: A short path algorithm was coded into the models, providing a consistent methodology for choosing network paths. This makes route choice a precise function of the network's structure, and therefore ensures that all paths are chosen according to the same criteria.

Freight Flows: Freight flow data was derived from the Origin-Destination matrices used within the freight demand model. These identify flows by 20 commodities, 62 county zones in the UK, and a mixture of countries and sub-national zones within the EU. Both road and rail flows are included, and the origins and destinations are defined as the ultimate access and egress points, rather than the mode interchange points.

Potential Environmental Benefits: The conversion from vehicle kilometres (vkms) to external costs was carried out using the valuations of SLMs used for the FFG scheme:

ROAD TYPE	SLM VALUE
Rural single carriageways	£1.00 per lorry mile
Urban single carriageway	£1.50
Urban non-grade separated dual carriageway	£1.50
Motorway	20p
Rural Dual Carriageway	20p
Urban grade separated dual carriageway	20p

The AA road categories can generally be matched exactly with these definitions:

AA ROAD CLASSIFICATION	SLM VALUE USED
Motorway	20p
Primary Urban	£1.50
Rural A Road	£1.00
Urban A Road	£1.50
B Roads and Others	£1.00

The main difficulty arose with Primary Rural roads in the AA road classification, which were a mixture of rural dual carriageways (valued at 20p per mile) and rural single carriageways (£1.00). The approach taken within this analysis was to take a weighted average equivalent to 75p per mile (47p per km).

Transport Costs: Rates for specific trips have been calculated within an external spreadsheet model, itemising road and rail haulage costs.

1.4 Steering Group

The research study has been assisted by a Steering Group, which consisted of representatives from the Scottish Executive Development Department, Scottish Enterprise and the Strategic Rail Authority.

The conclusions drawn and the recommendations made in this report are those of the consultants only and do not reflect current or future Government policy in Scotland or elsewhere in the United Kingdom.

2 EVALUATION OF THE EXISTING FREIGHT FACILITIES GRANT SCHEME

2.1 Introduction

Legal powers

Freight Facilities Grants (FFG) were first introduced in Great Britain in section 8 of the Railways Act 1974 and were extended to inland waterways by section 36 of the Transport Act 1981. These provisions were re-enacted with amendments by section 139 and section 140 of the Railways Act 1993. Under this legislation the Scottish Office and then the Scottish Executive were responsible for the administration of the FFG scheme for freight facilities located in Scotland.

Following the passing of the Transport Act 2000, Scottish Ministers can make FFG awards for rail freight projects in accordance with schemes notified to them by the Strategic Rail Authority (SRA) under Section 249 of the Act. Under Section 211 of the Act the SRA cannot make awards in Scotland. The Scottish Executive therefore has sole administrative responsibility for FFG in Scotland, but the scope and nature of the scheme is determined by the SRA. The Scottish Executive can only make a financial contribution to rail schemes located in Scotland and, similarly, the SRA can only make a contribution to rail schemes located in England.

The FFG scheme for inland waterways and, in future, for coastal and short sea shipping is a fully devolved matter, but only for journeys which begin and end in Scotland. Scottish Ministers have the power to award such grants under Section 271 of the Transport (Scotland) Act 2001. We were informed by the Scottish Executive that they hope in the future to acquire the executively devolved power to award grant for journeys which begin or end outwith Scotland.

Administration of grant

Grant is provided at the discretion of Scottish Ministers, subject to certain terms and conditions of grant, and each application is considered on its merits. Applications are only made on the initiative of applicants. The administrative rules for the FFG scheme in England and Wales are the same as those in Scotland.

The objective of the grant scheme is to encourage the removal of lorries from the Scottish road network by helping applicants to invest in rail or inland waterway freight facilities. A wide range of rail freight and inland waterway facilities are eligible for grant. The award of grant is limited to capital expenditure and the amount of grant provided is determined by two main factors:

- The value of the potential environmental benefits generated by the project, calculated by ascribing monetary values to each lorry mile forecast to be saved over the lifetime of the project;
- The need for grant support, determined by a financial appraisal of the relative road and rail/waterway costs over the lifetime of the project, taking into account the capital costs of the facilities required to secure the traffic for the sustainable mode.

The actual value of the FFG award is therefore the lower of:

- The net present value (NPV) of the potential environmental benefits over the life of the project;
- The financial need for grant over the life of the project, calculated on a discounted cash flow basis.

The grant is provided to the awardee in advance of any sustainable distribution traffic actually moving and is paid against invoices for the cost of developing the facilities. In administering the scheme, the Scottish Executive has to find a balance between, on the one hand, minimising the risk to the taxpayer as an investor in private freight facilities and maximising value for money where grant is paid in advance of traffic actually moving and, on the other hand, ensuring that the scheme remains attractive so that high quality applications are made and the objective of the scheme can be achieved.

Calculation of environmental benefits

The potential environmental benefits of each project are calculated by assigning a monetary value to a mile travelled by a lorry on different types of road, to quantify the value to society of reduced congestion, environmental pollution, road accidents and road damage as a result of removing the lorry from the particular road. These Sensitive Lorry Mile (SLM) values vary from £0.20 per mile on a motorway, rural dual carriageway and urban grade separated dual carriageway to £1.50 per mile on an urban single carriageway road and an urban non-grade separated dual carriageway. The SLM values have been under review by consultants for the SRA and any revised values were not available to MDS Transmodal while carrying out this study.

When appraising a scheme located in Scotland the Scottish Executive can take account of environmental benefits that accrue in England. Similarly, the Strategic Rail Authority (for rail schemes located in England) and the DTLR (for inland waterway schemes located in England) can take account of environmental benefits that accrue in Scotland.

Scottish Executive target

In September 1999 the Scottish Executive made the following commitment in its *Programme for Government:*

By increasing the freight facilities grant, we will move freight off the roads and onto trains and ships, and we will transfer an additional 18 million lorry miles p.a. off the roads in Scotland by March 2002.

The analysis in this Chapter measures progress towards achieving this target.

2.2 Methodology

The evaluation of the FFG scheme in Scotland has been carried out using statistical analysis of trends and the calculation of various value for money (VFM) indicators. The data sources were extracts from the relevant application documents provided by the Scottish Executive (for background information on FFG awards and details of the environmental benefits calculations) and the awardees (for information on the current status of schemes and actual traffic movements). No information was available on the financial cases used to justify the FFG awards, to protect the commercial confidentiality of the awardees.

In order to carry out a comparison of trends between Scotland and other areas of Great Britain, management information on awards was requested from the National Assembly for Wales (for all awards made in Wales), the Strategic Rail Authority (for rail awards in England) and the Department of Transport, Local Government and the Regions (for inland waterway awards in England). Explanations for trends observed in Scotland were sought from the Scottish Executive and awardees, where necessary.

The evaluation has been restricted to awards made during the period 1993-2001 i.e. following the introduction of the new FFG regime after the passing of the Railways Act 1993.

The evaluation also involved the use of Application 1 of the computer model to calculate the total lorry miles (forecast and actual) removed as a result of the FFG awards, the total value of the environmental benefits and the routes and types of roads from which lorries have (or will have) been removed.

2.3 Grants awarded

Summary of awards

The twelve grant awards made during the period 1993-2001 are summarised in Table 2.1 below.

Table 2.1
Summary of FFG awards 1993-2001

COMPANY	TYPE OF FACILITY	LOCATION	DATE OF AWARD	FFG AWARD (£ MILLION)
Deanside Transit	Intermodal rail terminal	Hillington, west of Glasgow	August 1997	3.1
Safeway (Phase 1)	Intermodal rail equipment	For use in secondary distribution between Glasgow and the Inverness area	November 1998	0.7
HJ Banks	Bulk rail facility for handling coal	Watsonhead, North Lanarkshire	July 1999	0.9
LAW Mining	Bulk rail facility for handling coal	New Cumnock, Ayrshire	September 1999	2.6
TDG Nexus	Intermodal rail terminal	Grangemouth	September 1999	9.7*
Associated British Ports	Waterborne bulk facility for handling timber	Port of Ayr	February 2000	4.4
ST Services	Bulk rail facility for handling bulk liquids	Port of Leith	March 2000	0.9
Forth Ports	Bulk rail facility for handling cement	Port of Leith	March 2000	0.08
Safeway (Phase 2)	Intermodal rail equipment & enhancements to rail terminal	For use in secondary distribution between Glasgow and the Far North	March 2000	0.9
BP Oil	Bulk rail facility for handling refined petroleum products	Grangemouth	December 2000	10.0
Iggesund Paperboard	Waterborne bulk facility for handling timber	Lochaline, Lochaber	December 2000	0.7
WH Malcolm	Intermodal/conventional rail terminal	Grangemouth	December 2000	0.9**

* Includes a contribution of £6.5 million from the DETR for benefits accrued in England
** Includes a contribution of £0.6 million from the DETR for benefits accrued in England
Source: Scottish Executive

Since 1993 there have been twelve grants awarded to eleven different organisations, with total committed expenditure of some £34.7 million, including £27.6 million provided by the Scottish Executive. The grantees have been from various industrial sectors: logistics companies, ports, manufacturers, mining companies, oil companies and a supermarket

chain. The commodities carried are also diverse: dry bulk commodities such as coal, cement and timber; unitised bulk commodities such as chemicals; unitised general cargo/manufactured products. The nature of the facilities is similarly diverse: three intermodal terminals, all located in the Central Belt; two separate awards for intermodal equipment and some enhancements to existing terminal capacity for the secondary distribution of food by rail; two timber handling facilities at ports/piers; two coal handling terminals at open-cast mines; two bulk rail handling facilities at the Port of Leith; a bulk rail handling facility at the BP Grangemouth oil refinery.

Two of the awards were part-funded by the then Department of the Environment Transport and the Regions (DETR) due to the value of the environmental benefits which would accrue in England.

Geographic distribution of awards

Table 2.2 shows the estimated total volume of cargo transported by rail and road transport in 2000, with origins and destinations, in each old Scottish county. This provides a reasonable indication of the volume of inland traffic generated in each old county.

Table 2.2
Geographic distribution of loading and unloading of freight in Scotland in 2000

County	Million tonnes	Percentage
Borders	4.6	1%
Central	22.1	7%
Dumfries & Galloway	14.8	5%
Fife	21.7	7%
Grampian	38.7	12%
Highland	22.4	7%
Lothian	40	12%
Strathclyde	137.7	42%
Tayside	25.5	8%
Total	327.5	100%

Source: MDS Transmodal GB Freight Model version 3.1

While some of the counties included in Table 2.2 are large and diverse and the potential for modal shift of traffic to more sustainable modes of transport will vary considerably, the analysis allows a high level comparison of the location of traffic generation with the location of FFG-funded facilities. Most awards have been made for facilities in the Central Belt of Scotland, which is where the majority of freight activity is generated, given the distribution of population and industry. Some areas of Scotland, such as Tayside and Grampian, have had little or no FFG funding. However, the locations of FFG-funded facilities are likely to be

explained by the applicant-led nature of the scheme and the fact that there is no mechanism within the existing FFG scheme to ensure that the available funds are allocated in a more strategic manner.

A summary of the nature of the awards is provided below, split by broad type of facility.

Intermodal terminals

There have been three FFG awards for intermodal terminals in Scotland, all located in the Central Belt. In total some £13.7 million of FFG has been provided to intermodal terminals in Scotland (39% of the total).

Waterborne

There have been two FFG awards for waterborne freight facilities in Scotland, both related to the shipping of timber in bulk both coastwise and along inland waterways from forests in the Highlands to piers/ports in both Scotland and England. In total some £5.1 million of FFG has been provided for waterborne facilities in Scotland (15% of the total).

Bulk rail handling facilities for coal

There have been two awards to companies seeking to use rail to transport bulk coal between an extraction site and power stations in Scotland and England. The two awards totalled about £3.5 million, which amounts to some 10% of the total FFG committed during the period 1993-2001.

Rail-linked storage facilities at ports

There have been two awards to companies seeking to transport bulk commodities by rail to and from port-based storage facilities at the Port of Leith. £1.0 million of FFG has been awarded to facilities of this type, which represents about 3% of the total funding committed.

Retail secondary distribution

Two awards, both to Safeway, have been made for the secondary distribution of food using intermodal rail services between the Central Belt and the Highlands and Orkney. In total £1.6 million of FFG has been provided, which represents about 5% of the total FFG for facilities in Scotland.

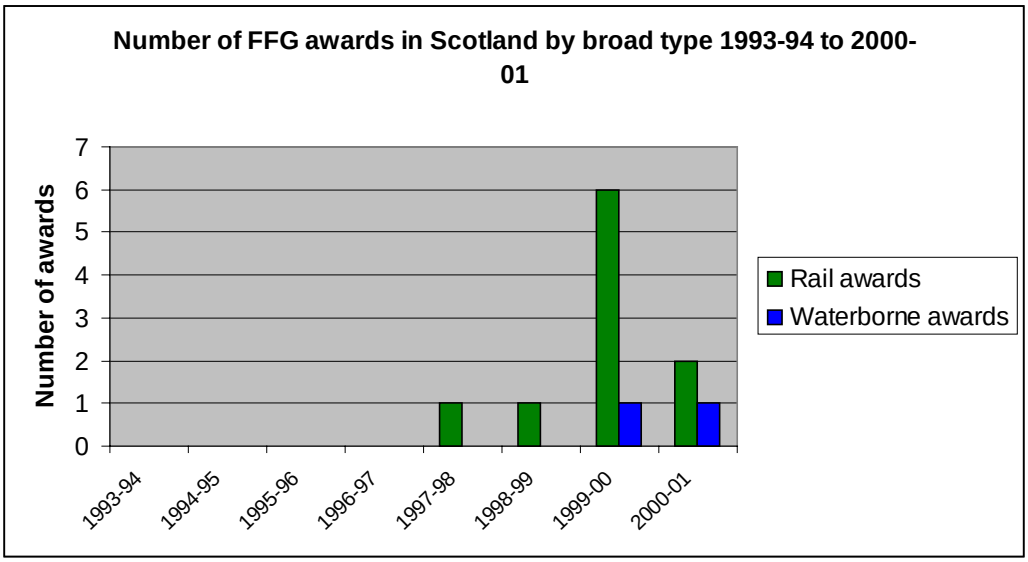
Bulk rail distribution from manufacturing site

This award to BP Oil is for a facility at a (non-port related) private site to transport manufactured products by rail. The award of £10 million represents some 29% of the total FFG funding committed and is the biggest award ever made for a rail facility in Scotland.

2.4 Trend analysis

Number of awards announced by year

The chart below provides an analysis of the number of awards announced in Scotland, by broad type, between 1993-94 and 2000-01. In total twelve awards have been made, ten for rail projects and two for waterborne projects. No awards were made before August 1997 and only two awards were made before July 1999. Seven awards were made in 1999-2000 and three in 2000-2001. Overall just over 80% of the awards were made in the period April 1999 to December 2000. There has therefore been a significant increase in the number of awards made towards the end of the period under review, with a fall in the final year. The scheme continues to receive a significant number of applications and 12 were under consideration by the Scottish Executive in August 2001.

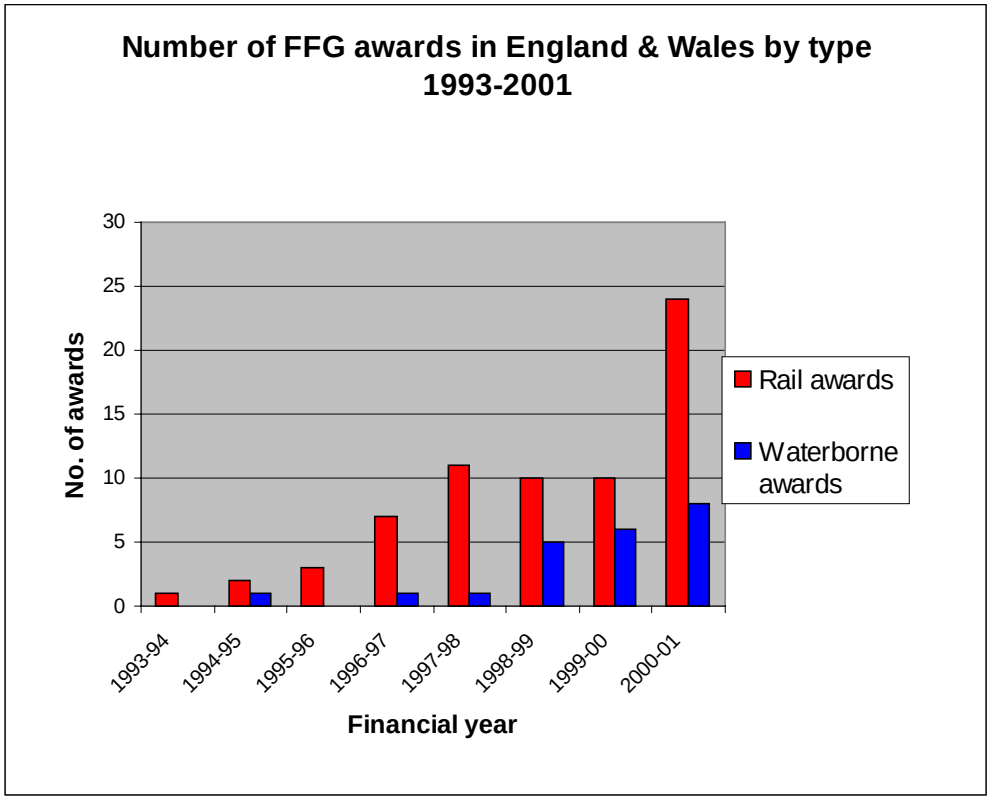


Source: Scottish Executive

The trend in the number of awards announced per year seems to be due to a combination of factors. There has been greater industry interest in, and awareness of, opportunities to use rail following rail freight privatisation. Government policy to promote sustainable distribution may also have contributed to increasing awareness at the availability of FFG. Some high profile awards may have led to increased interest in the potential of the scheme from companies operating in the same market (the so-called "replication effect"). Greater promotion of the FFG scheme by Scottish Ministers and the Scottish Executive following devolution may have played a part.

The reduction in the number of awards in 2000-01 has been due to the impact of one large award made in that year to BP Oil at Grangemouth, given budgetary constraints.

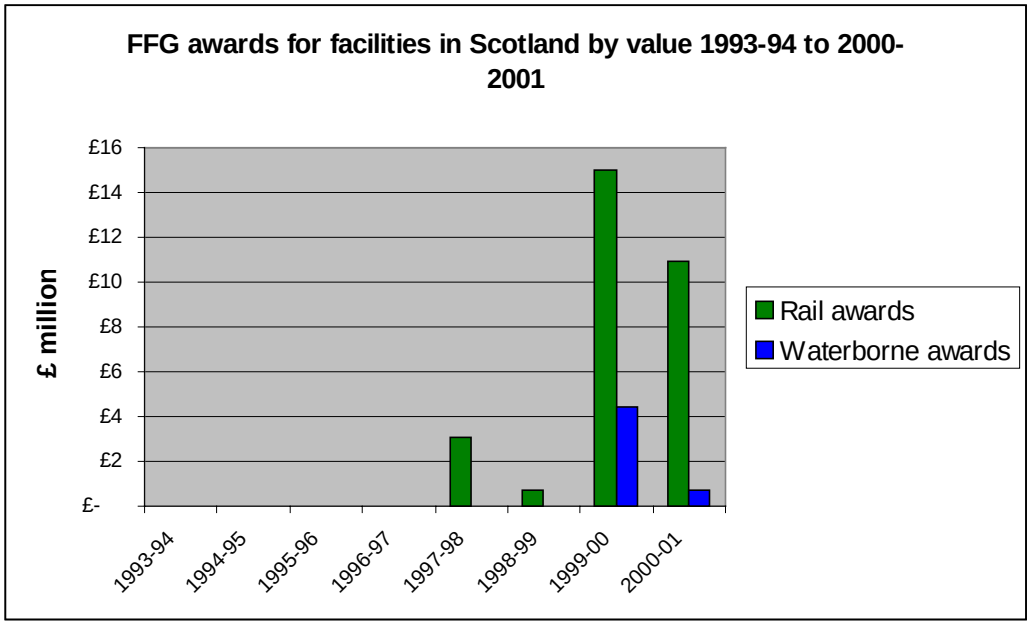
The chart below provides, for comparative purposes, an analysis of the number of awards in England and Wales, by type, between 1993-94 and 2000-01. In total 89 awards have been made in England and Wales (only two were made in Wales), 67 awards for rail projects and 22 for inland waterway projects. Only seven awards were made before the 1996-97 financial year, with a steady increase in the number of awards from eight in 1996-97 to 32 in 2000-01. Overall just over 60% of the awards were made in the period April 1999 to March 2001. There has therefore been an increase in the number of awards made towards the end of the period under review.



