

Ashton Vale Corridor Rapid Transit

Ultra Light Rail Transit Review

Report

May 2011

Bristol City Council

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Executive Summary

Overview

1. Bristol City Council and North Somerset Council are promoting a Bus Rapid Transit (BRT) scheme that would run between Long Ashton Park & Ride to Bristol City Centre via Ashton Gate and the former Harbour Railway. In November 2010 Bristol City Council received an independent proposal from the Sustraco Consortium for an alternative Ultra Light Rail Transit (ULRT) scheme between Ashton Gate and Bristol Temple Meads following the same general alignment.
2. To allow a robust consideration of whether ULRT could be a viable alternative to BRT it is necessary to review the proposed ULRT scheme on a comparable basis. This review developed Sustraco's outline ULRT scheme using the work undertaken to date developing the BRT scheme.
3. An objective of this analysis is to understand whether the differences between ULRT and BRT result from the different mode or from the extent of the route. To achieve this, two ULRT options have been considered:
 - Sustraco's proposed ULRT alignment and service characteristics between Ashton Gate and Bristol Temple Meads station; and
 - A ULRT option more closely comparable to the BRT option, extended to the Long Ashton Park & Ride site, but following the core alignment and using service characteristics identified in Sustraco's proposal.
4. Both options have been assumed to include a standalone bus shuttle service round the city centre to reflect the bus link identified in the Sustraco proposal and ensure the ULRT scheme offers access to the city centre comparable to the BRT scheme.
5. The Sustraco proposal identifies an aspiration for a ULRT city centre loop, but this does not form an integral part of the proposal. In addition to track costs the loop would incur the cost of highway modifications including signalling 15 existing highway junctions and the remodelling of St James Barton roundabout. The inclusion of a ULRT City Centre loop would incur additional cost and represent a significant delivery challenge. Therefore this option has not been considered.

Demand Forecasts

6. Demand for the different options was forecast using the same modelling framework. Demand forecasts for the ULRT and BRT options are summarised in Table 1. This shows that ULRT, in either option, is forecast to attract fewer trips than the BRT scheme. This is because in comparison with the BRT the ULRT alternative offers:
 - fewer direct journey opportunities to city centre locations including Cabot Circus and Broadmead;
 - a less frequent peak service of six trams per hour compared to ten buses per hour; and
 - a slower journey time.

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7. The Long Ashton ULRT option attracts more demand than the Ashton Gate ULRT alternative, because the Ashton Gate option is in competition with existing Long Ashton Park & Ride bus service whereas the Long Ashton option is assumed to replace the Park & Ride bus service.

TABLE 1 DEMAND SUMMARY (2016)

Single Trips	ULRT Ashton Gate to Temple Meads	ULRT Long Ashton to Temple Meads	BRT Long Ashton to City Centre
AM Peak Hour	170	530	1120
Inter Peak Hour	120	270	427
PM Peak Hour	130	360	796
Total Daily Demand	1,470	3,845	7,365
Total Annual Demand	371,910	972,785	1,863,219

8. Note the BRT demand includes specific BRT services between Long Ashton and the city centre only. It excludes 1,178,727 annual trips on routes from North Somerset.

Affordability

9. To ensure consistency between ULRT options and the BRT scheme the ULRT options have been developed using design and cost analysis undertaken for the BRT scheme. The capital cost (2010 prices) for each option can be summarised as follows:

- BRT Long Ashton to City Centre - **£39.1m**;
- ULRT Ashton Gate to Temple Meads - **£38.9m**; and
- ULRT Long Ashton to Temple Meads - **£53.2m**.

10. The cost of the comparable Long Ashton to Temple Meads ULRT option is £14.1m more expensive than the BRT scheme. The cost of the Ashton Gate to Temple Meads ULRT option is greater than the cost identified in the Sustraco proposal, because the review identified a number of cost items that were either omitted, underestimated or were not justified in the Sustraco proposal. The cost estimates exclude the cost of city centre loop bus priority measures, although the additional bus loop costs have been included in the economic appraisal.

Economic Case

11. Economic appraisal has been completed using the same framework as the BRT Major Scheme Business Case (MSBC) submission to ensure consistency with the BRT scheme and the DfT's appraisal guidance. The economic appraisal has estimated the Present Value of Benefits (net benefits for users and the impact on private sector operators) and Present Value of Costs (impact on local and central government accounts). These are shown in Table 2.

TABLE 2 APPRAISAL SUMMARY

Present Value 2002 £m	ULRT Ashton Gate to Temple Meads	ULRT Long Ashton to Temple Meads	BRT Long Ashton to City Centre
Present Value Benefits	£73.9	£40.2	£250.6
Present Value Costs	£64.2	£72.8	£79.7
Net Present Value	£9.7	-£32.6	£170.9
Benefit to Cost Ratio	1.2	0.6	3.2

12. The Benefit Cost Ratio (BCR) indicates that the economic case for the ULRT is weaker than for the BRT scheme. The BCR for the ULRT options suggests there is a poor case for public sector investment and that the options would not secure DfT funding. A BCR of 2:1 is regarded as the minimum requirement.
13. The low BCR for the ULRT options compared to the BRT scheme is as a result of higher capital and operating costs (which significantly reduce the benefits for the private sector), lower demand attraction and detrimental impact on highway journey time and congestion in the city centre.

