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Freight Potential of the Caledonian Canal

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Executive summary (ES)

Introduction

1. The Caledonian Canal runs for 60 miles along the Great Glen from Corpach near Fort William in the south west to Inverness in the north east and provides a route between eastern and western Scotland. The 60 mile transit of the Canal includes Loch Lochy, Loch Oich and Loch Ness and a total of 29 locks. Map 1 shows the canal corridor and its immediate hinterland.

2. During 2006 British Waterways completed a ten year £20 million lock stabilisation programme which was required to secure the long term future of the canal. British Waterways aims to double freight carriage on its inland waterways throughout the UK by 2010 and the lock stabilisation programme on the Caledonian Canal was required to support, amongst other initiatives, the potential reintroduction of freight onto the waterway.

3. The purpose of this study is to assess the potential market for freight on the Caledonian Canal and any technical issues which arise in relation to moving identified goods on the Canal.

What is the Market for Freight along the Canal Corridor?

4. Interviews with businesses in key industries identified significant producers of processed wood products, suppliers of raw timber, producers of fish feed, fish farms and producers of quarry goods located at either end and along the canal corridor. Volumes of traffic along the corridor itself, however, were limited with sawmills, for instance, sourcing most of their raw timber from local supplies and exporting goods by sea through local ports at either end of the canal. Even with these patterns, however, the analysis identified northbound flows of raw timber, southbound potential flows of fish feeds and small flows of quarry goods in both directions.

What is the Potential to Use the Canal?

5. The business interviews identified a number of companies who expressed, in principle, a strong or potential interest in using the canal for freight transport, providing concerns over cost and practical considerations can be addressed. In particular the consultations identified the potential demand for the following flows of key commodities:

    - Northbound – 63,000 tonnes per annum of raw timber supplies
    - Southbound – 36,000 tonnes per annum of feeds for fish farms

Are there any Supply Side Constraints?

6. In terms of the canal infrastructure and its operating requirements, there are no constraints which cannot be addressed through careful passage planning. However, there is a major constraint in terms of vessel availability with a recent British Waterways search not identifying any suitable vessels for sale or contract hire.

7. There are two main options in terms of securing a vessel which is either to commission a ‘purpose built’ vessel which is the correct dimensions for the Canal or to adopt a tug and barge operation. The costs of commissioning a vessel are likely to be prohibitive at upwards of £3 million, but the tug and barge operation is also limiting when transiting the locks. It is however, likely to be a more realistic cost option.

How Competitive is the Canal?

8. Using road equivalent haulage rates of £10 to £12 per tonne, the revenue generated from the identified goods would not cover the operating costs of a service and make no contribution to the vessel costs and profit.

9. To cover all operating costs and make a contribution to vessel capital charges and profit of £250,000, an operator would have to charge approximately £19 to £28 per tonne depending on the availability of a backload.

Is the Proposed Service Viable?

10. Under current market conditions, the proposed service would have an annual operating deficit of £90,000 to £218,000 before capital costs. It is not, therefore, financially viable at current market prices on a "stand alone" basis.

11. There are two possible grants which could contribute to the costs of introducing a service:

- Waterborne Freight Grant support is available during the first 3 years of operation and is limited to the lower of 30% of the operating costs, the environmental benefits generated by the project or €1m in year one, €0.66m in year 2 and €0.33m in year 3. Applicants are required to present a business case which demonstrates that break even position will be reached by the end of the 3 year period. The grant available would be in the range £91,000 to £135,000 depending on loads, but this does not make the service viable and the grant is only available for three years.

- Freight Facilities Grant could be available to support the costs of acquiring facilities or a vessel. Grant is limited to the lower of the environmental benefits generated by the project or the additional costs of the water freight operation compared with road. However, the grant is usually limited to 50% of the capital cost, which would be £1.5 million. This would leave annual capital costs of around £120,000 which could not be met by a service which was not also having its running costs subsidised.

- Waterborne Freight Grant and Freight Facilities Grant can be combined although there the total grant which can be awarded is restricted to 30% of the total project cost and in this situation would be less favourable that the capital grant alone.

12. The overall conclusion is that under current and foreseeable market conditions and the current and foreseeable grant regime, a freight service on the canal is not commercially viable even although there is substantial interest in such a service from potential users. A sharp increase in road freight rates *could* make a service viable – especially if grant aided. While such a rate increase is not foreseen in the short to medium term the position should be monitored and the proposal revisited if such a change in freight rates occurs.

1 Introduction

1.1 Background

1.1.1 The Caledonian Canal runs for 60 miles along the Great Glen from Corpach near Fort William in the south west to Inverness in the north east and provides a route between eastern and western Scotland. The 60 mile transit of the Canal includes Loch Lochy, Loch Oich and Loch Ness and a total of 29 locks. Map 1 shows the canal corridor and its immediate hinterland.

Map 1
Caledonian Canal Corridor

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1.1.2 During 2006 British Waterways completed a ten year £20 million lock stabilisation programme which was required to secure the long term future of the canal. British Waterways aims to double freight carriage on its inland waterways throughout the UK by 2010 and the lock stabilisation programme on the Caledonian Canal was required to support, amongst other initiatives, the potential reintroduction of freight onto the waterway.

1.1.3 The HITRANS Regional Transport Strategy's strategic priorities include:

- Optimising the modal shift for freight transport by rail and coastal shipping; and
- Developing a long term strategy for port, ferries and waterways that is driven socio-economic goals.

1.1.4 Research undertaken by HITRANS to support these policies recommended that a detailed assessment was undertaken of the potential of the Caledonian Canal for freight movement.

1.2 Study Objectives and Approach

1.2.1 The purpose of this study was to assess the potential market for freight on the Caledonian Canal and any technical issues which arise in relation to moving identified goods on the canal. The study was undertaken in two phases:

- Phase 1 assessed the current and future potential flows on the Caledonian Canal corridor which includes the Great Glen between Inverness and Fort William and extends to the communities along the Moray Firth to the north and Lochaber and Argyll to the south.
- Phase 2 examines the extent to which the freight flows along the corridor could be carried by water and the potential for the use of the Caledonian Canal. This phase includes examination of both the demand for freight and any supply side constraints associated with the canal.

