Options for Breich Station

Appraisal Report

Updated document dated August 2017

Contents

Executive Summary

This appraisal has been prepared by Network Rail to identify the benefits and costs of different options for service provision at Breich Station in West Lothian, including the closure of the station. The appraisal was carried out at GRIP stage 1.

Breich station is located on Network Rail's Shotts Route, which is scheduled to be electrified as part of Network Rail's Control Period 5 investment programme. Maintaining the station at Breich will increase the costs of electrification, however, the case for closure stands independently of the electrification project.

Three options were considered:

- Maintaining the station in its current form (i.e. independently of the proposed investment)
- Reconfiguring the station at Breich in line with current standards
- Relocating the station at Breich in line with current standards.

A sensitivity test was undertaken[1]:

- Doubling the demolition and site clearance costs at Breich Station

Overall the appraisal suggests that there is a case for closing Breich on an operating cost basis alone (i.e. the low level of user and non-user benefits from retaining Breich are insufficient to outweigh the cost of operating the station as reflected in the long term charge for the station). Once demolition and site clearance costs are allowed for, the Net Present Value of closure is estimated to be (positive) £0.59m

- The option to retain the station on its current site has a (negative) Net Present Value2 of -£1.79m. This result is a result of on the additional renewal costs avoided alone over a 60 year appraisal period.[3]
- The option to retain the station on an adjacent site once the electrification scheme has been completed has a (negative) Net Present Value of -£1.95m over a 60 year period

[1] In an earlier published version of this appraisal, a sensitivity test was carried out assuming zero journey time impacts as a result of closing Breich Station. This sensitivity test was removed, as the impact was negligible.
[2] Railways Closure Guidance suggests the use of benefit cost ratio methodology to assess investment proposals. Net present value is a related method which provides a more helpful metric in cases such as this where there are net disbenefits or net cost savings.
[3] Following consultee feedback costs presented in this appraisal have been amended. As a result the case for retaining Breich (either by retaining the current station site or by relocation) has deteriorated.

- The closure will avoid station rebuild costs of £1.4 million associated with the Shotts Electrification Programme.

Conclusion

The analysis presented within this document suggests that retaining the station at Breich would represent poor value-for-money irrespective of its likely impact on the Shotts Electrification Programme.

The analysis also considers the case for closure with the electrification-related costs included. The results of this analysis suggest that the opportunity to avoid these upgrade costs would improve the case for closure at this point in time. [4]

[4] In the initial version of this document, user and non-user impacts were reported. A review of the appraisal recommended the removal of these impacts due to the low number of passengers currently using Breich.

1. Introduction and objectives

This section includes an introduction to the appraisal, a summary of scheme objectives and a description of the contents of this report. These are addressed in turn.

1.1 Introduction

This appraisal has been prepared by Network Rail to assess options for future service provision at Breich Station in West Lothian, including the closure of the station. The case for closure has been assessed independently of the need to upgrade the route (and therefore upgrade Breich Station). The timing of any closure is significant as the station would require upgrading to remain open.

This appraisal was carried out at GRIP stage 1.

Breich Station is located in West Lothian between the villages of Fauldhouse and Addiewell. It has one weekday and Saturday service in each direction between Glasgow and Edinburgh. There is no Sunday service.

The station at Breich has low patronage, with 138 annual exits and entries in total in 2015/16 (i.e. 69 entries and 69 exits). The low patronage at the station reflects its relative remoteness to the village of Breich and the relatively close proximity of Addiewell and Fauldhouse Stations, both of which enjoy a superior service as result of their population catchment and their convenience.

Station Name	Station Facility Owner	12/13 Entries & Exits	13/14 Entries & Exits	14/15 Entries & Exits	15/16 Entries & Exits
Breich	ScotRail	102	64	92	138

Table 1: Total entries and exits at Breich Station 2012-13, 2013-14, 2014-15, 2015/16, Source: ORR Station Usage Statistics

The West Lothian Local Plan, last updated in 2009, outlined a certain amount of growth in the land allocated for housing in the area, this is concentrated within the village. Breich is a dispersed settlement with the station located at a distance from the most populated part of the village.

Given the low level of patronage at the station, and limited potential to grow this patronage based on the information available, the operating cost per passenger is approximately £95 per single passenger journey.

The Rolling Programme of Electrification is a scheme to undertake 25kv OLE on the route between Edinburgh and Glasgow via Shotts. A critical element of the engineering works related to electrifying the line is achieving safe contact wire clearances along the route.

This is particularly relevant at stations, where the relevant standards require a contact wire height of 4.7m from public areas. Achieving this height can be problematic where stations have overbridges included as part of the station infrastructure or where overbridges are located adjacent to stations. Where this is the case one or more solutions can be employed (potentially in combination):

- Raising bridge heights to gain increased clearances
- Lower the track and platforms to gain increased clearances
- Relocate stations to achieve the necessary clearances, either through complete relocation or by reconfiguring operational platforms
- Risk assess and accept reduced clearances.

