Greater Bristol Bus Network
Major Scheme Business Case

Chapter 3

Appraisal and Value for Money

3. Appraisal and Value for Money

INTRODUCTION

3.1 This chapter presents an update of the appraisal and value for money of the GBBN scheme presented in our Programme Entry submission. As described in Chapter 1, we have taken into account the minor changes to the scheme specification, revised scheme costs and relevant changes made by the Department in modelling and appraisal guidance. As per the Department's guidance it also uses a new optimism bias factor appropriate to the Full Approval stage of scheme development.

3.2 The reappraisal demonstrates that the case for the GBBN scheme remains very strong with a benefit-cost ratio (BCR) that meets the Department's criteria for high value for money schemes.

3.3 In line with the DfT's Draft Guidance the scheme appraisal is presented under standard headings, though focusing only on the significant changes to the business case presented at Programme Entry. The following headings are used:

- Scheme description;
- Problems and objectives identified;
- Assessment of alternative options;
- Capital costs;
- Operating costs;
- Risk assessment and optimism bias;
- Demand modelling;
- NATA assessment;
- Transport Economic Efficiency data;
- Sensitivity and scenario analysis;
- Supporting analyses; and
- Overall VfM conclusions.

3.4 As appropriate detailed descriptions and analysis are presented in Appendices

SCHEME DESCRIPTION

3.5 The GBBN Major Scheme will provide for significantly enhanced bus services on ten of the core travel corridors in the Greater Bristol area and can generically be referred to as a "Bus Showcase" network. The corridors

themselves serve a far wider network of bus services using them as core routes to link together the key destinations across Greater Bristol.

3.6 A full description of the scheme is re-provided in Appendix 2B. The scheme remains an integral part of the JTLP and its wider strategic context is already set out in Chapter 2.

Changes to the Scheme Specification

3.7 As described in Chapter 1, minor refinements to the scheme cost and specification have been made to maximise value for money and deliverability. These refinements have been made as part of a rigorous review of the scheme's elements and costs and comprise:

- A value management exercise that has scrutinised each of the scheme's infrastructure components to ensure that they add to the overall benefits of the scheme;
- A detailed cost review of all scheme elements;
- A further re-review in conjunction with First of all service and frequency enhancement assumptions;
- An updated Quantified Risk Assessment (QRA); and
- Overlaying the whole review process an ongoing risk identification and management process that ensured that, where additional risks were identified, actions were taken to refine elements such that design, cost and delivery risks have been mitigated.

3.8 Each of these elements is described in greater detail below.

Value Management Exercise

3.9 As evidenced by the material provided with the Programme Entry submission, this scheme has already been developed to a high level of design detail. Preliminary designs and detailed cost estimates based on existing contract prices have been prepared for the bus priority and bus stop improvements elements of the bid.

3.10 In line with best practice, we have undertaken a comprehensive review of all infrastructure elements of the scheme as part of a value management exercise that has sought to challenge the robustness of the design and deliverability assumptions and the business case benefits of each of the bus priority elements making up the overall scheme.

3.11 A key aim of the process was to highlight the schemes that offer the best value for money and to prioritise these schemes within the GBBN implementation process. The schemes that scored lower in terms of value for money were short listed for reassessment and further evaluation. A more detailed description of the approach adopted and the outcomes of the exercise are presented in Appendix 3C.

3.12 In summary, the value management review resulted in the exclusion of 11 scheme elements from the scheme as initially proposed in the Programme Entry submission. The total value of these scheme elements is £2.1m (2006 prices prior to applying construction inflation). The scheme elements (with their reference numbers) are as follows:

- Portbury Hundred HOV Lane (3007) - further detailed assessment has highlighted the limited public transport benefits that the scheme will deliver relative to its costs. The frequency of bus services is low on this section and First have confirmed that they do not consider the scheme as significant in terms of benefits to their operations.
- Orpheus Avenue (4012) - this scheme is for a short length of bus lane but the cost is high because of widening requirements to accommodate the bus lane. On-site surveys have observed marginal journey time and reliability benefits. On closer inspection this scheme is not considered to have significant operational benefits for First.
- A37 New Fosseway Rd to Airport Rd (2022) - detailed analysis has identified limited impacts in terms of predicted journey time savings and reliability impacts. With relatively few bus services using this section First have confirmed that the scheme is marginal in terms of anticipated benefits for their operations.
- B3340 Locking Rd / New Bristol Rd (3003) - detailed analysis identified that the proposed bus lane would deliver few benefits and that the inclusion of Selective Vehicle Detection (SVD) unit at the traffic signals would be the most cost effective form of priority at the traffic signals. The proposed changes to the scheme reduce scheme costs by 20%;
- A4174/M32 J1 Sliproad Works (7002) - there is already a bus lane on the approach to junction 1 slip road. This scheme is anticipated to provide limited additional benefits relative to the cost;
- A432 Downend Bus Lane (4018) - detailed site surveys have identified that this scheme would deliver limited journey time or reliability benefits. The scheme is also relatively high cost due to highway widening requirements;
- Coldharbour Lane Westbound Approach (4023) - detailed analysis of the journey time and reliability benefits conclude that this short left hand turn scheme into the proposed bus lanes on Coldharbour Lane is providing no significant additional benefits to the wider bus lane scheme on Coldharbour Lane.
- A370 Main Road, Cleeve (3006) - detailed reassessment of this scheme concluded that whilst the costs are modest the scheme would not providing any tangible benefits to bus operations.
- A4174 Signal Priority (4019 - two sites) – SVD can be provided via the Real Time Passenger Information system. SVD can be provided using 'virtual' loops and no roadside infrastructure is required.
- Parkway Bus Link (4013) - this scheme was included in the 2005 Programme Entry bid in anticipation that First would seek to make use

