



# Oban - Glasgow Rail Service Enhancements

## Demand Forecast and Economic Appraisal

Final Report

January 2009



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# HITRANS

## Oban - Glasgow Rail Service Enhancements Demand Forecast and Economic Appraisal

### Contents Amendment Record

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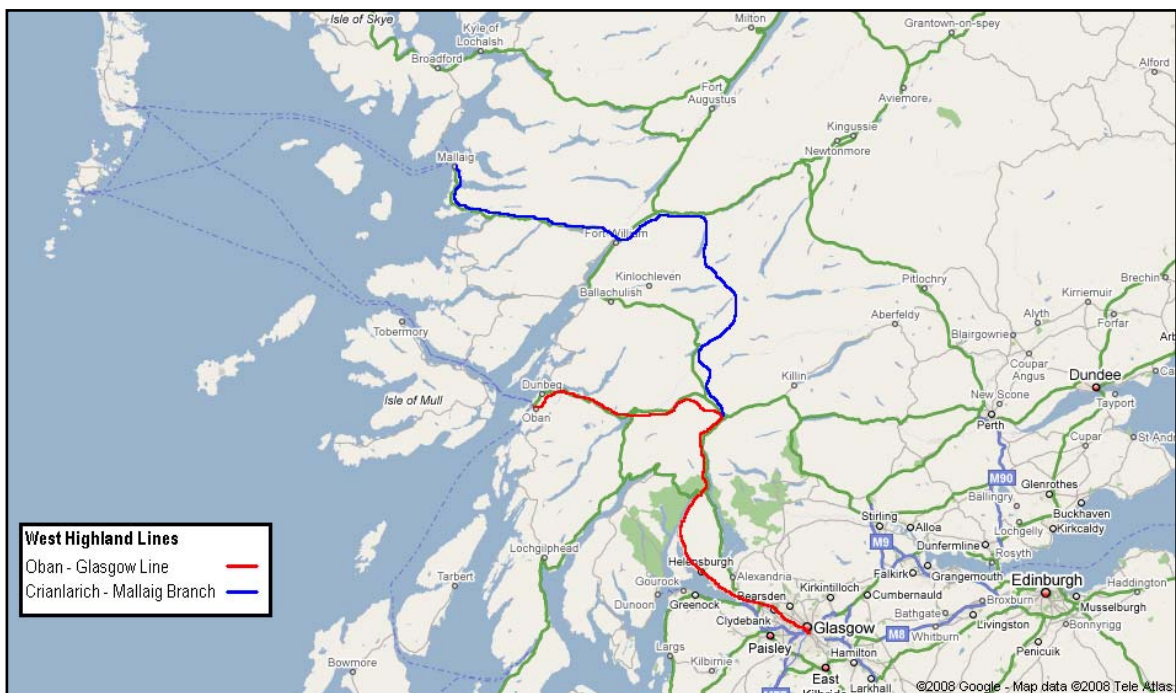
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# 1 Study Background, Context and Objectives

1.1.1 The Oban – Glasgow service operates on part of the West Highland line. The West Highland line runs from Glasgow Queen Street up to Crianlarich where it splits into two branches. One branch goes to Oban whereas the other heads northwards to Fort William and Mallaig. The service calls at a number of intermediate stations which serve settlements along the route. Figure 1.1 provides a map of the West Highland lines.

Figure 1-1: West Highland Lines



1.1.2 A summary of the current service provision follows:

- Three trains per day from Glasgow Queen Street to Oban and Fort William/Mallaig. Services are combined as far as Crianlarich, where the



train is split, with one part continuing to Oban and the other to Fort William/Mallaig;

- Three trains per day between Oban and Fort William/Mallaig to Glasgow Queen Street, with the trains joining at Crianlarich to form a combined service continuing to Glasgow Queen Street; and,
- An additional early morning service between Arrochar and Glasgow Queen Street arriving in the peak hour.

1.1.3 There is an additional overnight sleeper service from London Euston which operates up to Fort William and calls at a number of the intermediate stations on the Queen Street – Crianlarich stretch of the line.

1.1.4 There is a need for an increase in the number of services operating on the Oban – Glasgow route as populations have risen along this corridor. Oban is the largest settlement in Scotland served by the minimum rail service of three trains per day. In addition there is a high level of tourism in the area with Oban Tourist Information Centre being the busiest in Scotland after Edinburgh.

1.1.5 An increase in the number of rail services operating along the route will provide a number of benefits to residents along the corridor as well as to people from other parts of the country, especially tourists. The additional services will provide more commuting possibilities into Glasgow due to the wider spread of departures at both ends. At the Oban end of the line there will be more opportunities to link in to the ferry service from Oban to islands such as Mull and Barra.

1.1.6 A new timetable has been developed by Habtrans Consultancy Ltd (Habtrans) to take effect in December 2009 which will aim to improve the service frequency on the Oban – Glasgow line from 3 to 5 trains per day. This is in accordance with the HITRANS Regional Transport Strategy which states the improvement of public transport frequency as a goal. One of these additional services is an extension of the current early morning service between Arrochar and Glasgow Queen Street, providing commuting opportunities into Glasgow. The full details of the new timetable are given in a later section.

## 1.2 **Study Context**

1.2.1 In 2006, baseline rail traffic growth forecasts were published by the Highlands and Islands Enterprise (HIE) in association with the Highland Rail Partnership, HITRANS and Transport Scotland. These forecasts were based upon population

growth, developments, economic performance and plans for the level of future rail services. Both Optimistic (Higher) and Pessimistic (Lower) growth scenarios were produced up until 2020. These forecasts have previously been used by Halcrow as the basis for a number of studies examining the impact of improvements to the rail network in the Highlands of Scotland.

1.2.2 Last year Halcrow undertook a similar appraisal of proposed changes to the Far North timetable. Work undertaken as part of this previous study has informed the current project.

### 1.3 ***Study Overview***

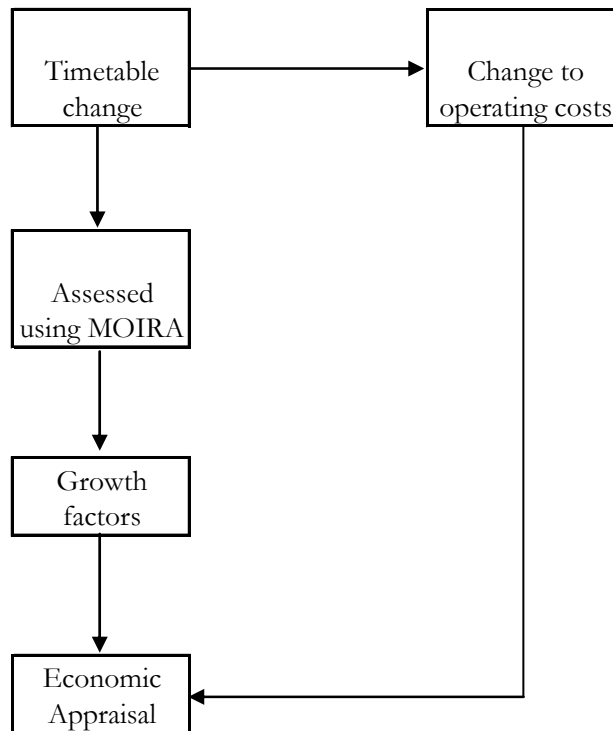
1.3.1 HITRANS has commissioned Halcrow to undertake this study with the aim of producing a forecast of the change in demand due to improving the timetable and to use this forecast to undertake a Transport Economic Efficiency (TEE) appraisal of the proposed timetable enhancements.

1.3.2 Whilst the TEE analysis is compliant with the Scottish Executive's STAG guidance, this study does not explicitly consider at this stage the Executive's other objectives for transport investment: safety, environment, integration and social inclusion and accessibility.

1.3.3 The study examines the change in demand on both the Oban and Mallaig branches of the West Highland lines. Higher and lower forecasts have been generated using the higher and lower growth scenarios developed for HIE. In line with previous studies, it is thought that the provision of an upper and lower range of forecasts will be more useful than a single central business case. Full TEE appraisal tables are provided for the scheme.

- 1.4 Methodology**
- 1.4.1** The MOIRA rail demand forecasting tool was used to estimate demand generated by the timetable improvements. MOIRA is the industry standard forecasting tool and is based upon PDFH and LENNON data.
- 1.4.2** The standard PDFH elasticity based approach is not suitable for this study as PDFH should only be used when looking at changes to regular services operating at a frequency of more than one train every 3 hours. The West Highlands timetable is not at this level and so MOIRA was used as the primary forecasting tool as recommended by PDFH.
- 1.4.3** In addition to the change in demand MOIRA also provides the scheme transport benefits in terms of value of time saved. This time saving was the building block for undertaking the economic appraisal of the scheme.
- 1.4.4** An overview of the methodology is provided within Figure 1.2 and more detail is given in Chapter 2.

**Figure 1-2: Methodology Overview**



## 1.5

### 1.5.1

#### **Report Structure**

The rest of the report is made up of five more chapters as follows:

- Chapter Two contains the method;
- Chapter Three outlines the demand forecasting component of the study;
- Chapter Four contains the results of the economic and financial appraisal of the scheme;
- Chapter Five contains the conclusions of the study; and
- Chapter Six is an annex containing the updated underlying growth projections from the HIE study previously carried out by Halcrow<sup>1</sup> as well as other assumptions and full NATA style tables.

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<sup>1</sup> Highlands and Islands Rail Traffic Growth Projections, 2005



## 2 Methodology

### 2.1 *Introduction*

2.1.1 This chapter outlines the approach and assumptions that were used to undertake the study.

### 2.2 *Methodology: Demand Forecasting*

2.2.1 The first study task was to forecast the change in rail demand at each of the stations affected by the timetable improvements. Increasing service frequency will mean that more demand is created for the services. This demand will come from two sources: firstly existing users of other modes switching to the rail service as it becomes more attractive; and secondly completely new trips will be generated.

2.2.2 Two methods were used to add confidence to the forecasts. The first method used the forecasting tool MOIRA. The second method used an empirical approach based on work undertaken with historical timetables and passenger numbers in the North Highlands Timetable Improvements Study carried out by Halcrow in 2007. The two methods are discussed in more detail below.

### 2.3 *MOIRA*

2.3.1 MOIRA is a software package which is based upon LENNON data and the principles within PDFH. It forecasts the change in demand resulting from improvements to existing timetables. MOIRA is the industry standard tool for undertaking such demand forecasts. The version of MOIRA used within this study contains the 2007/08 passenger numbers and existing timetables.

2.3.2 The proposed timetables were input into MOIRA and the software was run to obtain a number of outputs. The key results given by MOIRA are the change in passenger numbers and revenue and the saving in generalised journey time resulting from improving the timetable.

2.3.3 The MOIRA model was only run for the weekday timetable and demand. The summer version containing summer timetables and demand was run for the four months where the summer service operates. This was added to the results from running the winter timetable with winter demand.

2.3.4 The research underlying MOIRA was undertaken on lines where the service operating frequency is at least one train every two hours. The recommendation is that MOIRA does not fully assess the impacts of the exact timings of services (i.e. for children travelling to school, ferry timings) and so the results are to be treated with caution when examining changes to infrequent services. To add confidence that MOIRA is forecasting correctly for the parts of the line where service frequencies are low a second empirical approach to demand forecasting was undertaken.

## 2.4 ***Empirical Method***

2.4.1 Within the North Highlands Timetable Enhancement Study undertaken by Halcrow in 2007 historical timetables and passenger numbers were examined to obtain an average uplift in demand resulting from an increase in service frequency on low frequency lines. Changes on the North Highland lines were used as the basis for this work and a figure of 5.4% uplift in demand for an increase in frequency of one train per day was obtained.