1.2.2 The study has been undertaken using a combination of desk research and primary research as follows:

- Desk Research:
  - To map the structure of the economy to identify those sectors which are likely to generate or use the type of goods and materials which are suitable for transport by sea.
  - To identify companies or organisations within the hinterland of the canal corridor which transport goods along the route.
  - To review transport statistics on freight movements in the Highlands and Islands.
- Primary Research:
  - With port and freight operators in the area to understand the volumes of freight being moved through the ports and along the corridor, its origin and destination and average load size.
  - With companies and organisations to understand the potential for movements on the canal and their requirements in terms of load sizes, timings of deliveries, costs etc.

1.3 Report Structure

1.3.1 The remainder of the report is structured as follows:

- Section 2 sets out the analysis of demand for freight along the Canal;
- Section 3 considers the supply-side of moving freight on the Canal;
- Section 4 considers the competitiveness of the Canal; and
- Section 5 sets out our conclusions.

2 Demand Analysis

2.1 Introduction

2.1.1 This section analyses the movements of freight along the Caledonian Canal corridor and considers whether any of these movements could generate demand for a water-borne freight service on the Canal. There are two potential sources of demand for a water-borne service:

- Goods which currently travel by road from the Inverness area (and its hinterland) to the Fort William and Lochaber area (and vice versa); and
- Goods which currently arrive by sea to a port at either end of the Canal which are then distributed by road to destinations along the Canal.

2.1.2 One of the difficulties in assessing freight movements along the Canal corridor is the lack of detailed published data on the amount of and type of freight moved. This required published data to be supplemented by information provided by companies, port and freight operators. During this part of the study a series of consultations were carried out with industry bodies and other stakeholders across the Highlands region. These consultations helped identify the key commodities and industries likely to benefit from the development of the canal for freight transport and to develop an understanding of the issues facing these industries. These consultations were then followed up by a series of detailed interviews with individual companies in each key sector covering a number of topics relating to the movement of goods in and out of the region and the potential use of the canal. To maintain company confidentiality, data drawn from these interviews are aggregated by commodity throughout this section so that individual companies cannot be identified.

2.1.3 The section begins with an overview of the types of commodities which could be suitable for transport along the Canal and their importance within the hinterland of the Canal. This is followed by a review of the trends in road and water freight before providing an estimate of the total Canal corridor traffic. The section concludes with an assessment of the extent to which this corridor traffic could be transported along the Canal.

2.2 Potential Commodities for Transporting on the Canal

2.2.1 Not all commodities and products are suitable for transporting along a canal. In general consultees reported that goods most likely to be suitable for canal transport included those involving non-time sensitive deliveries, non-perishable goods and commodities for which companies could benefit from larger bulk deliveries than are possible by road. The following industries and commodities were identified as offering the greatest potential for the Caledonian Canal:

- Agriculture – primarily the transport of animal feeds and fertilizers.
- Aquaculture – transport of fish meal and fish feeds.
- Timber and forestry products – deliveries of raw timber products to sawmills.
- Processed wood products – receiving deliveries of raw timber products and shipment of processed wood.
- Mining and quarrying products – transport of aggregates and other construction materials.

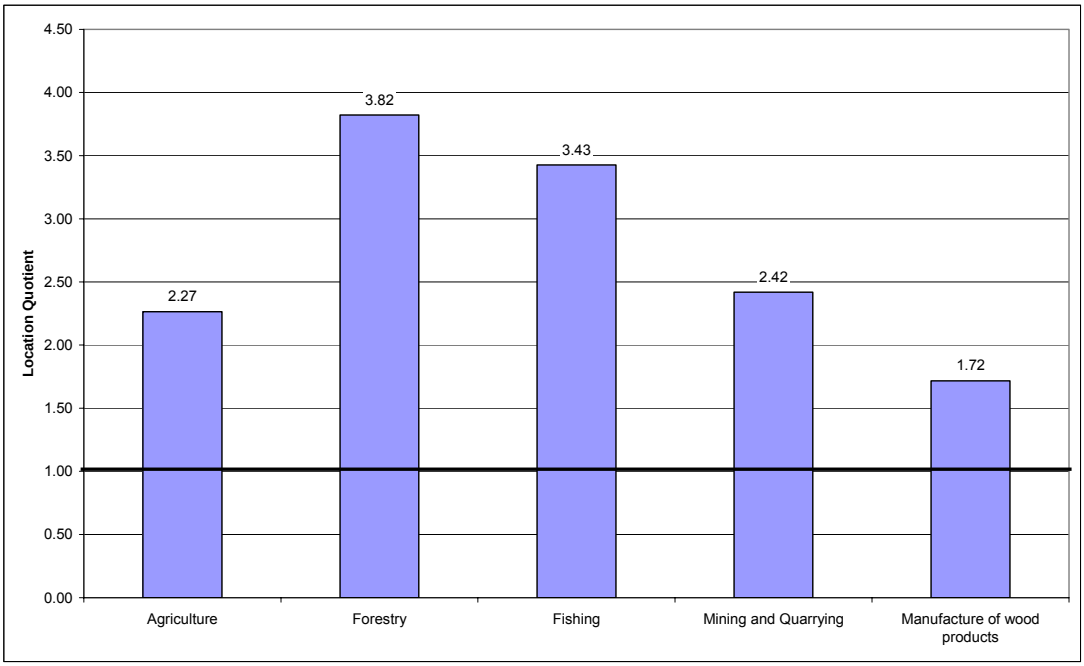
- Waste and recycling materials – transport of domestic and non-domestic waste to landfill and recycling sites.

2.2.2 Taken together these sectors provide over 10,500 employee jobs[1] in the Highlands and Islands in 2006, some 5% of employment across all sectors. This represents a concentration of employment in these sectors around twice the average for Scotland as a whole (where the same sectors accounted for only 2.7% of all employment).

2.2.3 Figure 2.1 uses location quotient analysis to illustrate the locally important nature of these sectors in the Highlands and Islands. This analysis compares the size of each sector in the region against the relative size of that sector across Scotland as a whole. A location quotient of one represents a sector which accounts for a similar proportion of employment in the region as is the average across Scotland. A quotient of more than one indicates a sector which is relatively large in the region compared to the Scottish average.

2.2.4 As Figure 2.1 illustrates, all the key sectors identified during the consultation process are highlighted as areas in which the Highlands and Islands has a strong regional specialism, with employment levels well above the national average.

