

6.0 Cost Benefit Analysis

The potential economic benefits/disbenefits from the Hucknall Town Centre Improvement Scheme arise by way of changes to journey times (for drivers of vehicles, bus users and pedestrians), vehicle operating cost changes arising from the amended road layout and changes in accident numbers. The cost benefit analysis is given in detail in an Economic Appraisal Report dated September 2007. Different analytical tools have been employed to quantify the different components of the overall scheme benefit. The traffic, pedestrian, public transport, and accident cost/benefit methods are separately detailed below together with a summary of economic appraisal findings.

6.1 TUBA Economic Appraisal

6.1.1 The conventional method of assessing road scheme economics is based on comparing the costs of the scheme with its benefits. Those costs and benefits that can be evaluated in monetary terms are identified and compared using the Department for Transport's (DfT) cost benefit analysis programmes and methods.

6.1.2 The economic benefits of the highway component of the scheme have been evaluated using the latest version of the DfT's Transport User Benefits Appraisal (TUBA) software (version 1.7), one of the Department's programmes for assessing economic viability. This assessment includes a quantified evaluation of both the highway traffic and public transport impacts in terms of journey time and vehicle operating cost changes brought about by the scheme.

6.1.3 The Transport User Benefit Appraisal (TUBA) evaluation relies on the following components:

- Standard economic parameters, including the DfT default values of time,
- Scheme specific data, including travel time matrices, travel distance matrices and trip matrices extracted from the Hucknall Town Centre Improvements SATURN model.

As a result the economic assessment for the highway traffic within TUBA is based on the model forecasts produced by the Hucknall SATURN traffic models. Matrices covering demand (number of trips in vehicles), travel time (in hours) and distance (in kilometres) between each origin/destination pair have been 'skimmed' from the Do Minimum and Do Something model assignments in order to form a basis for the economic appraisal. Separate matrices were extracted for each of the user classes in the model i.e. cars, LGV, OGV1 and OGV2. Copies of the TUBA input and output files are attached on a cd.

6.1.4 The highway assignment assessment has been calculated by SATURN and input to TUBA for the following time periods;

- An average morning peak hour, representing the period 07:00 to 10:00
- An average inter-peak hour, representing the period 10:00 to 16:00 and
- An average evening peak hour, representing the period 16:00 to 19:00.

- 6.1.5 In undertaking cost benefit analysis it was also necessary to combine the resulting representative periods such that analysis can be undertaken for a typical annual profile. The annualisation factors for each time period for the full TUBA assessment for a given year are as follows:
- 759 average morning peak hours
 - 1518 average inter-peak hours and
 - 759 average evening peak hours
- 6.1.6 The TUBA assessment covers 3036 hours out of 8760 hours in a year. Outside of the three modelled time periods, the benefits could be expected to be minimal since the network would experience less congestion at those times. Accordingly it is considered that the benefits for the modelled hours are likely to marginally underestimate the total benefits accruing to the Hucknall Town Centre Improvement Scheme.
- 6.1.7 The economic assessment includes the future proposed or committed land use development that is planned within the town, as shown on Figure 5. Both the Do Minimum and Do Something scenarios include the proposed land use development within the forecast traffic demand. The Do Something scenario also includes the pedestrianisation of the High Street, a new link road running parallel to the High Street (for all traffic), a bus only link connecting the relief road to High Street East and pedestrian priority measures.
- 6.1.8 The economic appraisal has been calculated for 60 years as required by the DfT (WebTAG, unit 3.5.4). The appraisal period is from 2011 (the assumed opening year) to 2070 with a discount rate of 3.5% for the first 30 years of appraisal and 3.0% for the second 30 years of appraisal.
- 6.1.9 For the economic assessment the SATURN model was run for the following forecast years;
- 2011 Scheme Opening Year
 - 2018 Intermediate Year
 - 2026 Scheme Design Year

An intermediate year was used as it was considered that the benefits might be non-linear due to the likely completion of new housing stock within the assessment period. Additionally given the current network conditions and in accordance with DMRB guidelines it is clear that continued traffic growth over the entire 60 year assessment period is 'unsustainable' and to this end traffic growth cut offs have been applied in 2026 in both the Do minimum and Do Something. Thus the level of traffic has been capped at the 2026 Design Year levels within the TUBA assessment to ensure a reasonable and robust assessment. The TUBA assessment interpolates the benefits between 2011 and 2018 and similarly between 2018 and 2026. Beyond 2026 the benefits are capped at the 2026 levels.