Financial Sustainability

14. A comparison of forecast revenue and estimated operating cost shows that the ULRT scheme would not generate sufficient operating surplus to be considered resilient to the margins of error of the revenue forecasts. Indeed the Ashton Gate to Temple Meads option would require an ongoing operating subsidy. In contrast the BRT scheme generates a much greater operating surplus which is the attraction for the planned commercial operation of the services.

Delivery Case

15. It has been shown that the BRT scheme can be funded in the current spending review period resulting in the scheme being delivered by 2015. To pursue a ULRT option at this stage would likely forfeit DfT funding in this period. At present there is no certainty in the funding of local transport schemes beyond 2015.

Conclusion

16. Compared to the BRT scheme being promoted the ULRT options would cost more, offer a weaker economic case and require ongoing subsidy which will make securing public sector investment challenging. The development work needed for the ULRT alternative, including obtaining TWA powers, would rule out delivery within the current DfT spending period.

1 Introduction

- 1.1 The current Ashton Vale to Temple Meads (AVTM) and Bristol City Centre Bus Rapid Transit (BRT) scheme forms part of an integrated package of improvements planned for the West of England sub-region. It is the first route of a network of proposed routes which will serve Bristol, identified within the Joint Local Transport Plan (JLTP).
- 1.2 The aspiration is a network of sustainable rapid transit corridors across the sub-region connecting the key areas of employment, leisure and housing and offering fast, reliable and comfortable journeys which provide a real alternative to the use of private cars. The network identified in the JLTP would serve Ashton Vale, Hengrove, Emerson's Green, North and East Fringe, Cribbs Causeway, Bath, South Bristol and Bristol Airport. Accordingly the West of England Partnership are currently promoting the following schemes:
- Ashton Vale to Temple Meads BRT scheme;
 - North Fringe to Hengrove Package;
 - South Bristol Link; and
 - Bath Package.

Alternative Technologies Considered

- 1.3 As part of the programme of work to develop a rapid transit system, the West of England Authorities considered different rapid transit technologies. Technology reviews were undertaken in 2007 for AVTM and in 2009 for the North Fringe to Hengrove package. These looked at a range of options from high capacity, high cost mass transit systems such as Heavy Metro (London Underground) to lower capacity and lower cost systems such as conventional bus and ULRT.
- 1.4 BRT was selected as the preferred technology on the basis of providing the optimum balance between the objectives for flexibility, value for money and mode shift.

Status of Current BRT Scheme

- 1.5 The Major Scheme Business Case (MSBC) for the AVTM scheme was submitted to the Department for Transport (DfT) in March 2009 with Programme Entry status being awarded in March 2010. A Transport and Works Act (TWA) application for BRT was also made during 2010.
- 1.6 Following announcement of the Government's 2010 Comprehensive Spending Review (CSR), this scheme, along with all other transport major schemes, was placed on hold pending the outcome of the CSR. Subsequently, the scheme has been placed in the Development Pool and the promoters have been invited to submit a Best and Final Bid (BAFB) by September 2011. Assuming that the BAFB submission is successful the proposed scheme programme is set out below:

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- BAFB -September 2011
- Confirm intent to hold a Public Inquiry (issue Relevant Notice Date) - September 2011
- DfT acceptance of BAFB - December 2011
- Public Inquiry - Quarter 1 2012
- Approval of Statutory Powers - Quarter 1 2013
- Contract Award - Quarter 2 2013
- Completion of work and start operation - Quarter 2 2015

Summary of Sustraco Proposal

- 1.7 In November 2010 Bristol City Council received an independent proposal from the Sustraco Bristol Tram Consortium for an Ultra Light Rail Transit (ULRT) scheme between Ashton Gate and Temple Meads.
- 1.8 To allow a robust consideration of whether ULRT could be a viable alternative to BRT it is necessary to review the proposed ULRT scheme on a comparable basis. While the ULRT scheme proposed by Sustraco is at an early design stage, the BRT scheme has been developed over a number of years and commensurate with the stage of the development the design, cost and benefit analysis is much more detailed. This review develops Sustraco's ULRT proposal to allow a consistent comparison of the affordability, economic case and financial sustainability of the ULRT and BRT alternatives. This review is also consistent with DfT guidance on the appraisal of major schemes.

Structure of this Document

- 1.9 This document is structured as follows:
- Section 2 - Compares the BRT and ULRT schemes;
 - Section 3 - Summarises the approach to demand and benefit forecasting;
 - Section 4 - Sets out the operating costs for each option;
 - Section 5 - Details the capital costs for each scheme;
 - Section 6 - Identifies wider delivery considerations; and
 - Section 7 - Concludes by summarising the affordability, economic case and financial sustainability of each option.

Disclaimer

- 1.10 This review has been undertaken by Bristol City Council and their advisers. A full disclaimer is included in Appendix A.