this bus-only link as a means of servicing Stoke Gifford and Bradley Stoke. First have confirmed that they have no medium term plans to use this link if provided and the element has been removed.

- A432 Signal Priority (4017 - three sites) - SVD is now to be provided via the Real Time Passenger Information system. SVD can be provided using 'virtual' loops and no roadside infrastructure is required.

3.13 As a result of the deliverability assessment further design work was also undertaken for a number of scheme elements, including examining alternative sub-options. Two areas received greatest attention, as follows:

- the M32 corridor – which was identified as having potential risks to delivery as it will require approval by the Highway Agency (HA). Significant new design work and analysis including a full topographical survey, a Stage III safety audit, confirmation of the preliminary design and cost estimates by the HA's own design consultants have all been completed. Additionally, approval in principle has been received from the HA for Departure from Standards. Agreements have also been reached with the Highways Agency for them to deliver the M32 scheme through a Section 278 Agreement on behalf of Bristol City Council.

  The net impact of the review is that the implementation costs of the M32 element of the scheme have been reduced slightly from Programme Entry stage and the risks associated with deliverability substantially reduced.

- A4018 Whiteladies Road and A432 Fishponds Road Corridors - the proposals for bus priority on both these routes are anticipated to face objections from both traders and residents. Both corridors have high bus patronage. Detailed corridor reviews were undertaken to critically assess the scheme elements proposed to ensure that there is robust justification for each element and the most effective form of bus priority is being proposed as part of the GBBN scheme. This assessment drew upon expertise in the delivery of bus priority outside the sub-region in locations such as London.

  Although a range of alternative options were generated and assessed the reviews have been to reaffirm the appropriateness of the measures contained within the Programme Entry scheme specification. There have been a number of relatively minor modifications to the 2005 proposals and a small number of additional measures included. The additional measures are primarily focussed on getting bottlenecks and junctions to operate to maximum efficiency.

Cost Review

3.14 A critical review of the cost estimation of all elements of the GBBN has been undertaken in parallel with the value management exercise and in conjunction with reviews of design parameters and procurement processes. These elements comprise:

- **Bus priority infrastructure costs** (bus lanes, signals and other associated infrastructure) which have been reviewed and revised since July 2005 for the following reasons: -
  - Changes to the implementation programme – which impacts upon construction inflation - and scheme costs since bid submission;
  - Estimates (prior to applying construction inflation) have been rebased at 2006 prices[1];
  - Construction cost inflation has been reviewed and applied at 6% per annum across the programme;
  - Bristol City Council and North Somerset have undertaken extensive reviews of scheme elements and costs in parallel to the value management exercise. These reviews have resulted in changes to the costs; and
  - As described above, M32 costs have been reviewed and reduced since July 2005 submission.
- **Bus stop costs** (raised kerbs, flag and replacement shelters and a subset of stops were identified with RTPI) – these costs have been revised based on:
  - A detailed audit of bus stops in the GBBN corridors enabling an identification of those stops which already have raised kerbs and adequate shelters;
  - A reduced unit cost for new bus shelters based on current suppliers and a re-review – as part of the bus stop audit – of bus shelter standard specifications for lower volume usage stops;
  - A scaling down of the number of stops requiring RTPI based on level of patronage; and
  - A reduction in the planning and supervision cost element included in the bus stop costs in the Programme Entry bid to apply only to the civil engineering costs (rather than full bus stop costs).
- **RTPI Costs** – estimates used in the Programme Entry submission were based on unit costs from the existing system Bristol City Council system. However, it was expected that with an effective procurement process and volume discounts would result in an improvement in these rates. As described in Chapter 6, we have progressed with the procurement process for the expansion of the RTPI system to support GBBN. Work since Sept 2006 has developed a business case for the contract to be awarded on a negotiated basis to ACIS. As a consequence the RTPI costs assumed in the bid have changed, as follows:
  - We now have firm unit prices that are lower than the unit prices assumed in the Programme Entry bid;
  - We have excluded certain optional items from the RTPI specification – audio systems on buses and on-vehicle displays;

[1] **BCC and NSC costs reviewed and rebased to qtr 3 2006, B&NES and SGC not rebased and global 6% uplift applied to 2005 Programme Entry costs to bring up to 2006 prices.**

- We have included certain items that were not included in the Programme Entry costs that are now considered mandatory e.g. audio at stops; and
- We have included capitalised maintenance and operating costs for he system for the first 5-years of expanded system operation.

