ANNEX K

ECONOMY (TRANSPORT ECONOMIC EFFICIENCY)

ZETTRANS

BRESSAY LINK

TEE ANALYSIS

May 2008

Halcrow Group Limited

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TEE ANALYSIS

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Contents

1 Introduction

1.1 General

The Transport Economic Efficiency (TEE) part of the STAG process involves assessing the economic impacts of the proposed schemes. This involves quantifying any costs and benefits associated with the scheme options. The assessment provides a measure of the contribution a transport proposal makes to economic welfare.

An economic appraisal is carried out over a set number of years with all scheme costs and benefits accruing in this period converted to the same price base. The standard appraisal period is 60 years and the standard price base to use is 2002. All prices are therefore 2008 values dis-inflated to 2002 prices. Standard discount rates of 3.5% for the first 30 years and 3% thereafter have been used.

The results of the cost benefit analysis feed into Net Present Value (NPV) and Benefit Cost Ratio (BCR) calculations. The NPV is regarded as the best measure of the absolute ranking of economic welfare for comparable proposals. It is the sum of the present value of all the costs and benefits of the proposal. The BCR value provides a measure of the value of the scheme to the government. A BCR value of 1 implies that every £1 invested generates a benefit of £1.

This approach seeks to ensure that proposals can be assessed on a common basis.

Three options have been appraised within the TEE process. They have all been compared with the Do Minimum Option which is the current ferry service (Option 4). The three options are listed below:

- Replace ferry service with drill and blast tunnel;
- Replace ferry service with high level bridge; and
- Upgrade ferry service (three different fare structures are proposed to give
- 3a: Upgraded Service, Existing Fares,
- 3b: Upgraded Service, Remove All Fares &
- 3c: Upgraded Service, Changed Fares).

2 Methodology

2.1 Introduction

The first stage of the methodology for undertaking the appraisal is to assess the benefits in terms of reductions in journey times and costs accruing to

people travelling over the stretch of water between Bressay and Lerwick. The following provides an outline of the approach taken, the assumptions made and any relevant results.

2.2 Assessment of current demand

This stage involved obtaining the current ferry demand figures. These were obtained for the period 01/04/2007 – 30/5/2008. Table 2.1 contains the data.

Table 2.1: Ferry Trips 07/08

Ticket Type	Number	Ticket Type	Number
Motorbikes	48	Tanker (M)	42
Cars	68,414	Tanker (L)	0
Bus (S)	496	Plant (S)	24
Bus (M)	14	Plant (M)	16
Bus (L)	2	Plant (L)	4
Trailer	1,286	Senior citizens	26,950
Commercial (S)	678	Adults	64,948
Commercial (M)	326	Children + Infants	25,986
Commercial (L)	470	Schoolchildren	7,166
Tanker (S)	140	Disabled	2,840

Current levels of revenue generated on the route were calculated using fare data. It was stated that around £331k in fare revenue was generated over this same period.

2.3 Estimation of the cost of making existing trips

The cost of making the trip as perceived by users of the existing ferry are calculated based on the journey time and wait time. In addition, fares and vehicle operating costs are quantified for using the existing service.

Journey times and costs were extracted from ferry timetables; the current crossing duration is 7 minutes. The minimum check in time for the ferry service is 5 minutes and anecdotal evidence suggests that the vast majority of passengers time their journeys to arrive at the terminal just before check in (the ferry frequency can be anything from 20 minutes to 1 hour but the standard approach of assuming passengers arrive, on average, halfway between services is considered unreasonable as people know the ferry timetable and plan their days around the departures). A combined wait time and ferry egress time of 10 minutes has been assumed (STAG recommends that time spent waiting for transport services is valued at twice the disutility as 'in vehicle time' (IVT), as users prefer travelling to waiting for services, so this is equivalent to 20 minutes IVT).

