TECHNICAL MEMORANDUM

DfT Feeder Road NPIF Economic Case Technical Note

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1.0 Background

Bristol City Council is submitting a National Productivity Investment Fund (NPIF) application to secure finance towards a number of schemes to improve access to the Temple Quarter Enterprise Zone from the east including an off-road pedestrian/cycle route along Feeder Road. The components of the scheme are as follows:

Ref	Junction	Cost
A	Avon Street/Temple Way junction	715,280.84
B	Avon Street/Feeder Road junction	625,870.74
C	Feeder Road cycle route Phase 1	924,458.90
D	Feeder Road cycle route Phase 2	418,078.88
E	Netham Lock junction	670,575.79
F	St Annes Road/Newbridge Road junction	393,404.46
G	Bath Bridges/Temple Gate	1,193,340.13
	Total	**4,941,009.74**

This technical note sets out the methodology and related assumptions, along with the outcome of the economic assessment and cost-benefit analysis.

The note sets out details for each of the assessment criteria, as follows:

- Avon St / Temple Way – travel time savings
- New signals equipment (better operation) – travel time savings
- New signals equipment (improved legibility) and Feeder Road – accident benefits
- New signals equipment (replacing faulty equipment) – travel time savings
- Improved walk / cycle provision – health
- Improved walk / cycle provision – travel time savings
- Bath Bridges / Temple Gate – travel time savings

A proportionate approach has been undertaken since the scheme is considered a small project in terms of the NPIF guidance.

2.0 Avon St / Temple Way – travel time savings

Changes to the junction focus on the construction of a right-turn out of Avon Street onto Temple Way and improved pedestrian and cycle connectivity on the Avon Street arm.

A high-level strategic assessment (using GBATS4 strategic traffic model) has forecast benefits to the local highway network in the form of reduced travel times during the AM and PM peak hours. More detailed modelling, including junction simulation, will need to be undertaken prior to further scheme assessment.

The test has assumed that there will be two phases to the signal cycle.

Forecast benefit

£2.37m (2010 prices)

3.0 New signals equipment (better operation) – travel time savings

Upgraded signal control (from VA to SCOOT) is included in the schemes Avon Street/Feeder Road junction, Netham Lock junction and St Annes Road/Newbridge Road junction.

The following reductions in total delay in line with evidence have been assumed:

- VA to SCOOT: 12%

Results have shown that SCOOT achieves an average saving in delay of about 12% when compared with up-to-date fixed time plans. Research by Bell and Bretherton (1986) suggests that SCOOT is likely to achieve an extra 3% reduction in delay for every year that a fixed-time plan ages. Since SCOOT is designed to adapt automatically to compensate for ageing and incident effects, it is reasonable to expect that, in many practical situations, SCOOT will achieve savings in delay of 20% or more. However, we have assumed the 12% reduction in this assessment.

This reduction was applied to total forecast AM peak, PM peak junction delays (from GBATS) in 2021 and 2036, which was factored up to calculate an annual delay reduction.

The total forecast reduction in annual delays is 4,701 hours in 2021 and 6,588 in 2036.

Forecast benefit

£2.39m (2010 prices)

4.0 New signals equipment (improved legibility) and Feeder Road – accident benefits

Benefits are forecast to arise from the replacement of signalling equipment at all existing signalised junctions included in the scheme.

The ROSPA Road Safety Engineering Manual Report states that improved pedestrian provision at existing crossings and (existing) signal improvements have been observed to reduce accidents generally by 41% and 22% respectively. As a conservative assumption, it has been assumed that each improvement will result in a general reduction in accidents by 10% (compounded).

These factors have been applied to the average annual accident rates (calculated from local data over the past five years) at all junctions subject to improvements.

Additionally, an assessment of the reduction in pedestrian and cyclist casualties along Feeder Road between Avon Street and the Netham Locks junction has been included.

The average value of prevention per casualty by severity has been taken from WebTAG data book (Table A 4.1.1) to which COBALT Compound Annual Rates of Growth of Accident Values have been applied.

The improvements are forecast to result in 0.1 serious and 2.2 slight casualties annually.

Forecast benefit

£0.94m (2010 prices)

5.0 New signals equipment (replacing faulty equipment) – travel time savings

Benefits are forecast to arise from the replacement of signals that are currently at least 20 years old, since there will be fewer signal failures. Comparing average and maximum travel times (i.e. during signal failures) through the junctions with the recorded number of annual signal failures, the annual delay to the network attributable to signal failures at each junction has been established.