2 Comparison of Schemes

Sustraco ULRT Proposal

- 2.1 The proposal submitted to Bristol City Council by the Sustraco Bristol Tram Consortium comprises a ULRT route operating from Ashton Gate, with a new Park & Ride facility adjacent to the former Mega Bowl site, to Temple Meads Station. The route (illustrated in Figure 2.1) follows the existing rail alignment (and the proposed BRT route) from Ashton Gate as far as Wapping Road. From there it continues on street via the Prince Street swing bridge, The Grove, Redcliffe Way and Portwall Lane to Temple Meads Station. Intermediate stops will be provided at Create, New Cut, Museum Street, The Grove and Redcliffe.
- 2.2 The proposed service would be operated by a fleet of ULRT vehicles using hybrid drive technology powered by methane, with an aspiration to later use bio-methane made from recycled local waste. Services would run every ten minutes between 06:00 and midnight with a journey time of eleven minutes between Ashton Gate and Temple Meads.
- 2.3 The proposal also identifies a circular city centre bus link, connecting with the ULRT services at Redcliffe, and providing access to the Cabot Circus development and wider city centre destinations. However this is not listed as an integral part of Sustraco's proposal and the costs of the loop are not identified. For appraisal purposes the cost of the city centre bus link have been taken from the BRT scheme cost estimates.

Comparison with BRT

- 2.4 The Sustraco proposed ULRT differs from the BRT scheme as a result of the specific characteristics and capabilities of each mode and due to some deliberate differentiation of the offer. The key differences can be summarised as follows:
- The ULRT scheme operates between Ashton Gate and Temple Meads whereas the BRT scheme comprises a busway from Long Ashton with services operating via a city centre loop;
 - The ULRT scheme proposes a stop at The Grove in place of the BRT stop at the Arnolfini and further additional stops at Create¹ and Redcliffe;
 - The ULRT scheme would provide a frequency of six trams per hour all day whereas the BRT scheme will provide ten buses per hour in peak hours and five per hour off peak;
 - The ULRT scheme offers a journey time between Ashton Gate and Temple Meads of 11 minutes while the longer BRT journey from Long Ashton to Temple Meads will be made in 12 minutes;
 - The proposed ULRT fare is £4.00 return all day, while the BRT fare is proposed at £3.50 peak and £2.50 off-peak return; and

¹ Development of the BRT scheme since the 2009 MSBC submission includes provision of a BRT stop at the Create Centre. However this review is based on information supporting the 2009 MSBC submission and does not include the BRT Create stop. This will not have a material impact on the conclusions of this review.

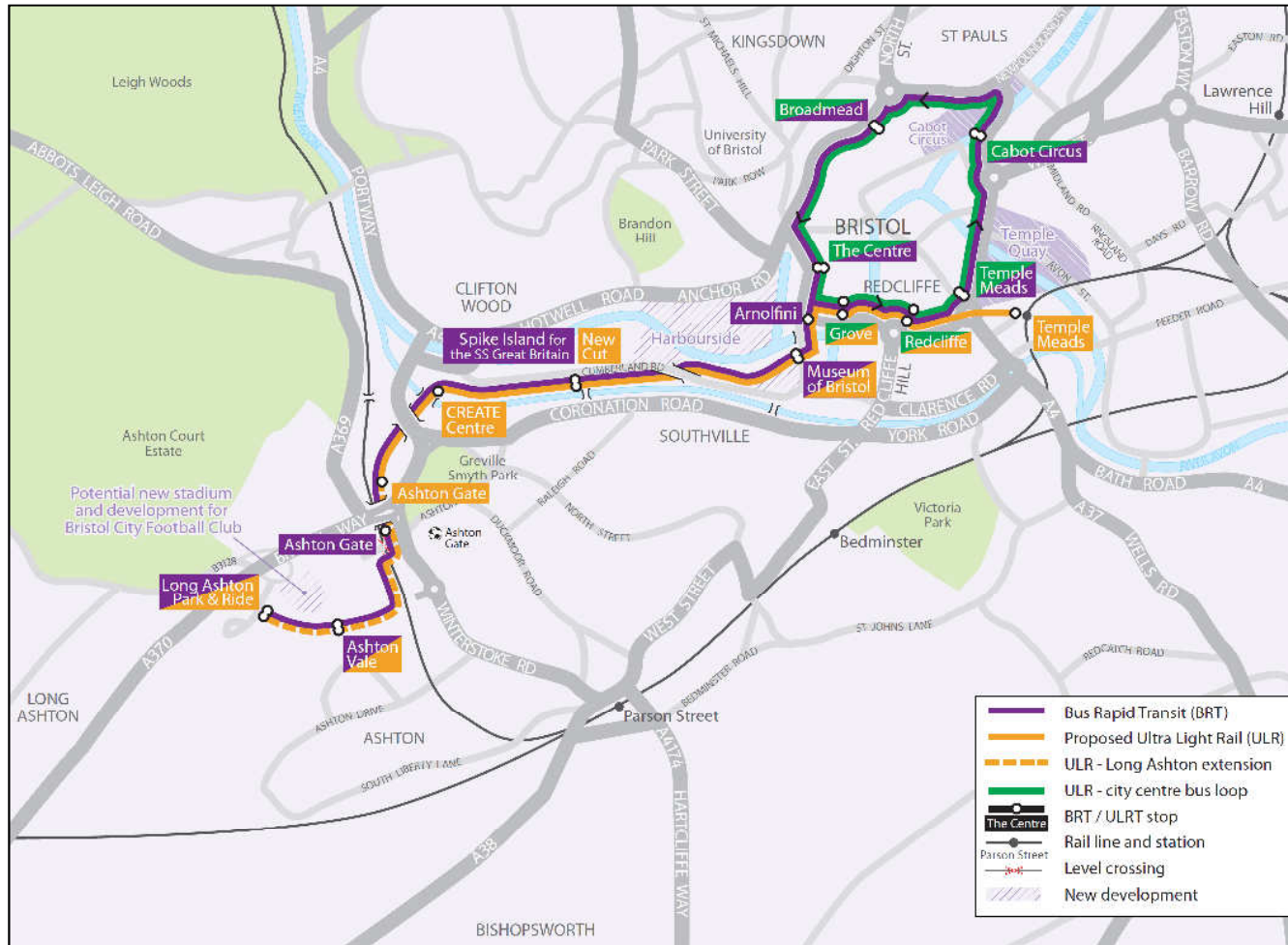
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- The BRT scheme allows existing bus services operating beyond the busway to be diverted via the busway allowing quicker journey times and a wider distribution of scheme benefits across the sub region.