The trend in the number of awards made in Scotland is therefore in line with the trend for the rest of the UK.

Value of awards by year

The chart below provides an analysis of the value of awards made for facilities in Scotland, by broad type, between 1993-94 and 2000-01.

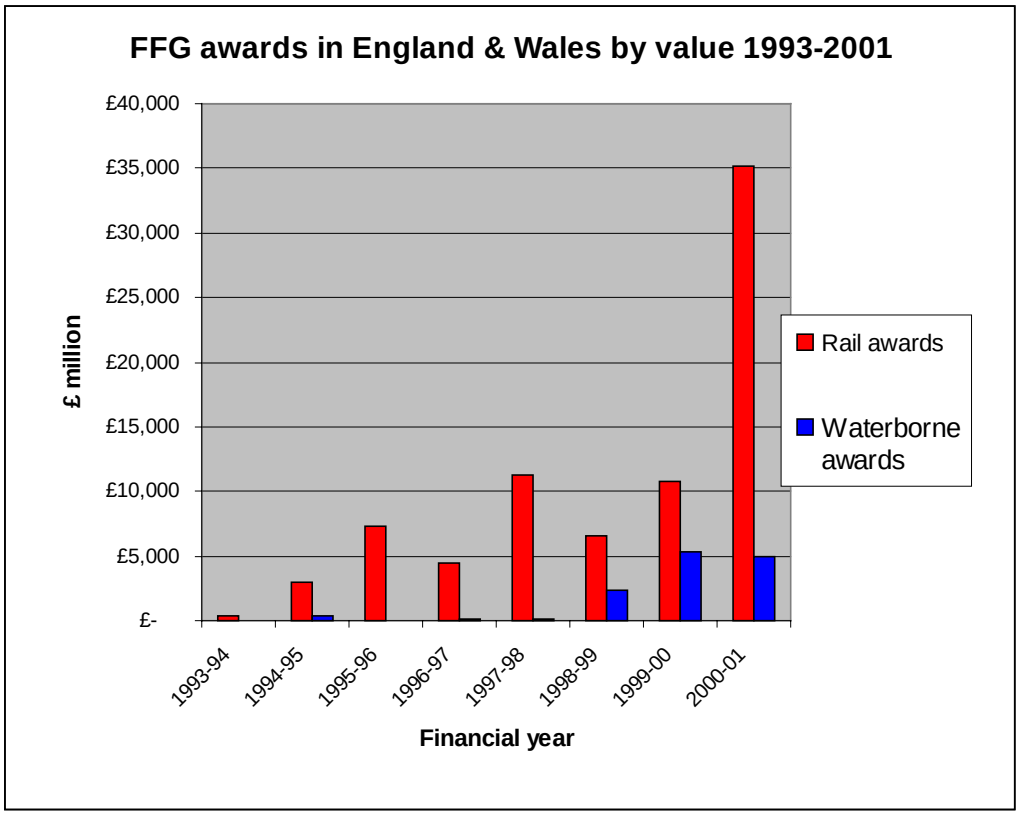


Source: Scottish Executive

£34.7 million of awards have been provided for freight facilities located in Scotland over the period 1993-94 to 2000-2001, with £27.6 million provided by the Scottish Executive and £7.1 million provided by the then DETR for environmental benefits accrued in England. The average award is £2.9 million. An above average award by value was provided in 1997-98, but by far the majority of awards by value were made in 1999-00 and 2000-01, with 89% of awards made in this period. Some 85% of funding was provided for rail projects and 15% for waterborne projects.

The actual value of each grant has to be assessed on a case-by-case basis by the Scottish Executive and is very largely determined by the individual circumstances of the particular grant application. The trend in the value of the FFG awards and the average value of awards is largely determined therefore by the number of applications made, the individual circumstances of the applications and budgetary constraints.

The chart below provides, for comparative purposes, an analysis of the value of awards in England and Wales, by type, between 1993-94 and 2000-01.



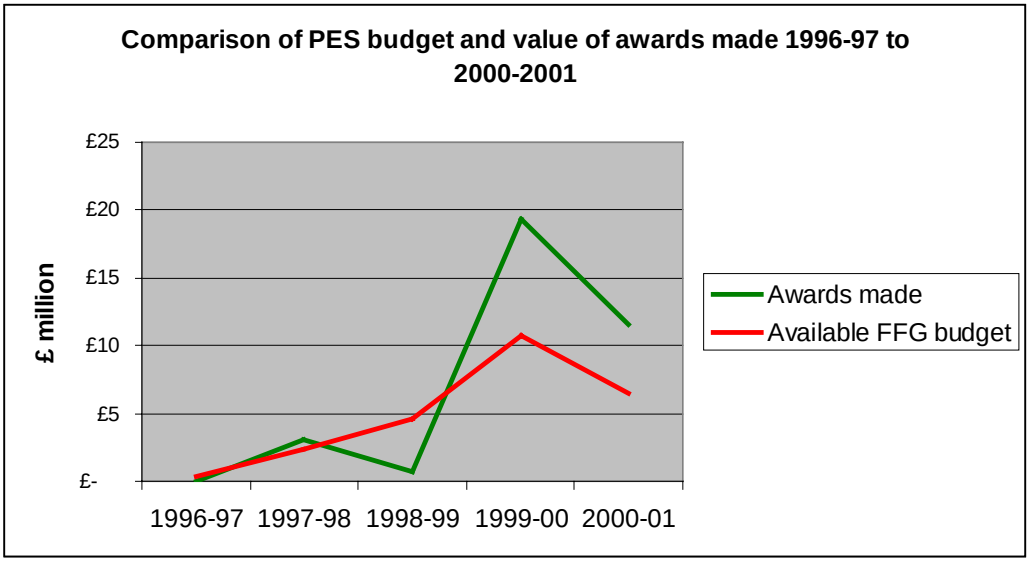
Source: DTLR, Strategic Rail Authority and National Assembly for Wales

£91.8 million of awards have been provided in England and Wales during the period 1993-2001, with 98% of that expenditure on grants in England. The average award is just over £1.0 million. Annual expenditure has increased significantly towards the end of the period and more than doubled between 1999-2000 and 2000-01 alone. Some 86% of funding was provided for rail projects and 14% for waterborne projects.

The number and value of FFG awards in England and Wales has therefore accelerated towards the end of the period, as they have in Scotland. The split of awards by value between rail and waterborne projects is roughly the same in all parts of Great Britain at 85:15. The major difference between Scotland and the rest of Great Britain is that the average Scottish award is twice as large as the average award in England and Wales. The reason for this is likely to relate to the nature of the applications received in the different countries. In particular, two relatively large awards, in excess of £9 million, have been made in Scotland.

Comparison of value of awards made with Scottish Executive budget

The following chart shows the value of the awards made between 1996-97 and 2000-01 compared to the budget which was, in theory, available. The available budget consists of the figure included in the Public Expenditure Survey (PES) for the FFG funded by the Scottish Executive, plus funds provided by the then DETR for two schemes in 1999-2000 and 2000-2001.



Source: Scottish Executive

The trend line for the budget mirrors the trend line for the value of the awards made, but expenditure has exceeded budget in every year except 1998-99. This suggests that the Scottish Executive has been prepared to carry forward funds from one year to the next (from 1998-99 to 1999-2000) and to vire funds from other Scottish Executive budgets wherever possible in order to meet the demand for FFG from applicants.

The Scottish Executive have informed us that the budget available for FFG in 2001-02 has increased to £10.0 million and will rise to £12.0 million in 2002-03 and £14.5 million in 2003-04, as promised in the Scottish Executive's *Programme for Government* in 1999.

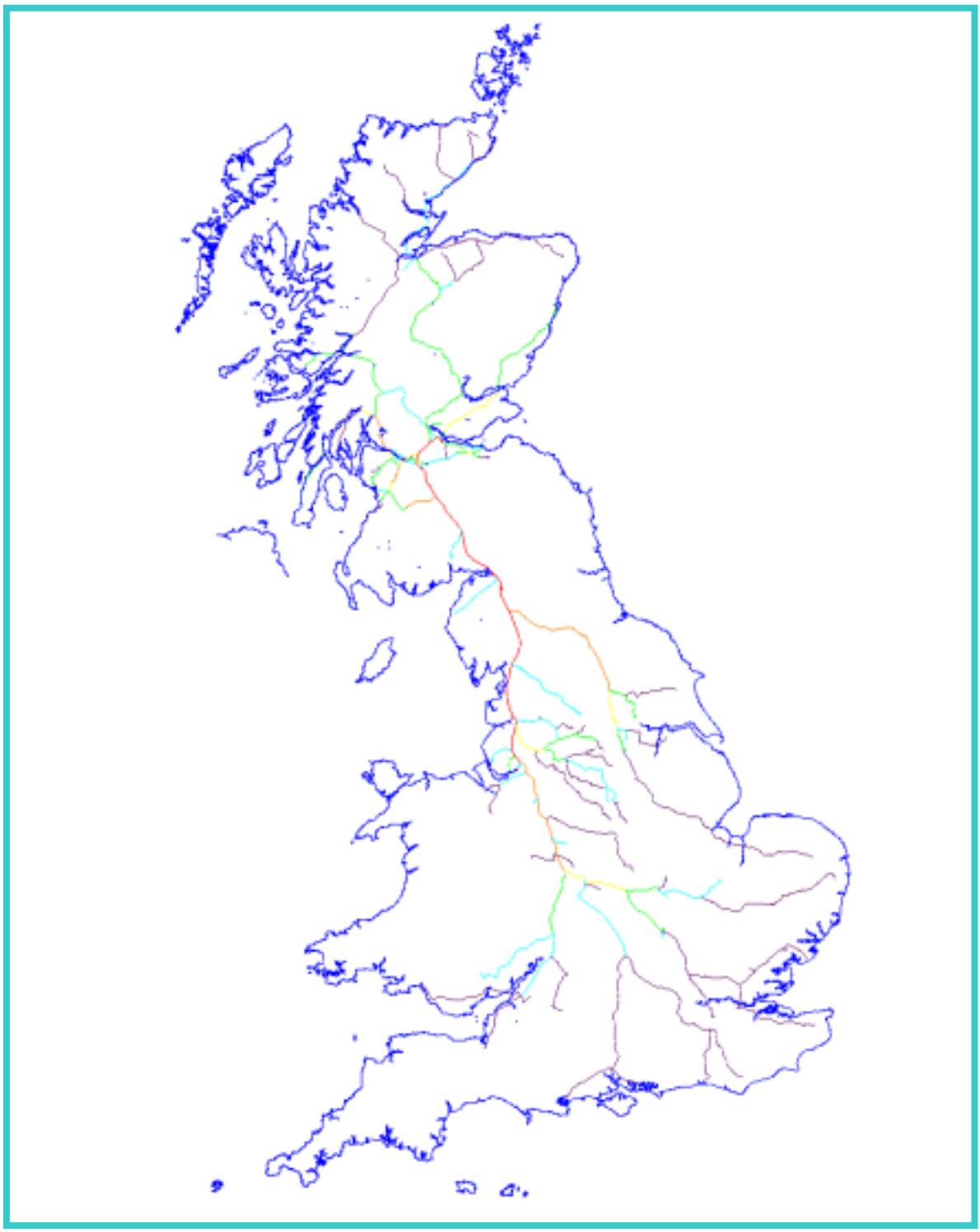
Analysis by route and road type

Map 1 shows the density of the forecast lorry mileage saved on particular routes in Great Britain. It provides an indication of the concentration of lorries removed from routes such as the M74 and the M6. The map has been produced based on data from Application 1 of the computer modelling work.

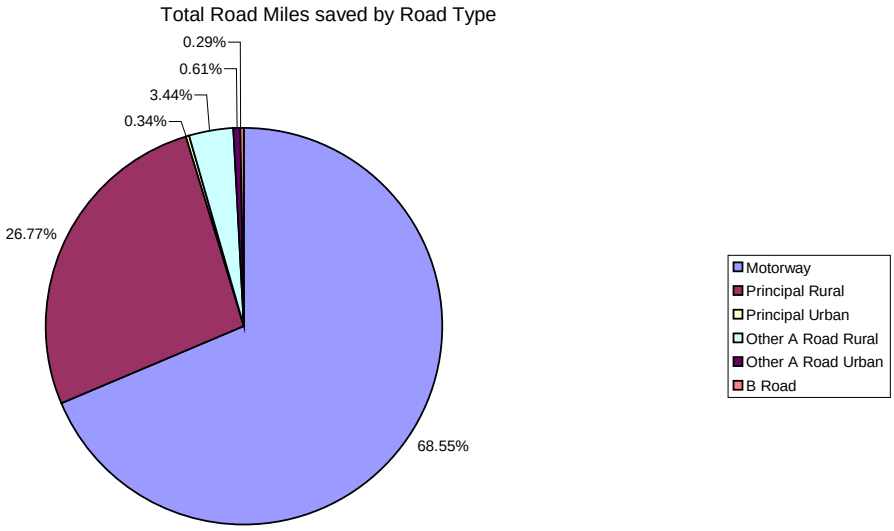
The scale in lorry trips on links in the road network over the lifetime of the grant scheme (1997-98 to 2015-16) is as follows:

Purple: 0 to 8,000
Cyan: up to 30,000
Green: up to 70,000
Yellow: Up to 120,000
Orange: Up to 190,000
Red: Above 190,000 (max link flow is 760,000)

Map 1: Forecast lorry movements removed by current FFG awards made 1993-2001



The chart shown below provides an analysis of the road types used, based on the route modelling software (Application 1).



The analysis suggests, not surprisingly, that the vast majority of road mileage saved is on motorways and rural A grade roads.

2.5 Conclusions and recommendations

Introduction

The SRA has published its intention to develop a new rail freight interchange scheme and to amend the existing FFG scheme and both these schemes will then be notified to the Scottish Executive. We hope that our conclusions and recommendations, which are set out below, will inform the design of these rail freight schemes, as well as assist the Scottish Executive to develop future waterborne freight schemes. The conclusions and recommendations apply therefore to all the sustainable modes of transport defined in Section 1.1 of this report

General conclusions of programme evaluation

After a complete lack of awards in the early to mid 1990s the Scottish Executive has made a number of FFG awards in the latter half of the 1990s. The Scottish Executive has shown itself to be flexible in its approach so that it has more than spent the budget available, with additional resources being found from other budgets when necessary.

When forecast lorry miles saved are compared with actual lorry miles saved the scheme has been reasonably successful in the two years for which the analysis was possible. However, a full analysis of the relative success of the scheme is not yet possible as most of the projects are in their early years and, for some projects, construction of the facilities is not complete. Based on an analysis of eleven of the twelve schemes, the total annual lorry mile savings are forecast to peak in 2002-2003 with 23.05 million lorry miles saved. In the year to 31 March 2002, the FFG awards are forecast to save 19.14 million lorry miles. Since completing this analysis the Scottish Executive has announced two further FFG awards of £289k to Thurso Building Supplies for the expansion of a railhead at Thurso and £9.75 million to Scottish Coal for a railhead and track in Ayrshire for the transport of coal from an open cast mine.

As a general rule the most successful FFG projects have been those where the awardee has a degree of control over the traffic upon which the applications are based. The least successful projects have been where the awardee has the least control over the traffics and the application is more “speculative” in nature.

The existing FFG scheme is designed to secure environmental benefits by shifting traffic from road to more sustainable modes of transport. As explained above, the scheme has been reasonably successful in achieving this objective, particularly in the context of a scheme that is not over-subscribed. However, it is likely in the future that the awards will have to be prioritised due to demand for grant exceeding supply. In our opinion, greater emphasis needs to be placed on funding projects which provide the best value for money in terms of environmental benefits per £ of FFG.

The existing scheme has no mechanism to ensure that freight facilities are located in strategic locations, so that demand can be met for general freight sustainable distribution services in particular regions of Scotland. The scheme is only designed to consider ad hoc applications from any company that takes the initiative to seek funding.

In some cases very high levels of grant have been provided compared to capital expenditure. This significantly reduces the risk for the recipient of grant of developing the facility.

Examination of the SLM values attributed to different types of roads was not included within the scope of this study as a separate review is being carried out in parallel by consultants for the SRA. However, the analysis of the environmental benefits calculations carried out during the study allowed some recommendations to be made on the overall methodology used for calculating environmental benefits.

A key point is that the administration of the FFG scheme needs to ensure there is a balance between, on the one hand, seeking to maximise VFM for the taxpayer and, on the other hand, maintaining the attractiveness of the scheme for applicants. In practice, maintaining this balance requires a high degree of judgement.

With the extension of the FFG scheme to short sea and coastal shipping, the Scottish Executive will need to take great care to ensure that the provision of FFG would not secure traffic for one sustainable mode (e.g. rail) at the expense of another (e.g. coastal or short sea shipping). It is also likely to be anti-competitive for FFG to be used to divert a significant volume of traffic in percentage terms from one port to another, even if this results in a reduction in lorry mileage. The Scottish Executive should seek external advice, where necessary, to review the business plans of applicants where there are competition issues of this nature. Some suggested guidelines for the new short sea and coastal shipping FFG schemes have been provided in Section 4.6.

Given the conclusions from the evaluation exercise, we would recommend that two separate schemes should be developed in the future: an FFG scheme, which would be very similar to the existing scheme; and a new strategic freight interchange scheme.

Strategic freight interchange scheme

The Scottish Executive should be more proactive in promoting and part-funding the development of new sustainable distribution facilities for general freight (whether waterborne or rail freight) in regions where there is a lack of existing capacity. The primary objective would be to secure environmental benefits, but other more strategic criteria should also be taken into account. These facilities would be "strategic" in that they would be provided for the benefit of many general freight customers from a wide hinterland and for a wide variety of commodities.

The Scottish Executive could be more explicitly a risk taker in these projects (as effectively it is in the existing FFG scheme), based on the environmental benefits that should be secured by the availability of the new facility. The actual site and private sector partner could be selected on the basis of an open tender, with a rigorous appraisal of bidders' business cases, to ensure there is competition for the public sector resources available. It is possible

that major strategic freight interchange schemes with associated distribution parks (probably located in the Central Belt of Scotland), could be wholly privately financed through planning gain, with the Scottish Executive providing support through the planning process. Whether or not public sector financial investment is required, these strategic freight interchanges would be limited in number.

The strategic approach would more explicitly recognise that such general freight facilities are more speculative in nature as the traffics that could be attracted to the facilities are less likely to be controlled by both the terminal operator and the sustainable transport operator. Facilities funded in this way would be those where the terminal operator who receives the funding has less control over the traffic flows, such as unit load short sea port terminals, intermodal rail terminals and rail-connected distribution facilities.

The freight interchanges would be strategic in nature in that they would:

- Be at appropriate locations to serve regional population and industrial centres
- Be developed only where there is an existing lack of appropriate capacity;
- Provide facilities to handle general freight traffic, which has both dispersed origins and destinations;
- Be open access and multi-user so that any sustainable transport operator can access the facilities carrying traffic controlled by any third party;
- Be adjacent to distribution centres, wherever possible, to minimise transport costs and maximise environmental benefits.