2.4.2 This increase was used within the current study to produce a second demand forecast to back up the MOIRA work. 2007/08 LENNON data was used to create a matrix of trips within the West Highland lines. The increase in trip frequency between each of the station pairs was obtained and the appropriate uplift factor applied. This method was only applied to stations north of Helensburgh as service frequencies within the Glasgow area are much higher which means that the uplift factor is not suitable for use (as it is only applicable to low frequency lines).

## 2.5 ***Growth Factors***

2.5.1 In 2005 Halcrow produced a set of rail growth projections for each of the lines in the Highlands and Islands area. This study was commissioned by HIE and the factors have subsequently been used in a number of studies.

2.5.2 These factors are provided at a station level and under an optimistic and pessimistic projection. As the factors were produced three years ago the forecasts were updated using more up to date GDP growth assumptions. Chapter 6 contains the growth projections for each of the stations on the West Highland Lines for both growth scenarios. The total growth figures are contained within Table 2.1.

**Table 2-1: Average Passenger Growth Rates**

<b>Year</b>	<b>Pessimistic Annual Growth Rate</b>	<b>Optimistic Annual Growth Rate</b>
2005/06	2.8%	3.9%
2006/07	2.3%	3.3%
2007/08	1.5%	2.5%
2008/09	1.3%	2.3%
2009/10	2.3%	3.3%
2010/11	5.9%	10.2%
2011/12	2.3%	3.0%
2012/13	2.1%	2.8%
2013/14	1.9%	2.6%
2014/15	1.7%	2.3%
2015/16	1.7%	2.3%
2016/17	1.9%	2.4%
2017/18	2.2%	2.4%
2018/19	2.2%	2.4%
2019/20	2.2%	2.4%
15 Year %	40.3%	60.1%



2.5.3 The growth factors were applied to the base year demand forecast to obtain the forecast of demand over the coming years. After 2020 it is assumed that no further growth occurs. This assumption was made to ensure that the appraisal results are robust.

## 2.6 ***Methodology: Economic Appraisal***

2.6.1 The final stage of the methodology was to carry out an economic appraisal of the proposed timetable enhancements and hence produce a Transport Economic Efficiency (TEE) table in line with STAG<sup>2</sup>.

2.6.2 In order to undertake this appraisal the costs and benefits of the improvements were quantified. The quantifiable benefits come in the form of the generalised journey time saved, with new users obtaining half the benefits of existing users (following the rule of a half contained within STAG).

2.6.3 The additional costs of operating the new timetable are estimated to provide the cost elements for the appraisal process. These costs are mainly taken from the Habtrans report and professional experience and fall into three categories:

- **Mileage Based Costs:** As there will be a higher annual rolling stock mileage operating costs in the form of fuel and track access charges will increase accordingly.
- **Train Lease Costs:** An additional train will need to be leased during the winter months to operate the new timetable.
- **Staffing Costs:** The additional services will need to be staffed by additional drivers and conductors. This will lead to an increase in the annual wage costs.

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<sup>2</sup> *Scottish Transport Appraisal Guidance*

## 3 Demand Forecasting

### 3.1 *Introduction*

3.1.1 A demand forecast has been prepared for all stations appearing in the West Highlands timetable 2008 under both optimistic (higher) and pessimistic (lower) demand scenarios. The forecasts are derived using the methodology outlined in Chapter 2 of this report and incorporate the impact of the timetable change and underlying rail growth in the region.

### 3.2 *Base Demand*

3.2.1 It is necessary to prepare an accurate base case demand in order to effectively forecast demand into the future. The industry standard LENNON ticket data was provided by First ScotRail for the purpose of this task, including ticket sales data for all stations within the study area to all other stations in the mainland UK.

3.2.2 The derived base demand data set includes flows to and from all stations within the study area and those to and from study area stations to all other stations in mainland Great Britain. Stations not in the study area are classified as 'external stations' in this report.

3.2.3 A simple process of removing double counted entries from the LENNON data and a summation was used to derive the total number of journeys between two stations. This data is then summed to provide total entries and exits at each station<sup>3</sup>.

3.2.4 Table 3.1 shows the derived demand for each station in the study area. Note that demand at Tyndrum Lower and Upper Tyndrum has been estimated using the ratio 0.002:0.998.

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<sup>3</sup> Note that total boardings and alightings at a station may differ from entries and exits. This is because entries and exits do not account for interchange demand.

**Table 3-1: Base Demand 2008**

<b>Station</b>	<b>Line Section</b>	<b>Entries and Exits (2008, '000s)</b>
Glasgow Queen St	Glasgow - Crianlarich	1,003.9
Westerton	Glasgow - Crianlarich	633.5
Dalmuir	Glasgow - Crianlarich	618.4
Dumbarton Central	Glasgow - Crianlarich	662.8
Helensburgh (All Stations)	Glasgow - Crianlarich	295.1
Garelochhead	Glasgow - Crianlarich	5.2
Arrochar & Tarbet	Glasgow - Crianlarich	9.6
Ardlui	Glasgow - Crianlarich	1.9
Crianlarich	Glasgow - Crianlarich	11.2
Tyndrum Lower	Crianlarich - Oban	0.0
Dallmally	Crianlarich - Oban	3.7
Loch Awe	Crianlarich - Oban	2.3
Falls of Cruachan	Crianlarich - Oban	0.2
Taynuilt	Crianlarich - Oban	9.9
Connel Ferry	Crianlarich - Oban	4.1
Oban	Crianlarich - Oban	109.3
Upper Tyndrum	Crianlarich - Fort William	7.7
Bridge of Orchy	Crianlarich - Fort William	5.5
Rannoch	Crianlarich - Fort William	16.7
Corrour	Crianlarich - Fort William	13.0
Tulloch	Crianlarich - Fort William	2.3
Roy Bridge	Crianlarich - Fort William	3.7
Spean Bridge	Crianlarich - Fort William	5.4
Fort William	Crianlarich - Fort William	115.5
Banavie	Fort William - Mallaig	3.5
Corpach	Fort William - Mallaig	2.3
Loch Eil Outward Bound	Fort William - Mallaig	0.9
Locheilside	Fort William - Mallaig	0.3
Glenfinnan	Fort William - Mallaig	5.2
Lochailort	Fort William - Mallaig	1.5
Beasdale	Fort William - Mallaig	0.2
Arisaig	Fort William - Mallaig	6.7
Morar	Fort William - Mallaig	3.5
Mallaig	Fort William - Mallaig	60.2
External Stations	Other	1,211.3
<b>Total (Excluding External Stations)</b>		<b>3,625.2</b>

3.2.5 The totals in the table have been audited using the Office of the Rail Regulator's (ORR) Station Usage data 2006-07. All stations can be broadly reconciled against these figures with the exception of Glasgow Queen Street and Helensburgh. The demand figures for these stations reported in Table 3.1 are considerably less than observed demand at these stations. This can be attributed to:

- Glasgow Queen Street: a file of LENNON data for this station was not provided and as such the demand figure in our base excludes trips from Glasgow to external stations;
- Helensburgh: tickets for this station are attributed to Helensburgh BR, Upper or Central in the LENNON data and in MOIRA. The discrepancy is likely to be caused by different allocation of these tickets to Helensburgh Upper and Helensburgh Central in MOIRA and in the LENNON data set. However, the lower figure reported in Table 3.1 is unlikely to have a detrimental effect on the output of the appraisal.

3.2.6 The base case provides a reference on which to forecast demand.

### 3.3 *Timetabled Service Enhancements*

3.3.1 The proposed timetable enhancements are taken from the Glasgow – Oban Service Enhancements Study undertaken by Habtrans at the start of 2008. The timetable that has been tested within this study is Option 2b within that report.

3.3.2 The main proposed changes are the increase of services between Glasgow and Oban from three to five trains per day throughout the year. This provides a better spread of services throughout the day. An early morning arrival at Glasgow (an extension of the existing Arrochar to Glasgow Queen Street service) coupled with a late afternoon departure leads to more opportunities for commuting.

3.3.3 In addition the later evening departure from Glasgow improves connections from the south linking with services from Edinburgh and London.

### 3.4 *Assumptions*

3.4.1 The demand forecast has been prepared with the following assumptions:

- LENNON data is the most appropriate source of data to determine demand on each flow and therefore is used to produce a base demand matrix;

- MOIRA is the most appropriate tool by which to determine demand change based on a timetable change and therefore is used to determine an uplift on the base demand for the timetable change;
- As MOIRA does not report all flows, a demand uplift is derived from the MOIRA output to be applied to base case demand to forecast the impact of the timetable change on demand;
- The appropriate service related demand uplift factor is applied to flows subsequent to the timetable change in a consistent manner;
- General demand growth is taken from Halcrow's Highlands and Islands Rail Traffic Growth Projections report (2005) – updated for recent economic events – and applied to each flow based on the 'producer'<sup>4</sup> station. An optimistic scenario of higher demand growth and a pessimistic scenario of lower demand growth are forecast;
- Demand growth is assumed to be 0% per annum post-2020; and
- Demand ramp up is not assessed.

### 3.5

#### ***Demand Forecast***

#### 3.5.1

The overall results of the demand forecast in the study region are reported in Tables 3.2 and 3.3 for a selection of key years.

**Table 3-2: Total Journeys in Study Area – Optimistic Demand**

	Journeys ('000s) - Optimistic Demand				
	2008	2009	2010	2015	2020
<b>Total Journeys</b>					
Do-Minimum	2,418	2,463	2,532	3,053	3,428
Central Case	2,418	2,463	2,544	3,067	3,444
Increment	0	0	12	14	16
<b>CAGR</b>					
Do-Minimum		1.85%	2.82%	3.81%	2.35%
Central Case		1.85%	3.29%	3.81%	2.34%

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<sup>4</sup> The 'producer' is the station at which a single or return trip starts.

**Table 3-3: Total Journeys in Study Area - Pessimistic Demand**

	Journeys ('000s) - Pessimistic Demand				
	2008	2009	2010	2015	2020
<b>Total Journeys</b>					
Do-Minimum	2,418	2,447	2,501	2,868	3,184
Central Case	2,418	2,447	2,512	2,881	3,199
Increment	0	0	12	13	15
<b>CAGR</b>					
Do-Minimum		1.20%	2.18%	2.78%	2.11%
Central Case		1.20%	2.65%	2.78%	2.11%

3.5.2 The tables show that demand is expected to grow between 1.8 and 3.8% annually between the years 2008 and 2020 in the optimistic demand scenario, representing an increase in demand over the base of 1,026,000. The result of the timetable change is a higher growth rate of 3.3% between 2009 and 2010, implying that the timetable increases the total number of journeys by 12,000 or 0.47%. Whilst the demand growth in general is less under the pessimistic demand scenario assumptions, the impact of the timetable change is similar at 0.47% between 2009 and 2010.

3.5.3 However, Tables 3.2 and 3.3 show the growth in the study area as a whole including flows that are only marginally affected or not affected at all by the timetable change. Tables 3.4 to 3.7 show the impact on station entries and exits<sup>5</sup> of the timetable change on different sections of the study area rail network.

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<sup>5</sup> Note that station entries and exits are expected to be twice the number of journeys.