- **Marketing and Consultation costs** have been revised as part of the enhancement and detailing of the communications strategy described in Chapter 5, as follows:
  - Marketing costs of £100,000 were included in the July 2005 bid. From the Gateway Review 0 in October 2005 and subsequent work since it has been recognised that sufficient resources need to be invested in marketing and raise awareness both during and after completion of the scheme. In developing a marketing plan we identified a range of budgets that could be used to support and promote GBBN of between £500k - £2m. Because of the likely overlap with existing budgets within the UAs (e.g. Travel Plans, personalised travel marketing, public transport promotion, safer routes to schools etc.) we have used the lower end of the proposed range (£500k).
  - A budget of £150,000 has been identified by work undertaken since the Programme Entry submission as being required for the consultation exercise described in Chapter 4.

Review of bus service and frequency enhancements

3.15 A further review was undertaken in conjunction with First of all service and frequency enhancement assumptions included in the scheme specification underpinning the Programme Entry submission.

3.16 The review has confirmed that all frequency and service enhancement assumptions remain as per the original specification.

Quantified Risk Assessment

3.17 Management of risks has been the key focus of the work developing this Full Approval submission.

3.18 A Quantified Risk Assessment (QRA) has been repeated using the revised view of risks at this stage of the scheme development process. As for the Programme Entry bid, this has applied a process of risk identification via the Risk Register, workshop sessions and the application of an updated estimated risk exposure for the GBBN Scheme, using Monte Carlo risk simulation methods. Details of the QRA process are provided in **Appendix 4I**.

Summary and Overall Impact on Scheme Specification Changes

3.19 In summary, we have undertaken a very detailed review of all elements of the GBBN scheme at a number of levels.

3.20 Firstly, as required in moving a scheme from Programme Entry towards Full Approval, we have refined scheme cost estimates as part of a general process of de-risking the scheme through engineering and cost reviews, and by initiating procurement processes.

3.21 Secondly, we have critically reviewed the need for each of the individual scheme elements that make up the GBBN scheme. This has confirmed that the case for the vast majority of the bus priority measures proposed remains strong. A small number of scheme elements have been either dropped or re-designed so as to maximise benefits and deliverability.

3.22 Thirdly, we have reviewed with the bus operator the bus service enhancement assumptions underpinning the GBBN and confirmed that these remain the same.

3.23 Overall the specification of the GBBN scheme remains almost identical to that set out in our Programme Entry submission. All the major elements of bus priority measures in ten corridors supported by new vehicles, bus stop infrastructure and RTPI remain the same. The outcome of the review and refinement has been to verify scheme designs, costs and deliverability.

PROBLEMS AND OBJECTIVES IDENTIFIED

3.24 A summary of the transport problems faced by the Greater Bristol area is provided in Chapter 2, supported by a corridor level analysis in Appendix 2A.

3.25 In summary, the key problems and issues identified relevant to the scheme remain:

- Continuing to increase the use of public transport for local journeys as a means of delivering objectives linked to the four Shared Priorities of congestion, air quality, road safety and accessibility;
- The continued strong support identified from the JLTP consultation process for improvements to public transport;
- Severe problems of highway network congestion – as the congestion analysis presented in the JLTP indicates, peak and off peak traffic speeds in the Greater Bristol area are amongst the lowest in England for comparable urban areas;
- Knock-on effects for the attractiveness of bus use with increasing bus journey times and, particularly, worsening bus reliability caused by traffic congestion, noting that without measures to improve public transport and restrain car use congestion is expected to worsen in the future;
- The level of road traffic accidents, particularly in the urban areas, where there are significant levels of conflict between road traffic and pedestrians between motorised road traffic and cyclists; and
- Development pressures in the Greater Bristol area requiring appropriate transport infrastructure and services to ensure that accessibility levels are

maintained and enhanced without substantially increasing the level of congestion and pollution.

3.26 The assessment of objectives to address the identified transport problems and issues has been undertaken in conjunction with the development of the JLTP.