In the absence of detailed passenger survey data to give origins and destinations of trips using the ferry it has been assumed that purely the section of the trip between Bressay and Lerwick would be analysed. It is assumed that the average passenger needs to travel for 5 minutes between

the ferry terminal and their origin or destination on Bressay and 1.5 minutes on the Lerwick side1.

The journey times are converted to a monetary cost using standard values of time from WebTag2; these are £5.04/hr for commuters, £4.46/hr for non-work trips and £23.18/hr for trips made in work time. As travellers making trips in work time have different values of time to those commuting or travelling for other purposes an assumption has been made as to the proportion of trips for each purpose. At an earlier stage of this study a questionnaire was undertaken to understand ferry passengers' views of the service. Within this questionnaire interviewees were asked their trip purposes. In addition data was obtained from the Bressay Community Council and Bressay Ferry Crew as to the number of commuters using the service3. From this data a 20% commuting, 72% non-work and 8% work trip purpose split was obtained for car drivers and for non-drivers an 11% commuting, 80% non-work and 9% work split was obtained.

Trip costs include vehicle operating costs for the parts of the journey made by car and fare costs for the ferry leg of the trip. Vehicle operating costs were calculated based on distance travelled and the assumed average speed of 20mph. These costs can be split into two components: fuel and non-fuel and are based on official WebTag costs. Fares are taken from the ferry timetables with the assumption that 80% of travellers have 10 trip tickets.

Table 2.2 presents the costs of all passengers making the trips from 07/08 with the current ferry service.

Table 2.2: Existing Trip Costs

	Cost £
Journey Time	630,874
Fares	331,000
Vehicle Operating Costs	32,110

2.4 Estimation of cost making trips with implementation of options

When the options are introduced the costs of making the same set of journeys would change and where there is a decrease in journey cost, benefits are accrued.

In terms of trip costs the tunnel (Option 1) and bridge (Option 2) are considered to be identical apart from slightly different crossing times due to different design speeds. Based on information received as to the location of the proposed fixed link it is assumed that journey time to the link on the

1 A point on King Harald Street was taken as the generic Origin/Destination in Lerwick and the Brough / Setter fork in Uphouse Road the generic Origin/Destination on Bressay. Taking distances from Google Maps an average speed of 20mph was used to estimate journey times.

2 Department of Transport guidance on the conduct of transport studies.

3 November 2006

Bressay side is 9 minutes and 6 minutes on the Lerwick side4. Time spent crossing the link is assumed to be 1.5 minutes for the tunnel and 1 minute for the bridge.

Included within the fixed link proposals is the introduction of a bus service across the link. It is assumed that bus passengers would know the timetable and hence only wait an average of 5 minutes for the bus. An additional minute has been added to the assumed car journey times (to represent time waiting at stops) either side of the link to obtain the bus journey time.

Vehicle operating costs increase as vehicles have to travel further to cross between Bressay and Lerwick. All passengers make a saving of the ferry fare cost although users of the new bus service would pay a bus fare.

For the ferry upgrade options no changes to the journey time elements of the trip occur. The only difference is with regards to the fares. The first option involves no change to the existing fares, the second option is to remove fares altogether and the third option includes a reduction in fare cost for plant vehicles and motorbikes. In addition a monthly unlimited travel ticket is introduced at the cost of £100 for cars and £16 for adults. To work out the level of fare to assign per trip to those having a monthly pass an assumption has to be made as to the percentage of passengers owning such a pass and the number of trips per month these passengers would make. Based on the trip purposes discussed in paragraph 2.7 it is assumed that 20% of current car trips would be made by people with a monthly pass and that these people would make on average 4 trips per week. Analysis of the questionnaire data suggests around 70% of foot passenger trips would be made by people with monthly passes.

2.5 Estimation of mode switch with implementation of options

If a fixed link is introduced it is likely that few people would cross the link by foot due to its distance from Lerwick and the existing terminal at Bressay. An assessment of the number of non-vehicle drivers likely to switch to making their journey by car (either as a driver or passenger) and the number making their journey by bus is undertaken.