Options Considered

- 2.5 This review aims to compare in a consistent manner, the costs and benefits of the Sustraco ULRT proposal with the BRT scheme that has been approved by the DfT and is the subject of a Transport and Works Act Order Application submitted in 2010. An objective of this analysis is to understand whether the differences between ULRT and BRT result from the different modes or from the extent of the route. To achieve this, two ULRT options, illustrated in Figure 2.1, have been considered:
- Sustraco’s proposed ULRT alignment and service characteristics between Ashton Gate and Bristol Temple Meads station; and
 - A ULRT option more closely comparable to the BRT option, extended to the existing Long Ashton Park & Ride site, but following the core alignment to Temple Meads and using service characteristics identified in Sustraco’s proposal.
- 2.6 Both options have been assumed to include a standalone bus shuttle service round the city centre to reflect the bus link identified in the Sustraco proposal and ensure the ULRT scheme offers access to the city centre comparable to the BRT scheme.
- 2.7 The Sustraco proposal identifies an aspiration for a ULRT city centre loop, but this does not form an integral part of the proposal. In addition to track costs the loop would incur the cost of highway modifications including the signalling 15 existing highway junctions and the remodelling of St James Barton roundabout. The inclusion of a ULRT City Centre loop would incur additional cost and represent a significant delivery challenge. Therefore this option has not been considered.

FIGURE 2.1 MAP OF OPTIONS APPRAISED



3 Demand and Benefit Forecasts

Forecasting Framework

- 3.1 Demand for the BRT scheme was forecast using the G-BATS3 modelling framework. This is a suite of multi-modal transport assignment and demand models that has been developed to support highway and public transport scheme development across the Bristol urban area. The modelling approach was scrutinised by the DfT in advance of them granting the BRT scheme Programme Entry status in March 2010.
- 3.2 To ensure the necessary consistency of approach the ULRT options have also been represented within the G-BATS3 demand model. This approach has the additional advantage that its outputs include the data required for DfT's TUBA software to calculate economic benefits. This is again consistent with the approach taken for the current BRT scheme and with DfT requirements.
- 3.3 It is acknowledged that there is variation in the way that travellers view the attractiveness of different transport modes and vehicle types. The specification of the ULRT options in G-BATS3 includes a 'mode constant' parameter, which is higher than the equivalent for the BRT scheme. This represents the general passenger perception that tram travel is more attractive than bus travel.

Demand Forecasts

- 3.4 Demand forecasts for the ULRT and BRT options are summarised in Table 3.1. This table also summarises the demand estimates provided in Sustraco's proposal.

TABLE 3.1 DEMAND SUMMARY (2016)

Single Trips	Sustraco Proposal (Ashton Gate to Temple Meads)	ULRT Ashton Gate to Temple Meads	ULRT Long Ashton to Temple Meads	BRT Long Ashton to City Centre
AM Peak Hour	-	170	530	1125
Inter Peak Hour	-	120	270	427
PM Peak Hour	-	130	360	796
Total Daily Demand	3,580	1,470	3,845	7,365
Total Annual Demand	905,740*	371,910	972,785	1,863,219

* Based on the BRT annualisation factor, see paragraph 3.8

- 3.5 Note that the BRT demand includes specific BRT services between Long Ashton and the city centre only. It excludes 1,178,727 annual trips on routes from North Somerset.

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- 3.6 Table 3.1 shows that the ULRT options attract fewer trips than the BRT scheme. The benefits of the mode constant factor, which represents ULRT being more attractive to passengers, is more than offset by the other advantages offered by the BRT scheme. When compared to BRT the ULRT alternatives offers:
- direct journey opportunities to fewer city centre locations including Cabot Circus and Broadmead;
 - a less frequent peak service of six trams per hour compared to ten buses per hour; and
 - a slower journey time.
- 3.7 The Long Ashton ULRT option attracts more demand than the Ashton Gate ULRT alternative. The key reason for this is because the Ashton Gate option competes with the existing Long Ashton Park & Ride bus services whereas the Long Ashton ULRT option replaces this bus service.
- 3.8 The conversion of single hour forecasts to daily demand (07:00-19:00) uses the factors derived for the BRT proposal of 2.5 for the AM peak hour, 6.0 for the Inter Peak hour and 2.5 for the PM peak hour. The accompanying annualisation factor of 253 is used to convert from daily to annual demand. For consistency Sustraco's annual forecast has been recalculated using this lower annualisation factor. There is no justification to assume different annualisation factors for ULRT and BRT therefore the choice of which factor to use will not affect the comparative performance of the two modes.