While public sector investment in the facility would be justified primarily by estimates of future environmental benefits, as required by EC State Aid rules, other more strategic issues would need to be taken into account, such as: whether the facility is located in an appropriate area to maximise environmental benefits for the Scottish taxpayer: whether it has sufficient critical mass to support viable services; the extent to which the facility is integrated with both other sustainable distribution infrastructure and road infrastructure; the cost of constructing the facilities and the extent of open access. These criteria are applied, at a high level, to the appraisal of potential strategic freight interchanges in Chapter 5.

For a future strategic freight interchange scheme, we would recommend that the potential environmental benefits to be included within an appraisal process should be based on a transparent matrix of county-to-county values, which would be established each year by the Scottish Executive/SRA. This methodology should also take into account, where appropriate, the road collection and delivery costs associated with intermodal transport chains, which will encourage greater use of the nearest port and regional intermodal terminal by taking into account the environmental disbenefit (in terms of SLM) of road transport from the terminal/port to the nearest trunk road or motorway junction. This would have the advantage of being consistent with the likely methodology to be adopted by the SRA for the Company

Neutral Grant Scheme (see Chapter 3). For flows to and from very large counties, such as Highland, it may be necessary to include sub-county zones in the matrix.

Freight Facilities Grant scheme

For all other sustainable distribution facilities the existing FFG scheme should continue to be available, essentially in the same form as it is now, with the onus on the applicant to justify forecast traffic volumes and the potential environmental benefits that could accrue.

Recommendations for the future FFG scheme are set out below:

- Maintaining attractiveness of scheme: as the scheme is applicant-led, it is essential that the scheme remains attractive so it can achieve its objectives; measures to reduce the risk to the taxpayer (set out below) should be balanced with the need to ensure that high quality applications are received for eligible projects so that environmental benefits can be secured; this means that the Scottish Executive needs to adopt a flexible approach, considering each application on its merits.

- Prioritisation: given current demand for FFG and renewed awareness of the need for sustainable distribution in the future, resources may need to be prioritised; given two similar applications requiring the same level of grant, prioritisation on the basis of the NPV of the environmental benefits per £ FFG would maximise value for money and therefore this VFM measure should be taken into account when appraising an individual application.

- Grant rates: the level of grant funding for future FFG awards should not reach very high levels as a percentage of capital expenditure as this means that the public sector could be taking a high degree of risk when it may not be in a good position to judge the degree of commercial risk; the exact level of the maximum grant rate is difficult to judge, but it should probably be in the range 50-75% of the eligible capital expenditure. These grant rates are in line with the maximum grant rates available from the EC Structural Funds and would provide substantial public sector funding while requiring a reasonable level of commercial risk; greater use of external advice by the Scottish Executive to examine the business cases supporting traffic forecasts would help in the appraisal process.

- Other risk reduction measures: for future FFG awards, the Scottish Executive could introduce other measures to reduce the risk to the taxpayer; there could be a policy of providing 50% of the grant in advance and 50% in arrears as the forecast traffic is

actually secured; another possibility would be to reduce the time period over which environmental benefits can be quantified to 5-7 years.

- Methodology for calculating environmental benefits: The existing methodology should remain as, despite its limitations, it is the best methodology available and it meets EC State Aid requirements to show that the grant is no greater than the net unpaid external costs of road transport. For major FFG projects (requiring expenditure over, say, £1 million) independent advice should be sought by the Scottish Executive to provide additional validation on the traffic volumes included in the application.

Recommendations for monitoring and evaluation of sustainable distribution grant schemes

One of the conditions for the award of FFG by the Scottish Executive is that awardees must provide data on traffic volumes handled by the FFG-assisted freight facilities. The Scottish Executive already carries out some monitoring work, but recognises that its monitoring activities could be improved. Our recommendations for how monitoring and evaluation activities should be carried out are set out below.

Monitoring activities by the Scottish Executive should be concentrated on assessing the value of the outputs achieved by each project, in terms of the environmental benefits secured, as the objective of all future schemes is likely to remain focussed on securing reductions in lorry mileages. Actual traffic figures should be compared with the forecast of the environmental benefits included in the application.

The key data sets for each traffic flow are therefore:

- Type of commodity carried
- Volume of flow (tonnes or units)
- Origin of flow (post code)
- Destination of flow (post code)
- Reasons for any significant variations (+/-10%) in traffic volume on flow

The same data should be collected for any other traffic that has been secured for rail/waterborne transport from road as a direct result of the grant-funded scheme, even if it was not included in the original application, but the applicants should be asked to justify why the additional traffics should be taken into account.

It is recommended that the monitoring exercise is carried out annually, as soon as possible after the end of the financial year. A comparison of forecast against actual environmental

benefits could be facilitated by asking applicants to provide their environmental benefits calculation in a specified format and electronically. The Scottish Executive should produce a short monitoring report each year so that action can be taken and any lessons learned.

It is recommended that a programme evaluation exercise should be carried out every three years to assess the value for money of the scheme in Scotland. This could largely be based on data provided from the annual monitoring reports, but could be enhanced by a survey of successful and unsuccessful applicants, carried out on a confidential basis. The latter would provide insights into how the administration of the schemes could be improved and this would help to balance the necessity to evaluate the schemes in terms of VFM, with the need to attract high quality applications.

3 POLICY ANALYSIS

3.1 Introduction

This chapter sets out the public policy environment within which a strategy to promote sustainable distribution in Scotland can be developed. It includes a summary of the main European Union framework documents and provides a summary of the relevant UK policy documents.

3.2 European policy analysis

The European Union plays an important role in developing an overall transport policy framework, which the UK Government has closely followed. In the context of this study, the European Union should be seen mainly as providing a policy framework which can be followed by Member States, rather than having a direct impact on transport policy in Scotland. The European Commission does, however, have a direct role in ensuring that any grants and subsidies that are awarded in Scotland are compatible with the EC Treaty. The policy framework document for European Union transport policy is provided by the *Common Transport Policy*.

Common Transport Policy

The European Union's Common Transport Policy was published in 1992, but has set the agenda for European initiatives throughout the last ten years.

The fundamental objective of the document was to foster a transport network and markets that will support the completion and enhancement of the functioning of the Single Market. This requires affordable, safe and efficient transport infrastructure and services that are compatible with environmental concerns – the concept of sustainable mobility.

The CTP is concerned with the impacts of transport on the environment and the damage to the European Union's economy due to the increase in road congestion. It therefore suggests ways to increase the use of more environmentally sustainable modes of transport such as intermodal rail services and short sea shipping.

In September 2001, the European Commission published a White Paper, entitled *European transport policy for 2010: time to decide* and this advocates policies which strongly favour the development of sustainable distribution.

The basic justification under EC State Aid rules for public sector funding of sustainable distribution facilities (such as FFG) and services is that users of road transport infrastructure are not at present paying for the full "external costs" of their use of that infrastructure. The external costs in this context include the cost to society and the economy of environmental

pollution, traffic accidents, road congestion and damage to roads. As road users are not paying the full cost, the transport market cannot reflect the true relative costs of each mode of transport and there is market failure. This is set out in the European Commission's White Paper on infrastructure charging.

Fair Payment for Infrastructure Use; a phased approach to common transport infrastructure charging framework in the EU

This document developed a rationale and strategy for charging all transport infrastructure according to the user pays principle. The aim of such a policy would be to ensure that users of the different modes of transport pay for the full costs (including external costs) of their use of the infrastructure.

The Commission argued that such a policy would ensure a more efficient allocation of resources in the long run as transport users would be able to make appropriate modal choices based on full information.

It has generally been assumed that the introduction of a system of infrastructure pricing across all modes of transport would have the effect of increasing the costs of road haulage, thereby reducing the distance over which more sustainable modes of transport can be competitive.

The basic arguments set out in this White Paper have, as a general rule, been accepted by the Member States, although there are likely to be political concerns about the acceptability of the universal system of road pricing which the Commission's proposals are likely to require. The introduction of such a system of road pricing would result in a general increase in the cost of road haulage, although the extent of the required increases would vary depending on a number of factors: the type of road (motorway, urban single carriageway, single track road etc.); the type of vehicle (heavy goods vehicle, light goods vehicle, "white van"); the amount of road congestion and the time of day, so that, for example, a truck on the M8 in the morning rush hour would incur higher costs than the same truck on the A9 between Perth and Inverness during the middle of the day. This should mean that in rural and peripheral areas of Scotland any increase in road haulage costs should be lower than in, say, the Central Belt.

The introduction of a fair and comprehensive system of road pricing should provide a boost to sustainable distribution due to the likely increased cost of road haulage. The greatest increases in road haulage costs should be in areas with the most severe road congestion and where road traffic is generating the most environmental pollution. This should mean that road haulage costs in rural areas would not be affected to the same extent. However, the likely impacts on particular areas are difficult to predict given that there is no policy to implement such a scheme and no detailed scheme has been designed.

If such a scheme of road pricing was developed in the future, the market failure argument for any public sector subsidy of sustainable distribution facilities would no longer hold and schemes such as FFG would no longer be available under EC State Aid rules. The greater average cost of road haulage should allow market forces to provide a boost to sustainable distribution services, without any need for public subsidy.

3.3 National policy analysis: framework documents

The Westminster Government has closely followed European Union policies, adapted to the UK context. The major UK framework document was the 1998 White Paper called *A New Deal for Transport*, which was published in parallel with the *Travel Choices for Scotland* White Paper.

A New Deal for Transport: Better for Everyone

Published by the Department of the Environment Transport and the Regions in July 1998, this transport White Paper set out the Westminster Government's philosophy towards the future of transport in the United Kingdom.

Key points included:

- Stated objectives of transport policy are the reduction of environmental pollution and road congestion.
- Emphasis on promoting sustainable and integrated transport for both passengers and freight, thereby balancing environmental sustainability with improved efficiency.
- Emphasis on pragmatic intervention in the operation of markets by means of economic regulation, fiscal instruments, public sector grants and new planning regulations, to pursue public policy objectives.
- A new emphasis on planning at local, regional and national levels, which is more in tune with public sector philosophies on the Continent.
- Consistent with key European Union transport policies to promote sustainable transport.

Travel Choices for Scotland

Published by the Scottish Office in July 1998, the document sets out the Government's philosophy towards the future of transport in the Scotland and is consistent with the philosophy provided by the DETR's earlier Transport White Paper, although it takes into account the distinctive transport challenges which Scotland faces due to its geography, population pattern and peripherality.

Key points included:

- The geography of Scotland with its islands, lochs, mountains and firths is such that there are greater transport challenges than in many other parts of the UK.
- Scotland's peripheral location means that links to England and the Continent of Europe are of particular importance to the economy of Scotland.
- Overall policy on freight is to encourage alternatives to road freight, where possible, and otherwise to increase the efficiency of current road haulage and reduce the number of lorry journeys.
- There was a commitment to improving the opportunities for rail freight, specifically mentioning the FFG scheme in Scotland, as well as working with the SRA to provide a clear focus for the promotion of rail freight in Scotland.

The *Sustainable Distribution* White Paper applied the principles of integrated transport to the freight transport sector.

Sustainable Distribution: A Strategy

This UK Government White Paper, designed to set out specific policies in the freight market, was published by the DETR in March 1999. It set out to describe the Government strategy to secure the sustainable distribution of freight in the United Kingdom.

Key points included:

- Specific measures to promote sustainable transport of goods, generally through fiscal measures, including annual increases in fuel duty of at least 6% above the rate of inflation - a policy which was subsequently reversed.
- Greater emphasis on planning for freight distribution at both regional and local levels and revised planning guidance to encourage the shipment of more goods by rail and waterborne transport.
- Encouraging the use of rail freight by providing incentives through grant schemes such as FFG and by setting up the SRA, which would have a duty to promote rail freight.
- Encouraging the use of waterborne freight, particularly by extending the FFG scheme to coastal and short sea shipping.

Following the publication of the above framework policy documents, the Westminster Government published its *Transport 2010: The 10 Year Plan* to set out its targets to 2010 and the policy instruments that would be used to achieve them. The most significant development was the creation of the Strategic Rail Authority, which has a statutory duty to promote use of the rail network for freight.

Transport 2010: The 10 Year Plan

The 10 Year Plan was published in July 2000 and aimed to provide a long-term strategy for delivering an efficient, safer and more environmentally friendly transport system. The document only provided broad outlines of where and how investment would be targeted, rather than providing details on particular projects.

The DETR Action Plan 2010 provided significant additional resources for transport infrastructure investment, with most of the additional investment in the railways rather than roads. However, there was more expenditure on the roads programme than was included in the conclusions to the roads review following the 1998 Transport White Paper.

There was particular emphasis on the rail strategy, which will be developed by a number of bodies in partnership and co-ordinated by the SRA. The SRA will decide what quality and capacity improvements are needed on the freight railway and the Rail Regulator will set the level of Railtrack's track access charges payable to rail freight operators.

Some £4 billion of public funds would be made available to fund investment in rail freight, which would promote an 80% increase in traffic by 2010.

As explained in Chapter 2, the Scottish Executive's *Programme for Government* sets out clear goals for the development of sustainable freight transport, particularly rail freight, in Scotland. In this document the Scottish Executive made the following commitment:

By increasing the freight facilities grant, we will move freight off the roads and onto trains and ships, and we will transfer an additional 18 million lorry miles p.a. off the roads in Scotland by March 2002.

3.4 National policy analysis: modal policies

The Scottish Executive and the Westminster Government have subsequently published White and Policy Papers to translate the principles of the framework policies into policies for individual modes of transport. The *Scottish Strategic Roads Review* stated there would be little new road construction in Scotland, although greater scope for new road construction was included in the 10 Year Plan.

Scottish Strategic Roads Review

Published by the Scottish Executive in November 1999, the objective of the roads policy must be "to view trunk road improvements in the context of an integrated transport strategy which encourages sensible road usage, particularly car usage, while promoting reliable, more sustainable and attractive alternatives for the transportation of people and goods".

Key points were:

- An emphasis on the maintenance of existing infrastructure and good traffic management, rather than new road construction.
- Any new investment would need to secure substantial benefits to road users through relatively modest investments. As a general rule, new construction is regarded as being very expensive, can generate additional traffic and can have a significant impact on the environment.
- Investment decisions for new or improved road infrastructure will be based on the five criteria of accessibility (access to public transport, community severance, impact of pedestrian and other no-road users) safety, economy (journey time reductions, journey time reliability, scheme costs, regeneration effects), environment (emissions, noise, local air quality, impact on landscape/biodiversity/heritage/water resources), and integration with other modes of transport.

The major policy documents in the rail sector have been produced by the Strategic Rail Authority (SRA). The SRA's *Strategic Agenda* was produced to provide an overall view of the SRA's strategic direction. The SRA *Freight Strategy* provided more detail on how the SRA would meet its targets for rail freight, as set out in the *Ten Year Plan* and its *Strategic Agenda*.

Strategic Rail Authority: A Strategic Agenda

Published by the SRA in March 2001, this document sets out the SRA's agenda for the development of rail freight to 2010 and provides a broad view of how the SRA will secure 80% growth in rail freight before 2010, as set out in the Government's Ten Year Plan.

Key points are:

- Some growth will come from the bulk rail sector, but most growth in rail freight must come from non-bulk intermodal traffic.
- The SRA will enhance the rail network for freight by increasing the capacity available on the main freight arteries.
- It will facilitate a significant increase in the number of freight interchanges to provide greater accessibility to rail freight services.
- It will provide greater financial support for rail freight, will amend the existing FFG scheme and will introduce a new "company neutral" operating subsidy scheme.

SRA Freight Strategy

Published by the SRA in May 2001, this consultation document sets out in more detail how the SRA intends to meet the rail freight targets included in the 10 Year Plan. It takes a strongly market-based approach, arguing that market forces and strong competition within the rail freight sector will secure the necessary growth. The SRA aims to facilitate this growth by developing four strategy elements:

- A Network Strategy to improve the "reliability, resilience and flexibility" of the network; by increasing train lengths, improving journey times and increasing axle weights; by enhancing loading gauge to improve access to traffics in key intermodal markets; by reducing conflicts with passenger services.
- An Interchange Strategy to promote the development of new and enhanced rail facilities at ports and inland terminals; an increase in the proportion of warehousing which is rail-connected; an increase in the available intermodal terminal capacity, particularly in the South East of England.
- A Funding Strategy to provide direct investment in the network, to provide Company Specific Support to maintain and increase the use of rail freight by traditional bulk rail freight services; by providing Company Neutral Revenue Support in the deep sea and domestic unit load markets; and interchange finance to support the development of strategic multi-user open access interchanges for intermodal and conventional wagon traffic.
- A Strategy for Service Delivery, which will provide a role in supporting rail operators to improve service quality, by providing financial support to innovative rail freight schemes, by increasing on-rail competition and improving the reliability and capacity of the rail freight network.

The major priority capital schemes are set out in the document and many are of relevance to Scotland, although they may not involve infrastructure work in Scotland itself. These are:

Phase I (implementation in 2-5 years):

- Freight enhancements to the East Coast Main Line (including W12 loading gauge and 775 metre intermodal trains)
- Enhancement of Felixstowe-Nuneaton route: to provide direct access from the deep sea container port at Felixstowe to the West Coast Main Line (including W12 and 775 m trains)
- Enhancement of Southampton-WCML: to increase capacity and loading gauge (to W12) between the deep sea container port and the WCML .

Phase II (possible implementation around 5 years):

- WCML north of Crewe: to enhance capacity on the WCML between Crewe and Glasgow, to avoid expected conflicts with high speed trains.

Phase III (possible implementation 5 –10 years):

- WCML Alternative Routes: including the Railtrack "Third Anglo-Scottish Route," which uses the Glasgow-Carlisle route via Kilmarnock and Dumfries for part of its route.

Although the Strategy does not suggest there is an urgent need for interchange capacity in Scotland, it does suggest that, along with English regions such as the East Midlands and the South West, there will be a need for new interchange development during the term of the 10 Year Plan.

No separate document has been produced to set out a strategy for the development of rail freight in Scotland. However, a consultation document on rail passenger issues produced in November 2000 described some of the major freight issues.

Strategic Priorities for Scotland's Passenger Railway: A Consultation Paper

This document sets out the vision for and objectives of Scotland's passenger railway, but also contains a section on rail freight. The key points on rail freight are:

- The document states the commitment of Scottish Ministers to transferring increasing amounts of road freight to rail and to using the devolved responsibility for freight grants to this end.
- It recognises that Scotland has a mixed use railway and that any growth in rail passenger services will have a direct impact on the capacity for rail freight.
- Some features of the Scottish context are set out: rail freight services serve locations more remote from markets and suppliers than in other parts of Great Britain; rail freight transfers large volumes of Scottish trade to and from deep sea container ports in England
- Capacity increases for rail freight should only be carried out where the overall benefits can be shown to be greater than the costs and on this basis the Scottish Executive will be prepared to work in partnership with the rail industry, the SRA and other bodies to secure infrastructure enhancements.

Two White Papers have been produced by the Westminster Government on maritime transport. The shipping policy White Paper concentrated on measures to increase the size of the UK registered fleet and to increase the number of people entering the maritime professions. The *Ports Policy Paper* was more relevant to this study and provided a generally market-focussed, non-interventionist approach to investment in port facilities. The Scottish Executive now has responsibility for the development of ports policy in Scotland.

Modern Ports: A UK Policy

Published by the DETR in November 2000, this was the first UK ports policy document for 20 years. The document applies the principles of the Government's integrated transport policy in the context of the ports industry. As in other areas of its integrated transport strategy, the UK Government sees itself as a facilitator and regulator, where necessary, of the activities of the UK ports. The document states that the UK ports have a role in promoting UK and regional competitiveness, high nationally agreed safety standards and the best environmental practice.