**Table 3-4: Station Entries and Exits ('000s) by Corridor – Optimistic Demand**

	Station Entries and Exits ('000s) - Optimistic Demand				
	2008	2009	2010	2015	2020
<b>Do-Minimum - Entries and Exits</b>					
Glasgow - Crianlarich	3,242	3,299	3,390	4,079	4,576
Crianlarich - Oban	129	132	137	168	188
Crianlarich - Fort William	170	174	180	216	244
Fort William - Mallaig	84	86	89	108	123
Other	1,211	1,234	1,269	1,534	1,725
Total	4,837	4,926	5,065	6,106	6,856
<b>Optimistic Demand - Entries and Exits</b>					
Glasgow - Crianlarich	3,242	3,299	3,404	4,096	4,595
Crianlarich - Oban	129	132	144	177	199
Crianlarich - Fort William	170	174	180	217	245
Fort William - Mallaig	84	86	89	108	123
Other	1,211	1,234	1,270	1,535	1,726
Total	4,837	4,926	5,088	6,134	6,888

**Table 3-5: Change in Station Entries and Exits – Optimistic Demand**

	Change in Station Entries and Exits - Optimistic Demand				
	2008	2009	2010	2015	2020
<b>Do-Minimum - Demand Growth</b>					
Glasgow - Crianlarich		1.78%	2.75%	3.77%	2.33%
Crianlarich - Oban		2.29%	3.24%	4.20%	2.30%
Crianlarich - Fort William		2.28%	3.26%	3.79%	2.49%
Fort William - Mallaig		2.32%	3.30%	4.02%	2.50%
Other		1.87%	2.84%	3.87%	2.37%
Total		1.85%	2.82%	3.81%	2.35%
<b>Optimistic Demand - Demand Growth</b>					
Glasgow - Crianlarich		1.78%	3.18%	3.77%	2.33%
Crianlarich - Oban		2.29%	9.06%	4.20%	2.30%
Crianlarich - Fort William		2.28%	3.62%	3.79%	2.49%
Fort William - Mallaig		2.32%	3.34%	4.02%	2.50%
Other		1.87%	2.93%	3.87%	2.37%
Total		1.85%	3.29%	3.81%	2.34%

**Table 3-6: Station Entries and Exits ('000s) by Corridor - Pessimistic Demand**

	Station Entries and Exits ('000s) - Pessimistic Demand				
	2008	2009	2010	2015	2020
<b>Do-Minimum - Entries and Exits</b>					
Glasgow - Crianlarich	3,242	3,281	3,353	3,849	4,276
Crianlarich - Oban	129	131	135	157	174
Crianlarich - Fort William	170	172	175	197	216
Fort William - Mallaig	84	85	87	98	107
Other	1,211	1,226	1,252	1,436	1,593
Total	4,837	4,895	5,001	5,736	6,367
<b>Pessimistic Demand - Entries and Exits</b>					
Glasgow - Crianlarich	3,242	3,281	3,367	3,865	4,294
Crianlarich - Oban	129	131	142	166	184
Crianlarich - Fort William	170	172	176	197	217
Fort William - Mallaig	84	85	87	98	107
Other	1,211	1,226	1,253	1,437	1,595
Total	4,837	4,895	5,024	5,763	6,397

**Table 3-7: Change in Station Entries and Exits - Pessimistic Demand**

	Change in Station Entries and Exits - Pessimistic Demand				
	2008	2009	2010	2015	2020
<b>Do-Minimum - Demand Growth</b>					
Glasgow - Crianlarich		1.22%	2.19%	2.80%	2.13%
Crianlarich - Oban		1.56%	2.52%	3.08%	2.12%
Crianlarich - Fort William		0.96%	1.94%	2.36%	1.95%
Fort William - Mallaig		0.89%	1.88%	2.41%	1.92%
Other		1.19%	2.16%	2.78%	2.10%
Total		1.20%	2.18%	2.78%	2.11%
<b>Pessimistic Demand - Demand Growth</b>					
Glasgow - Crianlarich		1.22%	2.61%	2.80%	2.13%
Crianlarich - Oban		1.56%	8.30%	3.08%	2.12%
Crianlarich - Fort William		0.96%	2.30%	2.36%	1.95%
Fort William - Mallaig		0.89%	1.91%	2.41%	1.92%
Other		1.19%	2.25%	2.78%	2.10%
Total		1.20%	2.65%	2.78%	2.11%



- 3.5.4 The tables show that the increase in demand reported in Tables 3.2 and 3.3 is driven mainly by increase in demand on the Crianlarich – Oban (8.3%/9.1% between 2009 and 2010) section of the network, as expected. This is because the service benefit is most pronounced for this section and implies that the timetable change is directly responsible for a 5.8% uplift in demand under both optimistic demand assumptions and pessimistic demand assumptions at the stations on the route. It is notable that a small increase in demand on all other sections is also forecast.
- 3.5.5 Tables 3.8 and 3.9 show the growth in station entries and exits at individual stations in the network for the two years either side of the timetable change.

**Table 3-8: Analysis of Station Entries and Exits by Station – Optimistic Demand**

	Station Entries and Exits ('000s)			Growth Rates	
	Do-Minimum		Optimistic Demand	Do- Minimum	Optimistic Demand
	2009	2010	2010	2009/10	2009/10
Glasgow Queen St	1,022	1,050	1,058	2.77%	3.55%
Westerton	644	660	660	2.59%	2.59%
Dalmuir	629	645	647	2.61%	2.97%
Dumbarton Central	676	695	695	2.91%	2.91%
Helensburgh (All Stations)	301	310	311	3.00%	3.37%
Garelochhead	5	5	6	3.00%	18.75%
Arrochar & Tarbet	10	10	11	2.79%	10.51%
Ardlui	2	2	2	3.00%	19.94%
Crianlarich	11	12	13	3.06%	9.85%
Tyndrum Lower	0	0	0	3.02%	7.24%
Dallmally	4	4	4	3.08%	13.00%
Loch Awe	2	2	3	2.96%	14.39%
Falls of Cruachan	0	0	0	3.19%	7.60%
Taynuilt	10	10	11	3.04%	11.52%
Connel Ferry	4	4	5	3.23%	10.97%
Oban	112	115	121	3.27%	8.52%
Upper Tyndrum	8	8	8	3.02%	7.25%
Bridge of Orchy	6	6	6	3.09%	2.84%
Rannoch	17	18	18	3.22%	3.16%
Corrour	13	14	14	3.19%	3.06%
Tulloch	2	2	2	3.24%	3.16%
Roy Bridge	4	4	4	3.32%	5.18%
Spean Bridge	6	6	6	3.32%	5.48%
Fort William	118	122	122	3.29%	3.42%
Banavie	4	4	4	3.31%	3.73%
Corpach	2	2	2	3.32%	3.62%
Loch Eil Outward Bound	1	1	1	3.36%	3.15%
Locheilside	0	0	0	3.27%	3.27%
Glenfinnan	5	5	5	3.28%	3.11%
Lochailort	2	2	2	3.33%	3.46%
Beasdale	0	0	0	3.31%	3.31%
Arisaig	7	7	7	3.32%	3.17%
Morar	4	4	4	3.29%	2.43%
Mallaig	62	64	64	3.30%	3.39%
External Stations	1,234	1,269	1,270	2.84%	2.93%

**Table 3-9: Analysis of Station Entries and Exits by Stations -Pessimistic Demand**

	Station Entries and Exits (‘000s)			Growth Rates	
	Do-Minimum		Pessimistic Demand	Do- Minimum	Pessimistic Demand
	2009	2010	2010	2009/10	2009/10
Glasgow Queen St	1,017	1,039	1,047	2.23%	3.02%
Westerton	641	655	655	2.14%	2.14%
Dalmuir	626	640	642	2.18%	2.54%
Dumbarton Central	671	685	685	2.15%	2.15%
Helensburgh (All Stations)	299	306	307	2.22%	2.59%
Garelochhead	5	5	6	2.38%	18.06%
Arrochar & Tarbet	10	10	11	2.14%	9.82%
Ardlui	2	2	2	2.28%	19.09%
Crianlarich	11	12	12	2.28%	9.04%
Tyndrum Lower	0	0	0	2.34%	6.53%
Dallmally	4	4	4	2.45%	12.33%
Loch Awe	2	2	3	2.39%	13.77%
Falls of Cruachan	0	0	0	2.49%	6.89%
Taynuilt	10	10	11	2.46%	10.90%
Connel Ferry	4	4	5	2.58%	10.28%
Oban	111	114	120	2.52%	7.74%
Upper Tyndrum	8	8	8	2.34%	6.53%
Bridge of Orchy	6	6	6	2.18%	1.93%
Rannoch	17	17	17	1.66%	1.60%
Corrour	13	13	13	1.98%	1.86%
Tulloch	2	2	2	1.82%	1.74%
Roy Bridge	4	4	4	1.83%	3.67%
Spean Bridge	5	6	6	1.92%	4.05%
Fort William	117	119	119	1.94%	2.07%
Banavie	4	4	4	1.73%	2.15%
Corpach	2	2	2	1.79%	2.08%
Loch Eil Outward Bound	1	1	1	1.97%	1.77%
Locheilside	0	0	0	1.72%	1.72%
Glenfinnan	5	5	5	1.74%	1.57%
Lochailort	2	2	2	1.89%	2.01%
Beasdale	0	0	0	1.86%	1.86%
Arisaig	7	7	7	1.86%	1.71%
Morar	4	4	4	1.76%	0.92%
Mallaig	61	62	62	1.91%	2.00%
External Stations	1,226	1,252	1,253	2.16%	2.25%

3.5.6 The table shows that the largest increases in demand are at stations between Helensburgh and Crianlarich and Crianlarich and Oban. This is consistent with the improvement in service provision. The largest increases in demand are closer to Glasgow, as trips to Glasgow represent that largest proportion of trips overall and the service improvement is greatest as a proportion of journey time closer to Glasgow. The increase in growth between Glasgow and Helensburgh and Crianlarich and Mallaig attributable to the service change are less pronounced due to the existing frequency of service and the proximity of the stations to the service change respectively.

### 3.6 ***Empirical Assessment***

3.6.1 As discussed in the methodology in Chapter 2 an empirical method of applying a demand uplift of 5.4% per frequency increase was used at each station. The percentage increase in demand forecast at each of the stations to the north of Helensburgh is given in Table 3.10 and compared with the forecast produced within MOIRA.

3.6.2 It can be seen that the two forecasts are in the same region with the MOIRA forecast being the more conservative of the two. As the issue would be that MOIRA might overestimate demand on low frequency lines this comparison provides confidence in the MOIRA demand figures.

Table 3-10: Comparison of % Change in Demand Forecast by MOIRA and by the Empirical Approach

Station	Forecast % Increase in Demand	
	MOIRA	Empirical Approach
Garelochhead	15.3%	10.2%
Arrochar & Tarbet	7.5%	4.5%
Ardlui	16.4%	12.5%
Crianlarich	6.6%	5.8%
Tyndrum Lower	4.1%	8.1%
Dallmally	9.6%	10.8%
Loch Awe	11.1%	10.5%
Falls of Cruachan	4.3%	10.8%
Taynuilt	8.2%	10.8%
Connel Ferry	7.5%	10.6%
Oban	5.1%	10.6%
Upper Tyndrum	4.1%	8.1%
Bridge of Orchy	-0.2%	1.6%
Rannoch	-0.1%	0.3%
Corrour	-0.1%	2.7%
Tulloch	-0.1%	4.4%
Roy Bridge	1.8%	5.4%
Spean Bridge	2.1%	5.4%
Fort William	0.1%	2.1%
Banavie	0.4%	1.6%
Corpach	0.3%	1.0%
Loch Eil Outward Bound	-0.2%	1.2%
Locheilside	0.0%	0.1%
Glenfinnan	-0.2%	0.6%
Lochailort	0.1%	0.9%
Beasdale	0.0%	1.6%
Arisaig	-0.1%	1.0%
Morar	-0.8%	0.7%
Mallaig	0.1%	1.3%
<b>Overall</b>	<b>2.5%</b>	<b>4.9%</b>

### 3.7

#### *Summary and Comments*

##### 3.7.1

The results of the demand forecast imply an increase in the number of journeys over the do-minimum of 12,000 in the first full year of operation, an increase of approximately 0.5% for the study area. This is the case in both the optimistic and pessimistic demand scenarios.

- 3.7.2 Demand is forecast to increase by approximately 7,000 station entries and exits per annum over the do-minimum at stations between Crianlarich and Oban, an uplift of approximately 5%. This figure is consistent with observed and forecast demand uplifts in other areas of the rail network.
- 3.7.3 The results presented above, specifically growth rates at the study area level and on the Glasgow to Crianlarich corridor, are biased slightly by missing and uncertain flows from Glasgow and Helensburgh, although this is not expected to have a detrimental affect on the appraisal.