3.27 The objectives of the scheme are therefore to:

- Increase the number of bus passengers;
- Increase satisfaction with bus services;
- Improve bus reliability and punctuality and reduce bus journey times; and
- Increase the percentage of the population within 45 minutes journey time by bus of the major centres of Bath, Bristol, Cribbs Causeway, the North Fringe and Weston-super-Mare.

ASSESSMENT OF ALTERNATIVE OPTIONS

3.28 No further assessment of alternative options has been made over and above that presented in our Programme Entry submission. It is not considered that any further assessment is required to support our case for Full Approval.

CAPITAL COSTS

3.29 As described above, the costs of the GBBN scheme have been critically reviewed and developed as part of the progression of the scheme towards approval and implementation.

3.30 As before, the scheme capital costs as used in appraisal comprise:

- Bus priority measures - the costs associated with the provision of the bus priority infrastructure;
- The cost of providing new and improved bus stops and shelters and providing Real Time Passenger Information (RPTI) at bus stops;
- The costs associated with providing RTPI equipment on buses; and
- Costs associated with the set up of marketing and new RTPI management systems.

3.31 The estimated capital cost for each of the above items is summarised in Table 3.1, with details provided in Appendix 3A.

Table 3.1 – Summary of Preferred Scheme Capital Costs

Item	Full Approval Scheme Costs
Construction (bus priority infrastructure)	£ 19,209,508
Construction (bus stops, RTPI at stops, RTPI central system)	£ 8,780,920
Preparation	£ 4,106,964
Site Supervision	£ 1,369,354
Land Acquisition	£ 1,758,315
Risk Budget	£ 2,872,000
Marketing	£ 500,000
Consultation	£ 150,000
TOTAL	£ 38,747,060

All costs in £ millions, 2006 prices and exclude impact of inflation over implementation period
All costs exclude allowance for optimism bias applied in appraisal

3.32 In addition, scheme costs include the provision of new buses for new services and enhanced frequencies. This is equivalent to a cost of £0.85 million, with subsequent replacement costs over the appraisal period.

OPERATING COSTS

3.33 The GBBN scheme will impose additional operating costs on the local authorities and will also result in changes to operating costs borne by the bus operator. These costs can be categorised as:

- Additional operating costs associated with the maintenance and operation of the bus priority and information infrastructure; and
- Changes in bus operating costs as a result of the impact of the priority measures and additional bus services and increased frequencies.

Infrastructure Operating Costs

3.34 The operating costs of the scheme associated with the provision of the bus priority infrastructure comprise:

- Additional operating costs for the maintenance of bus stop and shelters – including RTPI equipment at bus stops;

- Additional operating costs for the management and operation of the RTPI system.

3.35 Based on the review of the additional costs of the on-street priority measures and additional signalling equipment it was assessed that operating costs would be no more than in the Do-Minimum case.

3.36 A summary of the estimated additional operating costs (relative to a Do-Minimum reference scenario) are provided in Table 3.2. These costs fall on the Councils.

Table 3.2 – Summary of Additional Operating Costs associated with the Preferred Scheme

Item	Full Approval Scheme Costs
Bus Priority Measures	**£0.28**
RTPI and SVD maintenance	**£0.25**
Total	£0.53

All costs in £ millions per annum, 2006 prices for a 2011 forecast year

Bus Operating Costs

3.37 The impact of the scheme will change the operating costs borne by the various bus operators serving the corridors. These have been calculated and included in the appraisal of the scheme and comprise:

- Bus operating cost savings arising as a result of reduced journey times and improved services reliability; and
- Bus operating cost increases arising from increased frequencies and changes to bus routings on certain core routes.

3.38 These costs fall predominantly on the major bus operator, First. A summary of the estimated changes in operating costs (relative to a Do-Minimum reference scenario) are provided in Table 3.3.

Table 3.3 – Summary of Changes in Bus Operating Costs

Item	Full Approval Scheme Costs
Additional annual operating costs	**£1.01**
Total	£1.01

All costs in £ millions per annum, 2006 prices for a 2011 forecast year

3.39 Bus operating costs have been forecast to increase at a rate greater than inflation over the appraisal period based on current operating cost trends. Assumptions on bus operating costs have been verified with First.

RISK ASSESSMENT AND OPTIMISM BIAS

Quantified Risk Assessment

3.40 As set out above, a revised Quantified Risk Assessment (QRA) has been undertaken. The output of the analysis details a construction risk value for given confidence limits. For the GBBN, the following risk exposure(s) was calculated:

- 50% Confidence Level - £1.146m
- 80% Confidence Level - £2.872m

3.41 In line with the 2005 Programme Entry MSBC the 80% Confidence Risk exposure totally £2.872m has been included as the change budget within the total scheme costs for this Full Approval MSBC. This figure has reduced from the £3.48m in the 2005 Programme Entry MSBC.