Key points are:

- The policy paper reiterates the intention to extend the existing freight grant regimes to coastal and short sea shipping and emphasises the important role that ports can play in this context.
- It also reiterates its commitment to promoting the development of coastal and short sea shipping, including the potential for bulk and unit loads to shift to "coastal highways".
- The Government reiterates its general desire to see more freight on rail and it believes that some ports could make more use of the mode. It suggests that any port planning a new development or regeneration scheme should consider the revival of port railheads, although this is only likely to be realistic in a few cases. "Gateway ports" and those with large volumes of bulk traffic are, the document says, most likely to achieve the necessary economies of scale.
- Existing port capacity should be used more effectively, rather than constructing additional infrastructure. There may be a shortfall in capacity in some unit load sectors (deep sea containers and short sea ro-ro ferries, mainly in the South East of England) and some capacity expansion may be required, but only in a limited number of cases.
- As a general rule, there should not be public sector investment in UK port infrastructure.
- In Scotland the paper recognises the vital contribution of ports to local and regional economies; the ports industry and potential shipping operators must maximise opportunities for Scotland's sea transport and trading links; Government cannot determine which ports should be used for shipping routes.

Although the UK Government is seeking to make FFG available for short sea and coastal shipping, it is not, as a general rule, Government policy to provide public sector funding for port infrastructure. In this context we assume that port infrastructure includes quays, breakwaters, landside storage areas and dredging of maritime access channels. The issue of whether, and how, public sector investment in port infrastructure in Scotland might be justified is examined in more detail in Chapter 4.

No separate policy document has been produced on the potential for freight to be carried on inland waterways in Scotland. The White Paper produced by the DETR in England and Wales may provide some policy guidance for Scotland.

Waterways for Tomorrow

Published by the DETR in June 2000, this document has a short section on the potential of inland waterways in England and Wales to carry freight.

The key points are:

- Freight traffic on inland waterways has been declining for many years due to the increasing competitiveness of other forms of transport and declining markets suited to waterborne transport.
- Much of the inland waterway network is unsuited to carrying significant volumes of freight, but larger river navigations and canals may be suitable for the carriage of freight, particularly bulk cargoes which may have origins and destinations adjacent to quays.
- Facilitating the movement of freight between the major tidal rivers and non-tidal waterways is likely to be crucial to increase the use of inland waterways for freight traffic.

This recognises that larger river navigations and canals may be suitable for the carriage of freight, but smaller canals are likely to have limited potential. This issue is considered in more detail in the Scottish context in Chapter 4.

3.5 Conclusions on policy analysis

European and national policies are strongly supportive of the development of sustainable distribution, with the objective of reducing environmental pollution and road congestion. Major road-building programmes are no longer seen as a solution to general road congestion. A comprehensive and fair system of infrastructure charging for all modes may be introduced in the long term, which it is assumed, would raise the relative cost of road haulage. Such a development would remove the justification for public sector subsidy schemes such as FFG.

In the interim period public sector support for more sustainable modes of transport can be justified under EC State Aid rules. This public sector support, subject to EC State Aid clearance, can be provided as subsidy towards sustainable distribution facilities and services and this is the fundamental rationale for the existing FFG schemes for rail and inland waterways and the extension of the latter to coastal and short sea shipping.

The Scottish Executive has set objectives for increasing the volume of freight traffic of an additional 18 million lorry miles removed from Scottish roads by March 2002 and progress against this objective has been assessed in the evaluation of the existing FFG scheme in Chapter 2. This complements the Westminster Government's target for rail freight, included in its *Transport 2010: The 10 Year Plan*, of increasing rail freight (in terms of tonne kilometres) by 80%. One of the key objectives of this study is to show how investment by the Scottish Executive in sustainable freight facilities can contribute to, and exceed, these targets.

The SRA is developing new schemes for subsidising rail freight in the UK and the Scottish Executive will have an input into the development of these schemes. The SRA has indicated that subsidy for rail freight interchanges for intermodal and conventional wagonload traffic may, in the future, take a more strategic approach and this ties in with our recommendations in Chapter 2 that there should be a strategic freight interchange scheme for both waterborne and rail facilities in Scotland.

UK ports policy supports the extension of FFG to short sea and coastal shipping, but does not support, as a general rule, public sector investment in port infrastructure. This raises the issue of how FFG for short sea and coastal shipping should be applied in the Scottish context. This is considered in more detail in Chapter 4.

The SRA's *Freight Strategy* suggests that some rail freight interchange capacity is likely to be required in Scotland before 2010. The type, and location, of additional strategic freight interchange capacity (both waterborne and rail) that is required in Scotland is addressed in Chapter 5.

4 MARKET ANALYSIS & INFRASTRUCTURE CAPACITY

4.1 Introduction

This chapter sets out the market environment within which a strategy to promote sustainable distribution in Scotland can be developed. It includes an analysis of the strategic issues related to key transport markets, based on both publicly available and in-house data sources, and results from the interview programme.

4.2 Road haulage and rail freight

The road haulage market is characterised by a large number of hauliers, low market entry costs and relatively little regulation apart from on safety issues. Due to the number of haulage companies and the lack of barriers to entry into the market, the cost of road haulage is generally set by the market. Severe competition in most road haulage markets has meant that road hauliers operate very efficiently and will always seek to minimise operating costs. Road haulage is highly flexible so that hauliers can reposition their vehicle easily and quickly to pick up back loads, thereby reducing costs.

Rail freight, by comparison, has only a few operators in the market, and there are very high costs of entry involved in purchasing traction and rolling stock as well as significant regulatory barriers to entry. Rail freight is characterised by very high fixed costs (traction and rolling stock), but low variable costs per tonne compared to road transport. There are no published rates for rail freight charges and rail freight users have only a poor understanding of their suppliers' cost structures as there are dominant operators in the market and little on-rail competition.

There are three basic types of rail freight service – conventional trainload services, conventional wagon load services and intermodal services. Conventional trainload services provide for railway shipments from one private siding/rail connected facility to another without any use of road. The means of loading and unloading of the cargo is often the responsibility of the shipper/receiver, with only the traction and, usually, the wagons provided by the rail freight operator. The major advantage in using conventional rail wagons rather than road is that much higher weights can be carried by rail than would be possible by road. The major disadvantage of using conventional wagon services is that they are not flexible operationally, requiring dedicated rail-connected facilities at the premises of both shipper and receiver. As a general rule, trainload conventional flows can be competitive against road without public subsidy over distances of 90 kilometres, or even less under certain circumstances, due to the economies of scale which are available.

English Welsh & Scottish Railway has re-introduced conventional wagon load services, which were regarded as commercially unattractive by British Rail. This is providing a service for customers who are generally rail-connected, but have only one or two wagons of traffic rather than full trainloads. The EWS service, called *Enterprise*, operates using a regional hub and spoke network. In Scotland there are trunk haul services between major hubs at Mossend (near Glasgow), Millerhill (near Edinburgh) and Aberdeen with feeder services from a number of locations throughout Scotland.

Intermodal rail services transport standard unit loads such as ISO containers, swap bodies or "piggyback" road trailers by rail for a trunk haul between two intermodal terminals, but local distribution is generally by road. The intermodal units are loaded onto special intermodal platform wagons.

The advantages of intermodal rail over conventional wagons are that: no commodity specific handling equipment is required by the shipper or the receiver; there is a high degree of flexibility in that the units can be used solely on road; the rail freight operator is more likely to find back load traffics for wagons; and standard intermodal wagons are used, so that the transport offer can be competitive with road over reasonable distances.

The major infrastructure issue for intermodal services is that of "loading gauge". The loading gauge of a railway line is, in general terms, the space available in cross-section, through which an intermodal unit on an intermodal wagon can pass safely, given the width and height of bridges, tunnels and platforms. The UK loading gauge, compared to that on the Continent, is particularly restricted for intermodal traffic for historical reasons. A summary of the different loading gauges is provided below in Table 4.1. The subject is complex as there are many different combinations of intermodal units and intermodal wagon types which can be accommodated within the different gauges. While units can be designed which have less height and width and wagons can be built with lower deck heights, these constraints have a significant impact on intermodal rail economics: smaller units have a lower payload; low deck height wagons cannot carry as many units and result in more wear and tear on track. The table shows the different sizes of containers which can be accommodated on both standard Freightliner intermodal wagons, with a deck height of 980mm and "lowliner" Freightliner wagons with a deck height of 720mm. The table shows therefore examples of unit and wagon combinations that can be accommodated within each gauge rather than a comprehensive list.

Table 4.1
Unit and wagon combinations within UK loading gauges

GAUGE	ALTERNATIVE NAME	MAXIMUM SIZE OF UNITS WITH CLEARANCE (WIDTH X HEIGHT IN MILLIMETRES)	
		Containers on 1000 mm deck height wagons	Containers on 720mm deck height wagons
W6	W6A Gauge	2500 x 2402	2438 x 2720
W7	W6A exception Gauge for 8ft. 0in. high containers	2438 x 2545 2500 x 2402	2438 x 2805
W8	W6A exception Gauge for 8ft. 6in. high containers	2500 x 2638	2500 x 2686
W9	W6A/SB1-C Gauge for demountable loads	2500 x 2743	2500 x 2805
W10	Gauge for 9ft. 6in. high containers on specific wagons	2500 x 2896	2500 x 3146
W12	Gauge for 9ft. 6in. high & 2.6 metre wide containers	2600 x 2896	N/A

Source: Railtrack

The cost of road haulage distribution at each end of the transport chain has a considerable impact on the economic distance for intermodal rail services. On a typical intermodal transport rail flow where a unit load has to be collected from a shipper by road at A, taken to an intermodal terminal at B, lifted onto the train for a trunk haul to another intermodal terminal at C and then delivered by road to a receiver at D (i.e. neither end of the rail-based transport chain is rail-connected), rail can be competitive over a distance of about 450 kilometres. If one end of the transport chain is rail-connected, at a port or a rail-connected distribution site, for example, the break-even distance can be reduced to as little as 200 kilometres and even less in some cases.

This should provide an opportunity for the development of intermodal rail services from the Central Belt of Scotland, not only for the distribution of deep sea containers and Channel Tunnel traffic (where one end of the transport chain is effectively rail-connected), but also for UK domestic distribution.

The approximate distances between Glasgow and various regional centres are shown in Table 4.2 below.

Table 4.2
Distances between Glasgow and other GB regional centres

REGIONAL CENTRE	DISTANCE (KM)
Manchester	350
Leeds	350
Nottingham	450
Birmingham	475
Bristol	605
Cardiff	635
London	655

Source: AA Milemaster

This suggests that intermodal rail services should be competitive between the Central Belt of Scotland and the Midlands south if neither end of the transport chain is rail-connected. If one end of the transport chain is rail-connected (at a rail-connected distribution centre in the Central Belt of Scotland, for example) then services should be competitive from NW England and Yorkshire and Humberside south.

However, while cost is the major determinant of modal choice, other criteria are also important. These can be summarised as:

- Availability of suitable **rail-connected facilities**

- **Quality of service:** road hauliers generally provide a high level of service due to the level of competition in the industry and the rail freight industry has often failed to match these standards.

- **Flexibility:** road haulage is very flexible, so that it can match industry's requirements for Just-in-Time delivery and low or zero stock levels. Rail is inherently less flexible and has involved more actors in the supply chain, which makes coordination of services more difficult.

4.3 Rail freight services in Scotland

While the road haulage market is characterised by a large number of operators in a highly competitive market, the rail freight market is dominated by two large operators, which were created on the privatisation of British Rail, along with two smaller licensed rail freight operators:

English Welsh and Scottish Railway (EWS): *the company carries about 90% of all rail freight in the UK and also operates the Channel Tunnel intermodal services; the company owns and operates a network of conventional rail terminals throughout the UK and most Channel Tunnel intermodal rail terminals, including the Euroterminal at Mossend; EWS has invested heavily in new locomotives and wagons since 1996; the company is now owned by Canadian National.*

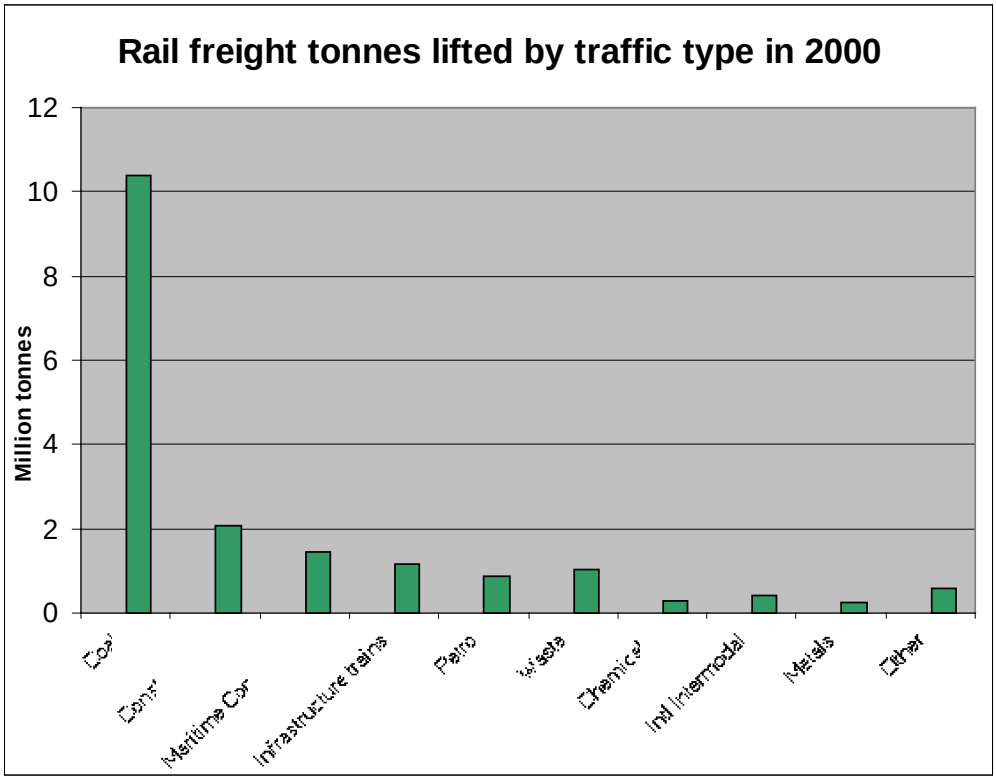
Freightliner*: mainly operates intermodal rail services between deep sea container ports in South East England and a network of regional terminals, including Coatbridge to the east of Glasgow. The company has also diversified into bulk rail services, in competition with EWS, with contracts with Blue Circle and Railtrack.*

Direct Rail Services (DRS): *a subsidiary of BNFL with a core business in the rail carriage of nuclear flasks. The company has recently been more active in the general rail freight market..*

GB Railfreight: *a new entrant into the market, which has won a contract from Railtrack to work rail infrastructure trains; the company has leased a fleet of seven locomotives.*

There are therefore two established players, which control terminal networks and operating in fairly distinct markets, and two much smaller operators, both of which are actively seeking to increase their presence in the freight market.

Rail freight services with origins and destinations in Scotland are dominated, in terms of volume lifted, by “traditional” rail freight services - trainload bulk services between private sidings - operated by EWS. The estimated rail freight volumes lifted in 2000 are shown in the chart below.



Source: MDS Transmodal GB Freight Model version 3.1

The chart shows that about 10.4 million tonnes, representing some 56% of total rail freight tonnes lifted, relates to coal movements. The major flows are deep sea coal imports from Hunterston in Ayrshire and from coal mines in Ayrshire, Lanarkshire and Fife to power stations at Longannet and Cockenzie. These are bulk trainload movements, with high volumes, high frequencies and dedicated handling facilities at both ends of the transport chain and are traditionally attractive flows for rail. There are also significant flows of imported coal from Hunterston, which are transported to coal-fired power stations in the East Midlands and Yorkshire. These flows are economic for rail, even though they are extending into the natural hinterland of deep sea ports such as Immingham, because of the economies of scale generated by the combination of deep sea ships and high volume, high frequency rail distribution between rail-connected sites.

The rail distribution of construction materials, particularly cement, within Scotland between rail-connected sites generated about 2.1 million tonnes of traffic in 2000. The principle flows are from the Blue Circle cement works at Dunbar to cement terminals at Leith and near

Glasgow. Again, these are bulk trainload movements, with high volumes, high frequencies and dedicated handling facilities at both ends of the transport chain.

Domestic waste accounts for 1.0 million tonnes of rail freight in 2000, with bulk containerised waste being carried from a refuse transfer station in Edinburgh to a landfill site near Dunbar. This flow is over a relatively short distance and requires a road haul at one of the transport chain. It is likely that the service is subsidised by the relevant local authority.

Movements of refined petroleum products in trainload volumes account for 0.9 million tonnes of rail freight in 2000. The major flows are bulk liquid trainload volumes from the BP Grangemouth oil refinery to a regional distribution site at Dalston in Cumbria and to various storage facilities in Scotland, mainly for the rail and aviation industries. The BP oil refinery has dedicated handling facilities, which are being modernised with the assistance of an FFG award, and the destination terminals are also rail-connected.

Other significant flows of bulk commodities, generally in trainload volumes, include: steel slab from steelworks in North East England to the rail-connected facility at Dalzell to the east of Glasgow; a trainload flow of sawn timber from forests in Argyll and Bute to a rail-connected factory in North Wales; a flow of mail between the Central Belt of Scotland and the English Midlands and London; trainload flows of china clay from Cornwall to Ayrshire.

Estimated traffic volumes for most of these flows are provided in Table 4.3 on the following page. This analysis, from the *MDS Transmodal GB Freight Model version 3.1*, provides estimates of region-to-region rail freight flows in 2000. Version 3.1 of the model is the latest version of the model, prior to further development work for this project.

Table 4.3 Total rail distribution flows between Scotland and other GB regions in 2000

Year	2000
Imp/Exp/Domestic	(All)
Trunk Mode	Rail
from/to county	(All)
Scottish County	(All)

Sum of Tonnes Transported	Region										
Commodity	E. Anglia	E. Mids	N. West	North	S. East	S. West	Scotland	W. Mids	Wales	Yorks&H	Grand Total
Auto	668				36,200	267					37,135
Chemicals			163,439	26,389			18,466			63,447	271,741
China Clay						142,503					142,503
Coal	1,569	638,286	708,629		3,099		7,166,290	7,381	8,591	1,849,675	10,383,520
Construction		7,950	7,773	23,208		25,698	1,995,770			7,701	2,068,100
Forest	211		5,220		12,043	7,867		210	126,454	15,264	167,269
Intl Intermodal					426,057						426,057
Mail					112,267	9,104		21,231	10,483		153,085
Maritime Containers	402,410	22	154,956	253,586	484,492	49	132,584	368	318	11,359	1,440,144
Metals				98,202	29,884				20,285	99,519	247,890
Nuclear				6,678							6,678
Ore				67,168	26						67,194
Own Haul	510	25,309	21,239	80,991	3,530		1,015,924		667	245	1,148,415
Petro				225,683			618,714			25,015	869,412
Unknown			64						1,648		1,712
Waste							1,022,068				1,022,068
Grand Total	405,368	671,567	1,061,320	781,905	1,107,598	185,488	11,969,816	29,190	168,446	2,072,225	18,452,923

Source: MDS Transmodal GB Freight Model Version 3.1

In the intermodal rail market, Freightliner have significant volumes of traffic in the maritime container distribution market (about 1.4 million tonnes) between Scotland and the deep sea container ports of Felixstowe, Southampton, Thamesport and Tilbury. As we have seen, the distances and traffic volumes involved make this market a "natural" market for intermodal rail services. But the volumes and distances involved also allow coastal and short sea container services to be competitive. Freightliner operates a "hub and spoke" network, based on their national hub at Crewe, although there also some direct services from Coatbridge to Felixstowe.

Channel Tunnel services, handling about 0.4 million tonnes of traffic, are operated by EWS International via their Mossend terminal, with most of the units bound for Northern Italy, although some traffic is also bound for Belgium and Germany. As with unit load trade in general between Scotland and the Continent, there is a significant imbalance in flows in favour of export loads. There no rail direct services between Scotland and the Channel Tunnel, with regional services operating to the Channel Tunnel hub at Wembley, where through trains are formed.

There is a new parcels service, using conventional wagons, operated by EWS for Securicor between the West Midlands and a terminal near Glasgow. Despite the distances involved, there was very little other UK domestic intermodal or general cargo traffic carried in 2000.