## 4 Economic and Financial Appraisal

### 4.1 *Introduction*

4.1.1 An economic and financial appraisal has been prepared to assess the impacts of the proposed timetable change as discussed in Chapter 3. This appraisal has been developed using the optimistic and pessimistic demand forecasts presented in the previous section and the results of the MOIRA run, in accordance with the appraisal methodology recorded in Chapter 2. The appraisal is produced using guidance contained within the 2008 revised Scottish Transport Appraisal Guidance (STAG) and WebTAG.

### 4.2 *Key Assumptions*

4.2.1 As with all appraisals it has been necessary to define assumptions and a methodology to apply these assumptions. Assumptions are taken from STAG or WebTAG and are reported in full in the annex of supplementary information.

4.2.2 Some of the key assumptions and methods are presented below:

- **Appraisal:** A standard 60 year appraisal is produced starting from the scheme opening year of 2010 (the timetable change is December 2009). Prices are 2002 market prices discounted using the standard rates to the current year, 2008;
- **Costs:** Service related costs are derived from the February 2008 Habtrans Consultancy report entitled 'Glasgow – Oban Service Enhancements'. Other sources of information are HITRANS, First ScotRail, the Office of the Rail Regulator and the consultant's experience. Costs are discussed in greater detail in the following sub-section;
- **Scheme impacts:** the magnitude of the impacts of the timetable change are derived using MOIRA and extend to demand change, value of travel time change and revenue change. As MOIRA outputs only demand data for flows where one of these aspects has changed, the MOIRA output has been used to derive marginal benefits and revenues to be applied to the base data;
- **Financial impacts:** the operator is assumed to absorb additional scheme costs and will be compensated for the change in their financial position by Transport Scotland;

- **Impacts as a result of mode switching:** It is assumed that 75% of additional demand is car users switching to rail and 25% is induced. The station to station distance output from MOIRA is used as an estimate for the road distance between stations. Impacts associated with a reduction in car travel (including accident savings and indirect taxation) are derived per car kilometre avoided and included in the appraisal;
- **Incidence of benefits:** it is assumed that all rail users in the region are travelling as either a commuter or for leisure, implying no business user benefit.

### 4.3

#### **Costs**

#### 4.3.1

The scheme involves a change to the timetable only and as such all scheme costs are related to the additional requirements to operate the changed service. The following costs have been identified:

- **Staff:** the Habtrans report indicates that an additional 8 staff will be required, at a cost in 2008 prices of £350,000;
- **Vehicle Leasing:** through consultation with First ScotRail and HITRANS, it has been determined that the availability of rolling stock may be limited. Therefore, the cost to hire one additional Class 156 unit is included at an estimated £250,000 in 2008 prices;
- **Variable costs:** the enhanced service is expected to result in an additional 75,000 miles, with the following associated costs:
  - *Fuel:* at £0.35/mile in 2007 prices, estimated based on consultant's experience;
  - *Variable usage charge:* at £0.10/mile in 2004 prices, estimated for a Class 156 using ORR's Track Usage Price List 2004;
  - *Capacity Charge:* at £0.01/mile in 2004 prices, estimated for First ScotRail using ORR's List of Capacity Charge Rates 2004;
  - *Fixed Track Access Charge:* at £2.00/mile in 2007 prices, estimated based on consultant's experience; and
  - *Access Charge Supplements:* assumed to be not applicable.

#### 4.3.2

Table 4.1 summarises the opening year costs of operating the additional service in 2008 prices and outturn costs. Note that these costs include 10% contingency on operating costs and are not market prices.



**Table 4-1: Summary of Opening Year Scheme Costs**

<b>Cost Item</b>	<b>Units Required</b>	<b>Unit Costs (2008 Prices, '000s)</b>	<b>Total Cost (2008 Prices, '000s)</b>	<b>Outturn Costs ('000s)</b>
Staff	8.00	48	385	410
Class 156 Units	0.67	275	183	195
Fuel	74,496	0	42	45
Variable Usage Charge	74,496	0	9	10
Capacity Charge	74,496	0	1	1
Fixed Track Access Charge	74,496	0	171	183
Access Charge Supplements	74,496	0	0	0
<b>Total</b>			<b>792</b>	<b>844</b>

4.3.3 The table shows that the total cost in 2008 prices is £790,000, with an expected outturn of £840,000. Staff costs contribute the most to the additional operating costs, with sizeable contributions associated with the lease of the additional Class 156 unit and the Fixed Track Access Charge.

4.3.4 Further cost related assumptions include:

- **Inflation:** costs are assumed to be constant in real terms over the appraisal period; and
- **Optimism bias:** as there is no investment or renewal cost element, optimism bias is applied at a rate of 0%.

#### 4.4 ***Benefits and Revenues***

4.4.1 Transport projects involving timetable changes are likely to result in the following impacts:

- Travel time changes;
- Farebox revenue changes;
- Road vehicle kilometre changes, leading to:
  - Changes in congestion levels;
  - Environmental impacts, including noise, air quality and climate changes impacts;
  - Accident cost changes;
  - Changes in impacts to infrastructure;

- Other transport impacts:
  - Changes in public transport reliability;
  - Option values;
- Wider economic impacts.

4.4.2 As part of this study, an attempt has been made to value the impact of travel time changes, farebox revenue changes, benefits as a result of changes in road vehicle usage and changes in public transport reliability. Wider economic impacts, which could be significant given the current poor service levels to Oban, are not estimated quantitatively but are commented upon in the Appraisal Summary Tables (ASTs).

4.4.3 Tables 4.2 and 4.3 summarise the impacts of the service enhancements in the opening year, excluding the impact on farebox revenue.

**Table 4-2: Summary of Opening Year Benefits – Optimistic Demand**

	Optimistic Demand	
	Value (£000s, 2008 Prices)	% of Total
Travel Time Savings	1,002	86.41%
Consumer Users	1,002	86.41%
Business Users	0	0.00%
Vehicle Operating Costs	50	4.35%
Consumer Users	50	4.35%
Business Users	0	0.00%
External Impacts	107	9.24%
Total	1,160	100.00%

**Table 4-3: Summary of Opening Year Benefits - Pessimistic Demand**

	Pessimistic Demand	
	Value (£000s, 2008 Prices)	% of Total
Travel Time Savings	989	86.41%
Consumer Users	989	86.41%
Business Users	0	0.00%
Vehicle Operating Costs	50	4.35%
Consumer Users	50	4.35%
Business Users	0	0.00%
External Impacts	106	9.24%
Total	1,144	100.00%

4.4.4 Travel time savings account for 86% of the total annual scheme benefit, providing a benefit to society of £1 million in 2010. Of this, 5% (4% of total benefits) are decongestion benefits, arising as fewer people commute into Glasgow by car. Benefits attributable to a reduction in car kilometres and improvements in transport reliability contribute 14% to a total benefit in 2010 of £1.2 million. The magnitude of the benefits under the pessimistic demand assumptions are slightly lower as fewer passengers are forecast to benefit from the service enhancement.

4.4.5 Tables 4.4 and 4.5 show the expected revenue change in 2008 prices and outturn revenue.

**Table 4-4: Opening Year Revenue – Optimistic Demand**

	Total Revenue (2008 Prices, £'000s)	Outturn Revenue (£'000s)
Revenue (Increment)	357	381

**Table 4-5: Opening Year Revenue - Pessimistic Demand**

	Total Revenue (2008 Prices, £'000s)	Outturn Revenue (£'000s)
Revenue (Increment)	352	376

4.4.6 The table shows that the increase in revenue under the optimistic demand assumptions is approximately £360,000 in 2008 prices, or £380,000 in outturn revenue. Analysis of the MOIRA output reveals that the revenue per additional journey is £17 in 2008 prices. Revenue generated in the scenario with pessimistic demand growth is approximately 1.5% lower.

4.5 ***Financial Appraisal***

4.5.1 Tables 4.6 and 4.7 report a comparison of costs and revenues for the two demand scenarios.

**Table 4-6: Summary Financial Appraisal – Optimistic Demand**

	Value (£'000s) - Optimistic Demand			
	2010	2015	2020	2010-2020
2008 Prices				
Costs (Incremental)	792	792	792	8,713
Revenue (Incremental)	357	458	541	5,028
Surplus	-435	-334	-251	-3,685
Outturn				
Costs (Incremental)	844	955	1,081	10,541
Revenue (Incremental)	381	552	738	6,138
Surplus	-464	-403	-343	-4,403

**Table 4-7: Summary Financial Appraisal - Pessimistic Demand**

	Value (£'000s) - Pessimistic Demand			
	2010	2015	2020	2010-2020
2008 Prices				
Costs (Incremental)	792	792	792	8,713
Revenue (Incremental)	352	428	500	4,717
Surplus	-440	-364	-293	-3,996
Outturn				
Costs (Incremental)	844	955	1,081	10,541
Revenue (Incremental)	376	516	682	5,752
Surplus	-469	-439	-399	-4,789

4.5.2

The tables show that the additional operating cost of the service enhancement clearly exceeds the additional revenue generated from the additional demand. In the opening year, 2010, the service would need to be supported by a subsidy of £0.45 million in 2008 prices under both demand assumptions. Although the subsidy required increases in outturn costs, the equivalent value in 2008 prices declines as the quantity of additional journeys over and above the do-minimum continues to increase. In total, the service would require a subsidy of £3.7 million under optimistic demand assumptions in 2008 prices over the 11 years 2010 to 2020. This figure increases to £4.0 million under the pessimistic demand assumptions.

4.5.3 The revenue to cost ratio implied here is 0.44-0.45 in the opening year, implying that the scheme does not represent value for money from a financial perspective.

4.6 ***Economic Appraisal***

4.6.1 Summary NATA appraisal tables are reported in Tables 4.8 and 4.9 and the relevant sections of the STAG 2008 AST table are presented towards the end of this subsection. For completeness, a full set of WebTAG NATA tables are included in the annex of supplementary information towards the end of this report, providing a detailed breakdown of benefits and costs.

**Table 4-8: Summary NATA Summary Table – Optimistic Demand**

	<b>Optimistic Demand (£m, 2002 Prices)</b>
Present Value Benefits	28.0
<i>Consumer Users</i>	24.1
<i>Business Users</i>	0.0
<i>Private Sector Providers</i>	0.0
<i>Other</i>	3.9
Present Value Costs	5.6
<i>Local Government</i>	0.0
<i>Central Government</i>	5.6
Net Present Value	22.4
Benefit:Cost	5.0

**Table 4-9: Summary NATA Summary Table - Pessimistic Demand**

	<b>Pessimistic Demand (£m, 2002 Prices)</b>
Present Value Benefits	26.0
<i>Consumer Users</i>	22.4
<i>Business Users</i>	0.0
<i>Private Sector Providers</i>	0.0
<i>Other</i>	3.7
Present Value Costs	6.6
<i>Local Government</i>	0.0
<i>Central Government</i>	6.6
Net Present Value	19.4
Benefit:Cost	3.9

- 4.6.2 The present value benefit of the scheme under the optimistic demand assumptions is £28.0 million in 2002 prices, and consists of:
- Travel time savings: £36.8 million;
  - Vehicle operating cost savings: £1.3 million;
  - User charge savings: (-)£14.1 million;
  - External benefits: £3.9 million.
- 4.6.3 The present value cost of the scheme is £5.6 million, and consists of:
- Subsidy payment: £5.0 million; and
  - Indirect taxation lost: £0.7 million.
- 4.6.4 Overall, the net present value of the scheme under the optimistic demand scenario is £22.4 million, yielding a benefit to cost ratio of 5.0. This implies that, for every £1.00 spent on the supporting the scheme, £5.00 of benefits will be returned.
- 4.6.5 The present value benefit of the scheme under the pessimistic demand scenario assumptions is £26.0 million in 2002 prices, and consists of:
- Travel time savings: £34.2 million;
  - Vehicle operating cost savings: £1.2 million;
  - User charge savings: (-)£13.1 million;
  - External benefits: £3.7 million.
- 4.6.6 The present value cost of the scheme is £6.6 million, and consists of:
- Subsidy payment: £6.0 million; and
  - Indirect taxation lost: £0.6 million.
- 4.6.7 Overall, in the pessimistic scenario the net present value of the scheme is £19.4 million, yielding a benefit to cost ratio of 3.9. This implies that, for every £1.00 spent on the supporting the scheme, £3.90 of benefits will be returned.
- 4.6.8 Under the guidelines contained within STAG, this result of the appraisals under optimistic and pessimistic demand growth show the scheme to represent excellent value for money and it is strongly recommended that this scheme is taken forward for further consideration.

