

## 2 Methodology

### 2.1 Approach to Transport Assessments

- 2.1.1 The assessment for each of the proposed options must align itself with best practice, national guidance, the regional transport strategy, and local policy contexts, in order to inform a robust evidence base for their transportation and associated impacts.
- 2.1.2 A number of requirements for the study have already been expressed within in the Panel's Report into the Examination of the East Midlands Regional Plan (including the Regional Transport Strategy). This suggests that more concentrated developments should help reduce traffic levels and congestion impacts (para 12.7); and that in general terms transport solutions should not drive land-use allocations (para 12.16) but rather proposed developments should be assessed in terms of overall sustainability including associated transport priorities.
- 2.1.3 Policy 1 of the approved Regional Plan sets out the regional core objectives that will need to be met to ensure the delivery of sustainable developments. For transport the objective is:
- “To improve accessibility to jobs, homes and services through the:
- Promotion and integration of opportunities for walking and cycling;
  - Promotion of the use of high quality public transport; and
  - Encouragement of patterns of new development that reduce the need to travel especially by car.”
- 2.1.4 In addition, it is important that although the developments will not be covered by the current or next LTP for their area of impact, it is important that they fit into each of the respective longer term strategies, set out below:

#### Leicestershire LTP 2006-2011

- provide the right transport conditions for economic growth;
- improve access to facilities for all;
- reduce transport's impact on the environment;
- keep transport safe; and,
- make sure that our highway assets are properly maintained and renewed for the long-term.

#### Central Leicestershire LTP 2006-2011

- tackling congestion;
- delivering accessibility;
- safer roads;
- better air quality;

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- better road, footway and cycle route conditions; and,
  - an overarching objective to improve quality of life for all.
- 2.1.5 In order to maximise consistency with these objectives each transport assessment has been undertaken in accordance with best practice, following recent guidelines within the DfT's Guidance on Transport Assessments (2007) and the Manual for Streets.
- 2.1.6 Following this guidance, our Transport Assessments have been informed by **persons**, rather than purely vehicles, and are assessed within a fully multi-modal capable framework. This approach has also been adopted in both the '[Building Sustainable Transport into New Developments](#)' (DfT, 2007) and the '[Eco-towns Transport Worksheet](#)' developed by the Town and Country Planning Association. Both of these consider this methodology important in order to develop sustainable transport in Growth Points and Eco-towns that will promote long-term modal shift and change the way people travel.
- 2.1.7 The Regional Transport Strategy further develops this point, arguing that modal split targets for each development are more robust indicators of success given that they are easier to monitor, have greater longevity, and are more readily transparent before and after the potential introduction of each development. A flexible multi-modal modelling approach, as utilised in this study, is equally aligned with the monitoring process, so that the impacts of any failure in delivering any of the appraised multi-modal mitigation options may be planned for prior to completion of the development.
- 2.1.8 The methodology adopted for each Transport Assessment is based upon a four-stage process:
- Determine the '**worst case**' impact of the development. This is defined in terms of assessing each of the development options with the development in place with no potential mitigation options;
  - Derive the potential mitigation options to be appraised across all modes for each of the scenarios;
  - Using an evidential basis from best practice, stakeholder consultation and the transport assessment mode choice models, assess each of the potential mitigation options in terms of their impact in reducing levels of development induced congestion; and,
  - Refine the options into packages by placing them within an overall multi-criteria framework, which includes indicative costs, in order to ensure that the packages deliver real transport benefits, as well as locally defined objectives and requirements.

### 2.2 Multi-Modal Model Development

- 2.2.1 A Loughborough Multi-Modal Model has been specifically developed and utilised for the appraisal of the Loughborough development options as outlined in the previous section. The model is based on the Loughborough Traffic Model, as utilised by Scott Wilson and Leicestershire County Council for the Loughborough Inner Relief Road major scheme bid. The highway model is in TRIPS format, with a 2005 base year, and models the AM and PM peaks (8am-9am and 5pm-6pm respectively).

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- 2.2.2 A public transport assignment model has been developed in PT TRIPS using the highway network base as a starting point, with the model including all AM and PM peak bus and train services stopping within Loughborough. Table 2.1 shows a list of the bus services incorporated into the model.
- 2.2.3 Counts of public transport patronage, and passenger boardings and alightings have been obtained from the bus operators, including Kinchbus, Arriva and Trent Barton. Total boarding and alightings at the rail station have been sourced from Network Rail patronage statistics, whilst Leicestershire County Council have provided a series of bus stops counts for all services and time periods at each of the main bus stops within the town centre, rail station and the university. Journey times have been obtained from timetable data and have been incorporated into the model. Frequencies referred to in this report are for services generally operating during the peak hours on Mondays to Saturdays. All model inputs have been checked with Charnwood Borough Council prior to incorporation.