4.4 Rail freight network

Scotland is located at the northern end of the two main strategic rail freight routes in Great Britain. The West Coast Main Line (WCML) is the most important rail freight route in the UK in terms of traffic carried, but is also the major fast passenger rail link between London, the West Midlands, Liverpool/Manchester and Glasgow. It is particularly important for intermodal traffic as it provides the main link between Scotland and the Channel Tunnel and the link between the Freightliner hub at Crewe and its Coatbridge terminal to the east of Glasgow. The mixed-use nature of the line has resulted in some competition between passenger and freight traffic for train paths, particularly south of Crewe. The line is cleared to W10 loading gauge, to accommodate the largest deep sea containers on standard intermodal wagons and a wide variety of Channel Tunnel intermodal traffic, although links from the WCML to the English South East deep sea container ports remain restricted to W8 or W9. Both the main intermodal terminals to the east of Glasgow, at Mossend (EWS) and Coatbridge (Freightliner), are directly connected to the West Coast Main Line.

The East Coast Main Line (ECML) provides the other strategic rail freight route, linking Edinburgh with the North East of England, Yorkshire and London. This is also a mixed-use line, with freight services sharing the line with high speed passenger services. The line is

cleared to W9. This means that high cube deep sea containers can only be carried on low height "megafret" wagons.

The ECML and WCML are linked by a W9 cleared route and the other main intermodal rail freight terminals in the Central Belt, at Grangemouth (TDG and WH Malcolm) and Hillington (Deanside Transit) are linked to the WCML by W9 cleared routes.

The SRA's plans to provide direct links, cleared to W10, between the English deep sea ports of Felixstowe and Southampton to the West Coast Main Line will improve the economic viability of deep sea intermodal rail services to Scotland.

In conclusion, while further gauge enhancement might be desirable in the future (to piggyback gauge, for example, so that unaccompanied road trailers could be carried on special intermodal wagons) loading gauge between the Central Belt and England and the Channel Tunnel could be considered to be adequate, apart from the need to up-grade links in England to the major deep sea container ports.

The major rail freight routes to the north of the Central Belt are provided by Railtrack's "Scottish Express Route" to Stirling and Perth, with two routes to Inverness, one via Dundee, Montrose and Aberdeen and the other more direct through the central Highlands. The direct Perth-Inverness route is cleared to W8, but intermodal traffic (Safeway retail distribution traffic) is carried to Inverness. The track between Perth and Inverness is almost all single track, with passing loops. The Perth-Dundee-Aberdeen-Inverness route has an even more restricted gauge (W7), but handles a significant volume of conventional freight traffic, particularly to Aberdeen. Between Aberdeen and Inverness the railway is only single track with passing loops.

Other important rail freight routes are:

- The Glasgow-Kilmarnock-Dumfries-Gretna Line: this line provides an alternative link between the Central Belt and Northern England, avoiding the WCML. It forms part of a possible third strategic Anglo-Scottish route for freight and already carries a significant volume of Scotland-England coal traffic. The single track Annan-Gretna section of the line is generally recognised as a bottleneck. The route, according to Railtrack, is cleared to W7.

- The West Highland Line: single track line, with passing loops, which links the Central Belt to Fort William, Oban and Mallaig; the line, according to Railtrack, is cleared to W7 for intermodal traffic; the line handles a number of conventional rail freight traffics such as alumina and timber.

- The Far North Line: mainly single track railway from Inverness to Wick and Thurso; cleared to only W7 beyond Dingwall, although intermodal traffic is handled at a small terminal at Georgemas Junction; conventional rail traffic is also handled on the line, with an EWS Enterprise service and cement traffic to and from Inverness.

- The Kyle Line: single-track line, with passing loops, from Dingwall on the Far North Line to Kyle of Lochalsh, where there is conventional rail loading point; cleared to W8, according to Railtrack, for intermodal traffic.

- The Glasgow-Ayr-Stranraer Line: double track as far as Ayr, but single track with passing loops between Ayr and the Irish Sea ferry port of Stranraer; according to Railtrack, the line is cleared to W7; significant volumes of coal traffic on the section between Ayr and Kilmarnock and on other sections freight traffic, including some intermodal traffic, is growing from a low base.

- The Fife Circle: double track link between Edinburgh via the Forth Rail Bridge to Fife, with two routes through Fife to Perth; handles significant volumes of coal traffic from open cast mines and power stations in Fife; provides a link between the Scottish Express Route to the north of the Central Belt and the East Coast Main Line via the Forth Rail Bridge; there are believed to be conflicts with Edinburgh-Glasgow passenger services which restricts capacity to the south of the Forth Rail Bridge, as well as weight and train length restrictions on the bridge; would provide a link between a potential rail freight facility at Rosyth and the WCML, if the Stirling-Alloa-Kincardine Line was re-opened; cleared to W7 for intermodal traffic.

The removal of capacity bottlenecks and the enhancement of loading gauge for intermodal traffic on the rail network should be considered as part of the strategic appraisal of schemes (Chapter 5). Additional gauge clearance work in England, on routes from the deep sea container ports of Felixstowe and Southampton to the West Coast Main Line, will have strategic significance for the economic viability of deep sea intermodal services to and from Scotland.

On lines to the north of the Central Belt train weight and length restrictions reduce the potential for both conventional and intermodal rail services to provide the economies of scale for viable rail freight services. This issue will need to be addressed alongside the development of new conventional rail freight opportunities along the routes and would be suitable for FFG funding in the future.

There are likely to be opportunities to re-open or create new private sidings for conventional rail freight traffic throughout Scotland. In the Highlands, these new connections are likely to provide the major contribution to modal shift from road to rail over the next 15 years and

should be suitable projects to be funded by the FFG scheme. Any industrial site in Scotland which has a requirement for regular shipments of a bulk commodity and which is adjacent to, or close to, a railway line could be suitable for a new rail connection.

4.5 Road haulage traffic volumes

Table 4.4 on the following page provides an analysis from the *MDS Transmodal GB Freight Model version 3.1* showing estimated tonnes lifted, by GB regional origin and destination in 2000. The data is based on the *Continuing Survey of Road Goods Traffic* and so is based on sample data which is subject to a degree of sampling error.

The total Scottish road market size amounts to about 310 million tonnes lifted, of which some 264 million (85%) is transported within Scotland. The next largest flow of about 12 million tonnes is with the neighbouring English Northern region.

Sustainable distribution will be viable for some flows within Scotland and to the northern counties of England, particularly for bulk commodities, but most intra-Scotland flows of general cargo are likely to be over distances which are too short to be viable for intermodal rail services (e.g. within the Central Belt). Although potential intermodal traffic volumes may not be significant compared to those from the Central Belt to England, there are significant environmental benefits to be gained from the development of intermodal rail services from the Central Belt to Aberdeen, Inverness and further north. The FFG-assisted Safeway secondary distribution traffic from the Central Belt to the Highlands is an example and, according to reports in the trade press, EWS is successfully building on this base-load traffic.

Table 4.4
Total road distribution flows between Scotland and other GB regions in 2000

Year	2000
Imp/Exp/Domestic	(All)
Trunk Mode	Road
from/to county	(All)
Scottish County	(All)

Sum of Tonnes Transported	Region										
Commodity	E. Anglia	E. Mids	N. West	North	S. East	S. West	Scotland	W. Mids	Wales	Yorks&H	Grand Total
Agri	260,988	289,335	320,906	1,228,011	284,928	30,821	15,345,704	217,408	126,184	356,828	18,461,113
Auto	15,479	65,328	59,669	361,553	50,230	4,557	1,618,776	44,877		95,915	2,316,384
Beverages	33,915	407,797	312,761	448,381	602,241	115,638	11,832,892	116,118	29,656	379,527	14,278,926
Chemicals	94,355	109,619	598,423	991,171	498,517	45,250	4,754,794	72,409	37,892	542,774	7,745,204
Coal	125,222	49,977	120,357	407,620	79,212	1,201	10,238,780	250	117,741	151,053	11,291,413
Construction	39,617	163,069	322,871	1,136,650	652,750	131,992	85,068,036	234,112	44,321	448,136	88,241,554
Food	181,974	324,931	1,764,949	2,832,111	789,643	199,085	31,095,412	357,405	55,996	953,828	38,555,334
Forest	48,240	57,277	273,821	973,880	386,650	72,722	11,592,498	38,619	194,531	210,842	13,849,080
Mail	50,418	16,405	111,916	399,930	33,544	139,314	2,060,094	675,035	2,041	40,891	3,529,588
Manufactures	442,527	714,477	3,205,465	2,266,632	2,178,518	356,081	56,358,126	543,694	292,965	1,871,579	68,230,064
Maritime Containers	6		16,114	74,216	197	7	4,265,110	9		893	4,356,552
Metals	28,880	29,692	175,270	247,251	154,776	1,520	3,632,296	311,597	75,245	332,117	4,988,644
Ore	5,423		16,621	65,059	150,744	142	3,274,664	23,941		18,456	3,555,050
Petro	3,287	14,205	392,471	659,818	1,966,578	63,616	12,344,452	12,433	1,997,674	1,272,097	18,726,631
Unknown	605	20,090	296,285	138,831	7,718	6,963	5,100,310	17,233	30,054	63,819	5,681,908
Waste							5,384,078				5,384,078
Grand Total	1,330,936	2,262,202	7,987,899	12,231,114	7,836,246	1,168,909	263,966,022	2,665,140	3,004,300	6,738,755	309,191,523

Source: MDS Transmodal GB Freight Model Version 3.1

However, the key target market for intermodal transport in Scotland should be the GB domestic general cargo market between Scotland and many of the English regions and Wales, given the economic distances for rail discussed above. This general cargo market equates to the "beverages", manufactures" and "food" categories included in the *MDS Transmodal GB Freight Model* and an extract from the model is shown in Table 4.5. The table only includes flows which should be economic for rail i.e. from the M62 Corridor south.

Table 4.5
Estimated size of Scotland-GB domestic general cargo distribution market in 2000 (tonnes)

	REGION								
COMMODITY	**E. Anglia**	**E. Mids**	**N. West**	**S. East**	**S. West**	**W. Mids**	**Wales**	**Yorks&H**	**Grand Total**
Beverages	1,371	407,379	300,927	232,445	89,241	116,118	29,541	311,947	1,488,969
Food	173,257	324,641	1,757,844	518,111	183,342	357,211	55,949	892,472	4,262,827
Manufactures	325,234	713,647	3,158,634	790,436	346,747	520,690	282,857	1,519,004	7,657,249
Grand Total	499,862	1,445,667	5,217,405	1,540,992	619,330	994,019	368,347	2,723,423	13,409,045

Source: MDS Transmodal GB Freight Model version 3.1

The analysis suggests that the size of this market was about 13.4 million tonnes in 2000. Although these region-to-region flows are made up of hundreds of individual flows controlled by numerous parties, sustainable distribution solutions should be able to capture a reasonable share of this market. Flows between Scotland and the Midlands south could be economic for intermodal rail services even if neither end is rail-connected, as long as a sufficiently reliable service can be provided. For destinations in the M62 Corridor to be economic, one end of the transport chain would need to be rail-connected i.e. a rail-connected distribution site. However, a comparison with Table 4.2 suggests that no general cargo traffic of this kind (or at least very little) is being carried by rail at present.

The other key market is likely to be Scottish trade with the Continent of Europe. Analysis from the *GB Freight Model* suggests that some 2.8 million tonnes of trade in beverages, food and manufactures passed through ports in the range between Hull and Plymouth in 2000, with 72% of this volume passing through South East English ports. A significant proportion of Scottish imports and exports therefore are transported the length of Great Britain to take short crossings to the Near Continent. Some of this traffic should, in theory, be viable for Channel Tunnel rail services and this is also the target market for a direct Scotland-Continent ferry service.

4.6 Rail freight terminal capacity in the Central Belt

Overall, the Central Belt has some spare capacity available, although the Ten Year Plan forecasts suggest that additional capacity will be required by 2010.

4.7 Scottish ports and bulk shipping flows

Table 4.6 provides an analysis of traffic through Scottish ports in 1999, based on DTLR statistics. In total Scottish ports handled some 130 million tonnes of cargo in 1999, 81% of which was bulk fuels such as crude oil, coal and refined petroleum products. The vast majority of Scottish port traffic is "captive" to maritime transport as it is only practical or economic to use this mode of transport.

Table 4.6
Traffic through Scottish ports in 1999

PORTS	THOUSAND TONNES		THOUSAND UNITS ("MAJOR PORTS" ONLY)	
	Total traffic	Of which bulk fuels	Containers	Trailers
Forth	45,396	41,781	66	
Sullom Voe	37,680	37,640		
Orkneys	16,998	16,795		
Clyde	8,495	6,965	23	37
Glensanda	5,217			
Aberdeen	3,368	852		10
Cairnryan	2,437			
Cromarty Firth	2,336	2,091		
Peterhead	2,209	445		
Stranraer	1,690			
Dundee	1,072			
Inverness	783			
Montrose	614			
Lerwick	486			
Perth	242			
Ayr	229			
Other East Coast ports	480			
Other West Coast ports	365			
Total	**130,097**	**106,569**	**89**	**47**

Source: DETR Maritime Statistics

The best example of flows of such captive flows of traffic is crude oil from the North Sea oil fields which is handled at Sullom Voe on Shetland, at Hound Point in the Forth Estuary and Flotta on Orkney. Another example is the 5 million tonnes of aggregates traffic shipped from the Foster Yeoman quarry at Glensanda, both coastwise and abroad. This traffic is

captive to the maritime mode as it would not be economic to exploit the quarry resources without cheap maritime transport being available. A further example is the import of paper pulp through east coast ports such as Aberdeen and Montrose to feed paper mills within the hinterland of the ports. The cargo is distributed inland by road and the distances involved are likely to be too short to be viable for rail.

There are important flows of refined petroleum products coastwise from the BP refinery at Grangemouth on the Forth to coastal tank farms in England, as well as to tank farms at Aberdeen, Inverness, Peterhead and the Northern Isles. These storage facilities are owned by, and the shipping companies are contracted to, the oil companies.
With the exception of the flows to the Northern Isles, these coastwise flows are not necessarily secure for coastal shipping, as trunk rail haulage would be possible although the economies of scale provided by shipping may be too great. This view has been confirmed by the major British shipping line operating in this market. Road distribution is, and will always be, required to transport tanker loads of fuel from quayside tank farms to petrol stations and other inland sites.

A major development in recent years has been the use of Hunterston in Ayrshire to handle deep sea imports of coal for use in power stations in Scotland, England and Northern Ireland. Coal is transhipped at Hunterston into smaller vessels to be shipped to Northern Ireland, but most of the coal is distributed inland by rail to power stations in Scotland and Yorkshire and the Midlands.

Almost all Scottish ports of varying sizes handle dry bulk/general cargo commodities with origins/destinations in their immediate hinterlands, such as fertilisers, scrap metal and animal feedstuffs. These commodities are generally low value and will not justify significant inland distribution costs. They are, however, ideal cargoes to be handled by small and medium sized ports, where road mileages can be minimised by taking cargoes to the port closest to the inland origin or destination of the cargo. Ports of all sizes have potential to handle these types of cargo.

A major issue in the short sea and coastal shipping market is the trend in ship sizes of short sea dry cargo vessels in NW Europe. These vessels are generally getting larger, driven by shipowners seeking operational economies of scale as well as some demand from shippers for larger consignments. The following table provides an analysis of dry cargo short sea vessels on order in North West Europe between 1992 and 2000.

Table 4.7
Short sea dry cargo ships built between 1992 and 2000 (by year of build)

DWT	1992	1994	1996	1998	2000
<1000	0%	3%	4%	1%	0%
1,000-2,999	25%	20%	20%	11%	15%
3,000-4,999	36%	25%	25%	22%	35%
5,000-6,999	21%	17%	23%	22%	12%
7,000-8,999	9%	15%	5%	12%	12%
9,000-10,999	2%	5%	7%	7%	8%
>10,000	8%	15%	17%	25%	18%
% < 3000 dwt	25%	24%	23%	12%	15%
% > 3000 dwt	75%	76%	77%	88%	85%
Source: Fairplay Newbuilds					

Even in 1992, only a small number of vessels under 1000 dwt were being built and about 25% of vessels were under 3000 dwt. By 2000, only 15% of newbuilds were under 3000 dwt. This means that there are fewer and fewer vessels under 1000 dwt that are available for shippers and there is a trend towards vessels over 3000 dwt. Scottish ports and harbours with significant access restrictions may see their cargo base dwindle over the next 10 years or so. This means that ports need to have an adequate depth of water to be able to accommodate the increasing ship sizes.

The other major issue is that, although there are a large number of small piers and harbours in Scotland, some of the basic infrastructure is in need of repair. There may therefore be a case for FFG funding to be used to repair existing facilities to handle specific traffics which are currently being carried by road. This would have particular benefits for the handling of bulk cargoes such as construction materials and timber.

Having said this there is not a shortage of port infrastructure capacity in Scotland as a whole, given the large number of ports and piers of varying sizes. The interview programme included owners and terminal operators at most of the major ports in Scotland and all stated there was no lack of port infrastructure capacity.

EC state aid approval has been given by the European Commission to the extension of the existing inland waterways scheme to include short sea and coastal shipping, with the following exceptions: the capital cost of vessels should not be an eligible cost under the

scheme; if the Scottish Executive is minded to award a grant of greater than 50% of the eligible costs of a scheme, then the individual award must be notified to the European Commission. In our opinion, the following guidelines could be adopted:

- Applicants would need to demonstrate that environmental benefits would be generated by a short sea or coastal shipping scheme by removing traffics from the road network and that traffic would not be transferring from another sustainable mode such as rail
- The financial case would need to show that the grant is required to make the waterborne transport chain more competitive with road
- Eligible capital expenditure should generally be limited to superstructure (terminal facilities and handling equipment), although rehabilitation of existing infrastructure could be justified.
- Where it can be shown by the applicant that the FFG funding would not have a significant competitive impact on another port; if necessary, the Scottish Executive should request external assistance to examine inter-port competition issues as part of the validation process for applications.

In conclusion, in the bulk waterborne transport market, the greatest potential for sustainable transport lies in coastal and short sea vessels taking bulk cargoes as close as possible to the origins and destinations of cargo. Most Scottish ports are already playing this role and competing strongly for traffic, but there is likely to be more scope in transporting certain commodities such as timber. An example of traffic of this kind is the FFG-funded project to distribute timber from the West Highlands to Ayrshire paper mills, via the port of Ayr. As some of the basic infrastructure may be in need of repair, there could be a case for funding the renovation of piers and breakwaters where this leads to the development of coastal and short sea traffics.

4.8 Sustainable distribution of timber

Some considerable attention has been given to the potential for the sustainable distribution of timber from the forests by both public sector authorities and private sector players. To avoid duplication of resources, much of the analysis provided below is drawn from the *Scottish Products Transport Mappin*g study, carried out by Spaven McCrossan Partnership, IBI Group and Alan Massey for Scottish Enterprise in 2001, although we have added our views on the potential for an intermodal rail-based solution.

This study estimated that current demand from UK mills amounts to about 3.5 million tonnes per annum and this is forecast to rise to 4.4 million tonnes per annum by 2015. Some 1,700 exit points from the timber-growing areas onto the road network were identified, with almost

60 existing or potential customers. The origins of traffic are therefore highly dispersed and consumption is concentrated on major mills throughout Scotland, in Cumbria and North East England, Merseyside and North Wales.

The SEn study found that the major external costs associated with timber transport are most likely to relate to congestion on and damage to local roads. While timber distribution results in little general additional congestion on most roads, the study concluded that there was an apparent lack of capacity on B and C graded roads. Sustainable distribution services are unlikely to be able to result in a significant reduction in traffic on these roads as HGVs will still be required to deliver the timber from the forests to rail loading points andr ports or piers.