Scottish Transport Statistics for Shetland state that 25% of households on the islands don't have access to a car and 24% of adults aged 17 and over don't have a driving licence. Therefore it has been assumed that 75% of current non-vehicle drivers will either drive or travel as a car passenger over the proposed link. Car occupancy of 1.645 has been assumed amongst these users. The rest of the adults are assumed to use the new bus service. Amongst children it is assumed that 25% would travel as a passenger in a car and the remaining 75% would use the new bus service. It is assumed that disabled travellers would currently be travelling as car passengers rather than drivers and that this would continue upon completion of the fixed link. Table 2.3 presents the number of existing non-vehicle driver trips which would switch to car and bus.

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4 Journey times taken from Google Maps with same Origins/Destinations as before.

5 National average car occupancy (2006) from Transport Statistics Great Britain (TSGB) Section 1

Table 2.3: Number of Trips switching from Foot / Car Passenger to Car / Car Passenger or Bus

	Switch to Car / Car Passenger	**Switch to Bus**
Senior citizens	20,213	6,738
Adults	48,711	16,237
Children	4,412	13,236
Schoolchildren	1,792	5,375
Infants	6,254	2,085
Disabled	2,130	710
Total	**83,511**	**44,380**

The 83,511 passengers switching to car would generate 50,921 car trips assuming car occupancy of 1.64.

Work undertaken by Shetland Islands Council has forecast that an increase of daily car trips by around 100% would be a conservative estimate of the number of new trips made as a result of the introduction of a fixed link. This equates to 327 cars which are assumed to carry an additional 209 passengers (all assumed to be children or disabled users) based on the standard car occupancy rate of 1.64. It is stated that all of these trips will be made for non-work purposes.

Work done by ZetTrans based on fare elasticities forecasts that if the fares on the ferry service are removed altogether then there will be a 23% increase in passengers and a 38% increase in vehicles using the service. Table 2.4 contains the number of new passengers per annum.

Table 2.4: Forecast Generated Ferry Passengers due to Fare Removal

New Drivers		**New Foot Passengers / Car Passengers**	
Cars & Bikes		Senior citizens	33,149
Commuters	9,869	Adults	
Non - work	76,063	*Commuters*	8,345
Work	8,545	*Non - work*	64,316
Bus	707	*Work*	7,225
Commercial	2,034	Children + Infants	43,414
Tanker	251	Schoolchildren	21,707
Plant	61	Disabled	3,493
Total	**97,530**	**Total**	181,649

The introduction of the 7-seater bus service to the Bressay terminal which is part of the reconfigured ferry option leads to a few people using this service to access the ferry. It has been estimated that the average occupancy on each trip made by the bus will be 4 passengers. Assuming 6 services per day it is therefore assumed that there will be a total of 48 one way trips made on this service.

2.6 Costs of all trips with implementation of options

Taking into account these new car / car passenger and bus trips (transferred from existing foot passengers) and the existing vehicle trips as well as the

generated trips which would now use the fixed link, the journey costs of all three options can be calculated. As previously noted the two fixed link options are the same with regards to user journey costs.

2.7 Costs and benefits accruing to users

Comparing the costs in the Do Something scenario with those in the Do Nothing leads to the opening year costs and benefits to existing passengers and new users of each of the three options. It should be noted that as per STAG, new users only gain half of the benefits that existing users get. Table 2.5 contains these results. A positive number indicates a benefit and a negative number a cost.

Table 2.5: User Costs and Benefits

	Option 1	**Option 2**	**Option 3a**	**Option 3b**	**Option 3c**
Journey Time	413,985	426,113	0	0	0
Fares	283,248	283,248	-17,520	313,480	-11,477
Vehicle Operating Costs	-228,921	-228,921	0	0	0

The fixed link options both provide benefits to users as journey times are reduced for both options and users no longer need to pay ferry fares. The upgraded ferry service with no changes to fares (Option 3a) has no benefit that is quantifiable here (there is a benefit in terms of increased service frequency / operating hours but it is not possible to assign a monetary value to this benefit). The ferry options with changes to the fares (Options 3b and 3c) both lead to a benefit to users as some fares reduce.