The project team has established that in the case of Breich, relocation of the platforms is the only feasible and safe option if the station is to remain open.

It should be noted that any closure will be detrimental to service users, some of whom may depend on the limited service that exists, and that closure may – at the margin – deter new development in the vicinity of a station.

The low patronage at Breich Station should be considered given the costs of operating the station and of rebuilding it. As a public sector body Network Rail is obliged to follow the principles outlined in the UK Treasury's 'Managing Public Money'[5].document.

The socio-economic appraisal was carried out in accordance with Transport Scotland's STAG appraisal guidance[6], which closely follows the Department for Transport's (DfT) appraisal guidance in this area.

The appraisal assumptions are discussed in more detail in Sections 3 and in the Appendix (Table A.1).

The appraisal compares the costs and benefits of each option relative to the Base Case (see Section 2), in accordance with STAG.

In this report, all years refer to financial years (i.e. 2014 = 2014/15) unless stated.

[5] Managing Public Money - https://www.gov.uk/government/publications/managing-public-money

[6] Scottish Transport Appraisal Guidance (STAG) https://www.transport.gov.scot/our-approach/industry-guidance/scottish-transport-analysis-guide-scot-tag/#

1.2 Scheme objectives

The main objectives of the scheme are to:-

- Ensure services on the route represent good value-for-money
- Enable the electrification of the route between Edinburgh and Glasgow via Shotts by achieving a compliant contact wire height through Breich Station.

1.3 Structure of the report

This report includes the following sections:

- Section 2 described the scheme options and Base Case;
- Section 3 explains how the costs and benefits were estimated;
- Section 4 presents appraisal results and conclusions; and
- Appendix, including further information on assumptions and Appraisal Summary Table.

2. Scheme options and Base Case

This section defines the scheme option(s) and the Base Case in turn.

2.1 Options assessed

The options assessed in this appraisal are summarised in Table 2.1.

Table 2.1: Description of options/scenarios	
Option / scenario	Description
Option S1	Option S1: Avoidance of future renewals (expressed as avoided Long Term Charge)
Option S2	Option S2 Reconfigure Breich Station
Option S3	Option S3 Relocate Breich Station

2.2 Base Case/Comparator

The base case assumes that electrification goes ahead as per the settlement for Control Period (CP5)[7], and that the appropriate wire heights are achieved through Breich by closing and demolishing the station.

The rationale for the base case is as follows:

- Network Rail is funded to deliver the outputs specified in the High Level Output Specification (HLOS) (including the Rolling Programme of Electrification) at a price that the ORR has deemed to be efficient. Closing the station at Breich would, at the margin, represent a reduction to the CP5 commitment to maintain the current capability of the network
- Electrification schemes involve significant capital costs, and focussing investment at locations where demand for services exist means that electrification can be extended across the network more rapidly than would otherwise be the case
- The economic and social benefits of enhancing the rail network will be diluted if low productivity assets are retained without considering whether they represent good value for public money
- In the case of Breich Station, the level of investment required to achieve a compliant contact wire height is high relative to the user and non-user benefit that the station supports.

[7] Network Rail's funding and regulated outputs are established in 5 year periods the current Control Period runs between April 2014 and March 2019

The option to close Breich Station has costs associated with it. Demolition and site clearance costs are estimated be approximately £241k.

Option 1

Option 1 considers the impact of maintaining rail services at Breich Station net of the reconstruction costs associated with Shotts Electrification Programme.

The option considers the ongoing costs of maintaining the station in its current form, and identifies cost streams that could potentially be avoided by closing and demolishing the station.

The costs associated with this option are:

- Rail network renewals costs
- Rail network maintenance costs.

No renewals are planned for CP5 and no renewals cost has been estimated. However, under Network Rail's current regulatory settlement a Stations Long Term Charge of £27,141 per annum is applied to reflect the long term renewals liability at Breich. This figure has been included as an operating cost reduction to Abellio ScotRail under Option 1.

Abellio ScotRail visits Breich Station five days a week as part of its franchised quality regime (SQUIRE). The apportioned cost to Breich is approximately £15,000 per annum[8]. The nature of these costs means that they cannot necessarily be considered to be avoidable, and therefore are not included as part of this appraisal. Removing these visits from the team's workload would be likely to have an (unquantified) impact on SQUIRE[9] station condition scores along the route. Not including any operating cost saving or benefit from this source is a relatively cautious assumption.

Option 2

Option 2 assumes that electrification goes ahead as per the settlement for CP5, and that the appropriate wire heights are achieved through Breich by reconfiguring the current station by extending the platforms eastwards and cutting them back at the west end of the station close to overbridge 285/100.