Optimism Bias

3.42 As per the DfT's guidance, a central case scheme appraisal has been undertaken applying an allowance for optimism bias on top of the estimated cost of the infrastructure components of the scheme.

3.43 In preparing the 2005 Programme Entry MSBC we sought detailed guidance from the DfT on the level of optimism bias to apply for this particular scheme and were advised[2] that an optimism bias factor of 32% should be applied as the central case.

3.44 In undertaking the modelling and appraisal of this Full Approval MSBC we have now reduced the Optimism Bias in line with TAG 3.5.9. Table 8 of TAG 3.5.9 sets out that at Full Approval stage (stage 3) an optimism bias uplift of 3% should be applied to a scheme of this nature. The revised Optimism Bias of 3% for the central case been agreed with DfT[3].

3.45 A sensitivity test is included in this Full Approval MSBC with the 32% Optimism Bias as used in the 2005 MSBC.

Summary of Costs Used for Appraisal

3.46

3.47 Table 3.4 sets out the costs employed in scheme appraisal incorporating an allowance for risk and optimism bias.

[2] Meeting DfT Major Projects and representatives of the Unitary Authorities, January 26th 2005
[3] Email confirmation from John Collins, DfT, 8th February 2007

Table 3.4 – Summary of Scheme Costs Employed in Appraisal: Undiscounted 'Base' Scheme Costs

Item	Programme Entry Scheme Costs	Full Approval Scheme Costs
Bus Priority Measures	£20,095,377	£19,209,508
Bus Stops and RTPI at stops	£10,211,610	£8,780,920
Preparation and Supervision Costs	£7,541,047	£5,476,318
Land acquisition costs	£1,801,920	£1,758,315
Risk Allowance	£3,480,000	£2,872,000
Optimism Bias	£13,801,585	£1,162,412
Marketing	n/a	£500,000
Consultation	n/a	£150,000
New buses	£12,240,000	£12,240,000
Total	£69,171,539	£52,149,473

All costs in £ millions, Programme Entry costs in 2004 prices; Full Approval costs at 2006 prices
Optimism bias of 32% was applied for Programme Entry, and 3% for Full Approval.
Programme Entry costs for marketing and consultation included in preparation and supervision costs
New bus costs comprise only the cost of new vehicles required to run services over and above those that would be required in the Do-Minimum and include allowance for replacement costs
Bus vehicle costs have not been inflated from Programme Entry estimates as a broad estimate of £170K per bus was used

DEMAND MODELLING

3.48 The modelling and appraisal for the Programme Entry bid used a detailed area-wide multi-modal model of the Bristol area – the BATS2 model – along with three supporting models used to estimate benefits in locations where the BATS2 model provided insufficient detail . The BATS2 model was specifically created for the GBBN work using new demand, count and journey time data, and was audited by consultants on behalf of the Department prior to the decision on Programme Entry. For the reappraisal of the scheme to support the Full Approval business case we have used the same modelling tools. The acceptability of this approach was confirmed by the Department during the preparation of the scheme reappraisal[4]. It is noted that none of the scheme specification changes are in geographic areas outside the scope of the BATS2 model. Only the BATS2 model – and not the supporting models – has therefore needed to be re-run as part of the reappraisal.

3.49 We have not therefore repeated details of the demand modelling approach in this submission. These details are provided in Chapter 2 and supporting Appendices of the Programme Entry submission.

[4] Confirmation by email 08/02/07 from John Collins (DfT) to T Meehan (Atkins) in response to letter by email from T Meehan to J Collins dated 28/02/07

Forecast years and scenarios

3.50 As for Programme Entry, the appraisal of the Major Scheme – defined as the do-something case - has been undertaken relative to an appropriate do-minimum case. The modelling framework has been developed to represent a 2004 base year and then employed in forecast mode to represent the following scenarios:

- 2011 forecast year - assumed to be the first year of full scheme (i.e. all corridors) opening;
- 2021 forecast year - assumed to be 10 years after the full scheme opening. It is noted that given the nature of the scheme (i.e. effectively being delivered from 2006 onwards) a +10 year horizon was considered more appropriate as a means of providing a further point for the appraisal process[5].

3.51 Do-Minimum and Do-Something scenarios were defined and employed for forecasting at 2011 and 2021. Details of the definition of the do-minimum and do-something forecasting assumptions employed are presented in Appendix 3D (Update to GBBN Forecasting Report).

Projected Scheme Impacts

3.52 The forecast impact of the revised GBBN scheme is summarised in Table 3.5. More detailed results are presented in Appendix 3D (Update to GBBN Forecasting Report).