Figure 2.1: Relative size of key sectors, 2006



Source: Tribal analysis of Annual Business Inquiry data (via www.nomisweb.co.uk)[2]

2.2.5 Key issues in each of these sectors can be summarised as follows:

Agriculture

- The sector provided employment for an estimated 5,400 employee jobs in 2006. When self employment is included this rises to a total of 24,100 people across the

[1] Excluding self employment

[2] NB: no reliable data was available covering employment in the waste/recycling sector, so this industry was excluded from the chart.

Highlands and Islands, representing more than a third of total Scotland-wide employment in Agriculture[3].

- Employment in the sector has fallen in recent years, the number of employee jobs recorded in the Highlands and Islands has dropped by 12% in the period 2000-2006[4].
- Commodities most likely to be suitable for transport by canal include animal feeds (livestock production accounts for around 60% of all output from the sector), fertilizers and other supplies.
- Key supplier companies located in the region include Harbro, Aggrovista and Higgins Agriculture.

Acquaculture

- The fish farming industry in the Highlands and Islands employed a total of 1,300 people in 2005. Including supply chain jobs, this total is estimated to rise to over 2,000 jobs across Scotland. In addition to these, some 361 jobs in the region are supported by the production of shellfish[5].
- Local concentrations of activity in the industry are evident at key points at either end of the Caledonian Canal corridor. The sector is of particular importance in Argyll and Bute, Lochaber, Ross and Cromarty, Shetland and Orkney.
- Employment in the sector has fallen in recent years due to continuing mergers and consolidation throughout the industry.
- Commodities most likely to be suitable to transport by canal include fish feeds, salmon smolts and other supplies.
- Key producer companies in the region include Marine Harvest, Mainstream Scotland, Scottish Seafarms and Lighthouse Caledonia. Key suppliers of fish feeds and smolts include Skretting (based in Invergordon) and Landcatch (with facilities in Argyll and at Foyers).

Timber and Forestry Products

- The forestry harvesting industry supported a total of 1,100 direct employee jobs in the Highlands and Islands in 2006. Overall, the region accounts for almost a third of all forestry employment across Scotland as a whole. Woodland accounts for an estimated 0.5m hectares of land in the region, some 40% of the total woodland across all of Scotland[6].
- Local concentrations of activity are again evident at key points at both ends of the canal corridor. The sector is of particular local importance in Argyll and Bute, Inverness and Nairn, Moray and Ross and Cromarty, although significant harvesting activities take place in all parts of the region.

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[3] Source: HIE Sector Profile: Agriculture, May 2007

[4] Source: Annual Business Inquiry (via www.nomisweb.co.uk)

[5] Source: HIE Sector Profile: Aquaculture, May 2007

[6] Source: HIE Sector Profile: Forestry, May 2007

- Commodities likely to be suitable for transport by canal include raw timber rounds currently transported by road and wood chips.
- Employment in the sector has remained steady in recent years, dropping by only 3% over the period 2000-06.
- The Freight Action Plan for Scotland notes that the volume of timber products being harvested is likely to rise in the next few years. Over the next 20 years the volume of output is forecast to double as forests reach maturity for harvesting.
- Key companies in the region include Scottish Woodlands, Forestry Enterprise and UPM Tilhill.

Processed Wood Products

- This sector includes sawmilling and the production of processed wood products for construction and other purposes. The sector employed a total 1,300 employee jobs in the Highlands and Islands in 2006, an estimated 12% of total employment in the sector across Scotland as a whole.
- Commodities likely to be suitable for transport by canal include supplies of raw timber rounds and deliveries of finished wood products.
- Key concentrations of activity in the region are evident in Inverness and Nairn, Moray and Lochaber.
- Key companies include Norbord, John Gordon and Sons, James Jones and Sons and BSW Kilmallie.

Mining and Quarry products

- Almost 1,200 people in the Highlands and Islands are employed in mining and quarrying and the production of processed construction materials. This includes employment at quarries themselves and at plants producing varying grades of aggregates and other stone products for construction projects.
- In employment terms quarrying activities in the region are concentrated in Argyll and Bute and Ross and Cromarty, although there are significant businesses located throughout the Highlands and Islands. Employment in processing of construction materials is focused in Inverness and Nairn and in Caithness and Sutherland.
- Employment in these sectors has remained steady in recent years, dropping by only 2% over 2000-06.
- Commodities likely to be most suitable for transport on the canal include aggregates for road projects, road salt and other materials.
- Key companies in the canal corridor include Aggregate Industries, Leith's Scotland, Pat Munro and Ennstone Thistle.

Waste and Recycling

- Little data is available on employment in waste management and recycling in the Highlands and Islands. Data from the Highland Council, however, shows that some 163,700 tonnes of municipal waste was handled in 2006/07, 121,000 of which were taken by road to landfill across 6 different sites[7].

- Almost a third of all municipal waste was generated from the Inverness area, with some 16,000 tonnes being generated from the Lochaber area.

- The suitability of the canal for waste transport depends largely upon the location of sites for recycling and landfill. A number of consultees discussed the potential benefits that could arise from developing centralised processing sites at one end of the corridor and using the canal for transport to these sites. Movement of recycling traffic has also been identified as a potential market for other canal corridors across the country (the Lowland canals in particular).

- The Highland Council policy for waste management at present, however, is to distribute recycling and landfill sites throughout the region with waste being processed as close as possible to where it is generated. Such a policy would limit the amount of waste transported by road along the canal corridor. While it is likely that there will be a requirement for the movement of recycled material (paper, plastics and metals) from the Lochaber area, at present this material is mostly likely to be transported south to facilities in Central Scotland rather than North along the canal corridor.

- Overall, the analysis suggested that there was limited potential for movement of waste by canal in the near future, although this position may change in future as recycling rates increase and new facilities are developed.