The rationale for this option is as follows:

- The High Level Output Statement (HLOS) for CP5 states that the "capability of the network will be maintained as a minimum"
- This implies that the base case should include the minimum works necessary to keep Breich Station operational following electrification and that the station should remain compliant with current standards (including the relevant equalities legislation)

[8] Figure provided by Abellio ScotRail
[9] SQUIRE is Transport Scotland's Service Quality Inspection Programme for the ScotRail franchise

- Given the work required to achieve a compliant contact wire height at this location, and given the current condition of the station, the station would need to be reconfigured and the operational platforms repositioned
- The cost of the work required to achieve the minimum standard is expected to be substantial, and would include the costs of bringing the station up to current accessibility standards. The costs are likely to include:
    - Mobilisation
    - Demolition
    - Civil engineering to extend platforms eastwards to accommodate 4-car electric trains (Hitachi Class 385 EMUs)
    - Modifications to the station consistent with the requirements of the PRM-TSI[10]
    - Relocation of signalling equipment
    - Construction of waiting shelters
    - Construction of a trail route over the Eastbound to the Westbound platform
    - Installation of high lux lighting
    - Installation of telecoms equipment

Under Option 2, the Long Term Charge for Breich would be likely to fall in line with other, similar stations on the network. An ongoing Long Term Charge of £14,711 has been assumed, as per Blackridge on the Airdrie-Bathgate route.

Option 3

Due to the low level of demand at Breich Station, construction of a new, relocated station on a site close to Breich would likely be more expensive without generating materially higher benefits.

Sensitivity Tests

In addition to these costs a sensitivity test (Scenario 1S1) has been run to examine the impact that a significant increase in the costs of closure (i.e. increase demolition and site clearance costs by a factor of two)

[10] Persons of Restricted Mobility -TSI - https://www.rssb.co.uk/standards-and-the-rail-industry/standards-explained/technical-specifications-for-interoperability

3. Costs and benefits

This section of the report defines how the costs and benefits in the appraisal were estimated. The results of the appraisal are shown in Section 4. The costs and benefits comprise the following elements, which are addressed in turn:

- Capital costs
- Operating costs
- Journey time/reliability benefits.

3.1 Capital costs

Capital costs consist of initial capital costs and renewal costs / renewal cost savings, which are addressed in turn.

Table 3.1: Capital costs

Option	Proposed funding source	£m
Option S1	CP5 Rolling Programme of Electrification	0.2
Option S2	CP5 Rolling Programme of Electrification	1.6
Option S3	CP5 Rolling Programme of Electrification	1.6

Notes

The capital cost used for the appraisal, as quoted above, includes the base cost/point estimate but excludes any QRA-based risk allowance and excludes general contingency/generalised risk allowance etc.

The above capital costs include Schedule 4 possession costs: see Table A.1. User and non-user disbenefits associated with possessions are based on these costs: for assumptions see Table A.1; these disbenefits are shown in Table 4.1.

50% of the above total costs are assumed to be incurred in 2017, 50% are assumed to be incurred in 2018 and 0% are assumed to be incurred in 2019.

The above costs are in 2017 factor prices, at GRIP stage 1, are undiscounted and exclude optimism bias.

No real terms changes in costs are applied to the above costs during the appraisal period, leaving aside the issue of optimism bias.

The PVs for total capital costs (including renewal costs/cost savings) are shown in Table 4.1. These include optimism bias (using the OB rates shown in Table A.1) and are discounted (using the discount rates shown in Table A.1).

The above costs are assumed to be grant-funded unless stated. The PVs in Table 4.1 therefore exclude RAB finance costs.

Costs are relative to the Base Case. Initial capital costs only (renewal costs are excluded). Costs are shown as positive.

Source: Project Team.

Initial capital costs

Initial capital costs are shown in Table 3.1. The table includes the funding sources assumed.

The Do-Minimum case of closing Breich Station involves demolition and site clearance costs estimated at £241k.

Option 1 includes the costs of demolishing and clearing the site of Breich Station.

Option 2 (reconfiguring the operational platforms at Breich Station) is likely to involve significant capital expenditure. The additional capital expenditure required to deliver Option 1 is estimated to be £1.64m[11] at GRIP 1.

Option 3 (relocating the operational platforms at Breich Station) is likely to involve significant capital expenditure over and above that required to reconfigure the existing station.

It is assumed that the Schedule 4 costs associated with both Option 1, 2 and 3 will be included within the electrification project.

Renewal costs and / or cost savings

No project-related renewals are anticipated at this location. The ongoing renewals liability at Breich has been captured through the removal of the Long Term Charge liability in the Operating Costs section below.

The Present Values (PVs) of total capital costs (initial capital costs and renewal costs or cost savings where relevant) over the appraisal period are shown in Table 4.1 (see Section 4 below).

3.2 Operating costs

The operating costs / cost savings are shown in Table 3.2. The PVs of the operating costs over the appraisal period are shown in Table 4.1.

The operating costs associated with Breich Station are:

- ScotRail's Stations Long Term Charge costs
- ScotRail's maintenance costs.

The Stations Long Term Charge enables Network Rail to recover its ongoing renewals liability at its stations from train operators. The long term charge for Breich is £27k per annum for CP5.

This figure has been included as an operating cost reduction for ScotRail under Option 1.