Table 3.5 – Summary of Projected Demand Impacts of the GBBN Scheme

	Programme Entry Scheme Impacts	Full Approval Scheme Impacts
Daily Bus Trips		
2011 Do-Minimum	126,198	126,198
2011 Do-Something	132,905	132,786
% change	+ 5.3%	+ 5.2%
Daily Car Trips		
2011 Do-Minimum	1,815,002	1,815,002
2011 Do-Something	1,808,902	1,808,234
% change	- 0.3%	- 0.4%

Daily trips forecasts for an average weekday, 2011 forecast year

[5] As discussed and agreed at a meeting with DfT Major Projects and representatives of the Unitary Authorities, January 26th 2005

NEW APPROACH TO APPRAISAL (NATA) ASSESSMENT

3.53 Major schemes are required to be assessed against the government's overarching objectives for transport, as embodied in the NATA assessment framework, namely:

- Environment
- Safety
- Economy
- Accessibility.
- Integration.

3.54 The extent to which the revised preferred scheme achieves the above objectives is described in the Appraisal Summary Table (AST) presented in Table 3.6.

3.55 Given that the changes to the scheme specification are minor there are no changes to the assessment for accessibility and integration.

3.56 There are impacts on the transport efficiency sub-objective under 'economy' – which is covered in the next sub-section.

3.57 There is a very minor change to the greenhouse gases indicator under 'environment'. There are also minor changes to the estimate of accident savings under 'safety'. These changes are therefore described below.

3.58 Detailed descriptions of the other elements of the assessments which remain unchanged, including the various appraisal worksheets that underpin the assessment, are not re-presented here but are available in the Programme Entry submission.

Table 3.6 – Appraisal Summary Table – Revised Preferred GBBN Scheme

Option : Preferred GBBN Scheme		**Description:** Implementation of 10 Bus Showcase Corridors in the Greater Bristol area comprising bus priority measures, improved stops and real time information, new modern buses on core routes an new services and frequencies on high demand corridors.	**Problems:** Congestion on major transport corridors, and resulting problems of pollution, safety, quality of life and declining bus use	**Present Value of Costs to Public Accounts £ 66 mill**
OBJECTIVE	**SUB-OBJECTIVE**	**QUALITATIVE IMPACTS**	**QUANTITATIVE ASSESSMENT**	**ASSESSMENT**
ENVIRONMENT	Noise	Change in traffic levels on individual road links <20%, therefore noise impact quantification not undertaken. However, some noise benefits would be expected due to reduced traffic levels and newer buses.	n/a	Slight beneficial
	Local Air Quality	Change in traffic levels on individual road links <10%, therefore air quality impact quantification not undertaken. However, some benefits would be expected due to reduced traffic levels and newer buses. Additionally, 8 out of the 10 corridors pass through the central Bristol Air Quality Management Area and can therefore be expected to contribute to improving air quality in this area	n/a	Slight beneficial
	Greenhouse Gases	The scheme will result in a small reduction in traffic levels thereby contributing to reducing CO2 emissions	Reduction in Carbon Emissions: 2011: 870 2021: 791 Project Lifetime: 47,771 PVB: £1.638 million	Slight beneficial
	Landscape	The proposed schemes could result in lost of vegetation at certain locations in Corridors 2, 3, 4,7,8,9 and 10 that could reduce landscape quality. However, mitigation measures could be applied.	n/a	Slight adverse
	Townscape	The proposed schemes could result in reduced townscape quality in Corridors 2, 3, 4, 8 and 9, with some potentially beneficial impacts in Corridor 5.	n/a	Slight adverse
	Heritage of Historic Resources	The proposed schemes could result in limited adverse impact on conservation areas in Corridor 2 and listed buildings in Corridor 9.	n/a	Slight adverse
	Biodiversity	The proposed schemes could result in lost of vegetation and habitats at certain locations in Corridors 3, 5, 6, 8, 9 and 10, with potentially large adverse impacts at Wick due to loss of grassland at Site of Nature Conservation interest at Wick Wick.		Moderate adverse
	Water Environment	No significant impact	n/a	Neutral
	Physical Fitness	The scheme will contribute to improving physical fitness by encouraging walking as part of public transport journeys. The scheme may also	n/a	Slight beneficial