4.6.9

The results of the appraisal are summarised in the economy sections of the STAG 2008 ASTs below.

**Table 4-10: Appraisal Summary Table – Optimistic Demand**

<b>Economy (Transport Economic Efficiency)</b>			
<b>Sub-criterion</b>	<b>Item</b>	<b>Qualitative Information</b>	<b>Quantitative Information</b>
User Benefits	Travel Time	Travel time savings from reduced serviced intervals (95%) and a reduction in car journeys into Glasgow (5%)	£36.8 million
	User Charges	Increase in fares as rail patronage increases	-£14.1 million
	Vehicle Operating Costs	Reduction in car journeys as people switch modes to rail	£1.3 million
	Quality / Reliability Benefits	Reliability benefits from reduced travel times	£3.5 million
Private Sector Operator Impacts	Investment Costs	Not applicable for service enhancement	£0
	Operating & Maintenance Costs	Additional rail operating costs.	-£19.1 million
	Revenues	Increase in fares as rail patronage increases	£14.1 million
	Grant/Subsidy payments	Required so net financial position of operator is neutral	£ 5.0 million
<b>Monetised summary</b>		£24.1 million (Excludes Reliability)	
<b>Monetary Impact Ratio</b>		4.3 (Excludes Reliability)	
<b>Economy (Wider Economic Benefits)</b>			
<b>Sub-criterion</b>	<b>Item</b>	<b>Qualitative information</b>	<b>Quantitative information</b>
Wider Economic Benefits	Agglomeration economies (WB1)	Small benefit for Glasgow/Crianlarich/Oban as centres of employment can be accessed by rail more frequently	Not assessed

	Increased output in perfectly competitive markets (WB3)	-	Not assessed
	Wider benefits arising from improved labour supply (WB4)	Greater access to employment opportunities in Glasgow likely to increase employment and opportunities to find higher paid work	Not assessed
<b>Monetised summary</b>		Not assessed quantitatively	
<b>Monetary Impact Ratio</b>		Not assessed quantitatively	
<b>Economy (Economic Activity and Location Impacts)</b>			
Sub-criterion	Item	Qualitative Information	Quantitative Information
Economic Activity and Location Impacts	Local Economic Impacts	Greater accessibility to employment opportunities in Glasgow and accessibility to region by tourists likely to improve local economy	Not assessed
	National Economic Impacts	Increase in employment likely to increase national GDP.	Not assessed
	Distributional Impacts	Unemployment in region likely to improve with residents in region travelling to centres of employment. However, employment opportunities in region are likely to remain to be filled by existing residents	Not assessed

<b>Cost to Public Sector</b>		
Item	Qualitative information	Quantitative information
Public Sector Investment Costs	Not applicable for service enhancement schemes	£0
Public Sector Operating & Maintenance Costs	Service is operated privately	£0
Grant/Subsidy Payments	Support required to ensure financial position of	-£5.0 million



	operator is neutral	
Revenues	Loss of parking revenue as a result of fewer car trips is not assessed	£0
Taxation impacts	Loss in fuel purchases as car users switch to rail	-£0.7 million

Monetised Summary	
Present Value of Transport Benefits	Including external impacts reported in appraisal: £24.1 million + £3.9 million = £28.0 million
Present Value of Cost to Government	-£5.6 million
Net Present Value	£22.4 million
Benefit-Cost to Government Ratio	5.0
Benefit-Cost to Government Ratio (including WEBs)	Not assessed
Benefit-Cost to Funding Agency Ratio	5.5

**Table 4-11: Appraisal Summary Table - Pessimistic Demand**

Economy (Transport Economic Efficiency)			
Sub-criterion	Item	Qualitative Information	Quantitative Information
User Benefits	Travel Time	Travel time savings from reduced serviced intervals (95%) and a reduction in car journeys into Glasgow (5%)	£34.2 million
	User Charges	Increase in fares as rail patronage increases	-£13.1 million
	Vehicle Operating Costs	Reduction in car journeys as people switch modes to rail	£1.2 million

	Quality / Reliability Benefits	Reliability benefits from reduced travel times	£3.2 million
Private Sector Operator Impacts	Investment Costs	Not applicable for service enhancement	£0
	Operating & Maintenance Costs	Additional rail operating costs.	-£19.1 million
	Revenues	Increase in fares as rail patronage increases	£13.1 million
	Grant/Subsidy payments	Required so net financial position of operator is neutral	£ 6.0 million
<b>Monetised summary</b>		£22.4 million (Excludes Reliability)	
<b>Monetary Impact Ratio</b>		3.4 (Excludes Reliability)	
<b>Economy (Wider Economic Benefits)</b>			
<b>Sub-criterion</b>	<b>Item</b>	<b>Qualitative information</b>	<b>Quantitative information</b>
Wider Economic Benefits	Agglomeration economies (WB1)	Small benefit for Glasgow/Crianlarich/Oban as centres of employment can be accessed by rail more frequently	Not assessed
	Increased output in perfectly competitive markets (WB3)	-	Not assessed
	Wider benefits arising from improved labour supply (WB4)	Greater access to employment opportunities in Glasgow likely to increase employment and opportunities to find higher paid work	Not assessed
<b>Monetised summary</b>		Not assessed quantitatively	
<b>Monetary Impact Ratio</b>		Not assessed quantitatively	
<b>Economy (Economic Activity and Location Impacts)</b>			
<b>Sub-criterion</b>	<b>Item</b>	<b>Qualitative Information</b>	<b>Quantitative Information</b>
Economic Activity and Location Impacts	Local Economic Impacts	Greater accessibility to employment opportunities in Glasgow and accessibility to region by tourists likely to improve local economy	Not assessed

	National Economic Impacts	Increase in employment likely to increase national GDP.	Not assessed
	Distributional Impacts	Unemployment in region likely to improve with residents in region travelling to centres of employment. However, employment opportunities in region are likely to remain to be filled by existing residents	Not assessed

Cost to Public Sector		
Item	Qualitative information	Quantitative information
Public Sector Investment Costs	Not applicable for service enhancement schemes	£0
Public Sector Operating & Maintenance Costs	Service is operated privately	£0
Grant/Subsidy Payments	Support required to ensure financial position of operator is neutral	-£6.0 million
Revenues	Loss of parking revenue as a result of fewer car trips is not assessed	£0
Taxation impacts	Loss in fuel purchases as car users switch to rail	-£0.6 million

Monetised Summary	
Present Value of Transport Benefits	Including external impacts reported in appraisal: £22.4 million + £3.7 million = £26.0 million
Present Value of Cost to Government	-£6.6 million
Net Present Value	£19.4 million
Benefit-Cost to Government Ratio	3.9
Benefit-Cost to Government Ratio (including WEBs)	Not assessed

Benefit-Cost to Funding Agency Ratio	4.2
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4.7 ***Summary and Comments***

4.7.1 The results of the financial appraisal suggest that the scheme does not represent value for money from a financial perspective, with a revenue to cost ratio in the opening year of 0.44-0.45. However, the economic appraisal of the scheme yields economic benefits of £22.4 million over the appraisal lifetime assuming optimistic growth and £19.4 million assuming pessimistic growth. The associated benefit cost ratios of 5.0 and 3.9 imply that the scheme represents excellent value for money and can be taken forward with a view to implementing the scheme.

4.7.2 However, the results of the appraisal are sensitive to the assumptions made, and some aspects in particular are simplified. This includes the assumed values for external impacts. If required, further consideration may be given to the size of these impacts, and how they are calculated to increase the robustness of the appraisal.

4.7.3 Overall, the use of MOIRA software and the high percentage of scheme benefits that are attributable to travel time savings ensure that the appraisal is robust. Appraising the scheme using only travel time savings and revenue and cost changes yields a benefit to cost ratio of approximately 3.2 (pessimistic) – 4.0 (optimistic), which implies excellent value for money.

## 5 Conclusions

### 5.1 *Summary*

5.1.1 The preceding sections of this report present a demand forecast, economic and financial appraisal of enhancing rail services between Oban and Glasgow. The appraisal is conducted in line with the latest Scottish Transport Appraisal Guidance (STAG).

5.1.2 Demand is forecast to increase in the study area by an additional 12,000 journeys in the scheme opening year of 2010, an increase of 0.5%, in both the optimistic and pessimistic demand scenarios. The increase in demand is greatest at stations between and including Garelochhead and Oban. Demand growth for this corridor is forecast to increase by 9.1% in the optimistic demand scenario between 2009 and 2010. Approximately 5.8% of this demand is as a result of the timetable change.

5.1.3 The financial assessment of the scheme shows that the operating costs exceed the revenue generated by additional and reassigned patronage by a ratio of approximately 2:1. In outturn costs and revenues, the financial support required for the service enhancement is forecast to be £0.45 million in both the optimistic and pessimistic demand growth scenarios, although this masks that the subsidy required in the pessimistic scenario is greater.

5.1.4 The results of the economic appraisal are as follows:

**Table 5-1: Summary of Economic Appraisal Results**

	<b>Optimistic Demand</b>	<b>Pessimistic Demand</b>
Present Value Benefit (£m)	28.0	26.0
Present Value Cost (£m)	5.6	6.6
Net Present Value (£m)	22.4	19.4
Benefit:Cost	5.0	3.9

5.1.5 Overall, the service enhancements generate a positive return to investment, with net present values of £22.4 million in the optimistic demand growth scenario and

£19.4 million in the pessimistic demand growth scenario. The benefit to cost ratios are 5.0 and 3.9 respectively.

## 5.2

### ***Conclusions and Recommendations***

#### 5.2.1

Although the scheme will require additional subsidy support, the benefit to cost ratios derived in the economic appraisal of the service enhancements with optimistic and pessimistic demand growth assumptions imply that the scheme represents excellent value for money. Although the appraisals are based in part on a number of simplifying assumptions, 81% of the benefits are rail user travel time savings, implying that the appraisal is robust. The use of MOIRA and LENNON data provides a level of confidence in the results obtained.

#### 5.2.2

The strength of the service enhancements scheme is the relatively low cost of implementing the timetable change compared with the benefit to transport users in the study area. It is also highlighted that the scheme is likely to improve employment prospects in the region and afford tourists without a car easier access to the area. Therefore, there is a strong economic case for implementing this timetable change.