[11] The capital expenditure cost includes the cost of demolishing and clearing Breich Station (£241k) and the cost of rebuilding the station to required standards (£1.4m)

If the station is reconfigured at Breich it is understood that the renewals liability would be significantly lower than the current station (largely as a result of providing pedestrian access from the adjacent road overbridge rather than via a station footbridge). For this reason the avoided Long Term Charge for options 2 and 3 have been estimated at £12k per annum (on the basis of a similar station at Blackridge on the Airdrie-Bathgate route).

Abellio ScotRail visits Breich Station five days a week as part of its franchised quality regime (SQUIRE). The cost apportioned cost to Breich is approximately £15,000 per annum. The natures of these costs mean that they cannot be assumed to be wholly avoidable. On this basis these costs have not been included in the appraisal. This is a relatively cautious assumption.

The appraisal does not include any costs associated with a replacement bus service. Given the low level of service and patronage at the station, the case for operating such a service would be likely to be weak.

Table 3.2: Operating costs/cost savings

Option	Type of cost/cost saving	£ per annum
Option S1	Stations Long Term Charge Reduction	27,000
Option S2	Stations Long Term Charge Reduction	12,000
Option S3	Stations Long Term Charge Reduction	12,000

Notes

Costs are in 2014 factor prices, at GRIP stage 1 and refer to the first full year of benefits; they are undiscounted and exclude optimism bias.

No real terms changes in costs are assumed during the appraisal period (leaving aside the issue of optimism bias).

The PVs are shown in Table 4.1 and include optimism bias where relevant (using the OB rates shown in Table A.1) and are discounted (using the discount rates shown in see Table A.1).

The PVs in Table 4.1 are shown separately for operating costs/cost savings retained by the private sector and costs/cost savings transferred to government. Operating cost transfer assumptions are shown in Table A.1.

Costs (or cost savings) are relative to the Base Case. Costs are shown as positive; cost savings as negative.

Source: Project Team.

3.3 Journey time / reliability benefits

This section addresses journey time / reliability value of time benefits and other benefits associated with these benefits: specifically revenue benefits and non-user benefits, as well as tax costs. These benefits/costs are addressed in turn.

For the purposes of this appraisal, the impact on journey times or performance of withdrawing services has been assumed to be zero.

User benefits

The value of time benefits depend on the following key factors: the benefits per passenger, the number of passengers experiencing these benefits and the characteristics of these passengers.

The low number of services and passengers expected to use the station means that the economic and revenue impacts of closure are minimal, and may even be positive. They have no material impact on the business case for Option 1.

Revenue benefits

Revenue benefits are based on an estimation of the additional passengers generated by the scheme. The analysis we have carried out using MOIRA[12] suggests that the revenue impact of retaining the station is likely to be negative, but the overall impact of this on the business case is minimal given the low patronage of the station. They have therefore been assumed to be zero.

Non user benefits

Like user and revenue benefits, non-user benefits are proportionate to the overall demand for travel from the station. Given the low demand to and from Breich, the estimated value of non-user benefits based on 138 trips per annum is also low. A proportionate consideration has been given to the option value of retaining the station at Breich. However, the level patronage at the station is such that the option value of retaining the station is likely to be low.

Tax costs

Any additional rail journeys result in tax costs associated with a reduction in the number of cars on the roads. These tax costs, both fuel duty and VAT, were estimated in accordance with STAG. Given the low numbers of passengers using and forecast to use the station, the taxation impact of the scheme is not likely to be material to the business case and has been assumed to be zero.

[12] MOIRA is a rail industry demand forecasting package.

4. Appraisal results and conclusions

This section of the report presents appraisal results, the results of sensitivity analysis and conclusions.

4.1 Appraisal results

The socio-economic appraisal includes the following costs and benefits:

- Capital costs (see Section 3.1)
- Operating costs or cost savings (Section 3.2)
- Journey time/reliability benefits, comprising value of time benefits and associated revenue and non-user benefits and tax costs (Section 3.3)
- Station amenity benefits (Section 3.4).

The results for each option under the central case scenario are shown in Table 4.1. The Transport Economic Efficiency (TEE) table(s) and Appraisal Summary Table (AST) are shown in the Appendix.