The SEn study found that the existing modal split for timber distribution from Scotland between road, sea and rail is 95:3:2. The only major rail flow is to Chirk in North Wales. With the assistance of FFG funding, coastal shipping services are operating from the West Highlands to both Scottish and English ports.

We believe that coastal shipping and rail have failed to make significant progress in this market due to a number of factors:

- The product is low value and there are potential sources of supply outside the UK; this means that distribution contracts for rail tend to be short-term (up to 6 months)
- Some areas of the forests are remote from the rail network and ports/piers
- Inadequate rail network infrastructure, with weight and length restrictions on the Scottish network outside the Central Belt restricting the size of trains which can be operated.
- A lack of suitably located loading points to both the maritime and rail modes; some of the small ports and piers which could be used to handle timber suffer from maritime access restrictions and the basic infrastructure (piers, breakwaters) may be in need of essential repairs.
- Sources of timber vary from year-to-year as different areas are harvested; this means that establishing local loading points may not always be worthwhile where significant capital costs would be incurred.
- Customers expect to be able to ship small volumes at short notice, whereas sustainable distribution requires critical mass of traffic to be viable and a reasonable planning period.

Although there are infrastructure problems related to the distribution of timber by sustainable modes of transport (principally a lack of suitably located loading points and, in the case of rail, weight and length restrictions), the analysis shown above suggest that there are some structural issues relating to the nature of the timber industry which cannot be addressed by infrastructure improvements alone.

The SEn study concluded that some investment in ports/piers of various sizes in timber source areas would be appropriate in strategic locations to enable the coastal distribution of timber and we would support that view. Appropriate facilities are likely to be those with sufficient depth of water to accommodate vessels of about 1000 dwt, with sufficient space to store timber prior to loading and reasonable road access from local timber growing areas. Such facilities should be eligible for FFG funding.

The SEn study also concluded that there is no apparent lack of train paths on the relevant sections of the rail network, except on the Ayr-Kilmarnock-Dumfries-Carlisle Line, where most paths are taken by coal trains. There are significant infrastructure issues relating to the number and quality of rail-loading facilities and the weight limits available on some parts of the network. The study recommended that new rail loading points should be developed close to sources of timber and existing facilities should be up-graded, particularly to improve road access where there is a lack of terminal capacity and that selected network infrastructure up-grades should be carried out to improve the length and weight of timber trains and we would broadly support these recommendations. As the SEn report emphasised, detailed feasibility work would be required to establish the most appropriate infrastructure investment. In principle, new rail loading points should be eligible for FFG funding.

In addition we would recommend that the potential for intermodal rail distribution of timber should be considered in more detail. An innovative solution could involve the development of special containers to handle timber, which could be transferred between a road vehicle and a standard intermodal rail wagon using special low cost handling equipment. The “terminal” facilities required would be minimal: reasonable road access to the line, space to construct a single siding parallel to the main line and sufficient space next to the sidings to allow a container to be transferred from road to rail. These terminals could easily be transferred from one location to another as different areas of the forest are harvested. The intermodal units could be designed to fit within the existing loading gauge while maximising payload and could facilitate the development of some backload traffics. An innovative solution of this kind should be eligible for FFG funding.

4.9 Unit load waterborne services: deep sea container distribution

There are no deep sea container ports in Scotland, with deep sea containers being distributed to deep sea container ports in SE England and on the Continent by rail and short sea/coastal shipping. The deep sea shipping lines are operating increasingly large vessels to

achieve operational economies of scale in a highly competitive market. The lines have adopted two main strategies to maintain the frequency of their services and still fill the larger ships they are now building and operating. Firstly, the lines have adopted a strategy of consolidation by forming alliances to combine fleets and selling slots on each other's ships. The second strategy is transhipment, where the deep sea vessels call at only a few very large "transhipment hub" container ports, with traffic from smaller ports being fed to and from the hub on short sea feeder vessels. This means that deep sea lines are, as a general rule, only making one call at a UK port, one call at a Benelux port (Zeebrugge, Rotterdam or Antwerp), one port in Germany (either Bremerhaven or Hamburg) and one call in France at Le Havre. Deep sea container port facilities therefore need to be located close to the main route from Gibraltar to Rotterdam to minimise the diversion and therefore the costs to the operator of a call at the port. To handle domestic import and export traffic (as opposed to transhipment traffic, which is not moved inland) a deep sea port requires proximity to the major markets. Again, all the deep sea ports in North West Europe are located close to major markets. In conclusion, Scotland is too small and too remote a market to justify direct calls from deep sea container ships.

However, due to the distances involved, sustainable modes of transport dominate the market for distribution of deep sea containers between Scotland and deep sea container ports. Freightliner's intermodal rail services to UK ports are in direct competition with feeder container services from Grangemouth to Rotterdam, Thamesport and Felixstowe and a new service from Greenock to Southampton. There are also short sea container services between Aberdeen and Rotterdam and Antwerp which are likely to be carrying deep sea containers.

We are aware there is a proposal to develop an Orkney Container Transhipment Terminal at Scapa Flow, which has been promoted by the Highlands and Islands Enterprise Network and Orkney Islands Council. The promoters of the scheme are in the process of marketing the concept to potential terminal operators.

4.10 Unit load waterborne services: short sea services

SW Scotland to Northern Ireland

In terms of volume the most important ferry services are those from South West Scotland to Northern Ireland, operated from the ports of Troon, Cairnryan and Stranraer. The ferry routes from Stranraer and Cairnryan provide short crossings for accompanied freight to/from both Scotland and England, while Troon provides a service for Scottish unaccompanied trailers. English traffic accounts for about two thirds of the traffic passing through the ports of Stranraer and Cairnryan, as these routes have traditionally provided the only route for fast-moving English traffic to reach Northern Ireland for early morning deliveries. They have

also traditionally been used for UK-Republic of Ireland traffic to avoid the Port of Dublin, which suffered from industrial relations problems until the early 1990s.

Table 4.8 provides an analysis of ro-ro freight traffic between 1990 and 1999, by main route.

Table 4.8
UK-Ireland ferry volumes
Thousand freight units

ROUTE	1990	1993	1996	1999	GROWTH 1990-1999
SW Scotland-N Ireland	217	280	312	356	64%
NW England-N Ireland	157	271	313	373	138%
NW England/N Wales– ROI	126	168	428	497	294%
S Wales-ROI	51	63	62	93	82%
Total	551	782	1,115	1,319	139%

Source: Industry sources & MDS Transmodal

Mainly due to dramatic economic growth in the Republic of Ireland, the freight market between the UK and Ireland has expanded by almost 140% in the last ten years. However, the routes from SW Scotland have seen more modest growth and have lost market share to routes from North West England and North Wales. This is mainly due to improved industrial relations in the Port of Dublin and the trend for retail distribution from the UK to Northern Ireland to be handled through NW England Regional Distribution Centres (RDCs) using Welsh and NW England crossings rather than Scottish RDCs. In the future this trend for English traffic to use Welsh and NW England ferry crossings is likely to increase with the introduction of riverside berths on the Mersey and Dee estuaries and the use of faster ferries on these routes so that deliveries will be possible overnight to Northern Ireland. From the point of view of sustainable distribution, this is a positive development. The SW Scotland routes could, however, develop longer ferry routes to Dublin, for example, and to France which would provide a sustainable distribution option for Scottish exports to these countries.

Scotland-Continent ferry service

A short sea or coastal shipping solution for general freight is most likely in the next 15 years to be provided by the new generation of fast conventional ferries, which are operating successfully in the Mediterranean, the North Sea and the Irish Sea. The concept will soon be extended to the Baltic. They provide fast transit times, comparable with road haulage, and allow the operator to utilise their vessels more efficiently. It is this type of vessel that will be deployed on the Scotland-Continent service and could also be used on Atlantic Arc services. In the future, they could also provide coastal distribution of unit loads from the Forth to SE England.

Superfast Ferries have announced they will be launching a direct Scotland-Continent ferry service in May 2002 between Rosyth and Zeebrugge in Belgium. It is proposed that the service would provide a daily frequency in each direction, with two vessels capable of completing the crossing overnight in about 16.5 hours and would provide a daily frequency in each direction for both freight and passengers. Rosyth is the selected port in Scotland because it provides 24 hour lock-free access to the main Central Belt market. The service would provide a sustainable distribution service for Scottish imports and exports, avoiding the need for freight to be road hauled to English ports.

Lifeline ferry services and other short sea services

Ferry services operated by Caledonian MacBrayne on the west coast and, from 2002, by Northlink to the Northern Isles provide vital lifeline freight services for fragile island communities. Opportunities for sustainable distribution by rail to ferry hubs such as Oban and Mallaig are limited due to the low volumes of traffic. The most important freight route is Ullapool-Stornaway and Ullapool is not on the rail network.

There are also niche freight-only ro-ro services from Aberdeen to Norway and the Netherlands. These services are likely to be for traffic from the immediate hinterland of Aberdeen and the service to the Netherlands provides a good example of a ferry service acting as part of a sustainable distribution chain, in competition with long distance road haulage.

There are short sea container services operating from the Clyde (Greenock) to Liverpool, Dublin and Bilbao, providing a sustainable transport option for Scottish exports to Ireland and Spain. However, the major opportunity on these Atlantic Arc routes is likely to be the trailer market and short sea container services are too slow and too infrequent for this market.

4.11 Inland waterways

As explained in Chapter 2, the definition of an inland waterway used during the study has been taken from the FFG guidance:

In addition to canals, an inland waterway is generally considered to be upstream of any point where a river, or sea inlet, first narrows so that the opposite banks are no more than 5kms apart at high water spring tide, or 3kms apart at low water spring tide.

The canals, with access restrictions and freight facilities are shown in Table 4.9.

Table 4.9

Access restrictions and freight facilities on canals in Scotland

CANAL	LOCATION	MAX. LENGTH (METRES)	MAX. BEAM	MAX. DRAFT	MAX. HEADROOM	FREIGHT FACILITIES
Caledonian Canal	Links Atlantic Ocean at Fort William to North Sea at Inverness via Loch Lochy and Loch Ness	45.72	10.67	4.11	27.4	Wharves/piers at Corpach, Banavie. Fort Augustus, Loch Ness and Inverness.
Crinan Canal	Across northern end of Kintyre peninsular from Loch Crinan to Loch Gilp	26.8	2.89	6.09	N/K	None.
Union Canal	From Edinburgh to Falkirk	21.33	1.06	3.81	2.74	None.
Forth & Clyde Canal	Links Forth at Grangemouth to Clyde at Bowling	20.88	6.00	1.83	3.00	None.

Source: British Waterways

There is currently no freight traffic being carried on any of the four Scottish canals, which is likely to be mainly due to restrictions on the type of vessels which can access the canals as well as the natural advantages of road transport. Timber is being handled at Ardrishaig on Loch Gilp; the facility is owned by British Waterways and is close to the entrance to the Crinan Canal, but the traffic is not actually being carried on the canal itself.

The Caledonian Canal, with its less restricted access and existing freight facilities may provide some potential for transporting slow-moving bulk, non-time sensitive cargo by barge and British Waterways believe that there is potential for the movement of domestic waste on the Canal if an incinerator (to replace a landfill site at Inverness) is located adjacent to the Canal. Canal-side facilities would be required at the major settlements along the route and lay-by berths would be needed at locks so that the barges can wait for pleasure craft to negotiate locks.

It is possible that timber could be distributed from forests adjacent to the Canal to Corpach at the western end of the canal for onward distribution by coastal vessel, but in our opinion the cost of road delivery to a wharf, the cost of loading onto a barge and transhipment from barge to coastal vessel is unlikely to be competitive with direct road haulage to Corpach, even if FFG was provided.

Due to access restrictions and lack of demand, the scope for using the Crinan, Union or Forth & Clyde Canals is likely to be limited, although there may be niche markets for waste traffic. However, new freight facilities would be required and this may not provide good VFM compared to other priorities.

However, there are significant flows of freight on Scottish inland waterways when movements up major river estuaries (included in the definition of inland waterways for the purposes of FFG) are taken into account, such as the River Forth, the River Clyde and the Firth of Tay. This means that waterborne movements on the Clyde upstream of about Gourock, on the Forth upstream of the Forth Road Bridge and all movements to Dundee and Perth are inland waterway movements. We estimate the volume of traffic using inland waterways to access Scottish ports in 1999 as 10.8 million tonnes in 1999 *(Source: DETR Maritime Statistics 1999 and MDS Transmodal)*, which represents about 8% of all traffic handled at Scottish ports. Inland waterways, if not canals as such, are expected to play a major role in reducing lorry mileage by securing coastal shipping movements at the expense of road haulage and by taking cargo closer to its inland origins and destinations. Examples are provided by the FFG-assisted coastal shipping movements of timber between the Highlands and other Scottish and English ports.

4.12 Conclusion

Based on the above analysis, strategic freight interchanges are likely to be required to support the following kinds of general freight services over the next 15 years:

- Longer distance unitised freight ferry services between Scotland and the near Continent, Ireland and the rest of the Atlantic Arc, using fast conventional ferry technology from ferry ports located close to the Central Belt of Scotland.

- Rail services carrying intermodal and general freight traffic between Scotland and the Midlands south if neither end of the transport chain is rail-connected and to NW England/Yorkshire and Humberside south if one end of the transport chain is rail-connected (e.g. at a Scottish rail-connected distribution centre).

- Rail services carrying intermodal and general freight traffic between Scotland and the Continent (particularly France and Italy) via the Channel Tunnel, particularly to France and Italy.

- Rail services carrying intermodal and general freight traffic between points north of the Central Belt and the Central Belt itself and beyond, particularly to secure environmental benefits.

Chapter 5 concentrates on analysing where the necessary strategic freight interchanges should be located and how these locations affect the development of network infrastructure. We would recommend that these interchanges should be funded via the strategic freight interchange scheme described at the end of Chapter 2.

There are numerous other areas of potential for sustainable distribution relating to bulk traffics, which do not require such a strategic approach, but which would be suitable for FFG funding. These include: projects to reconnect industrial premises to the rail network for conventional trainload or wagon load services between private sidings; projects to develop the sustainable distribution of timber; projects to develop short sea and coastal shipping flows, generally but not exclusively, of bulk commodities to and from Scottish port facilities.

5 ANALYSIS OF POTENTIAL STRATEGIC INVESTMENT PROJECTS

5.1 Introduction and methodology

The objective of this Chapter is to establish the location, nature and scale of the strategic freight interchanges that should be developed in Scotland over the next 15 years to allow the development of sustainable distribution for general freight. In the analysis, general freight traffic is defined as including the following commodities: manufactures, food, beverages, deep sea containers and Channel Tunnel through rail traffic. All other commodities are assumed to be bulk.

The conclusions set out in this chapter were developed making extensive use of computer modelling techniques. Application 2 of the computer model was used to determine the theoretically optimum location of strategic freight interchanges in Scotland. The objective was to take the distribution of demand for freight transport services in Scotland and to use the model to derive a technically efficient network of interchanges that minimizes road access time to this network. The results do not therefore take account of existing capacity at ports and rail terminals, nor do they take account of current rail accessibility and the location of existing ports in Scotland. The distribution of freight traffic, upon which this analysis is based, includes all traffic for which the origin an/or destination is in Scotland or the northern English counties.

From this starting point, the practical issues connected with the potential strategic freight interchanges were examined by means of a high level appraisal of the theoretically optimum locations to take account of issues such as rail and maritime accessibility and existing capacity. The appraisal concluded with recommendations as to which of the locations should be regarded as potential strategic investment projects in the short term (to be completed by 2005), in the medium-term (by 2010) and in the long-term (by 2015).

Then, using Application 3 of the computer model, the demand for services using the refined network was estimated, and expressed in terms of the potential environmental benefits obtained by constructing the facilities using the Sensitive Lorry Mile rates. To show the impact of the development of the strategic freight interchanges over and above existing Government plans, the results of three modelling scenarios are presented: the Base Case; The Ten Year Plan Scenario and the Scottish Sustainable Distribution Scenario. The assumptions that lie behind each of these scenarios are set out in Section 5.4 below.

5.2 Optimum network of facilities: modelled outputs

In this context, an optimum network means the configuration of strategic freight interchanges that minimizes road access times to the network's facilities, given the actual distribution of freight generation within Scotland, for any given number of facilities. It is therefore the optimum in terms of maximising road accessibility, given the distribution of traffic, and does not consider the capital costs of the interchanges, differences in land values, the availability of suitable land or the value of environmental benefits resulting from their use.

Application 2 of the computer model used the origin destination matrices included within the *MDS Transmodal GB Freight Model* to determine the optimum (as defined above) distribution of sustainable freight facilities in Scotland, by minimising the average access cost across the country for a given number of facilities. The objective was to assess whether the current system, which is demand driven, has produced an efficient network. To achieve this, the computer model is not given the location of existing facilities – it is starting from a blank screen. The resulting network can then be overlaid on the existing network of freight facilities to see where gaps or capacity shortages exist.

The steps within Application 2 were to:

- Read the individual records from the OD database (Year 2000 estimates, from MDS Transmodal's multi-modal database, based on 1999 CSRGT survey data and 2000 Railtrack data).
- Split the county-county flows into zone-to-zone flows, using the postcode district density and the number of bulk delivery addresses to weight the zones.
- Build a matrix of zone-zone-commodity flows, selecting only those where at least one end of the journey is in Scotland or the Northern counties of England (Cumbria, Northumberland, Tyne and Wear, Cleveland and County Durham), and only those where the zones are different. Intra-zonal movements were not regarded as relevant for the population of traffic, as these would only be competitive by road.
- Run a computer algorithm to determine the distribution that minimises access costs for discrete numbers of freight facilities.

The model uses a "rule of thumb" which works by adding the "next best" facility location into the solution until the desired number of freight facilities is reached. Then it iterates, attempting to replace each element of the solution with every other possible site, to see if it improves the network performance. By testing sequential numbers of sites, it is possible to see how quickly the series flattens out and a cut-off for the number of freight facilities can be determined.

The most significant problem with this model application has been the distribution of traffic below county level. Although the use of postcode districts has allowed the resulting network to be described in adequate detail, the estimation of the zone-by-zone matrix has been implemented without adequate data on the true distribution of traffic within Scotland for all commodity and traffic types. The precise location of key freight generators and consumers (particularly for consumers and generators of bulk commodities which are more site specific), such as mines, quarries, refineries, power stations, heavy industry and so on would strengthen this analysis.

This means that the modelling methodology can be applied most easily to general freight traffic for which an individual facility has a broad and non-site specific hinterland, rather than for bulks which are usually generated and consumed at specific locations.

The sequence of optimum locations generated by the model in Application 2, for all commodities, is shown in Table 5.1. This shows the theoretically optimum locations for freight facilities to minimise accessibility by road for the total distribution of Scottish and Northern English traffic, given a certain number of facilities. For example, if we assume that only one facility should be available in Scotland, then the optimum location would be Dalkeith (EH22), with an average road accessibility time of 135 minutes.

The cut-off point was taken at twelve facilities in Scotland and Northern England, where the marginal improvement in road accessibility due to the addition of another facility is less than one minute. The optimum network in Scotland would be:

AB11 Aberdeen
DD1 Dundee
DG1 Dumfries
EH2 Edinburgh
FK2 Grangemouth
G2 Glasgow
IV1 Inverness

Given this network, average accessibility by road to a facility would be 16.5 minutes. All of the locations in Scotland are on the railway network and at least four of them provide the potential for waterborne/rail/road tri-modal facilities.

Although the modelled outputs provide precise post codes, this does not mean that a facility should necessarily be located in that post code district. Planning and commercial issues (land prices, land use zoning, the availability of appropriate sites, levels of local road congestion) and network connectivity issues (proximity to railway lines and availability of access to waterborne transport) need to be taken into account and so the theoretically

optimum locations should only be taken as a guide to the general area in which facilities could be located. Some of these planning, commercial and network connectivity issues are considered, at a strategic level, in the following section.