## 6

# Annex of Supplementary Information

### 6.1

#### *List of Assumptions*

#### 6.1.1

The following provides a comprehensive list of assumptions used in the demand forecast and the appraisal:

#### Demand

- **Study area:** consisting of the following stations:

**Table 6-1: Stations in Study Area**

<b>Station</b>	<b>Line Section</b>
Glasgow Queen St	Glasgow - Crianlarich
Westerton	Glasgow - Crianlarich
Dalmuir	Glasgow - Crianlarich
Dumbarton Central	Glasgow - Crianlarich
Helensburgh (All Stations)	Glasgow - Crianlarich
Garelochhead	Glasgow - Crianlarich
Arrochar & Tarbet	Glasgow - Crianlarich
Ardlui	Glasgow - Crianlarich
Crianlarich	Glasgow - Crianlarich
Tyndrum Lower	Crianlarich - Oban
Dallmally	Crianlarich - Oban
Loch Awe	Crianlarich - Oban
Falls of Cruachan	Crianlarich - Oban
Taynuilt	Crianlarich - Oban
Connel Ferry	Crianlarich - Oban
Oban	Crianlarich - Oban
Upper Tyndrum	Crianlarich - Fort William
Bridge of Orchy	Crianlarich - Fort William
Rannoch	Crianlarich - Fort William
Corrour	Crianlarich - Fort William
Tulloch	Crianlarich - Fort William
Roy Bridge	Crianlarich - Fort William
Spean Bridge	Crianlarich - Fort William
Fort William	Crianlarich - Fort William
Banavie	Fort William - Mallaig
Corpach	Fort William - Mallaig
Loch Eil Outward Bound	Fort William - Mallaig
Locheilside	Fort William - Mallaig

Station	Line Section
Glenfinnan	Fort William - Mallaig
Lochailort	Fort William - Mallaig
Beasdale	Fort William - Mallaig
Arisaig	Fort William - Mallaig
Morar	Fort William - Mallaig
Mallaig	Fort William - Mallaig
External Stations	Other

- **Study area:** external stations are all those stations external to the study area where flows to/from the study area start/end. The measure includes all trips of this type.
- **Base demand:** the base demand is derived from 2007/08 LENNON data. LENNON data reports all flows to/from study area stations and can be used to produce a matrix of demand for all flows within, from and to the study area;
- **Rail demand growth:** background rail patronage growth is taken from Halcrow Group Limited's 2005 study Highlands and Islands Rail Traffic Growth Projections, updated in line with recent and forecast economic events. The high and low growth scenarios are used to inform the optimistic and pessimistic demand scenarios in the appraisal of Oban – Glasgow Rail Service Enhancements;
- **Rail demand growth:** background rail growth is applied at the 'producer' stations;
- **Rail demand growth:** growth is assumed to be 0% per annum post-2020;
- **Impact of service change on demand:** MOIRA is used to forecast summer and winter demand given the proposed timetable change. An uplift is derived at the flow level based on MOIRA's base demand and MOIRA's forecast demand and applied to the Halcrow's base demand matrix, as defined above;
- **Service change demand uplift:** the demand uplift is assumed to be consistent as a proportion of demand throughout the appraisal period. This ignores the effect changing values of time has on mode choice and travel decisions;

#### Costs

- **Staff costs:** based on Habtrans Consultancy Limited's February 2008 report Glasgow – Oban Service Enhancements, 8 additional staff are required at a cost of £350,000 in 2008 prices;



- **Leasing costs:** based on consultation with HITRANS and First ScotRail, 1 additional Class 156 is required for the winter period at a cost of £250,000 \* 0.67 in 2008 prices;
- **Track access costs:** based on Habtrans Consultancy Limited's February 2008 report Glasgow – Oban Service Enhancements, the service enhancements will result in an additional 74,496 vehicle miles, with the following costs:
  - **Fuel:** at £0.35/mile in 2007 prices. Source: consultant's experience;
  - **Variable Usage Charge:** at £0.10/mile in 2004 prices. Source: Office of the Rail Regulator's Track Usage Price List 2004, for a Class 156;
  - **Capacity Charge:** at £0.01/mile in 2004 prices. Source: Office of the Rail Regulator's List of Capacity Charge Rates 2004, assuming 10% of vehicle miles are in Strathclyde PTE area;
  - **Fixed Track Access Charge:** at £2.00/mile in 2006 prices, based on consultant's experience;
- **Contingency:** contingency of 10% added to all operating costs;
- **Optimism bias:** optimism bias is not included as there is no capital cost expenditure;
- **Cost inflation:** costs are assumed to remain constant in real terms over the appraisal period.

#### Deriving Scheme Impacts

- **Travel time savings:** a marginal value of travel time saved is derived at the flow level from MOIRA's forecast travel time saving, MOIRA's forecast demand and MOIRA's base demand in both the summer and winter periods, and for existing and new users. The values derived are converted to total savings using Halcrow's demand forecast;
- **Revenue changes:** a marginal revenue change is derived at the flow level from MOIRA's forecast travel time saving, MOIRA's forecast demand and MOIRA's base demand in both the summer and winter periods, and for national rail and First Scotrail. The values derived are converted to total revenue change using Halcrow's demand forecast;
- **Road vehicle kilometres:** rail distance is used as an estimator for road distance for each flow. Road vehicle distance change is derived using this figure, the incremental demand between the do-something and do-minimum, and an assumed split of demand abstracted from car.

## Economic and Financial Appraisal

- **Scheme start date:** December 2009;
- **Scheme opening:** December 2009, scheme impacts from 1<sup>st</sup> January 2010;
- **Ramp up:** not assessed;
- **Appraisal period:** 60 years (STAG);
- **Price base:** 2002 (STAG);
- **Present value year:** 2008 (STAG);
- **Discount rates:** 3.5% for first 30 years from scheme opening, 3% thereafter (STAG);
- **Unit of account:** market prices;
- **Market price correction:** 1.209 (STAG);
- **Monetary standardisation:** using RPI index, financial year Q1 prices, calendar year Q2 prices. 2008 RPI value 216.8;
- **Outturn costs and revenues:** RPI inflation assumed to be 3.5% in 2009, 3% in 2010 and returning to Bank of England's target of 2.5% thereafter;
- **Revenue growth:** rail fares assumed to increase by RPI + 1% per annum in line with industry recommendations;
- **Fares base (in MOIRA):** 2007;
- **Value of time:** assumed from MOIRA results. Value of time is assumed to grow from the MOIRA base of 2000 using growth rates reported in STAG;
- **Trip purpose split (for the purposes of value of time growth):** as defined in STAG for rail passengers, except that work-time trip purpose split assumed to be 0%;
- **Abstraction:** 75% car, 25% induced, based on consultant's judgement;
- **Bus user charges:** not assessed, as abstraction from bus assumed to be 0%;
- **Freight:** not assessed;
- **Decongestion:** road journeys between Helensburgh and Glasgow assumed to be congested (assumed 51km radial from Glasgow). Decongestion benefit £0.25/km in 2002 prices (based on previous studies) for congestion areas only – estimated to be 25% of all avoided vehicle kilometres. Assumed to increase by average value of time growth;
- **Vehicle occupancy:** 1.6 people per vehicle (STAG). Assumed constant through appraisal period;

- **Road vehicle operating cost:** £0.07/km in 2002 prices, based on previous studies. Assumed to remain constant through appraisal period;
- **Indirect taxation:** £0.04/km in 2002 prices, based on previous studies. Assumed constant through appraisal period;
- Other road vehicle distance based impacts, assumed to remain constant through appraisal period:
  - **Noise pollution:** <£0.01/km in 2002 prices, based on previous studies;
  - **Local air quality:** £0.01/km in 2002 prices, based on previous studies;
  - **Climate change:** <£0.01/km in 2002 prices, based on previous studies;
  - **Accidents:** £0.03/km in 2002 prices, based on previous studies;
  - **Infrastructure:** <£0.01/km in 2002 prices, based on previous studies;
- **Journey ambience including crowding:** not assessed;
- **Reliability:** 10% of travel time savings (Consultant's experience);
- **Option values:** not assessed;
- **Wider economic benefits:** not assessed quantitatively.

## 6.2

### *NATA Tables*

### 6.2.1

A full set of NATA tables is presented below:

Table 6-2: Transport Economic Efficiency Table – Optimistic Demand

TRANSPORT ECONOMIC EFFICIENCY							
Oban - Glasgow Rail Service Enhancements - Optimistic Demand							
<i>£m in 2002 prices</i>							
CONSUMERS	ALL MODES	ROAD	BUS & COACH	RAIL		TRAM	OTHER
User Benefits	Total	Private Cars and LGVs	Passengers	Passengers		Passengers	Walkers, Cyclists Etc
Travel Time Savings	£36.8	£1.9	£0.0	£34.9		£0.0	£0.0
Amenity/Facility Benefits	£0.0	£0.0	£0.0	£0.0		£0.0	£0.0
Vehicle Operating Costs	£1.3	£1.3					£0.0
User Charges	-£14.1	£0.0	£0.0	-£14.1		£0.0	£0.0
During Construction & Maintenance	£0.0	£0.0	£0.0	£0.0		£0.0	£0.0
<b>Total Impact on Consumers</b>	<b>£24.1</b>	<b>£3.2</b>	<b>£0.0</b>	<b>£20.8</b>		<b>£0.0</b>	<b>£0.0</b>
BUSINESS	ALL MODES	ROAD	ROAD	BUS & COACH	RAIL		TRAM
User Benefits	Total	Goods Vehicles	Business Cars and LGVs	Passengers	Passengers		Passengers
Travel Time Savings	£0.0	£0.0	£0.0	£0.0	£0.0		£0.0
Amenity/Facility Benefits	£0.0	£0.0	£0.0	£0.0	£0.0		£0.0
Vehicle Operating Costs	£0.0	£0.0	£0.0				£0.0
User Charges	£0.0	£0.0	£0.0	£0.0	£0.0		£0.0
During Construction & Maintenance	£0.0	£0.0	£0.0	£0.0	£0.0		£0.0
<b>Subtotal</b>	<b>£0.0</b>	<b>£0.0</b>	<b>£0.0</b>	<b>£0.0</b>	<b>£0.0</b>		<b>£0.0</b>
BUSINESS	ALL MODES	ROAD		BUS & COACH	RAIL	RAIL	TRAM
Private Provider Impacts	Total	General		Operators	TOCs	FOCs	Operators
Revenue (Farebox)	£14.1	£0.0		£0.0	£14.1	£0.0	£0.0
Revenue (Other)	£0.0	£0.0		£0.0	£0.0	£0.0	£0.0
Operating Costs	-£19.1	£0.0		£0.0	-£19.1	£0.0	£0.0
Renewal Costs	£0.0	£0.0		£0.0	£0.0	£0.0	£0.0
Investment Costs	£0.0	£0.0		£0.0	£0.0	£0.0	£0.0
Grant/Subsidy Payments	£5.0			£0.0	£5.0	£0.0	£0.0
<b>Subtotal</b>	<b>£0.0</b>	<b>£0.0</b>		<b>£0.0</b>	<b>£0.0</b>	<b>£0.0</b>	<b>£0.0</b>
BUSINESS							
Other Business Impacts							
Developer/Other Contributions	£0.0						
<b>Subtotal</b>	<b>£0.0</b>						
<b>Total Impact on Business</b>	<b>£0.0</b>						
TOTAL							
Present Value of Transport Economic Efficiency Benefits (PVB)	£24.1						

Table 6-3: Public Accounts Table – Optimistic Demand

<b>PUBLIC ACCOUNTS</b>				
<b>Oban - Glasgow Rail Service Enhancements - Optimistic Demand</b>				
<i>£m in 2002 prices</i>				
	<b>ALL MODES</b>	<b>ROAD</b>	<b>PUBLIC TRANSPORT</b>	<b>OTHER</b>
	<b>Total</b>	<b>Infrastructure</b>	<b>All Modes</b>	<b>Infrastructure</b>
<b>LOCAL GOVERNMENT FUNDING</b>				
Revenue (Farebox)	£0.0	£0.0	£0.0	£0.0
Revenue (Other)	£0.0	£0.0	£0.0	£0.0
Operating Costs	£0.0	£0.0	£0.0	£0.0
Renewal Costs	£0.0	£0.0	£0.0	£0.0
Investment Costs	£0.0	£0.0	£0.0	£0.0
Developer & Other Contributions	£0.0	£0.0	£0.0	£0.0
Grant/Subsidy Payments	£0.0	£0.0	£0.0	£0.0
<b>Total Local Government Funding</b>	<b>£0.0</b>	<b>£0.0</b>	<b>£0.0</b>	<b>£0.0</b>
<b>CENTRAL GOVERNMENT FUNDING</b>				
	<b>ALL MODES</b>	<b>ROAD</b>	<b>PUBLIC TRANSPORT</b>	<b>OTHER</b>
	<b>Total</b>	<b>Infrastructure</b>	<b>All Modes</b>	<b>Infrastructure</b>
Revenue (Farebox)	£0.0	£0.0	£0.0	£0.0
Revenue (Other)	£0.0	£0.0	£0.0	£0.0
Operating Costs	£0.0	£0.0	£0.0	£0.0
Renewal Costs	£0.0	£0.0	£0.0	£0.0
Investment Costs	£0.0	£0.0	£0.0	£0.0
Developer & Other Contributions	£0.0	£0.0	£0.0	£0.0
Grant/Subsidy Payments	£5.0	£0.0	£5.0	£0.0
Indirect Taxation	£0.7	£0.7	£0.0	£0.0
<b>Total Central Government Funding</b>	<b>£5.6</b>	<b>£0.7</b>	<b>£5.0</b>	<b>£0.0</b>
<b>TOTAL</b>				
<b>Present Value of Costs (PVC)</b>	<b>£5.6</b>			

Note: Costs to Government appear as positive numbers, benefits as negative numbers. This is contrary to the STAG approach.