2.3 Trends in Road and Water Freight

Road Freight

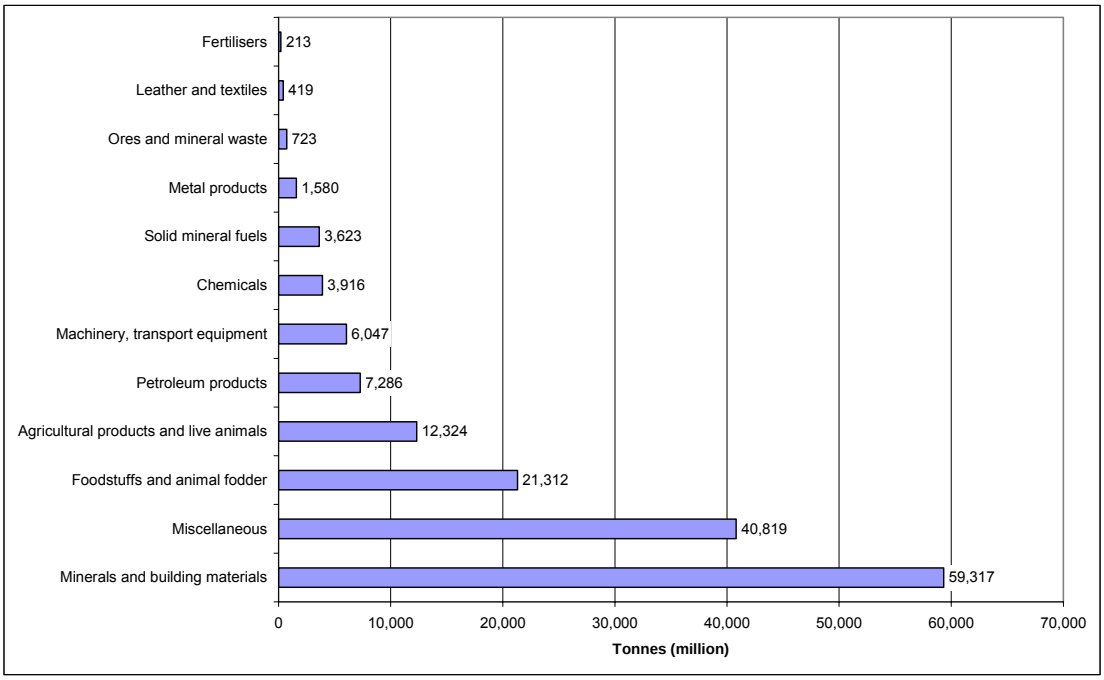
2.3.1 Road freight accounts for the vast majority of goods carried in Scotland, representing around three quarters of the total volume of goods moved. In 2006 a total of 158 million tonnes of goods were carried by UK registered HGVs between locations in Scotland. In addition to this traffic, a further 19.4 million tonnes were carried into Scotland from points of origin across the rest of the UK. By comparison the volume of freight being transported between Scotland and locations overseas is relatively small. Such traffic accounted for 0.6 million tonnes of goods in 2006[8].

2.3.2 Figure 2.2 provides a breakdown of road freight traffic in Scotland by commodity. Minerals and building materials (including quarry goods) account for 40% of all traffic by weight, while agricultural goods and supplies account for a further 22%. No specific data is available on the amount of timber or wood products carried by road in Scotland, these commodities are likely to be included in the data for Miscellaneous goods (26% of all traffic) and the data for building materials.

[7] Source: 2006/07 Annual Waste Data Report, Highland Council, October 2007

[8] Source: Scottish Transport Statistics 2007, Scottish Government

Figure 2.2: Road Freight Traffic in Scotland by Commodity, 2006



Source: Scottish Transport Statistics 2007

2.3.3 Over the period 2002-2006 an estimated 5% of all road freight movements in Scotland were made to destinations in the Highlands (an average of 7.1 million tonnes per year). On average, some 5.2 million tonnes of goods were moved between locations in the Highlands, accounting for 78% of all journeys with a point of origin in the region.

2.3.4 The Freight Action Plan for Scotland expresses a desire to encourage modal shift of freight from road towards rail and shipping through the continued use of incentives schemes such as the Freight Facilities Grant and the Waterborne Freight Grant. Over the period since 1999 the Freight Facilities Grant alone has helped remove some 76 million lorry miles from the road network in Scotland.

Waterborne Freight

2.3.5 An estimated 101.5 million tonnes of freight goods were carried by water through Scottish Ports in 2006. Of these, outbound movements accounted for 66 million tonnes, a drop of some 33% since 2000. Inbound movements, by contrast, have shown a steady increase in traffic in recent years, rising by 14% over the same period to 35 million tonnes in 2006[9].

2.3.6 Of the three main ports at either end of the Caledonian Canal corridor, Cromarty Firth handles by far the largest amount of traffic in volume terms. In 2006 a total of 3.2 million tonnes of goods were carried through Cromarty Firth Port (including all modes and products), representing a significant increase in the volume carried since 2000. The majority of this traffic, however, is bulk fuel. Other goods carried through the port account for only 175,000 tonnes and have shown a slight decline in the same period.

[9] Source: Scottish Transport Statistics 2007, Scottish Government

2.3.7 Inverness handled an estimated 0.7 million tonnes of goods in 2006, with flows remaining relatively steady in recent years. No officially published comparable data is available for Corpach, but in 2005 the port was estimated to handle some 101,000 tonnes of freight. In recent years traffic through West Coast ports in general (of which Corpach is one) has remained steady.

2.3.8 Consultations were carried out with each of these local ports to discuss the breakdown of traffic by commodity, the surface origin and destination of freight goods being moved and the scope for movement of goods to and from the port using the canal.

- **Inverness Port**: Raw timber accounts for the majority of non-fuel bulk imports received by the port with some 77,500 tonnes of timber goods received in 2007. Timber imports are distributed by road to end customers across the UK, although not to destinations located along the canal corridor. Other imports include salt, coal and animal feeds, all of which are shipped by roads to destinations within the Inverness and Nairn area. Exports from the port are dominated by consignments of processed wood products and wood chips. All these products are brought to the port from local producers and don't require transport along the canal corridor.

- **Cromarty Firth**: Imports account for around three quarters of all non-fuel traffic carried through the port. Key commodities include fish meal (for transport to local processers), coal, road salt and consignments of pipes and subsea fabrications. Surface transport of imported goods are predominantly to local firms with some oil industry related fabrications being carried to destinations in the North. Very little incoming traffic is transported onwards through the canal corridor. Exported goods include timber logs, processed fish feed and scrap metal. Again, such goods are sourced from within the local area.

- **Corpach**: Almost 90% of goods carried through Corpach port are timber or forestry related products. Imports of timber are brought in from origins in Scandinavia and transported onwards to local processers. Exports of roundwood timber and wood chips are made from the port to destinations across Europe. Such exports are generally sourced from forestry sites within a 30 mile radius of the port. As with the other ports, very little traffic moves directly to and from the port along the length of the canal corridor.