Table 5.1
Modelled outputs for optimum distribution of facilities in Scotland and Northern England

Workington	Carlisle	Dundee	Dumfries	Chester le Street	Hetton le Hole	Darlington	Nr. Darlington	Edinburgh	Dalkeith	Polmont	Larbert	Stirling	Glasgow	Glasgow	Alexandria	Inverness	Kirkcaldy	Kendal	Gateshead (nr)	Cramlington	Hexham	Morpeth	Gateshead	Sunderland	Hartlepool	Seaton Carew
CA14	CA3	DD1	DG1	DH3	DH5	DL1		EH2	EH22	FK2	FK5	FK8	G1	G2	G83	IV1	KY1	LA10	NE10	NE23	NE46	NE61	NE8	SR6	TS24	TS25
									EH22																	
				DH3							FK5															
		DD1		DH3									G1													
	CA3	DD1			DH5								G1													
	CA3	DD1			DH5			EH2						G2												
	CA3	DD1			DH5			EH2						G2		IV1										
	CA3	DD1				DL1		EH2						G2		IV1			NE10							
	CA3	DD1				DL1		EH2						G2		IV1			NE10							
	CA3	DD1				DL1		EH2		FK2				G2		IV1			NE10							
	CA3	DD1				DL1		EH2		FK2				G2		IV1							NE8		TS24	
CA14	CA3	DD1				DL1		EH2		FK2				G2		IV1							NE8		TS24	
CA14	CA3	DD1	DG1			DL1		EH2		FK2				G2		IV1							NE8		TS24	
CA14	CA3	DD1	DG1	DH3		DL1		EH2		FK2				G2		IV1				NE23						TS25
CA14	CA3	DD1	DG1	DH3		DL1		EH2		FK2				G2	G83	IV1				NE23						TS25
CA14	CA3	DD1	DG1	DH3		DL1		EH2		FK2				G2	G83	IV1	KY1			NE23						TS25
CA14	CA3	DD1	DG1	DH3		DL1		EH2		FK2				G2	G83	IV1	KY1				NE46	NE61				TS25
CA14	CA3	DD1	DG1	DH3		DL1		EH2		FK2				G2	G83	IV1	KY1				NE46	NE61		SR6		TS25
CA14	CA3	DD1	DG1	DH3		DL1		EH2		FK2				G2	G83	IV1	KY1	LA10			NE46	NE61		SR6		TS25
CA14	CA3	DD1	DG1	DH3		DL1		EH2		FK2		FK8		G2	G83	IV1	KY1	LA10			NE46	NE61		SR6		TS25
CA14	CA3	DD1	DG1	DH3		DL1	DL2	EH2		FK2		FK8		G2	G83	IV1	KY1	LA10			NE46	NE61		SR6		TS25

Table 5.2 provides an analysis of the outputs from the model. Essentially it has divided the country into a set of "market territories" or catchment areas for each location. The relative sizes of these catchment areas are measured according to the volume of freight being generated within them. Each traffic flow is assigned to the nearest facility. Intra-Scottish flows are counted twice - once in the origin zone, and again at the destination.

At this stage, the sizes of the market territories are expressed in terms of their entire population, and not the volume of traffic that would commence using the terminals. This provides an indication of the relative attractiveness of each facility and the scale of facility required. The modelled outputs suggest, for example, that the capacity required in Glasgow is some seven times greater than the capacity required in Inverness. However, estimates of the general freight that could be handled by rail (based on outputs from the *MDS Transmodal GB Freight Model* from the SRA's Ten Year Plan Scenario) is also provided by old Scottish county. Table 5.2 also shows the market share of total Scottish traffic that could be attracted to each facility.

The table provides an analysis of the modelled split between general freight and bulk traffic at each location. This is important because bulk commodities are more likely to be handled at very specific locations, such as quarries, oil refineries, power stations and ports with specialist bulk terminals, rather than through strategic freight interchanges. Nevertheless the table includes the major bulk commodities (defined as being those with a market size of more than 75,000 vehicles) as this may provide an indication of the good locations for bulk handling facilities for these commodities.

Table 5.2
Analysis of modelled market size and market share for each facility

AREA	TOTAL POTENTIAL MARKET SIZE (MILLION VEHICLES)	FORECAST GENERAL FREIGHT ATTRACTED TO RAIL IN 2010 (MILLION TONNES)	% SCOTTISH TOTAL TRAFFIC	GENERAL CARGO/BULK		MAJOR BULK COMMODITIES
				General cargo	Bulk	
Aberdeen	1.12	0.52 (Grampian)	7%	64%	36%	Agricultural; construction
Dundee	2.43	0.68 (Tayside)	15%	43%	57%	Construction; agricultural; forest products; chemicals
Dumfries	0.85	0.06 (Dumfries & Galloway)	5%	43%	57%	Construction; forest products; chemicals.
Edinburgh	3.53	1.49 (Lothian & Fife)	21%	45%	55%	Construction; agricultural; coal; mail; chemicals.
Grangemouth	2.11	0.64 (Central)	13%	44%	56%	Construction; chemicals; forest products; coal; agricultural.
Glasgow	5.75	3.24 (Strathclyde)	35%	50%	50%	Construction; coal; agricultural; forest products; metals; chemicals; mail; automotive.
Inverness	0.8	0.25 (Highland)	5%	36%	64%	Forest products; agricultural

Source: MDS Transmodal

The analysis suggests that all the Scottish facilities could attract reasonable volumes of general freight traffic, whereas some of the facilities identified in England mainly have potential as bulk facilities.

Some 69% of the total Scottish market would be attracted to the three facilities located in the Central Belt of Scotland, with a further 15% attracted to a facility located in the Dundee area.

5.3 Strategic appraisal and prioritisation of projects

A strategic appraisal of the above locations was carried out to establish whether they should be considered as having potential as strategic freight interchanges. These could become strategic investment projects for the Scottish Executive over the next 15 years. An indication of the prioritisation of these strategic investment projects has been included. Inevitably the conclusions are based on judgements made without the benefit of detailed feasibility work on individual schemes. More detailed work may result, in particular, in a different prioritisation.

The appraisal methodology aims to follow, if only at a strategic level, the STAG methodology for appraisal of transport projects. The key criteria for the methodology used for this study are "economy", "environment" and "integration". The other STAG criteria of "safety" and "accessibility" are important criteria for detailed project assessments, but are less easily included in the strategic appraisal of sustainable distribution facilities carried out for this study.

The strategic appraisal has taken into account the following factors:

Critical mass and environmental benefits ("economy" and "environment"): The locations already minimise the average accessibility by road, given a number of facilities in the network and therefore minimise road access costs; the potential market size for each facility, as forecast by the model, provides an indication of the extent to which there is a critical mass of traffic available to support sustainable distribution services; the environmental benefits associated with the potential modal shift from road to more sustainable modes is likely to be roughly in proportion to the volume of traffic which can be attracted to the facility.

Modal connectivity ("integration"): the availability of access to waterborne transport; whether the area is connected to the railway network; the existing quality of the railway infrastructure in the area (capacity constraints, loading gauge); the model already takes into account road connectivity.

Existing capacity ("economy"): The extent to which existing maritime and rail capacity is available in the area.

Infrastructure costs ("economy"): An indication of the type of capital expenditure that might be required to develop the facility, with comments on wider network issues where appropriate.

Conclusion: Whether or not the facility should be regarded as a potential strategic freight interchange and be taken forward as a strategic investment project by the Scottish Executive. An indication is provided as to whether it should be regarded as a short term, medium term or long term priority.

STRATEGIC APPRAISAL: ABERDEEN AREA

% traffic: 7%
Traffic types: 64% intermodal; 36% bulk

Critical mass and environmental benefits: The modelling suggests that the facility would have a market size of about 1.1 million vehicles per annum, which should provide critical mass for the development of sustainable distribution services and generate associated environmental benefits. A high proportion of the available market would be general freight and the outputs produced for the Government's Ten Year Plan suggest that demand for this type of traffic from Grampian will be 0.52 million tonnes in 2010 if the Government's rail freight targets are to be achieved.

Modal connectivity: Maritime access is available at the Port of Aberdeen and the port is rail-connected. There is direct rail access to the Scottish Express Route (almost all double track) to the Central Belt via Dundee and Perth, although loading gauge is restricted to W7 between Aberdeen and Perth; from Perth to the West Coast Main Line the route is cleared to W8. There is therefore potential for a tri-modal facility at Aberdeen.

Existing capacity: Apart from the Port of Aberdeen, which is not believed to be space-constrained, there is a conventional rail freight terminal at Guild Street (operated by EWS), and conventional rail facilities at Craiginches Yard and Waterloo Goods Terminal. There are plans to develop a new intermodal rail freight terminal outside the city centre at Dyce and to relocate the conventional rail terminal to Craiginches Yard so that the existing Guild Street site can be redeveloped. There would appear to be adequate bulk capacity in the area, but additional intermodal capacity may be required in the medium term.

Infrastructure costs: The development of intermodal rail freight services in the Aberdeen area will require some additional capacity, but there are existing or planned sites available. The existing loading gauge would be able to accommodate only standard short sea boxes (up to 8 foot high) on standard intermodal wagons. Some gauge enhancement works may be required via Dundee and Perth to the West Coast Main Line to achieve a loading gauge that could accommodate standard intermodal units on standard intermodal wagons.

Conclusion: The development of additional general freight facilities (particularly intermodal) as a strategic freight interchange should be considered a strategic project for the Scottish Executive as there is considerable potential for this type of traffic. Gauge enhancement work may be required between Aberdeen and the Central Belt to allow the intermodal traffic to develop. Most traffic is likely to be domestic intermodal. A location at the Port of Aberdeen would provide the greatest degree of modal integration.

Given the potential for developing general freight traffic and the lack of existing services this strategic project could, subject to more detailed feasibility work, be regarded as a medium-term priority.

STRATEGIC APPRAISAL: DUMFRIES AREA

% Scottish traffic: 5%
Traffic types: 43% intermodal; 57% bulk

Critical mass: The modelling suggests that the facility would have a market size of about 0.85 million vehicles per annum, which should provide critical mass for the development of sustainable distribution services and generate associated environmental benefits. Outputs produced for the Government's Ten Year Plan suggest that demand for general freight from Dumfries and Galloway alone will be 0.06 million tonnes in 2010 if the Governments' rail freight targets are to be achieved.

Modal connectivity: Direct rail access to the Glasgow-Kilmarnock-Dumfries-Gretna Line, which is cleared to only W7 for intermodal traffic and there is a lack of capacity on the single-track Gretna-Annan section of the line. A site adjacent to the West Coast Main Line, which passes through Dumfries and Galloway, would provide direct access to the core UK rail freight route. There is no potential for access to waterborne transport.

Existing capacity: There are no existing rail freight terminals in the Dumfries area, except the MOD-owned facility at Longtown in northern Cumbria, which is adjacent to the West Coast Main Line.

Infrastructure costs: The development of an intermodal rail freight terminal in the Dumfries area would require the construction of a new facility and it is likely that gauge clearance work would be required at least between Dumfries and the West Coast main Line at Gretna, as well as capacity improvements on the Annan-Gretna section. The development of a site in North Cumbria (e.g. at MOD Longtown) would provide direct access to the West Coast Main Line and therefore may provide a more cost effective solution.

Conclusion: The development of a small strategic freight interchange (probably an intermodal rail freight terminal) in the Dumfries/North Cumbria area should be considered a strategic investment project for the Scottish Executive and/or the SRA as there is potential for this type of traffic. If a site near Dumfries was selected it is likely that gauge enhancement works would be required between the terminal site and the West Coast Main Line, with increased capacity on the Annan-Gretna section. Most of the traffic is likely to be domestic intermodal.

Given the size of the potential market for general freight traffic compared to other areas this strategic investment project could, subject to more detailed feasibility work, be regarded as a long-term priority.

STRATEGIC APPRAISAL: DUNDEE AREA

% Scottish traffic: 15%
Traffic types: 43% intermodal; 57% bulk

Critical mass & environmental benefits: The modelling suggests that the facility would have a market size of about 2.43 million vehicles per annum, which should provide critical mass for the development of sustainable distribution services and generate associated environmental benefits. Outputs produced for the Government's Ten Year Plan suggest that demand for general freight from Tayside will be 0.68 million tonnes in 2010 if the Governments' rail freight targets are to be achieved.

Modal connectivity: Direct rail access to Scottish Express Route to Central Belt, although loading gauge is restricted to W7 between Dundee and Perth; from Perth to the West Coast Main Line the route is cleared to W8. Maritime access is available at the Port of Dundee and the port facility is located adjacent to the main railway line between Perth and Aberdeen. There is therefore potential for a tri-modal facility.

Existing capacity: Apart from the Port of Dundee, which is not believed to be space-constrained, there are no other sustainable distribution facilities in the Dundee area.

Infrastructure costs: The development of a rail freight terminal in the Dundee area would require the construction of a new facility, although there may be potential for a tri-modal facility at the Port of Dundee. Gauge enhancement works are likely to be required via Perth to the Central Belt.

Conclusion: The development of a strategic freight interchange for general freight (probably an intermodal rail freight terminal, preferably on a port site) in the Dundee area should be considered a strategic project for the Scottish Executive as there is considerable potential for this type of traffic. It is likely that loading gauge enhancement works would be required between the terminal site and the Central Belt. Most of the traffic is likely to be domestic intermodal.

Given the size of the potential market for general freight traffic compared to other areas this strategic project could, subject to more detailed feasibility work, be regarded as a medium-term priority.

STRATEGIC APPRAISAL: EDINBURGH AREA

% Scottish traffic: 21%
Traffic types: 45% intermodal; 55% bulk

Critical mass & environmental benefits: The modelling suggests that the facility would have a market size of about 3.53 million vehicles per annum, which should provide critical mass for the development of sustainable distribution services and generate associated environmental benefits. Outputs produced for the Government's Ten Year Plan suggest that demand for general freight from Lothian and Fife will be 1.49 million tonnes in 2010 if the Government's rail freight targets are to be achieved.

Modal connectivity: Rail access via the East Coast Main Line to England, with gauge clearance to W9 and, via the Edinburgh-Glasgow (Midcalder Junction and Fauldhouse) route to the West Coast Main Line, also cleared to W9. Maritime access is available at the Port of Leith (only W6A loading gauge) and the Port of Rosyth in Fife (also rail-linked with clearance to W7), where there could be synergies with the forthcoming direct Scotland-Continent ferry service. There is therefore potential for a tri-modal facility in the Edinburgh area.

Existing capacity: There is port capacity available at the ports of Leith and Rosyth on the Firth of Forth. The main rail freight facility in the Edinburgh area is at Millerhill, to the south east of the city centre. This facility is operated by EWS for conventional rail freight and is also the main eastern Central Belt hub for the company's "Enterprise" services. Other rail-connected facilities, which are not private sidings, are the Port of Leith and the disused container terminal at Portobello. Existing terminal capacity for conventional rail freight may be adequate, but there are no facilities for handling intermodal rail freight in the Edinburgh area.

Infrastructure costs: The development of a sustainable distribution facility for general freight in the Edinburgh area may require the construction of a new facility, although there may be potential for using land already designated for rail freight use. A site adjacent to the East Coast Main Line may not require significant loading gauge clearance work, although high cube deep sea containers could not be accommodated on standard intermodal wagons. A site in Fife is likely to require the re-opening of the Stirling-Alloa-Kincardine Line and gauge clearance work.

Conclusion: The development of a strategic freight interchange for general freight (an intermodal rail terminal with rail-connected distribution sheds, preferably at a port site) in the Edinburgh area should be considered a strategic investment project for the Scottish Executive as there is considerable potential for this type of traffic.

The Edinburgh area could be served by a site in Fife, such as Rosyth, to provide synergies with the forthcoming Scotland-Continent ferry service. Such a site could also promote the development of a rail-connected distribution park with the synergy between short sea imports and exports (via the ferry service) and domestic distribution between the eastern side of the Central Belt and England.

Given the size of the potential market for general freight traffic compared to other areas this strategic project could, subject to more detailed feasibility work, be regarded as a short-term priority.

STRATEGIC APPRAISAL: GLASGOW AREA

% Scottish traffic: 35%
Traffic types: 50% intermodal; 50% bulk

Critical mass & environmental benefits: The modelling suggests that the facility would have a market size of about 5.75 million vehicles per annum, which already provides critical mass for sustainable distribution services, generating associated environmental benefits. Outputs produced for the Government's Ten Year Plan suggest that demand for general freight from Strathclyde will be 3.24 million tonnes in 2010 if the Government's rail freight targets are to be achieved

Modal connectivity: Direct access is available to the east of Glasgow to the West Coast Main Line, which is cleared to W10 and so can accommodate high cube deep sea containers. There is also direct access to the Scottish Express Route to Edinburgh, Stirling, Perth, Dundee, Aberdeen and Inverness; to the West Highland Line to Fort William, Mallaig and Oban (W7); to the Glasgow-Ayr-Stranraer Line (W7); to the Glasgow-Kilmarnock-Dumfries-Gretna Line (W7). Maritime access is available at King George V Dock on the Clyde, but the facility is not rail-connected.

Existing capacity: The King George V Dock and Greenock on the Clyde have adequate spare capacity. The Euroterminal intermodal terminal at Mossend is at full capacity unless it is reorganised; the Freightliner intermodal rail terminal at Coatbridge has been close to full capacity before Hatfield; PD Stirling has spare capacity available at Mossend, as does the Deanside Transit facility at Hillington. Existing terminal capacity for conventional rail freight may be adequate, but there is likely to be a lack of intermodal rail capacity in the Glasgow area if the SRA's rail freight targets are to be met.

Infrastructure costs: In the short- to medium-term additional rail terminal capacity for general freight (both intermodal terminal capacity and rail-connected distribution warehousing) in the Glasgow area could be developed on existing rail freight sites and little additional network infrastructure would be required to accommodate all types of intermodal traffic. In the long-term completely new sites may be needed to accommodate growth in traffic.

Conclusion: The development of strategic freight interchange capacity (rail-connected distribution warehousing and intermodal terminal capacity), either on existing or new sites, should be considered a strategic investment project for the Scottish Executive as there is considerable potential for this type of traffic.

Given the size of the potential market for general freight traffic, compared to other areas, this strategic project could, subject to more detailed feasibility work, be regarded as a short-term priority.

STRATEGIC APPRAISAL: GRANGEMOUTH AREA

% Scottish traffic: 13%
Traffic types: 44% intermodal; 56% bulk

Critical mass & environmental benefits: The modelling suggests that the facility would have a market size of about 2.11 million vehicles per annum, which already provides critical mass for sustainable distribution services, generating associated environmental benefits. Outputs produced for the Government's Ten Year Plan suggest that demand for general freight on rail from Central will be 0.64 million tonnes in 2010 if the Government's rail freight targets are to be achieved.

Modal connectivity: Access is available to the Scottish Express Route between Edinburgh and Glasgow, which is gauge cleared to W9 to the West Coast Main Line. Maritime access is available in the area at the Port of Grangemouth. There is therefore potential for a tri-modal facility in the area.

Existing capacity: There are two intermodal rail terminals in the Grangemouth area, operated by TDG Nexus and WH Malcolm and both are operating at less than full capacity. There is believed to be adequate capacity available at the Port of Grangemouth and so there would appear to be no need for additional sustainable distribution facilities in the Grangemouth area. Even by 2010, the two existing terminals should be able to accommodate the rail freight growth expected in the old county of Central from implementation of the Government's Ten Year Plan.

Infrastructure costs: Not applicable.

Conclusion: In our opinion, there is no need for additional rail facilities to handle general freight in the Grangemouth area, at least until 2010, and therefore the development of additional facilities in this area should not be considered a strategic investment project for the Scottish Executive.

STRATEGIC APPRAISAL: INVERNESS AREA

% Scottish traffic: 5%
Traffic types: 36% intermodal; 64% bulk

Critical mass & environmental benefits: The modelling suggests that the facility would have a market size of about 0.8 million vehicles per annum, which should provide critical mass for the development of sustainable distribution services and generate associated environmental benefits. Outputs produced for the Government's Ten Year Plan suggest that demand for general freight on rail from Highland will be 0.25 million tonnes in 2010 if the Government's rail freight targets are to be achieved.

