

# Value for Money Assessment: Benefit-Cost Ratio

## Rationale for Intervention

The health of the main arterial east-west A44 corridor through Worcester is essential for access, growth and vitality of the City Centre. It is constrained by one river crossing, outdated junction designs, and poor facilities for pedestrian and cyclists. The Worcester Traffic Model confirms significant delays. Reference case journey times indicating these delays are given in Appendix 3. There are two AQMAs at St Johns (2014) and Dolday (2009) either side of the bridge and Deansway is expected to be an AQMA in the future. Two junctions have been identified for traffic signal upgrades through the Worcester Asset Management plan.

Status-quo will result in persisting congestion in and around Worcester City Centre, Worcestershire's economic engine. Equally, depressed levels of sustainable active travel modes within the City Centre's immediate context area will continue, which further accentuates congestion. Additionally, failure to increase capacity within the City Centre will restrict it from achieving its full potential.

As such, investment is needed to reduce congestion on the City Centre's east-west axis. Reduced congestion, with increase in active-travel modes, will create additional capacity on the City Centre's highway network. This can facilitate the delivery of the emerging City Centre Masterplan, along with other measures, to maximise the City Centre's potential by intensifying development. No further development can be delivered within the City Centre in the absence of any capacity improvements.

This context presents the rationale for intervention within Worcester City Centre to reduce congestion, promote sustainable travel modes and create capacity to facilitate further development. This is the focus of the NPIF funded Worcester City Centre Network Efficiency (Axis West East) schemes. The schemes will deliver the necessary junction improvements and public realm enhancements, including walking and cycling infrastructure, at the four locations identified in the scheme's location plan in Appendix 1.

## Scope of Value for Money Assessment

This appendix presents additional detail on the value for money assessment prepared for the scheme. It brings together the present value benefits (PVB) associated with transport economic efficiency (Appendix 3) and active mode appraisal (Appendix 4) into an aggregate PVB for the scheme. The monetary benefits are compared against the present value of costs (PVC) outlined below, to calculate a benefit cost ratio which demonstrates the scheme's value for money.

## Scheme Benefits

Two WebTAG-compliant benefit streams have been identified through scheme appraisal: transport economic efficiency and active mode appraisal. Table 1 indicates that the aggregate PVB generated through these benefit streams is £26.1m (2010 prices and values). More detail on these benefits streams and derivation of individual PVB's is presented in Appendix 3 and Appendix 4 respectively.

Benefit Stream	PVB (£)
Active Mode Appraisal	7,086,736
Transport Economic Efficiency	19,002,531
<b>Aggregate PVB</b>	<b>26,089,267</b>

TABLE 1: AGGREGATE PRESENT VALUE OF BENEFITS (2010 PRICES AND VALUES)

## Scheme Costs

The total cost associated with delivering the scheme is expected to amount to £4.6m (2017 outturn costs), as listed in Table 2. The total level of investment includes the cost of construction, as well as design, prelims, risk and other additional items. The assumptions underpinning these additional items are also listed in Table 2.

Cost Item	Assumption	Value (£)
<b>Construction Costs</b>		
Construction: St John Scheme	MOVA upgrade + Public Realm	350,000
Construction: Croft Road	New Junction Infrastructure + Public Realm	635,000
Construction: Dolday Gyratory	MOVA upgrade + Public Realm	690,000
Construction: A44 Deansway	MOVA upgrade + Public Realm	865,000
<b>Construction: Sub-Total</b>	<b>2,540,000</b>	
<b>Other Items Costs</b>		
Unmeasured Items (% of construction subtotal) @	10.0%	254,000
Prelims: Incl. site accommodation, public liaison, OH, profit etc (% of construction subtotal) @	30.0%	762,000
Design fees	8.5%	215,900
Preparation	7.0%	177,800
Supervision	5.0%	127,000
Risk (excluding OB)	20.0%	508,000
<b>Other Items: Sub-Total</b>	<b>2,044,700</b>	
<b>Scheme Total</b>	<b>4,584,700</b>	

TABLE 2: SCHEME COSTS (2017 OUTTURN COSTS)

The NPIF funding request is specifically associated with this construction stage investment. That said, it should be noted that present value of costs have been developed to incorporate annual maintenance costs and replacement costs at twenty year intervals. This means the PVC and subsequent value for money assessment captures the full lifecycle cost of the proposed scheme. An estimate for these cost items are presented in Table 3.

Location of the junction	Replacement Costs (20 year intervals)	Maintenance Costs (per annum)
St John Scheme	£60,000	£2,000
Dolday Gyratory	£180,000	£6,000
A44 Deansway	£120,000	£4,000
<b>Total</b>	<b>£360,000</b>	<b>£12,000</b>

TABLE 3: MAINTENANCE AND REPLACEMENT COSTS (2017 OUTTURN COSTS)

The key assumptions underpinning the replacement and maintenance costs are as follows:

- Replacement and maintenance is required at those scheme elements that are benefitting from MOVA upgrade only (i.e. St John Scheme, Dolday Gyratory and A44 Deansway);
- Maintenance for public realm improvement is not included;
- Lifecycle of signals is twenty years (with loops to be re-cut every 5 years), at an average cost of £60,000 per junction;
- Annual maintenance costs cover lamp faults, LED bulb replacement, clean lens and other costs, at an average cost of £2,000 per junction.

Within this context, the PVC is comprised of three cost streams: initial construction investment, replacement costs and annual maintenance costs. A standard level of optimism bias (44%) is applied

across all cost streams, based on DfT guidance. The discounted stream of costs is also subject to the prevailing discount rates recommended by HM Treasury’s Green Book, based on discounting to 2010 prices and values and a sixty-year appraisal period. Within the PVC, construction investment is assumed to be distributed evenly across 2018 and 2019, with annual maintenance incurred from 2020. Replacement costs are incurred at twenty year intervals from the year of opening, 2019. Based on this specification, the PVC for total scheme costs is estimated at £6.2m (2010 prices and values).

## Value for Money Assessment

Comparing the scheme’s PVB against PVC reveals a benefit cost ratio (BCR) of 4.2, as demonstrated in Table 4. This presents very high value for money for public sector investment.

Value for Money Metric	Value
PVB	26,089,267
PVC	6,217,095
BCR	4.2

TABLE 4: VALUE FOR MONEY METRICS (2010 PRICES AND VALUES)

## Sensitivity Tests

Three sensitivity tests have been developed to assess the impact of small changes in key elements of the value for money assessment:

- Sensitivity Test 1: 20% increase in costs;
- Sensitivity Test 2: 20% reduction in benefits (e.g. as a result of delayed construction programme);
- Sensitivity Test 3: 20% increase in costs and 20% reduction in benefits.

The sensitivity test results presented in Table 5 demonstrate that even where scheme costs are higher than expected and/or scheme benefits are lower than expected, the scheme will still deliver high value for money for public sector investment.

Sensitivity Test	PVB	PVC	BCR
1: 20% increase in costs	26,089,267	7,460,514	3.5
2: 20% reduction in benefits	20,871,414	6,217,095	3.4
3: 20% increase in costs and 20% reduction in benefits	20,871,414	7,460,514	2.8

Table 5: Sensitivity Test Value for Money Assessments (2010 prices and values)