2.8 Treatment of Scheme Costs

The next stage of the process is to assess the costs of each of the proposed schemes as well as the cost saving from removing the current ferry service (where applicable).

The first area of costs is capital costs in the form of construction costs for proposed infrastructure. These are applicable in Options 1&2 where fixed links are proposed and also apply to the ferry options in the form of new linkspans and terminals. For Options 1&2 the costs include the construction of the link, any road upgrades required and bus stops for the proposed bus route. The costs are taken from the appropriate annexes to this report (Annex G for tunnel, Annex H for bridge). Table 2.6 provides a breakdown of these costs.

Table 2.6: Scheme Capital Costs

	Base Costs £		**Including Optimism Bias & Contingency**	
	Tunnel	**Bridge**	**Tunnel**	**Bridge**
Link Construction (incl. land acquisition)	26,059,000	51,200,000	48,469,740	95,232,000
Road Upgrade	200,000	200,000	328,000	328,000
Bus Stops	30,000	30,000	30,000	30,000
Road upgrade for buses	50,000	50,000	82,000	82,000

It is a fact that costs are always underestimated. Official government guidance in the Treasury Green Book is to add optimism bias to account for this. The standard rates are +44% for roads and +66% for fixed links (these uplifts are applied to the base cost estimates. In addition a contingency should be added to all capital costs to account for risk within the project, this has been assumed to be +20% on the base cost estimate. The second set of numbers in the above table includes optimism bias at +66% for the link construction and +44% for the road upgrades and contingency at +20%.

In addition to capital costs there are operating and maintenance costs for each of the schemes. These are contained in Table 2.7 for each of the options and the current situation (these are again taken from the annexes with ferry and bus costs taken from Annex L and J respectively. Public transport Sub Option 'b' has been assumed for Options 1&2 and Sub Option 'a' has been assumed for Option 3).

Table 2.7: Scheme Operating Costs (£pa)

	Current Ferry	**Tunnel**	**Bridge**	**Upgraded Ferry**
Operating / Maintenance costs (£pa)	1,301,862	100,000	100,000	1,427,8415
Bus operating / maintenance costs (£pa)	0	95,000	95,000	35,000

As the current ferry service does not cover its operating costs by the revenue earned, the Council pays an annual amount for the service. In addition the proposed bus service would be financed by the Council although any fare revenue would go to the operator. In terms of overall operating costs the Council would benefit from the removal of the ferry service as it would no longer have to pay the operating costs for the ferry (the required level of bus operating costs are small in comparison).

The items of infrastructure involved in this study all have different lifespans before they need replacement. Also, items of infrastructure that are removed as a result of the implementation of the scheme will have a residual value (for instance if the ferry is replaced by a tunnel then the ferry can be sold for a proportion of its original value).

The appraisal process takes account of any residual asset values either in the opening year of the scheme when infrastructure becomes redundant or at the end of the asset's life, if it still has some value, or at the end of the 60 year appraisal period if the asset has a number of years service left in it.

The replacement years and lifespan assumptions are contained in Table 2.8. It is assumed that ferries have 10% of their original value at the end of their lifespan and that all assets experience straight line depreciation over their life.

Table 2.8: Replacement Schedule and Lifespans

	Lifespan	Replacement years
Existing Infrastructure		
Ferry	20	2012, 2032, 2052
Berthing Structure (Bressay)	60	2035
Berthing Structure (Lerwick)	60	2035
Linkspan	30	2015, 2035, 2055
Bridge	120	N/A
Tunnel	120	N/A

The costs of renewing existing ferry infrastructure are contained within Table 2.9. Optimism bias needs to be added to these costs, the third column provides the cost with optimism bias included at 66% as well as contingency at 20% for terminal infrastructure. No optimism bias is required for ferry renewal costs.