- 6.1.10 The economic results given by TUBA are consistent with the method of willingness to pay and are presented in the market price unit of account. All monetary values quoted in the economic results in this report are cited at 2002 prices and discounted to 2002

prices as required by the DfT, to enable all schemes across the country to be directly comparable.

- 6.1.11 Scheme benefits accruing to transport users can be subdivided into business users (those users travelling on employers business or during work time) and consumer user benefits (those travelling during non-work time). The difference between these user classifications is important when considering their value of time, as different values are ascribed to different users. For the purpose of this assessment the proportion of business and consumer users were the TUBA default values which are those recommended by the DfT in WebTAG Unit 3.5.6.
- 6.1.12 Delays during construction or during future maintenance are not expected to be significant and have not therefore been quantified.

6.2 Pedestrian Benefits and Costs

- 6.2.1 Pedestrian costs and benefits have been separately quantified in the economic efficiency analysis and a spreadsheet method has been employed to calculate the likely monetary value at 2002 discounted values.
- 6.2.2 The method used complies with the DfT WebTAG Unit 3.5.5. in that it requires the journey time impacts for each pedestrian route to be calculated via the following equation:

Number of pedestrians affected X change in journey time in minutes

The total time change is then converted into monetary values using DfT standard values of time. [Source: DfT Web Tag Unit 3.5.6].

- 6.2.3 The assessment includes consideration of three pedestrian desire lines, namely High Street to Tesco/Rail Station (crossing Station Road), High Street to residential area north of the town (crossing new link road) and pedestrians' activity on High Street itself.
- 6.2.4 Pedestrian counts were undertaken in each of the three corridors to ascertain the existing level of pedestrian activity, number of crossing movements and associated delays. Further details are given in the traffic survey report. This information provided the baseline conditions from which the benefits or disbenefits could be established for the Do Something scheme.
- 6.2.5 Pedestrian benefits and costs have been quantified over a typical 12 hour average weekday period (07:00 to 19:00). Annualisation has been undertaken using a factor of 305, therefore assuming that Sundays and Bank Holidays would have a minimal level of pedestrian demand as currently observed.

6.3 Public Transport appraisal

- 6.3.1 Public transport operators' costs and benefits have been assessed using the TUBA software. These impacts were related to bus route changes, both in terms of distance travelled and time spent en route.

6.3.2 The economic assessment for public transport passengers was undertaken separately from TUBA. This has been carried out by quantifying journey time savings on each bus route from the SATURN models and multiplying the travel time savings per bus by the average bus patronage. Values of time have been extracted from DfT Web Tag 3.5.6.

6.3.3 For the assessment the average number of passengers and dwell times at bus stops was assumed constant throughout the appraisal period. It has also been assumed that fares would remain constant. This leads therefore to a conservative estimate of likely future benefits.

6.4 Accident Analysis

6.4.1 The accident appraisal has been separately assessed using the DfT COBA programme (Version 11 Revision 7). Diagram 6 (at the rear of this document) illustrates the COBA node link network that has been built for this purpose.

6.4.2 The COBA accident appraisal uses the observed records of personal injury accidents throughout the network area for the period 2002 to 2006 inclusive. The use of 5 years of observed local accident data is recommended by the DfT. The traffic changes predicted by the SATURN model have been converted into daily equivalents and are used in the COBA programme to forecast the likely changes in accident numbers, severities and associated costs arising from the implementation of the scheme.

6.4.3 The COBA assessment has used the COBA default accident severity rates. Again all output costs and benefits are converted to 2002 market prices and discounted to 2002 values.

6.5 Maintenance Delay Costs / Savings

6.5.1 To assess the maintenance costs, comparison has been made between the Do Minimum and Do Something situation. The carriageway area to be maintained in the Do Something situation is greater than the Do Minimum. However the additional road space and greater flexibility offered by the introduction of traffic signals on Station Road means that disruption during routine maintenance of the road network in Hucknall is expected to be less with the Hucknall Town Centre Improvements in place.

6.5.2 With the Do Something maintenance delay costs likely to be no more than the Do Minimum, no maintenance delay costs have been calculated in the cost benefit analysis.

6.6 Construction Delay Costs

6.6.1 During the estimated 16 month scheme construction period of the new link road there are likely to be some traffic delays due to vehicular access to the construction site and traffic management. As the new road construction involves construction in a brownfield site any delays will principally be associated with managing the traffic when constructing the terminal traffic signal controlled junctions at Station Road and Baker Street.

6.6.2 It is inevitable that a small amount of the scheme benefits would be eroded by the delays experienced during construction. Given the expected limited nature of any delays during construction it is not thought that the absence of a more detailed analysis will have any direct bearing on the overall viability of this scheme.