2.4 Canal Corridor Freight Movements

2.4.1 In order to gather information on freight movements for key commodities along the Caledonian Canal corridor a series of consultations were carried out with industry bodies and individual businesses located at either end of the canal. The purpose of these consultations was to identify the volumes of traffic (both of supplies and outputs) along the corridor and to discuss the potential for transferring this traffic from road to the canal.

2.4.2 Table 2.1 provides a summary of the freight movements identified along the canal corridor. This analysis focuses on the key commodities most likely to be suitable for canal transport and only provides results for those commodities for which significant flows were identified. As discussed above, discussions around the movement of waste did not identify significant current or potential future flows along the canal corridor. Similarly, interviews with agricultural supplies businesses did not identify significant flows along the corridor. It should be noted that the analysis in Table 2.1 represents commodity flows only from those companies which were interviewed as a part of this study. No attempt has been made to gross these figures up across the economy as a whole.

2.4.3 Significant flows of road traffic were identified among businesses located at the North end of the canal, although a large proportion of movements were to destinations either North of Inverness or within a small, local area.

2.4.4 Key movements from the North to destinations at the Southern end of the canal include:

- Fish feeds being transported to fish farms: 36,000 tonnes. At present, these flows are transported to farms by sea via Kishorn, although the end destinations are located to the south west of the canal corridor.
- Small volumes of quarry goods and other construction materials.

2.4.5 Key movements from the South to destinations at the Northern end of the canal include:

- Raw timber being transported from forestry sites in Lochaber and Argyll to processers in Inverness and Nairn: 63,000 tonnes.
- Small volumes of quarry goods and other construction materials.

Table 2.1: Caledonian Canal Freight Movements

Businesses located at North end of canal corridor								
	Raw Timber		**Processed wood**		**Fish Feeds**		**Quarry goods/minerals**	
	Inputs	Outputs	Inputs	Outputs	Inputs	Outputs	Inputs	Outputs
Volume (tonnes)	*450,000*			*458,000*		*90,000*		*100,000*
North Highlands	86%			100%		60%		
Inverness/Nairn/Moray								95%
Lochaber/Argyll	14%					40%		5%
Rest of Scotland								
Rest of GB/overseas								
Businesses located at South end of canal corridor								
	Raw Timber		**Processed wood**		**Fish Feeds**		**Quarry goods/minerals**	
	Inputs	Outputs	Inputs	Outputs	Inputs	Outputs	Inputs	Outputs
Volume (tonnes)		*200,000*		*200,000*	*36,000*			*30,000*
North Highlands					100%			
Inverness/Nairn/Moray		5%						33%
Lochaber/Argyll		33%		100%				
Rest of Scotland		62%						67%
Rest of GB/overseas								

2.5 Demand for Freight on the Canal

2.5.1 In addition to identifying freight flows along the canal, businesses interviewed for the study were also asked to discuss the potential for switching these flows from road to the canal. The consultations identified specific commercial interest in the possible northbound transport of raw timber to wood processing firms in the Inverness and Nairn area as well as some interest in southbound movement among companies sending or

receiving deliveries of feed to fish farms. Companies involved in the production of quarry materials expressed little or no interest in transporting their products by canal.

2.5.2 Consultees reported a number of potential benefits which could arise from using the canal. These include:

- Larger and fewer shipments allowing for efficiencies in managing supplies.
- Potential for using storage facilities at ports or other hubs to manage timing of deliveries more efficiently.
- Easier, more direct access to forestry harvesting sites in the South West of the country.
- Environmental and safety benefits from removing lorries from the road network.

2.5.3 At the same time, companies reported a number of potential disadvantages from using the canal and which they would require more detail on before committing to transferring freight from road. The most significant disadvantage discussed by companies was the likely requirement for double handling of goods to and from lorries at either end of the canal and the cost implications of this activity. In general companies described themselves as very price sensitive and felt that cost would be the most significant barrier to encouraging them to use the canal. Most companies consulted expressed a positive interest in using the canal if the costs were equivalent to those of road for the same journey, but little or no interest if the cost of the journey was even 10% higher.

2.5.4 Other potential disadvantages identified by companies included:

- Inflexibility of large, slow shipments. Depending on the canal would prevent suppliers being responsive to last minute changes in the requirements of customers.
- Inflexibility of the canal infrastructure. A number of companies reported that the lack of access points along the canal would be a constraint to their using the route. Such companies reported that the benefits of the canal would be higher if it were possible to access a service at points such as Invermoriston or Invergarry. This was particularly true of products which have to be carried on the A87 and A887.
- Reliability. A number of companies also reported concerns over the ability of the canal to operate a regular service throughout the year and the impact on the service of breakdowns or other incidents along the route. Careful of scheduling of demand and of repairs to the canal would be required.

2.6 Conclusions on Potential Demand

2.6.1 The consultations carried out for the study identified a number of companies who can be regarded as potential canal users providing that concerns over cost and operational matters can be addressed. These potential users could generate the following traffic:

- Northbound – 63,000 tonnes per annum of raw timber supplies
- Southbound – 36,000 tonnes per annum of feeds for fish farms

3 Supply Side Analysis

3.1 Introduction

3.1.1 The supply side analysis considers the physical characteristics of the Canal and how these may impact on providing a freight service. This analysis draws on consultations with potential operators of services and British Waterways.

3.2 Canal Infrastructure

3.2.1 The dimensions of the Canal and locks restrict the size of vessel using the Canal to one which meets the following dimensions:

- Length: 45.72 metres
- Beam: 10.67 metres
- Headroom: 33.52 metres (27.4 metres if passing under Kessock Bridge)
- Draught: 4.11 metres

3.2.2 These dimensions affect the payload capacity of vessels using the Canal and while the maximum payload of the vessel is 1,000 tonnes, a payload of capacity of 600 – 800 tonnes is more likely given the nature of the commodities which could be transported using the Canal. This affects the financial viability of moving certain types of goods on the Canal.

3.2.3 The canal sections of the route (rather than the Lochs) are limited in width such that a freight vessel passing another vessel with a 10m beam would have to be very careful. However, this is an issue which could be addressed through good passage planning and would not be a major issue unless there were many freight and commercial vessels using the Canal.