Economic Benefits

- 3.9 Sustraco's proposal did not quantify the economic benefits that the ULRT scheme would generate. This is required to undertake the value for money calculations necessary for any public sector investment. Modelling the ULRT scheme within the G-BATS3 framework allows these economic benefits to be quantified, including user time benefits, highway congestion impacts, changes to vehicle operating costs and benefits to private sector operators.
- 3.10 TUBA is the DfT's standard software for computing the present value economic benefits of outputs from transport models. This has been used to calculate the economic benefits of the ULRT scheme to ensure consistency with the BRT scheme and with DfT guidance.
- 3.11 Table 3.2 summarises the valuation of economic benefits for each of the ULRT and BRT options considered. This shows that the ULRT alternatives generate less economic benefit than the BRT scheme. The user time benefit for ULRT is less than the BRT scheme due to the same factors that result in ULRT attracting fewer users (as set out in paragraph 3.6). The ULRT schemes cause significant disbenefit to highway users as a result of increased congestion and delay in the vicinity of Temple Circus, St Thomas Street and Redcliffe Street where the ULRT alignment crosses the highway network at signalised crossings. The private sector impacts for the ULRT scheme is negative as a result of operating costs exceeding revenues.

TABLE 3.2 ECONOMIC BENEFITS SUMMARY

PV 2002 £m	ULRT Ashton Gate to Temple Meads	ULRT Long Ashton to Temple Meads	BRT Long Ashton to Temple Meads
User Time Benefits	£124.4	£114.3	£197.1
Highway Impacts	-£31.9	-£64.4	£17.9
Vehicle Operating Costs	£0.3	-£2.0	£5.9
User Charges	-£1.2	-£0.9	-£0.1
Carbon and Accident Benefits	£0.2	£0.1	£3.2
Private Sector Provider Impacts	-£17.9	-£6.9	£26.4
Total Economic Benefits	£73.9	£40.2	£250.4

Revenue

- 3.12 Table 3.3 summarises the revenue generated for each option. For the BRT scheme this assumes a yield per single peak journey of £1.75 (based on a £3.50 return fare) and an off peak yield of £1.25 per single journey (based on a return fare of £2.50). The ULRT yield per single journey is assumed to be £2.00 based on the day return fare of £4.00 specified in Sustraco's proposal.
- 3.13 The patronage forecasts for ULRT have not considered the impact of different fare levels on mode choice. Therefore the revenue assessment presented below is likely to overstate the ULRT revenue in comparison to the BRT scheme as the higher revenue for ULRT will deter users. However this will not affect the relative performance of the options presented. The table shows that the comparable Long Ashton to Temple Meads ULRT scheme would generate £1.0m less revenue per annum compared to the BRT scheme.

TABLE 3.3 ANNUAL REVENUE (2010)

Million £2.00 per ULRT trip all day, £1.75 per BRT peak trip, £1.25 per BRT off peak trip	Sustraco Proposal (Ashton Gate to Temple Meads)	ULRT Ashton Gate to Temple Meads	ULRT Long Ashton to Temple Meads	BRT Long Ashton to City Centre
Annual Peak Demand	n/a	0.2	0.6	1.2
Annual Inter Peak Demand	n/a	0.2	0.4	0.6
Total Demand	0.9	0.4	1.0	1.9
Annual Peak Revenue	n/a	£0.4	£1.1	£2.1
Annual Inter Peak Revenue	n/a	£0.4	£0.8	£0.8
Total Revenue	£1.8	£0.7	£1.9	£2.9

Note: BRT revenue from North Somerset services is not included.

4 Operating Cost Estimates

- 4.1 The operating costs for the BRT scheme were estimated by considering the number of vehicles required and the bus mileage and hours operated, which suggests an annual operating cost for the BRT services between Long Ashton and the City Centre, including the city centre loop, of £0.8m (2010 prices).
- 4.2 As part of the BRT scheme there will be operating cost impacts on the wider bus network as a result of withdrawal of the current Park & Ride services and quicker journeys for the North Somerset services. This reduces the net bus operating cost impact to £0.3m and this value is used in the economic appraisal. An incremental fleet purchase and renewal cost of approximately £1.5m (2010 prices) over the economic appraisal period is also included.
- 4.3 The Sustraco proposal sets out the assumed organisational structure required to deliver the ULRT scheme, including an estimate of the operating costs that would be incurred. Sustraco identified the annual operating cost for the ULRT scheme between Ashton Gate and Temple Meads as £1.9m (2010 prices). This includes vehicle leasing costs and therefore no fleet purchase or renewal costs are incurred. For the purpose of this review and to ensure consistency with the BRT scheme it is assumed the ULRT services would be delivered by an existing operator. Therefore the Senior Management positions including in Sustraco's costs have been removed. This assumption favours ULRT, reducing the operating costs to £1.7m per year.
- 4.4 It has been assumed that the Long Ashton alternative considered in this review could be delivered with the same resources, and therefore within the same operating costs, as the service between Ashton Gate and Temple Meads. This is because there appears to be sufficient time in the timetable to allow a service to work from Ashton Gate to Long Ashton without requiring additional tram vehicles in service. The Long Ashton ULRT service would replace the existing bus based Park & Ride service resulting in a reduction in bus operating costs of around £0.4m per annum.
- 4.5 The options considered as part of this review include a city centre bus loop, operating at the same frequency as ULRT, estimated using the same method as the BRT scheme. This suggests that the gross annual operating cost for the service would be £0.3m.
- 4.6 The estimated annual operating cost for each option considered in this review is summarised in Table 4.1. This shows that the cost of delivering the ULRT services will be £1.7m greater than the net cost of the BRT scheme.