Table 6-4: Analysis of Monetised Costs and Benefits Table – Optimistic Demand

<b>ANALYSIS OF MONETISED COSTS AND BENEFITS</b>	
<b>Oban - Glasgow Rail Service Enhancements - Optimistic Demand</b>	
<i>£m in 2002 prices</i>	
<b>TRANSPORT ECONOMIC EFFICIENCY</b>	
Noise	£0.1
Local Air Quality	£0.3
Climate Change	£0.1
Journey Ambience	£0.0
Accidents	£0.0
Consumer Users	£24.1
Business Users and Providers	£0.0
Reliability	£3.5
Wider Economic Benefits	£0.0
Infrastructure	£0.0
Option Values	£0.0
<b>Present Value of Benefits (PVB)</b>	<b>£28.0</b>
<b>PUBLIC ACCOUNTS</b>	
Local Government Funding	£0.0
Central Government Funding	£5.6
<b>Present Value of Costs (PVC)</b>	<b>£5.6</b>
<b>OVERALL IMPACTS</b>	
<b>Net Present Value (NPV)</b>	<b>£22.4</b>
<b>Benefit to Cost Ratio (BCR)</b>	<b>5.0</b>

Table 6-5: Transport Economic Efficiency Table - Pessimistic Demand

TRANSPORT ECONOMIC EFFICIENCY							
Oban - Glasgow Rail Service Enhancements - Pessimistic Demand							
<i>£m in 2002 prices</i>							
CONSUMERS	ALL MODES	ROAD	BUS & COACH	RAIL		TRAM	OTHER
User Benefits	Total	Private Cars and LGVs	Passengers	Passengers		Passengers	Walkers, Cyclists Etc
Travel Time Savings	£34.2	£1.8	£0.0	£32.4		£0.0	£0.0
Amenity/Facility Benefits	£0.0	£0.0	£0.0	£0.0		£0.0	£0.0
Vehicle Operating Costs	£1.2	£1.2					£0.0
User Charges	-£13.1	£0.0	£0.0	-£13.1		£0.0	£0.0
During Construction & Maintenance	£0.0	£0.0	£0.0	£0.0		£0.0	£0.0
<b>Total Impact on Consumers</b>	<b>£22.4</b>	<b>£3.0</b>	<b>£0.0</b>	<b>£19.4</b>		<b>£0.0</b>	<b>£0.0</b>
BUSINESS	ALL MODES	ROAD	ROAD	BUS & COACH	RAIL		TRAM
User Benefits	Total	Goods Vehicles	Business Cars and LGVs	Passengers	Passengers		Passengers
Travel Time Savings	£0.0	£0.0	£0.0	£0.0	£0.0		£0.0
Amenity/Facility Benefits	£0.0	£0.0	£0.0	£0.0	£0.0		£0.0
Vehicle Operating Costs	£0.0	£0.0	£0.0				£0.0
User Charges	£0.0	£0.0	£0.0	£0.0	£0.0		£0.0
During Construction & Maintenance	£0.0	£0.0	£0.0	£0.0	£0.0		£0.0
<b>Subtotal</b>	<b>£0.0</b>	<b>£0.0</b>	<b>£0.0</b>	<b>£0.0</b>	<b>£0.0</b>		<b>£0.0</b>
BUSINESS	ALL MODES	ROAD		BUS & COACH	RAIL	RAIL	TRAM
Private Provider Impacts	Total	General		Operators	TOCs	FOCs	Operators
Revenue (Farebox)	£13.1	£0.0		£0.0	£13.1	£0.0	£0.0
Revenue (Other)	£0.0	£0.0		£0.0	£0.0	£0.0	£0.0
Operating Costs	-£19.1	£0.0		£0.0	-£19.1	£0.0	£0.0
Renewal Costs	£0.0	£0.0		£0.0	£0.0	£0.0	£0.0
Investment Costs	£0.0	£0.0		£0.0	£0.0	£0.0	£0.0
Grant/Subsidy Payments	£6.0			£0.0	£6.0	£0.0	£0.0
<b>Subtotal</b>	<b>£0.0</b>	<b>£0.0</b>		<b>£0.0</b>	<b>£0.0</b>	<b>£0.0</b>	<b>£0.0</b>
BUSINESS							
Other Business Impacts							
Developer/Other Contributions	£0.0						
<b>Subtotal</b>	<b>£0.0</b>						
<b>Total Impact on Business</b>	<b>£0.0</b>						
TOTAL							
Present Value of Transport Economic Efficiency Benefits (PVB)	£22.4						

Table 6-6: Public Accounts Table - Pessimistic Demand

<b>PUBLIC ACCOUNTS</b>				
<b>Oban - Glasgow Rail Service Enhancements - Pessimistic Demand</b>				
<i>£m in 2002 prices</i>				
	<b>ALL MODES</b>	<b>ROAD</b>	<b>PUBLIC TRANSPORT</b>	<b>OTHER</b>
<b>LOCAL GOVERNMENT FUNDING</b>	<b>Total</b>	<b>Infrastructure</b>	<b>All Modes</b>	<b>Infrastructure</b>
Revenue (Farebox)	£0.0	£0.0	£0.0	£0.0
Revenue (Other)	£0.0	£0.0	£0.0	£0.0
Operating Costs	£0.0	£0.0	£0.0	£0.0
Renewal Costs	£0.0	£0.0	£0.0	£0.0
Investment Costs	£0.0	£0.0	£0.0	£0.0
Developer & Other Contributions	£0.0	£0.0	£0.0	£0.0
Grant/Subsidy Payments	£0.0	£0.0	£0.0	£0.0
<b>Total Local Government Funding</b>	<b>£0.0</b>	<b>£0.0</b>	<b>£0.0</b>	<b>£0.0</b>
	<b>ALL MODES</b>	<b>ROAD</b>	<b>PUBLIC TRANSPORT</b>	<b>OTHER</b>
<b>CENTRAL GOVERNMENT FUNDING</b>	<b>Total</b>	<b>Infrastructure</b>	<b>All Modes</b>	<b>Infrastructure</b>
Revenue (Farebox)	£0.0	£0.0	£0.0	£0.0
Revenue (Other)	£0.0	£0.0	£0.0	£0.0
Operating Costs	£0.0	£0.0	£0.0	£0.0
Renewal Costs	£0.0	£0.0	£0.0	£0.0
Investment Costs	£0.0	£0.0	£0.0	£0.0
Developer & Other Contributions	£0.0	£0.0	£0.0	£0.0
Grant/Subsidy Payments	<b>£6.0</b>	£0.0	<b>£6.0</b>	£0.0
Indirect Taxation	<b>£0.6</b>	<b>£0.6</b>	£0.0	£0.0
<b>Total Central Government Funding</b>	<b>£6.6</b>	<b>£0.6</b>	<b>£6.0</b>	£0.0
<b>TOTAL</b>				
<b>Present Value of Costs (PVC)</b>	<b>£6.6</b>			

Note: Costs to Government appear as positive numbers, benefits as negative numbers. This is contrary to the STAG approach.



**Table 6-7: Analysis of Monetised Costs and Benefits Table - Pessimistic Demand**

<b>ANALYSIS OF MONETISED COSTS AND BENEFITS</b>	
<b>Oban - Glasgow Rail Service Enhancements - Pessimistic D</b>	
<i>£m in 2002 prices</i>	
<b>TRANSPORT ECONOMIC EFFICIENCY</b>	
Noise	<b>£0.1</b>
Local Air Quality	<b>£0.2</b>
Climate Change	<b>£0.1</b>
Journey Ambience	£0.0
Accidents	£0.0
Consumer Users	<b>£22.4</b>
Business Users and Providers	£0.0
Reliability	<b>£3.2</b>
Wider Economic Benefits	£0.0
Infrastructure	£0.0
Option Values	£0.0
<b>Present Value of Benefits (PVB)</b>	<b>£26.0</b>
<b>PUBLIC ACCOUNTS</b>	
Local Government Funding	£0.0
Central Government Funding	<b>£6.6</b>
<b>Present Value of Costs (PVC)</b>	<b>£6.6</b>
<b>OVERALL IMPACTS</b>	
<b>Net Present Value (NPV)</b>	<b>£19.4</b>
<b>Benefit to Cost Ratio (BCR)</b>	<b>3.9</b>

**Table 6-8: West Highland Line Rail Traffic Growth Projections - Optimistic Demand**

	Mallaig	Morar	Arisaig	Beasdale	Lochalort	Glenfinnan	Locheilside	Loch Eil O.B	Corpach	Banawe	Fort William	Spean Bridge	Rey Bridge	Tulloch	Corrour	Rannoch	Bridge of Orchy	Upper Tyndrum	Oban	Connel Ferry	Taynuilt
Base Year	33,376	1,703	3,474	161	826	1,875	174	224	1,024	1,228	49,005	2,859	1,586	927	5,064	5,416	2,062	2,810	51,693	1,522	5,677
2005/06	34,615	1,766	3,604	167	857	1,944	180	232	1,063	1,273	50,861	2,760	1,656	961	5,248	5,514	2,134	2,909	53,662	1,579	5,874
2006/07	35,747	1,824	3,723	173	886	2,007	186	240	1,098	1,315	52,540	2,852	1,711	992	5,413	5,795	2,197	2,995	55,422	1,630	6,043
2007/08	36,641	1,870	3,817	177	908	2,056	190	246	1,126	1,349	53,881	2,925	1,754	1,017	5,542	5,936	2,245	3,059	56,813	1,669	6,170
2008/09	37,477	1,912	3,906	181	930	2,102	195	252	1,152	1,380	55,140	2,993	1,795	1,040	5,663	6,069	2,290	3,120	58,125	1,707	6,288
2009/10	38,702	1,975	4,035	187	960	2,171	201	260	1,190	1,426	56,973	3,093	1,854	1,073	5,841	6,264	2,357	3,210	60,020	1,761	6,467
2010/11	44,008	2,106	4,277	197	1,011	2,296	211	273	1,271	1,524	61,716	3,225	1,941	1,115	6,055	6,620	2,446	3,440	68,230	1,851	7,145
2011/12	45,431	2,174	4,416	204	1,043	2,372	218	282	1,313	1,573	63,681	3,328	2,003	1,151	6,248	6,837	2,520	3,540	70,138	1,902	7,352
2012/13	46,800	2,240	4,548	210	1,075	2,444	224	290	1,353	1,621	65,568	3,427	2,063	1,186	6,435	7,045	2,592	3,636	71,975	1,951	7,554
2013/14	48,108	2,302	4,675	216	1,105	2,514	231	298	1,391	1,666	67,368	3,521	2,121	1,219	6,613	7,245	2,660	3,727	73,695	1,997	7,744
2014/15	49,346	2,362	4,795	221	1,133	2,580	237	306	1,427	1,709	69,067	3,610	2,175	1,251	6,781	7,434	2,723	3,811	75,282	2,039	7,919
2015/16	50,607	2,423	4,918	227	1,162	2,647	243	314	1,464	1,753	70,793	3,700	2,231	1,283	6,952	7,628	2,787	3,896	76,854	2,082	8,096
2016/17	51,906	2,485	5,044	233	1,191	2,716	249	321	1,501	1,798	72,582	3,794	2,288	1,316	7,131	7,827	2,858	3,994	78,624	2,131	8,302
2017/18	53,239	2,549	5,173	239	1,221	2,787	256	330	1,540	1,844	74,416	3,890	2,346	1,350	7,315	8,032	2,932	4,095	80,435	2,181	8,514
2018/19	54,606	2,615	5,306	245	1,252	2,860	263	338	1,579	1,892	76,297	3,988	2,406	1,385	7,504	8,242	3,007	4,198	82,288	2,232	8,731
2019/20	56,009	2,682	5,442	252	1,284	2,934	269	347	1,620	1,940	78,226	4,089	2,468	1,421	7,698	8,458	3,084	4,304	84,184	2,284	8,953
15 Year % Growth	68%	58%	57%	56%	55%	57%	55%	55%	58%	58%	60%	54%	55%	53%	52%	56%	50%	53%	63%	50%	58%