3.2.4 At present there are no opportunities for loading or unloading freight onto vessels along the Canal. Invergarry and Invermoriston were identified during the business consultations as potential access points. Discussions with British Waterways suggest that a jetty would be required at Invergarry, but given the shallow water, it would be difficult to provide freight access.

3.2.5 At Invermoriston, there are plans by Scottish and Southern Energy (SSE) to build a jetty to the north of Rubha Ban to provide access for a transformer which is being delivered by water. It is understood that this jetty would be available when it was no longer required by SSE. However, for the jetty to be used for loading/unloading freight a large amount of hard standing would be required. At the location of the proposed jetty, the alignment of the A82 is very close to the loch such that provision of hard standing would be difficult.

3.3 Canal Operating Issues

3.3.1 The Caledonian Canal is 59.25 miles from Corpach sea lock (Fort William) to Clachnaharry sea lock (Inverness) and operates a speed limit of 6 mph in the Canals. There are no speed restrictions in the lochs. Within scheduled opening hours, sea locks are normally available 4 hours either side of high water. At low water and spring tides the sea locks are closed for 2 hours either side of low tide.

3.3.2 British Waterways have scheduled lock opening times during spring, summer, autumn and winter which broadly correspond to daylight hours in winter (i.e. 9am to 4pm) and a standard working day in summer (i.e. 8am to 6pm). Passage through the locks is possible outside these hours, but it would incur additional charges by British Waterways.

3.3.3 A transit of the Canal takes approximately 21 working hours (depending on traffic through the locks) which would allow one round trip per week with a freight vessel. If a service is to be successful, it is important that it operates on a regular basis to establish reliability and restricting the service to one round trip per week should ensure reliability of the service.

3.3.4 Careful scheduling of a freight service would be required to minimise delays through the locks at peak times during the summer. This is particularly relevant in relation to the fleets of hire boats which, on changeover day, tend to arrive 'en masse' at key pinch points such as the locks at Fort Augustus. A freight service could not afford to be delayed as the leisure boats pass through and would require priority. This could result in potential conflict with the leisure users.

3.4 Vessel Availability

3.4.1 As discussed in paragraph 3.2.1 the vessel must fit the dimensions of the Canal locks. This requirement seriously restricts the type of vessels which could be used. The vessel used during the 2005 freight trial – the Calemax Enterprise – is no longer available for use on the Caledonian Canal and a recent search for available vessels by British Waterways failed to identify any vessels available for charter which would be able to navigate the Canal. This is a major issue and is a reflection of economic conditions which have rendered vessels small enough to navigate the canal uneconomic in the wider market.

3.4.2 The lack of vessel availability leads to the conclusion that there are two main options. These are to:

- Commission a 'purpose built' boat for the Canal
- Use a tug and barge operation through the Canal

3.4.3 While a purpose built boat would be ideal for the Canal in that it could be designed to fit the Canal and maximise the payload capacity, it is an expensive option. A review of ship building costs suggests that the cost of a vessel for the Caledonian Canal would be at least £3 million, but probably higher. This relatively high cost reflects the need to have a one-off design.

3.4.4 A tug and barge operation would be feasible in that both tugs and barges are more readily available and would be cheaper to secure. However, they are more limited in their operations on the Canal. With the length restriction of the locks, it is unlikely that both the barge and tug could go through the lock in one movement. A double locking operation would be required which would add to journey time.

3.5 Conclusions on Supply Issues

3.5.1 While there are some limitations regarding the use of the Canal (e.g. passing large vessels, conflict with leisure users), these issues can be managed by British Waterways with careful passage planning and would not prevent a freight service from operating.

3.5.2 The issues surrounding vessel availability are very significant and could affect the viability of a service.

4 Competitiveness of the Canal

4.1 Introduction

4.1.1 While the demand analysis has identified some cargoes which could be transported along the Canal, any service would only be used if it was competitive with road transport. In that context, this section sets out illustrative examples of the costs and revenues associated with a potential freight service.

4.2 Demand Considerations

4.2.1 The demand analysis in Section 2 identified the following potential traffic for the Canal:

- 63,000 tonnes of timber per annum to be transported from Fort William to Inverness
- 36,000 tonnes of fish feed per annum to be transported from Invergordon to Fort William

4.2.2 The timber tonnage equates to over 1,200 tonnes per week. Given the dimensions and payload capacity of vessels suitable for the Canal, this average weekly tonnage exceeds the capacity of a single vessel. To move the entire tonnage using the Canal would require more than one vessel. As vessel availability is the main issue on the supply side, this is not realistic. A tug and barge operation could possibly provide additional barges, but there would be additional costs and it is not ideal for the locks.

4.2.3 Hence, the calculations are undertaken on the assumption that the tonnage is restricted to the payload capacity of one vessel. As timber is a relatively bulky commodity, the payload capacity has been assumed to be 500 tonnes per journey, although it could possibly be slightly higher. This would enable 26,000 tonnes of timber per annum to be transported using the Canal which would remove 1,000 lorry journeys from the road. These movements would be from Fort William to Inverness.

4.2.4 The fish feed tonnage equates to almost 700 tonnes per week, which could be accommodated within one vessel, as it is less bulky. However, the attraction to the suppliers of using the Canal for moving fish feed was that feed be loaded at Invergordon, transported through the Canal and then delivered by sea (in the same vessel) to west coast fish farms. This approach would keep the handling costs to a minimum.

4.2.5 This method of operation would require the vessel to be sea-going. A tug and barge operation would not meet this requirement. Moreover, the requirement to transport the feed direct to fish farms would impact on the schedule that could be operated by a single vessel. Because of the additional time needed to exit the Canal at Fort William and travel to fish farms, it would not be possible to combine this service with a once a week schedule in each direction along the canal. Delivery of the fish feed to Fort William for onward movement by other transport would not offer the potential client any real advantages over the existing road transport operations.

4.2.6 Exploitation of the fish feed market opportunity is thus doubly constrained – it requires a sea going vessel and it appears to be incompatible with the proposed service schedule. It is not clear how the market potential for either the timber of fish feed movement would be affected by the inability to offer a weekly service.

4.2.7 In view of the uncertainties relating to the potential markets, the study has modelled three demand scenarios which are discussed in paragraph 4.4.1.