Option : Preferred GBBN Scheme		**Description:** Implementation of 10 Bus Showcase Corridors in the Greater Bristol area comprising bus priority measures, improved stops and real time information, new modern buses on core routes an new services and frequencies on high demand corridors.	**Problems:** Congestion on major transport corridors, and resulting problems of pollution, safety, quality of life and declining bus use	**Present Value of Costs to Public Accounts £ 66 mill**
OBJECTIVE	**SUB-OBJECTIVE**	**QUALITATIVE IMPACTS**	**QUANTITATIVE ASSESSMENT**	**ASSESSMENT**
		contribute to increasing cycling through the provision of bus priority measures that will be available for use by cyclists		
	Journey Ambience	Significant improvement in journey quality and waiting environment	n/a	Large Beneficial
SAFETY	Accidents	Change in traffic levels on individual road links is small but aggregated across the whole network the reduction in traffic is expected to yield some accident saving benefits.	0.2% reduction in personal injury accidents per annum by 2011	PVB £ 38.7 mill
	Security	Improvements in visibility at stops and on-bus communication equipment for emergency situations	n/a	Slight positive
ECONOMY	Public Accounts		Central Govt PVC, £ 55.1 mill Local Govt PVC £ 10.5 mill	PVC £ 65.6 mill
	Transport Economic Efficiency: Business Users & Transport Providers		Users PVB, £ -10.1 mill Transport Providers PVB, £ 19.0 mill Other PVB £ 0 mill	PVB £ 8.8 m
	Transport Economic Efficiency: Consumers		Users PVB, £ 219.5 mill	PVB £ 219.5 m
	Reliability	Bus priority measures will provide substantial bus reliability improvements	n/a	Large Positive
	Wider Economic Impacts	Not assessed but scheme will contribute to economic performance of Greater Bristol area and support regeneration of deprived areas	n/a	Moderate Positive

Option : Preferred GBBN Scheme		**Description:** Implementation of 10 Bus Showcase Corridors in the Greater Bristol area comprising bus priority measures, improved stops and real time information, new modern buses on core routes an new services and frequencies on high demand corridors.	**Problems:** Congestion on major transport corridors, and resulting problems of pollution, safety, quality of life and declining bus use	**Present Value of Costs to Public Accounts £ 66 mill**
ACCESSIBILITY	Option values	Not assessed	n/a	PVB £0m
	Severance	No significant impact – change in traffic flows below threshold		Neutral
	Access to the Transport System	Scheme will contribute to improving access to the transport system for those without access to a car and those in areas of social need.		Slight positive
INTEGRATION	Transport Interchange	Scheme will provide improved interchange and waiting facilities and deliver improved service reliability		Large Positive
	Land-Use Policy	Scheme complements national, regional an d local policies and objectives		Beneficial
	Other Government Policies	Scheme complements a range of other policy objectives		Beneficial

Environment

Greenhouse Gases

3.59 The latest version of TUBA calculates the change in carbon emissions in the study area before and after scheme opening, and produces a monetised benefit that contributes to the overall scheme BCR.

3.60 The scheme is projected to marginally reduce car vehicle kilometres and make a contribution to reducing the emission of greenhouse gases by an estimated 0.04 million tonnes across the project lifetime, generating monetised benefits of up to £1.638 million.

Safety

Accidents

3.61 The preferred scheme is expected to result in a transfer of trips from private car to public transport giving a reduction in vehicle trips on the road network.

3.62 Using the WebTAG methodology to calculate the expected reduction in accidents gives, for the Revised Preferred Scheme, a 0.2% reduction in Personal Injury Accidents (PIAs) per annum by 2011. This reduction is equivalent to a monetised benefit of £39 million over the scheme appraisal period.

3.63 Additionally, the scheme is expected to contribute to improved safety for pedestrians as a result of the priority measures and provision of improved access to bus stops and new and improved pedestrian crossing facilities. Cyclists will also benefit from greater segregation from general traffic by being able to use bus lanes.

Economy

Public Accounts, Business Users and Transport Providers and Consumers

3.64 The scheme has been subjected to a detailed economic assessment according to the requirements set out in the DfT's WebTAG guidance using the Transport User Benefit Appraisal (TUBA) software. The detailed Transport Economic Efficiency (TEE), Public Accounts and Analysis of Monetised Costs and Benefits (AMCB) tables are presented for both the Preferred Scheme in Appendix 3E.

3.65 Table 3.7 provides a summary of the key economic evaluation indicators.

Table 3.7 – Summary Cost-Benefit Analysis Statistics

Item	Programme Entry Scheme	Full Approval Scheme
Net Present Value (NPV) £ mill – including accident benefits and carbon emissions savings	*n/a*	**203.1**
Benefit Cost Ratio (BCR) – including accident benefits and carbon emissions savings	*n/a*	**4.01**
Net Present Value (NPV) £ mill – excluding accident benefits and carbon emissions savings	*151.6*	*162.7*
Benefit Cost Ratio (BCR) – excluding accident benefits and carbon emissions savings	*3.15*	*3.48*

3.66 **The table shows that The Preferred scheme has a positive Benefit Cost Ratio (BCR) of 4.01. This categorises the scheme as "High Value for Money" according to the DfT's Value for Money (VfM) guidance**[6].