	Falls of Cruachan	Loch Awe	Dalmally	Tyndrum Lower	Crianlanch	Ardlui	Arochar & Tarbet	Garelochhead	Helensburgh Upper	Dumbarton Central	Dalmuir	Westerton	Glasgow	Edinburgh	Strirling	Perth	Dundee	Inverness	Aberdeen	Total	% Growth
Base Year	64	1,223	1,914	966	4,916	1,006	3,642	1,948	3,443	1,223	1,589	125	59,718	8,349	510	164	237	28	308	263,768	
2005/06	66	1,266	1,981	1,000	5,089	1,040	3,729	2,065	3,620	1,287	1,635	129	62,147	8,722	524	169	244	30	310	273,999	3.9%
2006/07	68	1,302	2,039	1,030	5,238	1,069	3,826	2,126	3,713	1,323	1,673	132	64,366	9,072	537	173	250	31	311	283,063	3.3%
2007/08	69	1,329	2,083	1,052	5,352	1,091	3,897	2,172	3,779	1,350	1,700	134	66,169	9,367	546	176	254	33	308	290,253	2.5%
2008/09	71	1,354	2,125	1,072	5,458	1,111	3,962	2,215	3,839	1,375	1,724	136	67,883	9,651	554	179	257	34	305	297,017	2.3%
2009/10	73	1,392	2,186	1,104	5,617	1,142	4,054	2,279	3,935	1,413	1,765	139	70,298	10,038	567	183	263	36	304	306,819	3.3%
2010/11	78	1,528	2,383	1,181	5,982	1,196	4,248	2,395	4,330	1,532	1,922	149	77,567	11,034	620	201	289	40	331	337,965	10.2%
2011/12	81	1,573	2,452	1,215	6,159	1,228	4,363	2,459	4,456	1,581	1,974	153	79,686	11,408	638	207	297	41	332	348,026	3.0%
2012/13	83	1,616	2,519	1,249	6,330	1,259	4,489	2,520	4,576	1,628	2,025	157	81,710	11,771	654	213	305	42	331	357,694	2.8%
2013/14	85	1,657	2,582	1,280	6,492	1,287	4,568	2,576	4,689	1,673	2,072	161	83,599	12,119	670	218	312	43	330	366,629	2.6%
2014/15	87	1,695	2,640	1,309	6,642	1,312	4,655	2,628	4,794	1,715	2,115	164	85,340	12,451	684	223	319	44	328	375,353	2.3%
2015/16	89	1,733	2,699	1,338	6,793	1,339	4,746	2,679	4,898	1,759	2,159	168	87,108	12,720	699	228	326	46	326	383,904	2.3%
2016/17	91	1,777	2,767	1,372	6,966	1,371	4,865	2,743	5,027	1,805	2,206	171	89,024	12,998	716	233	333	47	325	393,128	2.4%
2017/18	93	1,822	2,836	1,406	7,143	1,405	4,987	2,808	5,161	1,853	2,255	175	90,963	13,285	730	238	340	48	324	402,575	2.4%
2018/19	96	1,869	2,908	1,442	7,324	1,439	5,112	2,874	5,297	1,902	2,305	179	92,984	13,578	746	244	348	49	323	412,253	2.4%
2019/20	98	1,917	2,981	1,478	7,510	1,475	5,241	2,943	5,438	1,952	2,355	183	95,030	13,876	763	250	356	50	322	422,165	2.4%
15 Year % Growth	54%	57%	56%	53%	53%	47%	48%	51%	58%	60%	48%	46%	59%	66%	50%	53%	50%	76%	5%		60.1%

**Table 6-9: West Highland Line Rail Traffic Growth Projections - Pessimistic Demand**

	Mallaig	Morar	Arisaig	Beasdale	Lochalort	Glenfinnan	Locheilside	Loch Eil O B	Corpach	Banave	Fort William	Spean Bridge	Roy Bridge	Tulloch	Corrour	Rannoch	Bridge of Orchy	Upper Tyndrum	Oban	Connel Ferry	Taynuilt
Base Year	33,376	1,703	3,474	161	826	1,875	174	224	1,024	1,228	49,005	2,659	1,596	927	5,064	5,416	2,062	2,810	51,693	1,522	5,677
2005/06	34,095	1,738	3,548	164	844	1,913	177	229	1,046	1,253	50,106	2,718	1,630	946	5,181	5,525	2,118	2,893	53,353	1,571	5,846
2006/07	34,679	1,766	3,608	167	859	1,943	180	233	1,063	1,273	51,010	2,765	1,667	962	5,276	5,612	2,165	2,962	54,782	1,612	5,996
2007/08	35,008	1,782	3,641	169	868	1,960	181	235	1,073	1,284	51,539	2,792	1,672	971	5,332	5,657	2,196	3,009	55,829	1,642	6,082
2008/09	35,263	1,793	3,667	170	874	1,972	182	237	1,081	1,292	51,963	2,814	1,683	977	5,377	5,690	2,224	3,052	56,784	1,669	6,169
2009/10	35,870	1,823	3,729	173	890	2,003	185	241	1,099	1,313	52,905	2,863	1,711	994	5,476	5,779	2,273	3,123	58,295	1,713	6,314
2010/11	36,440	1,867	3,850	178	916	2,055	190	248	1,140	1,361	55,292	2,933	1,755	1,016	5,602	5,954	2,336	3,270	63,004	1,778	6,716
2011/12	39,226	1,924	3,928	181	935	2,106	194	254	1,163	1,387	56,433	2,992	1,790	1,036	5,723	6,071	2,393	3,351	64,532	1,823	6,886
2012/13	39,944	1,958	3,986	185	952	2,143	197	258	1,183	1,412	57,474	3,047	1,822	1,055	5,835	6,177	2,447	3,430	65,188	1,867	7,050
2013/14	40,587	1,988	4,061	187	967	2,177	200	263	1,202	1,433	58,409	3,095	1,850	1,071	5,937	6,272	2,497	3,502	67,629	1,907	7,201
2014/15	41,151	2,015	4,116	190	981	2,206	203	266	1,218	1,452	59,229	3,137	1,875	1,086	6,026	6,354	2,541	3,568	68,941	1,943	7,338
2015/16	41,729	2,042	4,172	192	995	2,235	205	270	1,235	1,471	60,065	3,181	1,900	1,101	6,117	6,437	2,587	3,634	70,300	1,980	7,476
2016/17	42,321	2,069	4,229	195	1,009	2,265	208	274	1,252	1,490	60,933	3,226	1,925	1,116	6,214	6,523	2,639	3,712	71,838	2,024	7,640
2017/18	43,251	2,115	4,322	199	1,031	2,314	213	280	1,279	1,523	62,273	3,297	1,968	1,141	6,351	6,666	2,697	3,794	73,412	2,069	7,808
2018/19	44,202	2,161	4,418	204	1,054	2,365	217	287	1,307	1,556	63,643	3,369	2,011	1,166	6,491	6,813	2,756	3,877	75,021	2,114	7,990
2019/20	45,173	2,209	4,515	208	1,077	2,417	222	293	1,336	1,590	65,042	3,443	2,055	1,192	6,633	6,963	2,817	3,963	76,666	2,160	8,156
15 Year % Growth	35%	30%	30%	29%	30%	29%	28%	31%	30%	30%	33%	29%	29%	29%	31%	29%	37%	41%	48%	42%	44%

	Falls of Cruachan	Loch Awe	Dalmally	Tyndrum Lower	Crianlarch	Ardlu	Arrochar & Tarbet	Gareloch-head	Helensburgh Upper	Dumbarton Central	Dalmuir	Westerton	Glasgow	Edinburgh	Stirling	Perth	Dundee	Inverness	Aberdeen	Total	% Growth
Base Year	64	1,223	1,914	956	4,916	1,006	3,542	1,948	3,443	1,223	1,589	126	69,718	8,349	510	164	237	28	308	263,768	
2005/06	66	1,260	1,971	995	5,058	1,033	3,684	2,036	3,565	1,259	1,631	128	61,602	8,598	523	168	244	29	309	271,140	2.8%
2006/07	67	1,289	2,019	1,018	5,175	1,056	3,740	2,085	3,598	1,295	1,666	131	63,239	9,022	534	172	249	30	308	277,295	2.3%
2007/08	68	1,310	2,052	1,035	5,254	1,071	3,789	2,119	3,685	1,313	1,688	133	64,434	9,289	541	174	254	31	304	281,467	1.5%
2008/09	69	1,328	2,082	1,049	5,325	1,084	3,832	2,150	3,724	1,328	1,708	134	65,516	9,545	547	177	257	32	300	285,119	1.3%
2009/10	71	1,359	2,132	1,074	5,447	1,108	3,910	2,201	3,798	1,355	1,744	137	67,250	9,901	558	181	263	33	298	291,690	2.3%
2010/11	74	1,441	2,252	1,123	5,681	1,145	4,037	2,262	4,028	1,425	1,842	143	71,467	10,586	590	192	280	35	311	308,667	5.9%
2011/12	76	1,477	2,309	1,151	5,822	1,172	4,130	2,339	4,125	1,461	1,888	147	73,229	10,921	605	197	288	36	312	316,115	2.3%
2012/13	78	1,512	2,364	1,178	5,957	1,197	4,215	2,391	4,216	1,494	1,932	150	74,893	11,243	619	202	295	37	311	322,908	2.1%
2013/14	80	1,544	2,415	1,203	6,081	1,219	4,293	2,439	4,299	1,526	1,973	153	76,426	11,550	632	206	302	38	310	329,126	1.9%
2014/15	81	1,574	2,461	1,226	6,193	1,239	4,357	2,483	4,374	1,554	2,010	156	77,813	11,840	644	210	309	39	309	334,707	1.7%
2015/16	83	1,603	2,507	1,248	6,307	1,260	4,428	2,526	4,447	1,585	2,050	159	79,320	12,082	658	215	315	40	307	340,465	1.7%
2016/17	85	1,638	2,562	1,275	6,440	1,287	4,525	2,581	4,543	1,619	2,094	163	80,961	12,334	672	219	322	41	306	346,770	1.9%
2017/18	87	1,674	2,619	1,303	6,582	1,315	4,624	2,638	4,643	1,654	2,140	166	82,742	12,605	686	224	329	42	305	354,384	2.2%
2018/19	88	1,711	2,676	1,332	6,727	1,344	4,726	2,696	4,745	1,691	2,187	170	84,962	12,863	701	229	336	43	304	362,165	2.2%
2019/20	90	1,749	2,735	1,361	6,875	1,374	4,830	2,755	4,850	1,728	2,235	174	86,422	13,166	717	234	344	44	304	370,117	2.2%
15 Year % Growth	42%	43%	43%	41%	40%	37%	36%	41%	41%	41%	41%	39%	45%	58%	41%	43%	45%	54%	-2%		40.3%

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