Table 4.1: Results of socio-economic appraisal	Option S1	Option S2	Option S3
	£m PV	**£m PV**	**£m PV**
Net benefits to consumers and private sector (plus tax impacts)			
Rail user reliability benefits	0.00	0.00	0.00
Rail user journey time benefits	0.00	0.00	0.00
Journey ambiance inc. station amenity	0.00	0.00	0.00
Non user benefits - road decongestion	0.00	0.00	0.00
Non user benefits - noise, air quality, greenhouse gases & accident benefits	0.00	0.00	0.00
Rail user and non user disruption disbenefits during possessions	0.00	0.00	0.00
Current TOC revenue benefits*	0.00	0.00	0.00
Current TOC operating costs**	0.11	0.05	0.05
Indirect taxation impact on government	0.00	0.00	0.00
sub-total (a)	**0.11**	**0.05**	**0.05**
Costs to government (broad transport budget)			
Capital costs (c)	0.32	2.21	2.37
Non user benefits - road infrastructure cost changes	0.00	0.00	0.00
Revenue transfer*	0.00	0.00	0.00
NR operating costs and TOC operating costs transfer**	-0.80	-0.37	-0.37
sub-total (b)	**-0.48**	**1.84**	**2.00**
Net Present Value (NPV) (a-b)	**0.59**	**-1.79**	**-1.95**
Benefit Cost Ratio to Government (BCR) (a/b)	**financially positive**	**0.03**	**0.03**
Commercial Benefit Cost Ratio (CBCR) ((d-e)/c)	*2.81*	***0.19***	***0.18***
Notes:			
*Total revenue benefits = revenue benefits to private sector + revenue transfer to government (d)	0.00	0.00	0.00
**Total change in operating costs = change in operating costs to private sector sector + change in operating cost transfer to government (e)	-0.91	-0.42	-0.42
Present Values (PVs) are in 2010 market prices and are discounted to 2010 using Social Time Preference discount rates: see Table A.1. The appraisal is in accordance with the DfT's WebTAG appraisal guidance. Results are shown for the relevant option/scenario etc relative to the Base Case. For net benefits etc, benefits are shown as positive. For costs to government etc, costs are shown as positive.			
The above results refer to the "adjusted BCR" results. If the benefits include rail user reliability benefits, the "initial BCR" results will be lower than those shown, since these benefits should be excluded from the initial BCR. However this appraisal and the value for money assessment focuses on the adjusted BCR results.			
Commercial BCR is defined by Network Rail not by DfT/WebTAG. This is a summary version of the TEE tables.			

4.2 Results of sensitivity analysis

A sensitivity test are summarised in Table 2.2.

Table 4.2: Description of sensitivity tests	
Sensitivity test	Description
S1 SEN1	As Option S2 with site clearance costs doubled

The results are shown in Table 4.3. The impact of varying the key assumptions on the overall business case for the best performing option (Option 1) is minimal.

Table 4.3: Results of socio-economic appraisal (Sensitivity)		S1 SEN1
		£m PV
Net benefits to consumers and private sector (plus tax impacts)		
Rail user reliability benefits		0.00
Rail user journey time benefits		0.00
Journey ambiance inc. station amenity		0.00
Non user benefits - road decongestion		0.00
Non user benefits - noise, air quality, greenhouse gases & accident benefits		0.00
Rail user and non user disruption disbenefits during possessions		0.00
Current TOC revenue benefits*		0.00
Current TOC operating costs**		0.05
Indirect taxation impact on government		0.00
	sub-total (a)	**0.05**
Costs to government (broad transport budget)		
Capital costs (c)		2.05
Non user benefits - road infrastructure cost changes		0.00
Revenue transfer*		0.00
NR operating costs and TOC operating costs transfer**		-0.37
	sub-total (b)	**1.68**
Net Present Value (NPV) (a-b)		**-1.63**
Benefit Cost Ratio to Government (BCR) (a/b)		**0.03**
Commercial Benefit Cost Ratio (CBCR) ((d-e)/c)		***0.20***
Notes:		
*Total revenue benefits = revenue benefits to private sector + revenue transfer to government (d)		0.00
**Total change in operating costs = change in operating costs to private sector sector + change in operating cost transfer to government (e)		-0.42

Present Values (PVs) are in 2010 market prices and are discounted to 2010 using Social Time Preference discount rates: see Table A.1. The appraisal is in accordance with the DfT's WebTAG appraisal guidance. Results are shown for the relevant option/scenario etc relative to the Base Case. For net benefits etc, benefits are shown as positive. For costs to government etc, costs are shown as positive.

The above results refer to the "adjusted BCR" results. If the benefits include rail user reliability benefits, the "initial BCR" results will be lower than those shown, since these benefits should be excluded from the initial BCR. However this appraisal and the value for money assessment focuses on the adjusted BCR results.

Commercial BCR is defined by Network Rail not by DfT/WebTAG.

This is a summary version of the TEE tables.

4.3 Conclusions

The appraisal has been carried out in accordance with the Scottish Government's STAG appraisal guidance and with the Railway Closures Guidance. The appraisal has considered two fundamental questions relating to the closure of Breich Station. These are whether:

- Firstly, in the absence of the need to undertake major works at Breich Station, there is a case for closing the station at Breich on the basis of a reasonable view of its social and economic value
- Secondly, whether closing the station prior to the electrification works would significantly improve the value-for-money of the investments underway on the Shotts Route.

Overall the appraisal suggests that there is a case for closing Breich on an operating cost basis alone (i.e. the low level of user and non-user benefits from retaining Breich are insufficient to outweigh the cost of operating the station as reflected in the long term charge for the station).

Once demolition and site clearance costs are allowed for, the Net Present Value of closure is estimated to be (positive) £0.59m.