From Highways Analyst, the observed travel time on links approaching each junction (during 0700-1900) has been reviewed to identify the difference between the average travel time and maximum travel time. The assumption is that the maximum travel time occurs during major incidents including signal failures. To be conservative, the 5% lowest and 5% highest of travel times have been excluded from the dataset. This data has been combined with the recorded number of annual signal failures at each location (most recent 12 months of data available) and junction traffic counts (from GBATS or manual classified counts) to calculate the annual delay to the network attributable to signal failures at each junction.

Travel time savings were calculated for the AM and PM peak flows only, with total annual savings forecast to be 6,972 hours in 2021 and 7,883 hours in 2036.

This is conservative with respect to the following:

- Delays attributable to signal failures are assumed to remain constant in future (rather than increasing as would reasonably be expected)
- The number of signal failures per year are assumed to remain constant in future
- All failures have been assumed to be rectified within 24 hrs whereas in practice some failures would require longer to resolve.

Forecast benefit

£2.98m (2010 prices)

6.0 Improved walk / cycle provision – health

A HEAT assessment was undertaken by BCC for the forecast uplift in cycling arising from the scheme; the benefits were calculated at £14.72m (over 30 years at current prices). The assessment assumed a five-year build-up of benefits and a one year build-up for the update of cycling. This is considered a conservative assessment since it assumes a modest increase of 100 daily cyclists (doubling of current numbers) across the corridor and excludes consideration of an increase in walking, which would also likely take place due to the new facility and improved environment.

Forecast benefit

£10.34m (2010 prices)

7.0 Improved walk / cycle provision – travel time savings

Highway delay reduction attributable to modal shift has also been calculated. This draws on the BCR of 6.1 set out in the West of England Cycle Transformation Cycle City Ambition Grant (CCAG) Funding Bid, which is based on highway delay benefits due to mode shift from car to walk/cycle. The CCAG methodology applies evidence from investment in six Cycling Demonstration Towns (Sloman et al, 2009). This has been applied to the approximate walking/cycling spend of each element of the scheme, equating to 53% overall.

The assumed proportion of walking/cycling spend by element (as provided by BCC) is:

- A – 25%
- B – 70%
- C – 100%
- D – 100%
- E – 50%
- F – 20%
- G – 70%

Forecast benefit

£11.20m (2010 prices)

8.0 Bath Bridges / Temple Gate – travel time savings

Highway delay reduction resulting from the Bath Bridges and Temple Gate improvement scheme – focusing on improved pedestrian and connectivity through the junction and increased capacity of the junction – has been forecast. Annual delays savings covering 0700-0900 and 1500-1800 have been taken from S-Paramics work undertaken as part of an earlier Bath Bridges scheme assessment.

Forecast benefit

£1.43m (2010 prices)

9.0 Benefit Cost Summary

A cost-benefit analysis of the scheme has been undertaken over 60 years. 15% optimum bias has been included. An average value of time for all vehicle types of £12.25/hour (2010 prices) was used in all calculations.

The table below presents a summary Analysis of Monetised Costs and Benefits.

Analysis of Monetised Costs and Benefits	Present value (£k)
Accidents	939
Economic Efficiency: Consumer Users (Commuting)	6,628
Economic Efficiency: Consumer Users (Other)	6,628
Economic Efficiency: Business Users and Providers	5,681
Present Value of Benefits (PVB)	31,649
Present Value of Costs (PVC)	3,993
Net Present Value (NPV)	27,656
Benefit to Cost Ratio (BCR)	**7.9**

The benefits associated with each of the assessment criteria discussed above are summarised below.

Scheme component	Present value (£k)
Avon St / Temple Way	2,373
New signals equipment (better operation)	2,386
New signals equipment (if 20y+ old)+ Feeder Rd	939
New signals equipment (replacing faulty equipment)	2,980
Improved walk / cycle provision (health)	10,343
Improved walk / cycle provision (delays)	11,197
Bath Bridges / Temple Gate	1,430
Total	**31,649**

10.0 Economic jobs / GVA benefits

Job creation and GVA impacts have been estimated from delay/journey time savings associated with the scheme improvements.

Based on experience of the relationship between the monetised value of journey time savings and job creation on major transport schemes throughout the West of England (e.g. MetroWest, AVTM), it is assumed that journey time savings valued at £400,000 typically translate to one FTE job. This is primarily due to productivity impacts and labour supply expansion.

Based on this benchmark, a journey time saving of £20.37m translates to creation of **50.9 FTE jobs**.

Using the GVA benchmark of £48k per job for Bristol from ONS sub-regional data, the corresponding GVA benefits are **£2.44m**.

It is recognised that this scheme will support the wider job creation aspirations for the Temple Quarter Enterprise Zone.