4.3 Cost and Revenue Assumptions

4.3.1 The potential revenue generated by a service has been estimated on the assumption that the charge levied per tonne of cargo carried is equivalent to road haulage costs. Thus the market price is in the range £10 to £12 per tonne for a journey of between 50 and 75 miles. This includes £3 per tonne for handling freight onto and off the lorry.

4.3.2 The elements of cost involved in operating a freight service are as follows:

- Transit costs: British Waterways make a charge to transit the canal which is based on the freight tonnage calculated on a cost per tonne per kilometre. This is estimated to be £485 per transit for a 500 tonne load.
- Vessel operating costs: vessel operating costs have been estimated from available data. Excluding any capital charge, an average daily cost of £700 is assumed which yields an annual cost of £245,000. This cost includes crewing, fuel, insurance, maintenance and management.
- Handling costs: using the Canal is likely to result in double handling of all cargoes. Total handling costs are estimated (in line with the assumption at 4.3.1) to be £6 per tonne which covers loading cargo onto the road vehicle to take it to one end of the Canal, unloading from the road vehicle and loading of the Canal vessel, unloading from the Canal vessel onto the road vehicle and unloading from the road vehicle at the final destination.
- Transport costs: there would be additional transport costs incurred in delivering the cargo to the Canal and taking it to its final destination. This is estimated at 10 pence per tonne per mile and the origin and destination of all cargoes are assumed to be within ten miles of either end of the Canal.
- Vessel costs: these are not quantified, but the calculation shows the contribution available to “bare boat” vessel lease or capital costs.
- Profit: this is not quantified, but the calculation shows the contribution available for profit.

4.4 Cost and Revenue Calculations

4.4.1 The comparative cost assessment has been undertaken for three scenarios:

- Scenario 1 – No Backload: Service only carries 500 tonnes of timber per load in one direction, yielding a tonnage of 26,000 tonnes.
- Scenario 2 – 50% Backload: Service carries the timber to Inverness and pick up 13,000 tonnes over the year of a backload cargo yielding a total of 39,000 tonnes.
- Scenario 3 – 100% Backload: Service carries the timber to Inverness and picks up a full return load yielding a full load of 52,000 tonnes.

4.4.2 The costs and revenues for these scenarios are shown in Table 4.1. Assuming current road haulage rates of £10 to £12 per tonne, none of the scenarios generate sufficient revenue to cover their operating costs (excluding vessel capital or lease charges). The most optimistic scenario has an operating loss of at least £90,000. The double handling costs and additional road transport costs to get the cargo to/from its final destination from the Canal account for any surplus revenue that would exist once operating and transit costs had been paid.

Table 4.1: Costs and Revenues			
	Scenario 1 **No Backload**	**Scenario 2** **50% Backload**	**Scenario 3** **100% Backload**
Revenue	£260,000 to £312,000	£390,000 to £468,000	£520,000 to £624,000
Costs			
Transit	£25,200	£37,800	£50,400
Operating	£245,000	£245,000	£245,000
Handling	£156,000	£234,000	£312,000
Transport	£52,000	£78,000	£104,000
Total (ex vessel & profit)	**£478,200**	**£594,800**	**£711,400**
Net Revenue	(£218,200) to (£166,200)	(£204,800) to (£126,800)	(£191,400) to (£87,400)

4.4.3 An alternative approach to the scenarios would be to consider what could be charged per tonne to generate sufficient revenue to cover the necessary costs. Using the costs in Table 4.1 (which exclude vessel capital/lease charges and profit) the following rates per tonne would be required to cover the operating and transit costs:

- Scenario 1 – No Backload: £18.40 per tonne
- Scenario 2 – 50% Backload: £15.30 per tonne
- Scenario 3 – 100% Backload: £13.70 per tonne

4.4.4 The charges in paragraph 4.4.3 would cover the operating costs and every £1 per tonne on top of the charge would be a contribution to vessel capital/lease costs and profit. Scenario 1, with no backload, would require the addition of a further £10 per tonne to provide a contribution to vessel costs and profit of £250,000. With a full backload, Scenario 3 would only have to add £5 on top of the £13.70 to provide a contribution of £250,000.

4.4.5 For a contribution to vessel costs and profit of £250,000, the following rates would have to be charged per tonne:

- Scenario 1 – No Backload: £28 – and increase of 130% over the £12 per tonne rate.
- Scenario 2 – 50% Backload: £21.70 – an increase of 80% over the £12 per tonne rate.
- Scenario 3: 100% Backload: £18.50 – an increase of over 50% compared to the £12 per tonne rate.

4.5 Additional Sources of Funding

4.5.1 The Scottish Government funds two grants which have the objective of transferring freight from road to waterborne transport. These are the Freight Facilities Grant (FFG) and the Waterborne Freight Grant (WFG).

4.5.2 The FFG is a capital grant scheme to offset the capital costs of providing water freight facilities. The WFG offers grants to assist with the operating costs of a scheme for up to three years after which the route is expected to be commercially viable.

4.5.3 The payment made under both FFG and WFG are linked to the environmental benefits of taking freight off the roads. The calculation of environmental benefits in this study has been undertaken using the Department for Transport (DfT) environmental benefits calculator. The value of the environmental benefit is related to the route used and the impact of lorries on the route at different times and different conditions. One lorry journey removed from the A82 between Fort William and Inverness has an environmental benefit of £34.89.

4.5.4 Applying this value of environmental benefit to the number of lorry journeys which would be eliminated under the three scenarios yields the following annual value of environmental benefits. These calculations assume that the load per truck is 20 tonnes and that trucks return empty and are thus maximum values:

- Scenario 1 – No Backload: Tonnage 26,000 tonnes - £90,700.
- Scenario 2 – 50% Backload: Tonnage 39,000 tonnes - £135,700.
- Scenario 3 – 100% Backload: 52,000 tonnes - £181,400.

4.5.5 Freight Facilities Grant can contribute to the cost of handling facilities. It can, subject to restrictions, also be used to support the cost of modifying or acquiring a vessel – *provided that* the vessel is not designed to be sea-going. Waterborne Freight Grant can be applied to the costs of hiring or leasing any type of vessel but is restricted to a three year period.