Table 2.9: Existing Renewal Costs

Item	Renewal cost £	Cost with Optimism Bias £
Ferry	6,750,000	6,750,000
Berthing Structure (Bressay)	3,500,000	6,510,000
Berthing Structure (Lerwick)	2,500,000	4,650,000
Linkspan	500,000	930209,000

A further minor benefit which is obtained by the public sector is an increase in fuel duty and tax due to the increased vehicle km travelled. This is relatively minor (in the region of 75k pa) but has been included within the appraisal.

3 TEE Analysis

3.1 Introduction

A comparison of each of the options against the Do Minimum (existing ferry service) is undertaken to produce Transport Economic Efficiency (TEE) tables for each option.

This section presents the TEE tables for each of the options. In addition to containing the costs and benefits discounted over the appraisal period, the Net Present Value (NPV) and Benefit Cost Ratio (BCR) for each option are presented. The NPV is regarded as the best measure of the absolute ranking of economic welfare for comparable proposals. It is the sum of the present value of all the costs and benefits of the proposal. The BCR provides a measure of the best value for government expenditure; it compares total external benefits with the cost to the government and is defined as follows:

$$\frac{\text{Present Value of Benefits}}{\text{Present Value of Cost to Government}}$$

where the present value of benefits is the sum of the present value of the scheme benefits and the present value of cost to government is the sum of the present values of all the costs to the public sector less any revenues.

Tables 3.1 – 3.4 contain these tables. Note that the TEE table has not been presented for Option 3a with the upgraded ferry service with existing fares as there are no quantifiable benefits, only costs.

Table 3.1 Option 1 Tunnel TEE

Sub-objective	Item	Qualitative Information	Quantitative Information
User Benefits	Travel time		£17,103,782
	User charges		£6,501,983
	Vehicle Operating Costs		-£5,254,909
	Quality / Reliability Benefits		£0
Private Sector Operator Impacts	Investment costs		£0
	Operating and Maintenance Costs		£0
	Revenues		£1,096,161
	Grant/ Subsidy payments		£0
Cost to Public Sector			
Item	**Qualitative information**		**Quantitative Information**
Public Sector Investment Costs			£22,891,094
Public Sector Operating and Maintenance Costs			£25,254,808
Grant/ Subsidy payments			£0
Revenues			- £6,765,975
Taxation Impacts			£1,788,631

Monetised Summary	
Present Value of Transport Benefit	£19,447,016
Present Value of Cost to Government	- £2,613,631
Net Present Value	£16,833,385
Benefit-Cost to Government Ratio	7.44

Table 3.2 Option 2 Bridge TEE

Sub-objective	Item	Qualitative Information	Quantitative Information
User Benefits	Travel time		£17,124,853
	User charges		£6,255,149
	Vehicle Operating Costs		-£5,055,418
	Quality / Reliability Benefits		£0
Private Sector Operator Impacts	Investment costs		£0
	Operating and Maintenance Costs		£0
	Revenues		£1,054,547
	Grant/ Subsidy payments		£0
Cost to Public Sector			
Item	**Qualitative information**		**Quantitative Information**
Public Sector Investment Costs			£61,408,678
Public Sector Operating and Maintenance Costs			£24,296,063
Grant/ Subsidy payments			£0
Revenues			- £6,509,119
Taxation Impacts			£1,702,647

Monetised Summary	
Present Value of Transport Benefit	£19,379,131

Present Value of Cost to Government	- £41,901,088
Net Present Value	-£22,521,957
Benefit-Cost to Government Ratio	0.46