A comparison against other feasible options

- The option to retain the station on its current site has a (negative) Net Present Value13 of -£1.79m. This result is a result of on the additional renewal costs avoided alone over a 60 year appraisal period.
- The option to retain the station on an adjacent site once the electrification scheme has been completed has a (negative) Net Present Value of -£1.95m over a 60 year period
- The closure will avoid station rebuild costs of £1.4 million associated with the Shotts Electrification Programme.

In conclusion, the case for retaining the station is weak, and deteriorates when considered in the context of the requirement to invest significantly at this location if is not closed.

[13] Railways Closure Guidance suggests the use of benefit cost ratio methodology to assess investment proposals. Net present value is a related method which provides a more helpful metric in cases such as this where there are net disbenefits or net cost savings.

Appendix

This section includes the following further information:

- Table A.1, further information on appraisal assumptions
- Transport Economic Efficiency (TEE) tables; and
- Appraisal Summary Table (AST).

Table A.1: Further appraisal assumptions

Assumptions apply to central case unless stated. Further assumptions are in tables in main text.
All years refer to financial years e.g. 2014 refers to 2014/15 F/Y.

Assumption	Value	Source	Comment
General assumptions:			
Current year	2017	STAG	
Model base year	2017	STAG	
First year of benefits	2018	Project Team	100% of benefits realised from this year
Benefits profile by year 2018 2077	% of total 100% 100%	 Project Team Project Team	
Appraisal period (years)	60	Project Team	The maximum is 60 years under WebTAG
Price base year	2010	STAG Technical Database 9.5.7	Values converted from model base year to price base year using GDP deflator
Base year for discounting	2010	STAG Technical Database Section 14	
Discount rate (Social Time Preference Rate)	3.5% for 30 years from the current year and 3.0% thereafter	STAG Technical Database 9.5.4	
Unit of account	Market prices	STAG Technical Database 9.5.6	19% added to convert factor prices to market prices
Capital and operating cost assumptions:			
Changes in capital costs in real terms during appraisal period	Not applied		
Changes in operating costs in real terms during appraisal period	Labour costs are assumed to increase in real terms (relative to GDP deflator) during appraisal period. Increases are c. 2% per annum between 2015 and end of appraisal period.	Follows DfT advice	No other real terms changes in operating costs are assumed.
Cost of TOC profit as percentage of any change in operating costs	8%	DfT	
Optimism bias for: Capital costs	40% at GRIP stage 1	STAG 13.3 Optimism Bias - follow WebTAG (Unit A5.3, Table 2)	Optimism bias is not applied to cost savings

Operating costs	41% at GRIP stage 1	STAG 13.3 Optimism Bias - follow WebTAG (Unit A5.3, Table 2)	Optimism bias is not applied to cost savings
Passenger benefit-related assumptions			
Passenger demand growth Passenger set or all services	5.0% p.a. from 2010 to 2013, 5.0% p.a. from 2014 to 2018, 5.0% p.a. from 2019 to 2034 and 0% thereafter.	Based on…… Under the central scenario, growth is capped 20 years after the current year, in accordance with WebTAG (Unit A5.3, Para 2.3.1).	
Year in which underlying demand growth is capped (20 years from current year)	2034	STAG - 9.2.2.3 Growth in Public Transport Patronage	This cap year also applies to fare increases applied (see below) and any real terms cost increases applied (see above).
Type/area of journey:	Proportion of total journeys		
Within the London Travelcard Area	0%	Derived from MOIRA	
Rest of South East to/from London Travelcard Area	0%		
Within the South East (excl London Travelcard Area)	0%		
Outside South East to/from London (<100 miles)	0%		
Outside South East to/from London (100+ miles)	0%		
Outside South East <20 miles (excl within PTE areas)	0%		
Outside South East 20-100 miles	100%		
Outside South East 100+ miles	0%		
To/From Airports	0%		
Proportion of work time journeys:	11%		Remaining passengers are all non-work time (commuters or leisure - see below).
Average Base Generalised Journey Time (GJT) (minutes)	0		
Average yield (£)	1.0		
Average journey length (miles)	0.0		

Table A.1: Appraisal assumptions (continued)			
Values of time (VoT) by user type: Business (work) users Commuters Others	 £31.96 per hour in 2010 prices £6.81 per hour in 2010 prices £6.04 per hour in 2010 prices	 STAG 9.5.12, Table 7 - as per WebTAG (data-book-Autumn-2014, Table A1.3.1)	All data are in market prices
"Rule of the half"	50%	as per WebTAG (Unit A.1.3 Para 2.1.6)	Time savings applied to new users at half the rate applied to existing users
VoT growth (per annum) by user type: Business (work) users Non-work	 GDP (real terms) per person GDP (real terms) per person	 WebTAG (data-book-Autumn-2014, Annual Parameters)	
Weighting for delays relative to in-vehicle journey time for economic benefits by user type : Business (work) users Non-work	 1.0 3.0	STAG follows WebTAG in this area WebTAG (Unit A5.3, Table 3) WebTAG (Unit A5.3, Table 3) & PDFH (v5.0 Section B5.5)	Applied to economic i.e. VoT benefits only - see below for weighting for demand impacts
Weighting for walk time relative to in-vehicle journey time for economic benefits by user type : Business (work) users Non-work	 1.0 2.0	STAG follows WebTAG in this area WebTAG WebTAG (Unit A1.3, Para 4.3.5)	Applied to economic i.e. VoT benefits only - see below for weighting for demand impacts
Weighting for delays relative to in-vehicle journey time for demand impacts:	3.0	PDFH v5.0	
Weighting for walk time relative to in-vehicle journey time for demand impacts:	2.0	PDFH	
Average fare increases per annum (% per annum above RPI) except for specified years (see below). No increases applied after demand cap year (see above). Revenue growth also takes account of forecast increases in RPI relative to GDP deflator (until demand cap year), since appraisal uses GDP deflator to deflate prices to price base year.	1.0%	DfT advice	
Average fare increase in 2014 and 2015	0%	TS Advice	