Modal integration: Maritime access is available in the area at the Port of Inverness for short sea and coastal vessels and at Cromarty Firth for deep sea vessels. Inverness is also located at the eastern end of the Caledonian Canal. Access is available to the Scottish Express Route between Inverness and the Central Belt via Perth, which is gauge cleared to W8. To the north of Inverness, the Far North Line provides access to Thurso and Wick, with loading gauge clearance to W7, and the Kyle Line which is cleared to W8. Both these routes are mainly single track, although the Scottish Express Route is double track southwards from just north of Perth and there is a double track section between Blair Atholl and Dalwhinnie on the Perth-Inverness section. There is therefore potential for a tri-modal facility in the area.

Existing capacity: There is believed to be no lack of port capacity at the Port of Inverness and Cromarty Firth. There is a conventional rail freight facility operated by EWS in Inverness (Millburn Yard) and there is a small intermodal rail facility at the Port of Inverness, which is used to handle the Safeway traffic from Glasgow. There are also plans to develop a rail freight terminal at Highland Deephaven, near Evanton on Cromarty Firth. The precise capacity of these existing and planned terminals is not known, but it is likely that additional intermodal rail freight capacity would be required in the next 10-15 years.

Infrastructure costs: Additional intermodal rail freight capacity in the Inverness area may need to be developed in the medium to long term on existing or planned sites. The loading gauge is quite restricted, but the Safeway traffic has shown that special intermodal units, using appropriate wagons can allow the transport of units within a restricted loading gauge.

Conclusion: The development of a small strategic freight interchange (probably an intermodal rail freight terminal) in the Inverness area should be considered a strategic investment project for the Scottish Executive.

Given the size of the potential market for intermodal compared to other areas this strategic investment project could, subject to more detailed feasibility work, be regarded as a long-term priority.

The conclusions from the strategic appraisal are summarised in table 5.3:

Table 5.3
Strategic appraisal: summary of conclusions

AREA	STRATEGIC INVESTMENT PROJECT	NATURE OF FACILITY	NETWORK ISSUES	PRIORITY
Aberdeen	Yes.	Additional general freight facilities, (probably intermodal rail), preferably with maritime access.	Gauge enhancement probably required from Aberdeen to at least Perth.	Medium term
Dumfries	Yes.	General freight facilities (probably an intermodal rail terminal).	Gauge enhancement to WCML, unless site is adjacent to WCML in N Cumbria	Long term
Dundee	Yes.	General freight facilities, (probably intermodal rail), preferably with maritime access.	Gauge enhancement probably required to at least Perth.	Medium term
Edinburgh	Yes.	General freight facilities, (probably intermodal rail and rail-connected distribution warehousing), preferably with maritime access.	Gauge enhancement & re-opening of Stirling-Alloa-Kincardine Line if site in Fife.	Short term
Glasgow	Yes.	Additional general freight facilities, (probably intermodal rail and rail-connected warehousing), possibly with maritime access.	Minimal.	Short term
Grangemouth	No.	-	-	-
Inverness	Yes.	General freight facilities, (probably intermodal rail), preferably with maritime access.	Gauge enhancement may be required, but wagon technology solution also possible.	Long term

5.4 Traffic attraction to strategic projects: modelled outputs

The final modelling contribution (Application 3) has been to add services, based on a number of assumptions, to the facilities identified in Application 2, to estimate the change in traffic volumes and therefore the modal shift to more sustainable modes of transport. This has been carried out within the computer model. Three scenarios have been examined:

- The Base Case scenario
- The 10 Year Plan Scenario: using the SRA Industry and Government Actions scenario included in the Westminster Government's *Transport 2010 The 10 Year Plan*
- The Scottish Sustainable Distribution Scenario: adding the effects of the availability of the strategic freight interchanges in Scotland to the Ten Year Plan Scenario

The assumptions for the Base case are:

- Adoption of 44 tonne lorries for all road haulage
- No change in variable track access charges
- No major Government policy changes
- No major changes in industry performance

The assumptions for the Ten Year Plan Scenario are as per the Base Case plus:

- Train speeds increase
- Locomotive productivity improvements
- Train lengths increase from 550 metres trailing length to 750 metres
- Improvement in the quality of services
- Improved rail connectivity for traffic

The final scenario is the Scottish Sustainable Distribution Scenario and this is as per the Ten Year Plan Scenario, but assumes that the strategic freight interchanges have been developed in Scotland to accommodate the services shown in Table 5.4. There are a large number of possible permutations of services, but the scenario has been designed to be representative and assumes that new short sea ro-ro services between Scotland and the Continent and from SW Scotland to the Atlantic Arc are launched in the next few years.

Table 5.4
Assumptions for Scottish Sustainable Distribution Scenario

TIME PERIOD	AREA	FACILITY/SERVICE
2005	Glasgow	Additional intermodal/rail-linked distribution capacity
	Edinburgh/Rosyth	New intermodal/rail-linked distribution facility
	Rosyth	New ferry service to Belgium (Zeebrugge) 7 x week
2010	Dundee	New intermodal facilities
	Aberdeen	Additional intermodal capacity
	Glasgow	Additional intermodal/rail-linked distribution capacity
	Edinburgh/Rosyth	Additional intermodal/rail-linked distribution capacity
	SW Scotland	New ferry service to Rep of Ireland, Brittany & N Spain 3 x week
2015	Inverness	Additional intermodal capacity
	Dumfries	New intermodal facilities
	Glasgow	Additional intermodal/rail-linked distribution facilities

The results of the modelling in terms of lorry miles generated are set out below for 2005, 2010 and 2015. This shows the total modelled lorry mileage for all road distribution in Great Britain and Scotland in 2005, 2010 and 2015 and therefore provides an estimate of the modal shift from road to more sustainable modes of transport as a result of the 10 Year Plan Scenario and the Scottish Sustainable Distribution Scenario.

The analysis also shows the estimated external costs (expressed in terms of SLM) related to road distribution in Great Britain and Scotland in 2005, 2010 and 2015 and therefore provides an estimate of the value of the external benefits associated with the modal shift from road to more sustainable modes of transport as a result of the 10 Year Plan Scenario and the Scottish Sustainable Distribution Scenario.

Results of Scenario Testing: 2005 (short term)

	BASE-2005	10YP-2005	SSDS-2005
Total GB lorry miles km (billion)	14.346	13,815	13,773
Total GB SLM (£ billion)	£7,869	£7,637	£7,621
Scottish lorry miles	1,541	1,497	1,485
Total Scottish SLM (£billion)	£1,092	£1,071	£1,065

These results provide an annual valuation of the policy measures in terms of SLM saved. The results indicate that the 3.7% reduction in lorry miles between the Base Case Scenario and the 10 Year Plan Scenario is worth £232 million per annum at current prices. Adopting policies in accordance with the results of the Scottish Sustainable Distribution Scenario strategy produces a further benefit of £16.26 million per annum at current prices in 2005 and some £6.2 million (or 38%) of these benefits are secured in Scotland.

Results of Scenario Testing: 2010 (medium term)

	BASE-2010	10YP-2010	SSDS-2010
Total GB lorry miles (billion)	15,515	14,926	14,814
Total GB SLM (£ billion)	£8,355	£8,104	£8,060
Scottish lorry miles	1,634	1,584	1,549
Total Scottish SLM (£ billion)	£1,137	£1,115	£1,095

These results for 2010 indicate that the 3.8% reduction in lorry miles between the Base Case Scenario and the 10 Year Plan Scenario is worth £251 million per annum at current prices. Adopting policies in accordance with the results of the Scottish Sustainable Distribution Scenario produces a further benefit of £44 million per annum at current prices in 2010 and some £19.9 million (or 45%) of these benefits are secured in Scotland.

Results of Scenario Testing: 2015 (long term)

	BASE-2015	10YP-2015	SSDS-2015
Total GB lorry miles (billion)	17,423	16,718	16,571
Total GB SLM (£ billion)	£9,164	£8,870	£8,811
Scottish lorry miles	1,783	1,717	1,672
Total Scottish SLM (£billion)	£1,213	£1,183	£1,159

These results for 2015 indicate that the 4.0% reduction in lorry miles between the Base Case Scenario and the 10 Year Plan Scenario is worth £294 million per annum at current prices. Adopting policies in accordance with the results of the Scottish Sustainable Distribution Scenario produces a further benefit of £59 million per annum at current prices in 2010 and some £23.9 million (or 41%) of these benefits are secured in Scotland.

The SLM values are therefore the estimated annual value of the environmental benefits that would accrue, based on the existing valuations of lorry miles saved, if the strategic projects were completed within the timescales set for the short-, medium- and long-term priorities. These estimated annual valuations only relate to strategic freight interchanges and the development of additional facilities for specific point-to-point bulk flows through the FFG scheme would generate additional environmental benefits.

6 CONCLUSIONS

The existing FFG scheme has been reasonably successful in achieving its objective of reducing lorry mileages on the UK road network. However, the scheme is entirely applicant-led and does not allow the Scottish Executive to take a more strategic approach to investment in sustainable distribution facilities in Scotland to secure Government targets for modal shift of road traffic to more sustainable modes of transport. Furthermore, FFG is not so easily applicable to the general freight market where freight facility operators, seeking to attract traffic of this type, have little control over traffic volumes.

We have therefore proposed that two separate schemes should be developed in the future: an FFG scheme, which would be very similar to the existing scheme; and a new strategic freight interchange scheme.

The FFG scheme would remain applicant-led and would provide support for the vast majority of eligible sustainable distribution projects. It should include a more explicit assessment of risk-sharing between the taxpayer and the applicant, while maintaining the attractiveness of the FFG scheme for applicants.

The strategic freight interchange scheme would provide investment support for a limited number of strategic projects for Scotland, identified and promoted by the Scottish Executive, which would target the general freight market.

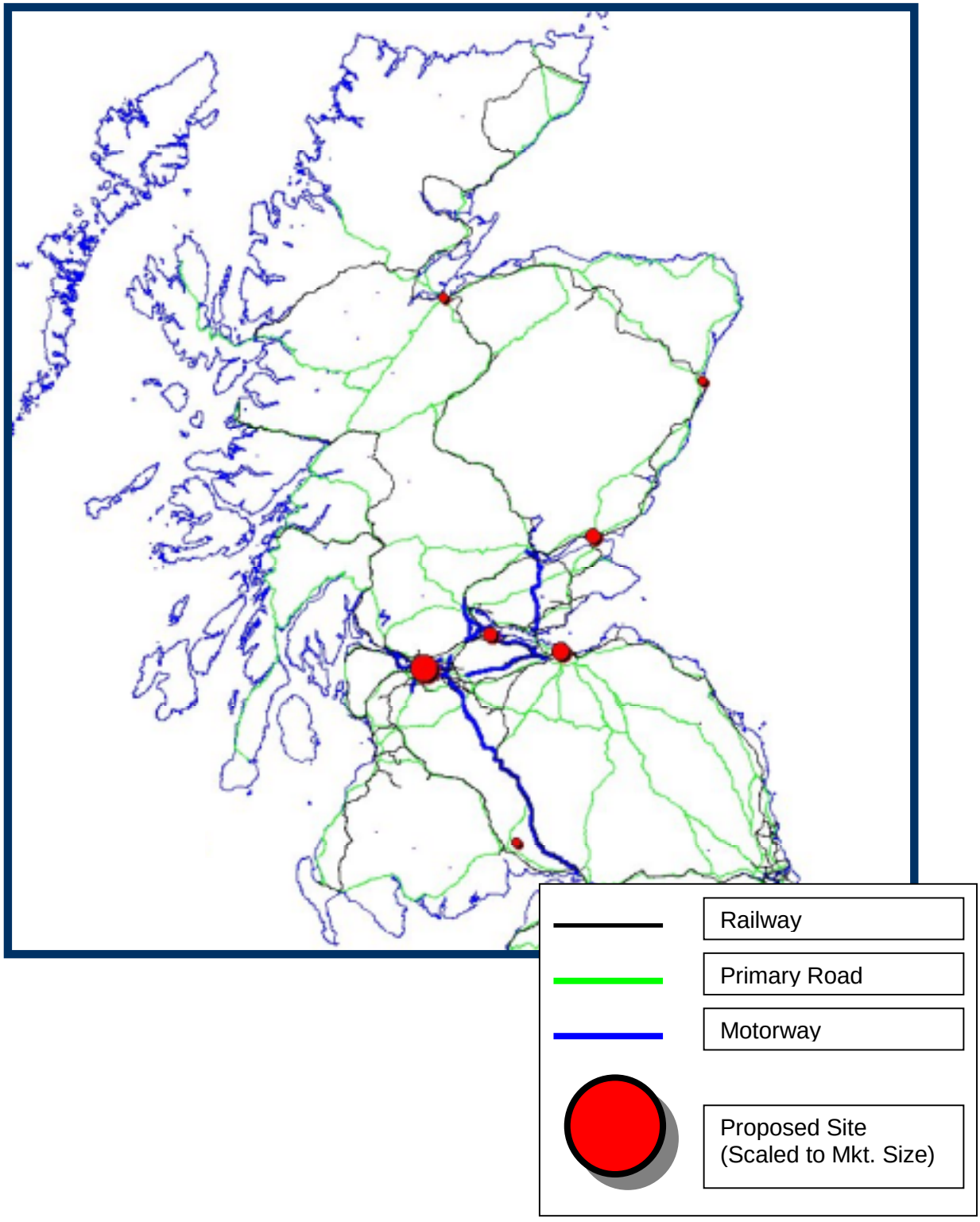
The network shown in Map 2 demonstrates the need for a set of facilities located close to the main economic centres where there are the heaviest concentrations of traffic (i.e. in the Glasgow, Edinburgh and Grangemouth areas) and the need for additional, smaller facilities exploiting the potential environmental benefits north and south of the Central Belt (i.e. in the Dumfries, Dundee, Aberdeen and Inverness areas). The inherently smaller markets served by these facilities, but the higher rates of environmental benefits per lorry mile, make these particularly relevant for public sector investment.

There are clear modal integration and accessibility benefits (in terms of minimising road haulage costs to access sustainable distribution facilities) in locating new interchanges in areas with maritime access (i.e. at ports), where a high proportion of economic activity already exists. The development of intermodal facilities for rail-based cross-Channel, deep-sea container, and domestic unitised traffic beyond Glasgow has major implications for the issue of loading gauge enhancement.

The modelled locations also provide an indication of the optimum locations for bulk handling facilities, although this does not mean that major new bulk facilities should be developed as often existing capacity is adequate. The modelled locations generally mirror the locations of

major bulk facilities such as the King George V Dock in Glasgow, the Ports of Leith and Rosyth in the Edinburgh area, the Port of Grangemouth, the Port of Dundee, Aberdeen Harbour, the ports of Inverness and Cromarty Firth in the Inverness area. Similarly they mirror the locations of the main EWS Enterprise wagon-load network hubs at Mossend in Glasgow, Millerhill near Edinburgh and at Aberdeen.

Map 2: Location and relative scale of modelled freight facilities



The model outputs and the result of the strategic appraisal suggest that the following should be regarded as potential strategic investment projects:

Summary of strategic facilities, with suggested prioritisation

AREA	NATURE OF FACILITY	PRIORITY
Aberdeen	Additional general cargo sustainable distribution facilities, (probably intermodal rail), preferably with maritime access.	Medium term
Dumfries	General cargo sustainable distribution facilities (probably an intermodal rail terminal)	Long term
Dundee	General cargo sustainable distribution facilities, (probably intermodal rail), preferably with maritime access.	Medium term
Edinburgh	General cargo sustainable distribution facilities, (probably intermodal rail and rail-connected distribution warehousing), preferably with maritime access.	Short term
Glasgow	Additional general cargo sustainable distribution facilities, (probably intermodal rail and rail-connected warehousing), possibly with maritime access.	Short term
Inverness	General cargo sustainable distribution facilities, (probably intermodal rail), preferably with maritime access.	Long term

In addition, the development of long distance ferry services from the east coast of Scotland to the to the Continental mainland and from SW Scotland to the Atlantic Arc should be considered potential strategic investment projects.

Finally, the analysis of the GB road network under the Base Case, 10 Year Plan and Scottish Sustainable Distribution Scenarios for 2005, 2010 and 2015 suggest that while the industry and government actions implicit in the 10 Year Plan Scenario would generate the most benefits, the development of the above facilities and the long distance ferry services would add about £16.3 million of environmental benefits each year from 2005, £44 million of environmental benefits per annum from 2010 and £59 million of environmental benefits per annum from 2015.

GLOSSARY OF TERMS

Coastal shipping	The movement of cargo by sea between a UK port and another port in the UK.
Deadweight (dwt)	A measure of the cargo carrying capacity of a commercial cargo vessel.
Deep sea shipping	The movement of cargo by sea between a UK port and ports in areas of the world not covered by coastal and short sea shipping.
ECML	East Coast Main Line. Links Edinburgh to North East England, Yorkshire and London.
Fast conventional ferry	A steel-constructed ship capable of achieving about 25 knots or more and able to carry unit load freight.
Inland waterway	Canals and waterways upstream of any point where a river, or sea inlet, first narrows so that the opposite banks are no more than 5km apart at high water spring tide, or 3km apart at low water spring tide.
FFG	Freight facilities Grant. A capital grant scheme to help companies offset the capital costs of providing rail and waterway freight facilities.
Intermodal	A load carrying box designed to be conveyed by more than one transport mode with transfer between modes at intermodal terminals. Main types of intermodal unit are containers, swap bodies and piggyback trailers.
Intermodal terminal	A terminal designed to transfer intermodal units between road and rail. Facilities consist of sidings to accommodate intermodal trains, hardstanding for storage of intermodal units and for loading and unloading of units by cranes or other handling equipment.
Loading gauge	The series of height and width profiles that govern the physical dimensions of a railway vehicle with loaded intermodal unit and that are applied to a given rail route to ensure that a railway vehicle with loaded unit will not collide with any structures.
Piggyback trailers	Road-going trailer that can be lifted onto a suitably designed rail wagon.
Planning gain	The uplift in value of land due to a change in planning permission for its use.
Short sea shipping	The movement of cargo by sea between a UK port and other ports outside the UK which are situated in geographical Europe and non-European countries bordering the Mediterranean.
SLM	Sensitive lorry miles. The financial values ascribed to the removal of a lorry mile from a particular type of road to provide an estimate of the environmental benefits achieved.
TAG	Track access Grant. TAG is a revenue grant scheme to help rail freight operators meet the charges paid to Railtrack for access to the rail network.
Train load services	Full length trains of conventional rail wagons usually carrying a single customer's goods. Usually moved directly between origin and destination terminal without intermediate marshalling.
VFM	Value for money. Ensuring that the maximum benefit is obtained for society for the minimum public sector investment.
Wagon load services	Where the volume of freight moved in conventional wagons per shipment from an individual customer is insufficient to justify operating a dedicated train service between two points and as such individual less than trainload consignments are marshalled to form a whole trainload.
WCML	West Coast Main Line. Links Glasgow to the North West of England, the West Midlands and London.

Source: Strategic Rail Authority & MDS Transmodal

APPENDIX: ORGANISATIONS CONTACTED DURING STUDY

Aberdeen Harbour Board
Andrew Weir Shipping Ltd.
British Waterways
Associated British Ports Troon
Caledonian MacBrayne
Clydeport PLC
Cromarty Firth Port Authority
Deanside Transit Ltd.
Direct Rail Services Ltd.
English Welsh & Scottish Railway Ltd.
Forestry Commission
Forth Ports PLC
Freightliner Ltd.
GB Railways Group PLC
Iggesund
Inverness Harbour Trust
HJ Banks
James Fisher PLC
LAW Mining
P&O Irish Sea
PD Stirling Ltd.
Railtrack PLC
Roadways Container Logistics Ltd.
Safeway PLC
ST Services
Stena Line
Tibbett & Britten Ltd.
TDG Nexus
Unilog NV
WH Malcolm Ltd.
Wm Martin & Co (Marine) Ltd.