

Annex 3

NIPF – Somerset Traffic Signal Efficiency Package – Economic Appraisal

General

This technical annex provides a summary of the work undertaken to support the economic case for this project. Somerset Traffic Signal Efficiency Package specifically targets the 11 traffic signal installations across the County that would benefit from improvements. These 11 sites comprise of traffic signals: 3 no. 4 arms junction, 5 no. 3 arms junction, 1 no. 2 arms shuttle working arrangement and 2 no. pelican crossings; details of the sites and their locations are provided in Annex 1. Improving these signal installations will be an integral part of delivering economic growth, productivity and improve movements for all road users.

The economic appraisal is derived from a first principle approach, following the guidance set out in WebTAG to calculate travel time savings (TAG Unit A1-3: User and Provider Impacts, TAG Databook March 2017 Release v1.7, Table A.1.3.1). The evaluation has been undertaken for a 20 year period (2020-2039), which corresponds to the typical life expectancy of a traffic signal installation.

The costs of the project have been derived from:

- Budgetary costs; and
- A Quantified Risk Assessment

It has been assumed that the project will start construction in 2018 and be open in 2020.

All costs and benefits have been discounted to 2010 and are reported to a 2010 price base unless otherwise stated

Calculation of the Benefits of the Project

The calculation of the project benefits is based on a “proxy traffic signal improvement” derived from the average improvement from three exemplar sites recently completed by the County in Bridgwater and Taunton. These sites represent a range of improvements with a range of benefits, which can be classified as poor (some dis-benefit), minor (slight improvement over the existing) and major (significant benefits over the existing), but on average there is some improvement in average journey times at these locations in the AM and PM peak hours. No assessment has been undertaken for the weekday interpeak and off peak or weekend hours.

The traffic modelling available for this assessment was 2028 AM and PM peak hour LinSig models developed in support of the improvement to the exemplar sites. No further junction modelling has been undertaken.

In order to estimate the vehicle-hour time saving for a typical weekday, it is assumed that a typical weekday comprises of 2x AM peak and 1.5x PM peak. The vehicle-hour time saving was then expanded to an average day and year (based on 220 working days per year). The estimated the vehicle-hour time saving for the proxy site is 44,871 vehicle-hours per year in 2028. However, if only a single hour for AM and PM peak is representative, the saving will be smaller.

To allow for a change in the volumes of traffic over time, this figure was inflated (or deflated) across the appraisal period by 3% per annum, for example the assumed time saving in the first appraisal year (2020) was 59,086 vehicle-hours and in the final appraisal year (2039) was 30,734 vehicle-hours.

Using WebTag Databook (March 2017 release v1-7), Table A1.3.5 provide the Value of Time of an Average Vehicle (£ per hr 2010 value, 2010 price base, market prices) and appropriate factors for changes in the Value of Time and discounting. A monetary value of the benefits for the proxy site was calculated. The Present Value of Benefits for the proxy site was estimated at £7.451m (2010 value 2010 price base, market prices) over the 20 years evaluation period (2020-2039).

The works proposed predominantly focus on renewing signal installations, and new communications and control technology; as well as enhancing facilities for non-motorised users. Since there will be few opportunities to achieve a step change in junction capacity and the slight variations in type of junction when

compared to the exemplar sites, a further reduction in the benefits of the exemplar sites and therefore the proxy site has been assumed:

- Signal 4 arms – 30% of proxy
- Signal 3 arms – 25% of proxy
- Signal 2 arms (shuttle working) – 10% of proxy
- Pelican Crossing – 1% of proxy

The PVB of the project is estimated at £16.915m (2010 value, 2010 price base, market prices) over the evaluation period.

Calculation of the Cost of the Project

Somerset County Council provided the Budgetary Cost of the sites. The project cost is included for a QRA. This has been adjusted further to include 44% optimism bias and to convert from factor to market prices.

Contribution		
Department for Transport	2.226	£m, 2016 value, 2016 price base, factor prices
Local authority	1.000	£m, 2016 value, 2016 price base, factor prices
Third party	0.000	£m, 2016 value, 2016 price base, factor prices
Total project cost	3.226	£m, 2016 value, 2016 price base, factor prices
Optimism bias	1.624	£m, year value, 2016 price base, factor prices
Conversion factor to market prices	1.190	
Present Value of Costs (PVC)	4.112	£m, 2010 value, 2010 price base market price

Cost-Benefit Analysis Summary

The following table summarises the cost-benefit analysis.

PVB	16.915	£m, 2010 value, 2010 price base
PVC	4.112	£m, 2010 value, 2010 price base
Net Present Value (NPV)	12.802	£m, 2010 value, 2010 price base
Benefit to Cost Ratio (BCR)	4.11	

Conclusion from Economic Appraisal

The economic appraisal has been undertaken for the project to upgrade 11 traffic signal sites across Somerset in order to improve signal efficiency, reduce delay for all road users and improve productivity. This supports the emerging planned growth in residential and employment.

Using three exemplar sites recently completed in Somerset as the basis, PVB of these signal sites are estimated to be in the order of £16.915m (2010 value, 2010 price base). This is solely derived from the travel time savings during the weekday – AM and PM peak periods. No further potential benefits have been evaluated. Although benefits could be accrued through a reduction in accidents, noise and local air quality improvements, a reduction in severance and greenhouse gas emissions.

Project costs have included QRA estimate and optimism bias. PVC is calculated as £4.112m (2010 value, 2010 price base).

BCR for the project is 4.11.