Table 3.3 Option 3b Upgraded Ferry, No Fares TEE

Sub-objective	**Item**	**Qualitative Information**	**Quantitative Information**
User Benefits	Travel time		£0
	User charges		-£7,696,602
	Vehicle Operating Costs		£0
	Quality / Reliability Benefits		£0
Private Sector Operator Impacts	Investment costs		£0
	Operating and Maintenance Costs		£0
	Revenues		£318,090
	Grant/ Subsidy payments		£0
Cost to Public Sector			
Item	**Qualitative information**		**Quantitative Information**
Public Sector Investment Costs			-£97,013
Public Sector Operating and Maintenance Costs			-£3,533,553
Grant/ Subsidy payments			£0
Revenues			- £7,309,696
Taxation Impacts			£0

Monetised Summary	
Present Value of Transport Benefit	£8,014,692
Present Value of Cost to Government	- £10,940,256
Net Present Value	-£2,925,564
Benefit-Cost to Government Ratio	0.73

Table 3.4 Option 3c Upgraded Ferry, New Fares TEE

Sub-objective	Item	Qualitative Information	Quantitative Information
User Benefits	Travel time		£0
	User charges		£520,368
	Vehicle Operating Costs		£0
	Quality / Reliability Benefits		£0
Private Sector Operator Impacts	Investment costs		£0
	Operating and Maintenance Costs		£0
	Revenues		£318,090
	Grant/ Subsidy payments		£0
Cost to Public Sector			
Item	**Qualitative information**		**Quantitative Information**
Public Sector Investment Costs			-£97,013
Public Sector Operating and Maintenance Costs			-£3,533,553
Grant/ Subsidy payments			£0
Revenues			- £133,462
Taxation Impacts			£0

Monetised Summary	
Present Value of Transport Benefit	£838,459
Present Value of Cost to Government	- £3,764,022
Net Present Value	-£2,925,564
Benefit-Cost to Government Ratio	0.22

The scheme with a positive economic case is the replacement of the existing ferry service with a tunnel. The BCR for this scheme is 7.44 which means that for every £1 invested in the scheme £7.44 of benefits are generated. This scheme has an NPV of £16.83m and generates transport benefits of £19.4m over the appraisal period. A BCR of this level would help in applying for external sources of funding.

The driving factors behind this good economic case are the reduction in journey times (from existing ferry crossing times) resulting from the introduction of a tunnel, reduction in user charges due to no longer having to pay ferry fares and operating cost savings to the public sector as a result of the removal of the ferry service. In addition the Council will no longer need to pay for ferry infrastructure renewals. All these benefits outweigh the costs of constructing the scheme.

The other three schemes all have BCRs of less than 1 which represents poor value for money. A BCR of less than 1 means that the level of benefits obtained from the scheme is lower than the level of costs needed to construct and operate the scheme. A BCR of less than 1 would not be sufficient to obtain government funding.

The bridge scheme has very similar transport benefits to the tunnel scheme; the reason that the case for the bridge is so much worse than that for the tunnel is therefore due to the large capital cost difference (the cost of the bridge is around twice that of the tunnel).

The ferry improvement schemes also have low BCRs due to the fact that there are very few quantifiable benefits resulting from improving the service. In the case where all fares are removed more people use the service but there are no journey time benefits. The only benefit in both ferry options is in terms of lower user charges.

4 Further Sources of Benefits / Costs

4.1 *General*

There are other benefits of the schemes which it has not been possible to assign a monetary value to. The main ones are as follows:

Fixed Link

- In the case of the tunnel, no disruption due to bad weather, this has reliability benefits.
- Less down time for workers needing to cross to or from Bressay and hence more efficient staffing, for example road maintenance workers - this will provide benefits to both the Council and other organisations.

Improved Ferry Service

- Ability to travel earlier and later, including the chance to connect with other transport services for example flights- may attract trips to the service with the associated benefits.
- More frequent service makes it easier for users' days to be planned around ferry sailings- again, may attract trips to the service with the associated benefits.

There are also a few additional potential costs associated with the schemes. For instance, if the fixed link is introduced then all vehicles on Bressay will require an MOT. This is a disbenefit to residents of Bressay but a benefit to the public sector. In addition, the longer distances required for people to drive to cross a fixed link will very slightly increase the likelihood of accidents.