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TABLE 4.1 NET INCREASE IN ANNUAL PUBLIC TRANSPORT OPERATING COST (2010)

Cost Item	Sustraco Proposal (Ashton Gate to Temple Meads)	ULRT Ashton Gate to Temple Meads	ULRT Long Ashton to Temple Meads	BRT Long Ashton to City Centre
P&R bus replaced by BRT	-	-	-£0.4	-£0.4
City centre bus cost	-	£0.3	£0.3	-
North Somerset bus cost	-	-	-	-£0.1
Rapid transit cost	£1.9	£1.7	£1.7	£0.8
Total Cost	£1.9	£2.0	£1.6	£0.3

5 Design and Capital Cost Estimate

- 5.1 The stage to which the BRT scheme has been progressed means that design and cost estimates have been developed to a greater level of detail than ULRT. Detailed design has been undertaken for the proposed BRT alignment as part of the development and option selection process BRT scheme and the cost estimates independently reviewed and verified. This presents the opportunity to adapt the designs quickly to consider ULRT options to a level of detail that allows suitable comparison with BRT. This approach ensures that the design and cost of ULRT is consistent with the design and costs of BRT.
- 5.2 Table 5.1 summarises the costs estimates from the Sustraco proposal, the BRT MSBC costs (uplifted from 2008 Q3 to 2010 for comparison) and the design costs estimated for the ULRT options prepared for this study.
- 5.3 The table illustrates that the cost of the Long Ashton to Temple Meads ULRT option is £14.1m more than the BRT scheme. The key items that generate this additional cost are:
- the greater costs of tram track compared to the busway;
 - the need to provide a tram signalling/control system;
 - the need for more utility diversions; and
 - increased land take and resulting land costs for a new Park & Ride site at Ashton Meadows and terminus at Plot 6 (Bristol Temple Meads station).
- 5.4 The Ashton Gate to Temple Meads ULRT option is £0.2m cheaper than the BRT scheme. However it is cheaper because the scope of route is not directly comparable to the BRT scheme. The cost of the Ashton Gate to Temple Meads ULRT option identified as part of this review is greater than the cost identified in the Sustraco proposal.
- 5.5 The review identified a number of cost items that were either omitted, underestimated or were not justified in the Sustraco proposal. To ensure consistency with the BRT costs these items have been incorporated in the costs for this review. The cost of the city centre bus loop priority measures and their associated risk layer, taken from the BRT scheme cost estimates, are not included in Table 5.1. However, the cost of these additional measures has been included in the economic appraisal for each option.

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TABLE 5.1 CAPITAL COST SUMMARY (2010 PRICES)

£m	Sustraco Proposal (Ashton Gate to Temple Meads)	ULRT Ashton Gate to Temple Meads	ULRT Long Ashton to Temple Meads	BRT Long Ashton to City Centre
Track / Busway	£9.6	£6.0	£8.1	£4.5
Tram Signalling	£0.1	£2.0	£2.3	£0.0
Structures	-	£2.6	£9.5	£9.8
Stops / Passenger Information System	£1.0	£3.2	£3.4	£1.8
Depot	£1.0	£1.0	£1.0	£0.0
Highway Costs	-	£3.8	£5.8	£6.9
Statutory Undertakings	-	£1.4	£2.2	£0.8
Land	-	£5.6	£4.2	£2.1
Other	£0.3	£2.8	£3.4	£2.8
Total Construction Costs	£11.9	£28.3	£40.0	£28.6
Detailed Design	£0.2	£2.4	£2.4	£2.4
TWA Application and Inquiry	£0.1	£0.5	£0.5	£0.5
Procurement	£0.1	£0.5	£0.5	£0.5
Evaluation and Monitoring	-	£0.3	£0.3	£0.3
Total Add Ons	£0.3	£3.6	£3.6	£3.6
Risk Layer (22% of Construction and Add Ons)	£2.4	£7.0	£9.6	£6.9
TOTAL	£14.7	£38.9	£53.2	£39.1

6 Delivery Case

- 6.1 In comparing the ULRT and BRT options it is necessary to consider the feasibility of delivering each alternative. This section sets out the key legal, commercial, funding and technical issues of adopting a ULRT option in preference to the current BRT scheme.