4.5.6 The implications of this potential funding for the viability of the service are considered below.

5 Conclusions

5.1 What is the Market for Freight along the Canal Corridor?

5.1.1 Interviews with businesses in key industries identified significant producers of processed wood products, suppliers of raw timber, producers of fish feed, fish farms and producers of quarry goods located at either end and along the canal corridor. Volumes of traffic along the corridor itself, however, were limited with sawmills, for instance, sourcing most of their raw timber from local supplies and exporting goods by sea through local ports at either end of the canal. Even with these patterns, however, the analysis identified Northbound flows of raw timber (63,000 tonnes per annum), Southbound potential flows of fish feeds (36,000 tonnes per annum) and small flows of quarry goods in both directions.

5.2 What is the Potential to Use the Canal?

5.2.1 The business interviews identified a number of companies who expressed, in principle, a strong or potential interest in using the canal for freight transport, providing concerns over cost and practical considerations can be addressed. In particular the consultations identified the potential demand for the following flows of key commodities:

- Northbound – 63,000 tonnes per annum of raw timber supplies
- Southbound – 36,000 tonnes per annum of feeds for fish farms

5.3 Are there any Supply Side Constraints?

5.3.1 There are no constraints in terms of the canal infrastructure and its operating requirements which cannot be accommodated through careful passage planning. However, there is a major constraint in terms of vessel availability with a recent British Waterways search not identifying any suitable vessels for sale or contract hire.

5.3.2 There are two main options in terms of securing a vessel which is either to commission a 'purpose built' vessel which is the correct dimensions for the Canal or to adopt a tug and barge operation. The costs of commissioning a vessel are likely to be prohibitive at upwards of £3 million, but the tug and barge operation is also limiting when transiting the locks. It is likely to be a more realistic cost option.

5.4 How Competitive is the Canal?

5.4.1 Using road equivalent haulage rates of £10 to £12 per tonne, the revenue generated would not cover its operating costs and make no contribution to the vessel costs and profit.

5.4.2 To cover all operating costs and make a contribution to vessel capital charges and profit of £250,000, an operator would have to charge approximately £19 to £28 per tonne depending on the availability of a backload.

5.5 Is the Proposed Service Viable?

5.5.1 Under current market conditions, the proposed service would have an annual operating deficit of £90,000 to £218,000 before capital costs. It is not, therefore, financially viable at current market prices on a "stand alone" basis.

5.5.2 As we have noted, Waterborne Facilities Grant could contribute to the cost of leasing and operating a vessel. Freight Facilities Grant might be available to support the costs of acquiring a vessel. However, capital support is not of much relevance if the vessel cannot be operated in a way as to cover its variable costs.

5.5.3 Waterborne Freight Grant and Freight Facilities Grant can be combined – though there are restrictions on the total grant which can be awarded.

5.5.4 The environmental benefits of transferring freight from road to water in the Caledonian Canal case were shown above to be between £90,000 and £180,000 per annum depending on how much freight was carried and based on removal of lorry miles between Fort William and Inverness.

5.5.5 We consider the Waterborne Freight Facilities Grant first. The grant awarded will be the **lower** of the environmental benefit or 30% of operating costs.

5.5.6 Table 5.1 shows the operating costs of the "waterborne" and other elements of service (handling costs are split between waterborne and road), the environmental benefit and the maximum grant under each "scenario".

Table 5.1: Operating Costs and Potential Grant

	Scenario 1 No Backload	**Scenario 2 50% Backload**	**Scenario 3 100% Backload**
Revenue (max)	£312,000	£468,000	£624,000
"Water" Costs			
Transit	£ 25,200	£ 37,800	£ 50,400
Running Ship	£245,000	£245,000	£245,000
Handling	£78,000	£117,000	£156,000
Road Costs	£130,000	£195,000	£260,000
Operating (Deficit)/Surplus	**(£166,200)**	**(£126,800)**	**(£87,400)**
30% of operating costs	£104,500	£119,900	£135,400
Environmental Benefit	£90,700	£135,700	£181,400
Annual Grant (Max)	£90,700	£119,900	£135,400

5.5.7 Grant is only awarded where there is a "need" but considering that the above calculations omit the cost of a vessel (estimated conservatively at 8% pa of the capital cost of £3,000,000 = £240,000) the issue of need is not in doubt. The figures suggest that a fully loaded grant aided service could meet part of the vessel capital costs. However, this does not make the service viable and, critically, the grant is for three years only.

5.5.8 Of course, as shown above, if rates rose very substantially – that is by 50% - 100% depending on the load factor – a grant aided service would be able to meet the hypothetical cost of capital to provide a ship, at least while the grant was paid.

5.5.9 As stated above, a vessel might be grant aided through the Freight Facilities Grant. The maximum grant is the value of the environmental gain. As this is an annual benefit, it is calculated as a present value using a 3.5% discount rate over the period of the investment. In that basis we calculate the capital value of the benefit as shown in Table 5.2 assuming a 10 year life for the project.

Table 5.2: Benefits and Potential Capital Grant

	Scenario 1 No Backload	**Scenario 2 50% Backload**	**Scenario 3 100% Backload**
Environmental Benefit Annual	£90,700	£135,700	£181,400
Present Value	£800,000	£1,200,000	£1,600,000
Normal Max Grant (50%)	£1,500,000	£1,500,000	£1,500,000

5.5.10 The 50% of capital cost limit can be breached in exceptional cases but it is probably safest to assume that £1,500,000 would be the maximum amount available through the grant. Even this would leave annual capital costs of at least £120,000 which could not be met by a service which was not also having its running costs subsidised – though again, a dramatic rise in freight rates could alter the position.

5.5.11 It is possible to combine Freight Facilities Grant and Waterborne Freight Grant. Where this is done there is an absolute ceiling of 30% of the total project cost defined as the capital cost plus the operating costs for three years. In the present case this amounts to £3,000,000 plus £450,000x3 = £1,350,000. The maximum grant is thus 30% of £4,350,000 or £1,350,000. Combining the grants is less favourable than the capital grant alone.

5.5.12 The overall conclusion is that under current and foreseeable market conditions and the current and foreseeable grant regime, a freight service on the canal is not commercially viable even although there is substantial interest in such a service from potential users. A sharp increase in road freight rates *could* make a service viable – especially if grant aided. While such a rate increase is not foreseen in the short to medium term the position should be monitored and the proposal revisited if such a change in freight rates occurs.