5 Sensitivity tests

5.1 Details of Tests

A couple of tests to assess the sensitivity of the results for a number of the key assumptions have been undertaken. This provides confidence in the economic case produced. As the tunnel option is the only one with a positive economic case this is the option used in the tests.

The first test is to assess the sensitivity of the results to the assumption that a fixed link will generate 100% more trips than are currently made. To this end the economic analysis was undertaken with no additional trips generated. Table 5.1 presents the comparison between the two scenarios.

Table 5.1: Comparison of Tunnel Scenario With and Without Generated Trips

Monetised Summary	Base	No Generated Trips
Present Value of Transport Benefits	£19,447,016	£17,582,675
Present Value of Cost to Government	-£2,613,631	-£3,679,582
Net Present Value	£16,833,385	£13,903,093
Benefit-Cost to Government Ratio	7.44	4.78

It can be seen that whilst these generated trips provide a certain level of benefit, they are not essential to the economic case of the scheme as a BCR of 4.78 still represents good value for money.

The second sensitivity test that is undertaken is to assess the scheme with different levels of optimism bias. Whilst the levels used within the main appraisal are in accordance with official guidelines it is a matter of interest to see how far the case for the scheme is driven by the level of optimism bias assumed. The first test was to set all optimism bias levels to +44% rather than having +66% for the fixed link. It was found that with these lower levels of optimism bias the economic case for the tunnel option increases dramatically as there is no longer an overall cost to the government of the scheme as the cost savings outweigh the capital costs so the BCR is infinite. Even the bridge option has a very slight positive case with a BCR of 1.49, although little impact is made on the reconfigured ferry option.

The third sensitivity test undertaken was to assess the impact on the economic case of having alternative ferry lifespans. Two lifespans were tested: 25 years with replacement due in 2017; and 30 years with replacement due in 2022. With longer ferry lifespans the case for the tunnel drops but still remains positive. This is due to the fact that the public sector will not save as much in renewal costs if a tunnel is introduced as the ferry would not have been renewed as frequently. Table 5.2 presents the comparison.

Table 5.2: Comparison of Tunnel Scenario with different ferry lifespans

Monetised Summary	Base (20 year life)	25 year ferry life	30 year ferry life
Present Value of Transport Benefits	£19,447,016	£19,447,016	£19,447,016
Present Value of Cost to Government	-£2,613,631	-£5,651,594	-£7,063,614
Net Present Value	£16,833,385	£13,795,422	£12,383,402
Benefit-Cost to Government Ratio	7.44	3.44	2.75

6 Summary

6.1 Summary

This section provides a summary of the key points of this section of the report.

- A TEE analysis of the proposed options has been undertaken in accordance with STAG, comparing the options with the Do Minimum which is the current ferry service.
- Net Present Values (NPVs) and Benefit Cost Ratios (BCRs) have been calculated for each scheme to provide a measure of economic worth and value for money.
- The scheme appraisal was undertaken over a 60 year period and takes account of the benefits of each scheme accruing to users due to reductions in journey times and fare charges where applicable. In addition in some of the schemes there are benefits to the public sector in the form of reduced annual operating costs and renewal costs.
- The appraisal also takes account of the costs associated with the scheme in terms of construction costs and changes in operating and maintenance costs.
- It was found that Option 1 which involves the construction of a tunnel to Bressay is the only one of the schemes with a positive economic case. This option was found to have a BCR of 7.44 which means that for every £1 invested by the public sector a benefit of £7.44 is generated; this represents excellent value for money. In addition this option has an NPV of £16.83m.
- The other schemes (Option 2: Bridge, Option 3a,3b&3c: Reconfigured Ferry with different fare structures) were all found to have BCRs of less than 1 which represents poor value for money.
- In conclusion, from an economic welfare perspective Option 1: Tunnel is the option that should be taken forward.