Average elasticity of demand with respect to Generalised Journey Time (GJT)	-1.20	Weighted average elasticity with elasticities from PDFH 5.1 (except for airport flows: PDFH 5.0) as recommended by WebTAG (Unit M4, Table 1) and with weightings based on proportion of total journeys under each journey/area type.	
Reduction in car kms for 100% increase in rail passenger kms (diversion rate), for external costs of car use	26%	STAG 9.5.23 - follows WebTAG (Unit A5.4, Table 1)	Same rate applied across GB
Proportion allocated to commuting	25%	DfT	
Proportion allocated to other	25%	DfT	
Freight benefit-related assumptions			
HGV MEC growth rates after 2035			
Accidents	Values at GDP per capita growth, quantities at no change	DfT	
Noise	Values at GDP per capita growth, quantities at no change	DfT	
Pollution	Values at GDP per capita growth, quantities at no change	DfT	
Climate change	Values in line with central projection for price of carbon, quantities at no change	WebTAG (data-book-may-2014, Table A3.4).	The same price applies to traded and non-traded price of carbon
Infrastructure costs	No change in values or quantities	DfT	
Road congestion	Values at GDP per capita growth, quantities at no change	DfT	
Indirect taxation	Values at GDP per capita growth, quantities at no change	DfT	

Table A.1: Appraisal assumptions (continued)			
MEC congestion benefits Proportion allocated to work time	50%	DfT	These allocations are also applied to disruption disbenefits
Rail environmental costs as % of road environmental costs (i.e. HGV MECs for noise, pollution and greenhouse gases)	33%	This is a conservative estimate of the relationship between rail and road environmental costs. For carbon emissions, for example, rail emissions are estimated at 24% of road emissions per tonne km (source: "Value and importance of rail freight", NR, 2010). The same proportion is applied throughout the appraisal period).	
Other assumptions			
TOC revenue and TOC operating cost transfer: During current franchise the following proportion of revenue and operating costs is assumed to be transferred to government	50%	Network Rail assumption	If the TOC is publicly-owned all revenue is transferred to government during the current franchise. Overall revenue and operating cost transfer assumptions are shown in the TEE tables.
After current franchise expires the following proportion of revenue and operating costs is assumed to be transferred to government	100%	Network Rail assumption	
Network Rail operating costs			All NR operating costs are treated as central government costs
Schedule 4 costs as a proportion of investment cost	0%	Project Team	
User disbenefits as a proportion of revenue disbenefits (i.e. Schedule 4)	100%	Economic Analysis Team assumption	User & non-user benefits are increased to allow for factor to market price adjustment.
Non user disbenefits as a proportion of revenue disbenefits	25%	Economic Analysis Team assumption	
Disruption during construction:			

Table A.1: Appraisal assumptions (continued)			
Indirect tax costs	Various including current fuel duty rates, resource costs of fuel and average fuel efficiency, and forecast changes in these parameters over the appraisal period	0	As a simplifying assumption, the share of petrol and diesel in total car miles is assumed to be 50%/50% throughout the appraisal period. No electric car mileage is assumed.
Value of preventing a fatality (VPF)	£1.640m in 2010 prices	STAG 8.2.3 - follow WebTAG (data-book-Autumn-2014, A4.1.5)	Growth in line with GDP (real terms) per person growth

Option S1

Table 1: Economic Efficiency of Transport System (All costs & disbenefits are negative, all benefits & savings are positive)