Legal

- 6.2 The key legal requirement for delivering a fixed alignment transport scheme is obtaining an order under the Transport and Works Act (TWA). Obtaining TWA powers takes a minimum of 18 months from application and the established process must be rigorously followed to reduce the chance of the application being judged non-compliant. Bristol City Council made a TWA application in 2010 for powers for the BRT system, which remains valid.
- 6.3 The process of obtaining powers is on the critical path for delivering the BRT project. A Relevant Notice Date (confirmation of intent to hold a Public Inquiry) is anticipated by September 2011, the expectation being that a Public Inquiry will be held in spring 2012 and the Secretary of State's approval of statutory powers will be obtained by spring 2013.
- 6.4 The application specifically relates to the construction of the BRT scheme and could not be altered to a ULRT proposal. To obtain powers for a ULRT scheme the process for obtaining TWA powers would need to be restarted.

Procurement

- 6.5 All public sector procurement above a certain threshold (which the BRT and ULRT exceed) must follow the Public Contracts Regulation. This stipulates that the procurement process must be open to competition with an advertisement of the procuring authorities intent to issue an invitation to tender issued via an Official Journal of the European Union (OJEU) notice. The procuring authority is required to invite at least three parties to tender (subject to there being sufficient interest). The procuring authority must appoint either the cheapest or most economically advantageous tender, which considers factors such as quality, technical merit and operating costs.
- 6.6 This procurement process will apply only to construction of the BRT infrastructure and will not be required to deliver the identified services. The Park & Ride service is already procured in accordance with the regulations. Other services which will use the busway currently run on a commercial basis and therefore no procurement is necessary. The busway maintenance will be delivered under Bristol City Council's existing highway arrangements.
- 6.7 The ULRT construction and vehicles are interdependent and therefore would be jointly procured through the Public Contract Regulations. The same process will apply to service operations and infrastructure maintenance, which would most likely form part of the construction contract although technically could be let separately. The procurement process could not start until funding has been

secured and traditionally takes place after powers are obtained. The option of 'Early Contractor Involvement', where procurement takes place in advance of obtaining powers would require DfT approval and would result in a delay in making an application for powers to allow the contractor/operator to make a material contribution to project development in advance of application. Given the complexity of procuring infrastructure and rolling stock, maintenance and operating contract(s), compared to an infrastructure only contract for the BRT scheme, the ULRT procurement process will inevitably take longer.

DfT Funding

- 6.8 Bristol City Council submitted the MSBC for the proposed BRT scheme to DfT in March 2009 with Programme Entry status being secured in March 2010, and was subsequently included within the Development Pool following the Comprehensive Spending Review.
- 6.9 The DfT is currently in the process of confirming which schemes that they will fund during the spending review period. To secure funding promoters must present a Best and Final Bid (BAFB) to the DfT in September 2011 and be able to deliver the majority of the scheme by the end of the spending review in 2015. The BRT scheme is well advanced in this process.
- 6.10 It is extremely unlikely that the DfT would consider the change in mode from BRT to ULRT as not constituting a different scheme. Accordingly the scheme would lose its Development Pool status and therefore any chance of securing funding before 2015.
- 6.11 Even if DfT were to accept the mode change the ULRT scheme is at an early stage of design and development and it is unlikely that the work required to bring the scheme to the level of cost certainty required to support the BAFB could be completed in the time available. The need to submit a new TWA application would mean that the earliest date that a Public Inquiry could realistically be held would be 2013. Assuming that procurement follows powers construction could not start until 2014. Therefore it is unlikely that the majority of funding could be expended before 2015.
- 6.12 Although other public funding streams are available, for example Regional Growth or Local Sustainable Transport funding, these funding sources would not be applicable to the proposed ULRT scheme.

Technical

- 6.13 There remain wide ranging technical feasibility and design issues that require resolution before the scheme reaches the level of cost certainty required to support the BAFB. Once the BAFB submission has been made the DfT contribution to the scheme will be fixed, with the promoters taking risk for any cost increases. Therefore the promoters need have confidence in the cost of the scheme, specifically including the items noted below, before considering a BAFB submission. The following points summarise the key considerations identified to date:

- The land required to deliver the 700 space Ashton Meadows Park & Ride site needs confirming. The acceptability of the proposed site is likely to be challenged and additional compensation land is likely to be required. Traffic modelling will be required to demonstrate that provision of the Park & Ride at this site will not have a unacceptable detrimental impact on the existing highway network in this area;
- The proposed dual track alignment across Ashton Avenue swing bridge does not allow for adequate segregation of tram, pedestrian and cycle movements;
- A structural assessment is required to confirm the structure of Prince Street Bridge could support two way tram working; and
- Further investigation is required to confirm that Ashton Avenue, Prince Street and Redcliffe Bascule bridge structures could contain a derailed tram vehicle.

6.14 These items are not considered likely to be unsolvable. However identifying and developing acceptable solutions will take time and these are likely to increase the cost of delivering ULRT.

7 Conclusions

- 7.1 This review has considered demand estimates, economic benefits and capital cost estimates for ULRT and BRT schemes. To conclude the review, this information has been used to compare the affordability, economic case and financial sustainability of each option.

Affordability

- 7.2 Sustraco's proposed Ashton Gate to Temple Meads option is estimated by this review to be £0.2m cheaper than the BRT scheme. However the different route means that it is not directly comparable. The Long Ashton to Temple Meads ULRT scheme is £14.1m more expensive than the BRT scheme, demonstrating the BRT scheme remains more affordable. These cost estimates do not include the additional city centre bus loop priority infrastructure, which has been included in the scheme appraisal for all options.