Comparison with the Programme Entry BCR

3.67 The table compares the BCR for the revised scheme with that of the Programme Entry scheme. It is noted that the Programme Entry BCR of 3.15 excluded accident savings (since under the guidance understood to be in force for Programme Entry accident savings were to be excluded from the BCR) and carbon emissions savings (which are a recent addition to TUBA). As the table shows, on a like for like comparison (excluding both accidents and emissions savings) the Full Approval Scheme has a BCR of 3.48 against 3.15 for the Programme Entry scheme.

3.68 It is noted that the revision to the optimism bias factor at Full Approval stage has a significant influence. Using the same optimism bias factor as employed at programme Entry stage would bring the Full Approval Scheme BCR down to 3.1 – which would still categorise the scheme as "High Value for Money".

Other Issues

3.69 It is noted that:

- The calculation of the scheme benefits includes all ten corridors using estimates from the BATS2 and A367 Corridor 10 modelling;

[6] Guidance on Value for Money, DfT (2004)

- The calculation of benefits includes benefits due to the proposed HOV lanes to car users;
- The additional benefits that could be expected to accrue to the scheme elements on the A370 in Weston-super-Mare (Corridor 9) and on the A4 in Bath (Corridor 4) are not included but will deliver a small additional benefit and strengthen the scheme's economic case;
- The calculation of user benefits also excludes potential time savings to general traffic and to pedestrians and cyclists brought about by the installation of improved signalling equipment – these are, too, considered small but would increase the level of benefits attributable to the scheme;
- The calculation of bus user benefits excludes longer distance coach services and other bus services that would also benefit from bus lanes and stop infrastructure. While small, these benefits would also increase the value for money case for the scheme; and
- As in the Programme Entry bid the benefits exclude those accruing in the PM peak. It was considered at the time of preparing the Programme Entry bid that to include PM benefits purely on the basis of a factoring up of AM peak benefits would be insufficiently robust. In preparing the Full Approval business case we have made more robust estimates using the available modelling tools. These are presented in a separate sensitivity/scenario analysis technical note (see below) but serve to boost further the scheme benefits and BCR.

SENSITIVITY AND SCENARIO ANALYSIS

3.70 It has also been agreed with DfT that in presenting the case for Full Approval that the same range of sensitivity tests that were previously included in support of the 2005 Programme Entry MSBC are also provided to demonstrate the results of the revised scheme are broadly consistent with the 2005 appraisal results.

3.71 The sensitivity test and scenario analysis results are reported in a separate technical note to be supplied to the Department.

SUPPORTING ANALYSIS

3.72 Given the minimal changes to the scheme specification, the supporting analyses presented in the Programme Entry submission remain valid for this Full Approval submission and are not re-presented.

VALUE FOR MONEY CONCLUSIONS

3.73 The DfT's guidance makes it clear that the Value for Money (VfM) assessment of public sector investment proposals is a critical consideration in the decision-making process.

3.74 Our Programme Entry submission demonstrated that the GBBN has an excellent VfM case. The appraisal of the slightly revised GBBN Full Approval scheme has

demonstrated that it, too, has an excellent VfM case with a BCR of 4.01 – in the "high value for money" categorisation with a BCR well in excess of the 2.0 threshold between "high" and "medium".

3.75 On a strictly comparable basis - excluding accident and emissions savings and using the same level of optimism bias applied at the Programme Entry stage - the scheme's BCR has dropped between Programme Entry and Full Approval stage very slightly from 3.15 to 3.09. This is a combination of slight increases in overall scheme costs and the inclusion of cost inflation over and above RPI in the appraisal. It is also a result of very small reduction in bus user benefits arising from dropping a small number of bus priority scheme elements from the overall scheme.

3.76 However, given a key element of the progression from Programme Entry to Full Approval is the refinement of scheme designs and cost estimates and the management of scheme delivery risks we can legitimately claim that the optimism bias factor can be reduced to just 3% in line with the DfT's guidance. With this level of optimism bias the Full Approval scheme's comparable BCR sits at 3.48 compared with 3.15 at Programme Entry. Once accident benefits and emission benefits are included, the VfM case is strengthened further to a BCR of 4.01.

3.77 As set out in the Programme Entry submission, the strong VfM performance is not surprising. The genesis and development of the scheme as a low cost option that makes best use of the Greater Bristol area's existing, extensive conventional bus network in delivering substantial public transport improvements meant that it would be expected to perform well in economic evaluation terms. The scheme is able to deliver substantial benefits to existing users as well as generate new bus system users through modal transfer and increased frequency of use. Importantly it is able to do this at a very low investment cost per user compared to many other forms of public transport enhancement schemes.

3.78 The modelling and analytical approach adopted for the scheme appraisal also gives a high degree of confidence in the VfM case. A comprehensive and detailed multi-modal modelling approach has been adopted to ensure that scheme benefits can be reliably estimated. The modelling and analysis has also been anchored in extensive data collection specifically to support the MSBC.