	Total in 2010 price base £	Cars, LGVs & goods vehicles	Bus & Coach	Rail Total	Rail infra-structure - Network Rail	Rail passengers, TOCs
Non-business commuting benefits						
Travel time saving	0	0		0		0
Vehicle operating costs	0			0		
User charges	0			0		
During construction & maintenance	0	0		0		0
Net (1a)	**0**	0	0	0	0	0
Non-business other benefits						
Travel time saving	0	0		0		0
Vehicle operating costs	0			0		
User charges	0			0		
During construction & maintenance	0	0		0		0
Net (1b)	**0**	0	0	0	0	0
Business benefits						
Business user benefits						
Travel time saving	0	0		0		0
Vehicle operating costs	0			0		
User charges	0			0		
During construction & maintenance	0	0		0		0
Net (2)	**0**	0	0	0	0	0
Private sector provider impacts						
Revenue	0			0		0
Opcost	912,839			912,839		912,839
Private sector contribution to investment cost	0			0	0	
Revenue transfer (0% to government)	0			0		0
Opcost transfer from TOCs (88% to government)	-802,858			-802,858		-802,858
Sub total (3)	**109,981**	0	0	109,981	0	109,981
Other business impacts						
Developer contribution (4)	**0**			0		
Net business impact (5 = 2+3)	**109,981**	0	0	109,981		
Total, PV of transport econ eff. benefits (6 = 1a+1b+5)	**109,981**	1(a), 1(b) and (5) flow into the AMCB table, not (6)				

Table 2 Public Accounts (costs should be recorded as a positive number, surpluses as a negative one)				
	All Modes Total	Road Infrastructure	Bus & Coach	Rail
Local Government funding				
Revenue	0			
Operating costs	0			
Investment costs	0			
Grant/subsidy: Public funds - local government (b)	0			0
Revenue transfer	0			
Net (7)	**0**	0	0	0
General Government funding: transport				
Revenue	0			
NR operating costs	0			0
Investment costs (a)	*324,483*			*324,483*
Grant/subsidy: Public funds - local government (b)	*0*			*0*
Developer contribution to investment cost(c)	*0*			*0*
Private sector contribution to investment cost (d)	*0*			*0*
Net investment costs to central govt (= a-b-c-d)	324,483			324,483
Revenue transfer (0% to government)	0			0
Opcost transfer from TOCs (88% to government)	-802,858			-802,858
Infrastructure cost savings	0	0		
Net (8)	-478,375	0	0	-478,375
General Government funding: non-transport				
Indirect Tax Revenues (9)	**0**	0		0
Totals				
Broad transport budget (10=7+8)	**-478,375**	* These costs exclude developer contributions		
Wider public finances (11=9)	**0**			

Table 3: Analysis of Monetised Costs and Benefits (AMCB)		
Noise		
Local air quality		
Greenhouse gases		
Rail environmental costs		
Journey ambience (inc. station amenity and crowding benefits)		
Accidents (incl. safety)		
Consumer users (sub-total 1a+1b, Table 1)	0	
Business users and providers (sub-total 5, Table 1)	0	
Reliability (including performance)		
Option values		
Wider public finances (indirect taxation revenues) (sub-total 11)	0	Sign changed from Table 2
PV of Benefits (a = sum of all benefits)	**0**	
Broad transport budget (sub-total 10)	**0**	From Table 2
PV of Costs (b = 10)	**0**	
Overall impacts		
NPV (a-b)	**0**	
BCR (a/b)	**0.00**	

Appraisal Summary Table		Date produced:		Contact:	
Name of scheme:	Shotts Electrification (Breich)			Name	Richard Owen
Description of scheme:				Organisation	Network Rail
				Role	Analyst

Impacts		Summary of key impacts	Assessment			
			Quantitative	Qualitative	Monetary £(NPV)	Distributional 7-pt scale/ vulnerable grp
Economy	Business users & transport providers	Journey time benefits to work-time rail users, road de-congestion benefits to work time road users and benefits to transport providers are included.	Value of journey time changes(£) Net journey time changes (£) 0 to 2min | 2 to 5min | > 5min		109,981	
	Reliability impact on Business users	Reliabilty (value of time) benefits to work-time rail users are included.			0	
	Regeneration	No significant change				
	Wider Impacts	No significant change				
Environmental	Noise	Benefits related to modal shift are included.			0	
	Air Quality	Benefits related to modal shift are included.			0	
	Greenhouse gases	Benefits related to modal shift are included.	Change in non-traded carbon over 60y (CO2e) Change in traded carbon over 60y (CO2e)		0	
	Landscape	No significant change				
	Townscape	No significant change				
	Heritage of Historic resources	No significant change				

	Biodiversity	No significant change				
	Water Environment	No significant change				
	Rail environmental costs	No significant change			0	
Social	Commuting and Other users	Journey time benefits to non work-time rail users and road de-congestion benefits to non work time road users are included.	**Value of journey time changes(£)** **Net journey time changes (£)** 0 to 2min / 2 to 5min / > 5min		0	
	Reliability impact on Commuting and Other users	Reliabilty (value of time) benefits to non work-time rail users are included.			0	
	Physical activity	No significant change				
	Journey quality/ambiance	Station amenity benefits and crowding benefits are included.			0	
	Accidents	Benefits related to modal shift are included.			0	
	Security	No significant change				
	Access to services	No significant change				
	Affordability	No significant change				
	Severance	No significant change				
	Option values	No significant change				
Public Accounts	Cost to Broad Transport Budget	Capital grant costs to government, revenue transferred to government, operating costs transferred to government and road infrastructure cost savings to government (associated with modal shift) are included.			478,375	
	Indirect Tax Revenues	Tax costs are included.			0	