Economic Case

- 7.3 The following table summarises the economic position of each option.

TABLE 7.1 APPRAISAL SUMMARY

Present Value 2002 £m	ULRT Ashton Gate to Temple Meads	ULRT Long Ashton to Temple Meads	BRT Long Ashton to City Centre
Present Value Benefits	£73.9	£40.2	£250.6
Present Value Costs	£64.2	£72.8	£79.7
Net Present Value	£9.7	-£32.6	£170.9
Benefit to Cost Ratio	1.2	0.6	3.2

- 7.4 Table 6.1 shows that the ULRT alternatives offer a lower BCR than the BRT option. A BCR of less than 1:1 suggests that investment in the scheme is not justified because the cost of the scheme is greater than the economic benefits generated. To secure DfT funding, a BCR greater than 2:1 is required, although given the competition from other schemes a much high BCR is typically required. Furthermore the DfT will only fund the solution offering the greatest value for money which means that a ULRT option would need a BCR greater than BRT (i.e. 3.1) to secure funding.
- 7.5 Sensitivity tests have been undertaken to understand the impact on the appraisal to two key drivers of the economic case for ULRT. The tests include removing all highway disbenefit from the ULRT appraisal, which it could be anticipated sensitive design could mitigate, and including the costs proposed by Sustraco for the Ashton Gate to Temple Meads ULRT option.
- 7.6 Table 7.2 shows that in each sensitivity test the BCR reported remains less than the BRT scheme.

TABLE 7.2 APPRAISAL SUMMARY - SENSITIVITY TESTS

Present Value 2002 £m	ULRT Ashton Gate to Temple Meads - No Highway Disbenefits	ULRT Long Ashton to Temple Meads - No Highway Disbenefits	ULRT Ashton Gate to Temple Meads - Sustraco Capital Costs
Present Value Benefits	£105.8	£104.6	£70.0
Present Value Costs	£64.2	£72.8	£32.4
Net Present Value	£41.6	£31.8	£37.6
Benefit to Cost Ratio	1.6	1.4	2.2

7.7 Further tests have been undertaken to understand the level of capital cost or additional benefit that would be required to generate a BCR of 3.2:1 equivalent to the BRT scheme. The maximum cost for the Ashton Gate to Temple Meads ULRT option with a BRT equivalent BCR is £5.8m (2010 prices) while the Long Ashton to Temple Meads equivalent is £0.5m. The benefits for the Ashton Gate to Temple Meads option estimated as part of this review would need to more than double while more than two and a half times the benefit of the Long Ashton to Temple Meads option would be required.

7.8 The results of these sensitivity tests strengthen the conclusion drawn that BRT offers the strongest economic case for investment.

Financial Sustainability

7.9 Table 7.3 summarises the annual financial position of each option.

TABLE 7.3 FINANCIAL POSITION (2016)

£m per annum rapid transit only	Sustraco Proposal (Ashton Gate to Temple Meads)	ULRT Ashton Gate to Temple Meads	ULRT Long Ashton to Temple Meads	BRT Long Ashton to City Centre
Total Revenue	£1.8	£0.7	£1.9	£2.9
Operating Cost	£1.9	£1.7	£1.7	£0.8
Operating Surplus	-£0.1	-£1.0	£0.2	£2.1

7.10 Note the BRT revenue and operating cost includes only the specific BRT services between Long Ashton and the City Centre. It excludes the revenue and operating cost of direct services to and from North Somerset.

7.11 The table shows that the ULRT options would not generate sufficient operating surplus to be considered resilient to the margins of error of the revenue forecasts. Indeed the Ashton Gate to Temple Meads is estimated to make an operating loss and would therefore require an operating subsidy to make delivering the service viable. In contrast the BRT scheme generates a much greater operating surplus which is the attraction for the planned commercial operation of the services.

Delivery

- 7.12 It is has been shown that the BRT scheme can be funded in the current spending review resulting in the scheme being delivered by 2015. To pursue a ULRT option at this stage would likely forfeit DfT funding in this period. At present there is no certainty in the funding of local transport schemes beyond 2015.

Conclusion

- 7.13 Compared to the BRT alternative the ULRT options would cost more, offer a weaker economic case and require ongoing subsidy which will make securing public sector investment challenging. The development work needed for the ULRT alternative, including obtaining TWA powers, would rule out delivery within the current DfT spending period.

APPENDIX

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DISCLAIMER

DISCLAIMER

This review has been undertaken by Bristol City Council with advice from Steer Davies Gleave, Halcrow, Atkins and Ardent. The review has been undertaken by Bristol City Council and their advisors to understand the comparable case of BRT and ULRT schemes. The analysis herein is not intended to be relied upon by third parties. Bristol City Council and its advisors accept no liability for the use of this document other than for the purpose for which it was produced.

The projections contained within this document represent the advisors current best estimates. While they are not precise forecasts, they do represent, a reasonable expectation for the future, based on the most credible information available as of the date of this report. However, the estimates contained within this document rely on numerous assumptions and judgements and are influenced by external circumstances that can change quickly and can affect the conclusions made.

This analysis is based on data supplied by third parties. This has been checked whenever possible, however Bristol City Council and their advisors cannot guarantee the accuracy of such data and do not take responsibility for estimates in so far as they are based on such data.