Table 2.1 Modelled Bus Routes in Loughborough

Route No.	Description	Operator
1	Loughborough – Clifton – Nottingham	NCT
2	Loughborough – Birstall – Leicester	Kinchbus
3	Market Place – Tyndale Road – Baxter Gate	Centrebus
4	Loughborough – Shepshed	Paul S Winson Coaches
5	Ravensthorpe Drive – Hazel Road Estate	Kinchbus
8	Loughborough – Grantham	Paul James Coaches
11	Thorpe Acre – Shelthorpe (Clockwise)	Kinchbus
12	Thorpe Acre – Shelthorpe (Anti-Clockwise)	Kinchbus
13	Market Place – Tuckers Road – Baxter Gate	Centrebus
27	Loughborough – Syston – Thurmaston	Centrebus
54	Loughborough- Anstey- Leicester	Centrebus
99	Nottingham – Loughborough – Coalville	Arriva
127	Leicester – Loughborough – Shepshed	Arriva
SKY	Loughborough – Airport – Derby	Kinchbus
SPR	Industrial Estates – University	Kinchbus
IGO	Loughborough – Long Eaton – Nottingham	Trent Barton

- 2.2.4 The multi-modal model has also been developed in TRIPS/ CUBE and essentially consists of three main parts. The first element skims generalised costs for each mode, which are then run through the second stage which is a calibrated incremental logit model developed from base year levels of demand. A logit model, in simple terms, takes the cost skims and allocates a proportion of overall demand between two zones as a function of the difference in

generalised cost between the two modes. This gives forecast levels of demand for each mode; car, bus, rail and park and ride depending of the network and demand changes that have occurred from the validated base (2005) starting position.

2.2.5 The benefits of a multi-modal model approach for development assessments, include the facts that it:

- Allows specific walking, cycling and public transport options to be modelled, including base levels of public transport usage with each option, as well as analysis in terms of mode choice and transfer to bus and rail routes with each mitigation option tested;
- Allows scrutiny of the existing highway model within the key areas impacted by the development options prior to its incorporation into a multi-modal format;
- Incorporates a specific park and ride model, so that demand for park and ride and its overall cost-effectiveness can be established, including the maximum parking required parking size;
- Represents an identical model set-up to the Central Leicestershire Transport Model utilised for the Transport Assessments for the South Charnwood Options, which includes the same set of indicators and output analysis. Whilst the model is necessarily and locally calibrated, the similarity of model approach and output analysis makes direct comparative analysis between the two broad locations much more transparent; and,
- Is in line with best practice and relevant local and national guidance.

### 2.3 Multi-Modal Model Validation

2.3.1 The validation procedures and results for the multi-modal model, including its respective highway and the public transport models are detailed in Appendix A. The appendix explains DfT and WebTAG requirements in terms of model validation, as well as how the models match each of these requirements.

2.3.2 All stakeholders have discussed the validation results obtained from the model, the revisions made to it, and the overall levels of validation that have resulted from its development. Stakeholders have included Leicestershire County Council, the Highways Agency, and Charnwood Borough Council.

2.3.3 The model has also been independently audited by both ATKINS (on behalf of GOEM and the DfT) and AECOM (on behalf of the Highways Agency), and their comments have been incorporated into the modelling process, but are also included within the model validation report in Appendix A.

2.3.4 However, the most salient points of the model development and validation process are:

### Highway Model

2.3.5 Whilst the previous model validated at an aggregate scale (78-86% of counts for the AM and PM peaks and 88% screenlines), validation in the vicinity of the developments options was typically poor, not meeting relevant model validation criteria of 85%. Only 59- 63% of counts in the vicinity of development options within the previous highway model validated to required standards.

Whilst this may be regarded as little concern for schemes in Central Loughborough for which the model was designed, the ability of the previous highway model to predict the congestion impacts of developments is seriously undermined when flows are up to 300 vehicles too low within the base case model in their vicinity.

2.3.6 Validation of the previous highway model in the vicinity of the Cotes option was particularly poor, with flows systematically too low. The cause of this has been confirmed with Leicestershire County Council and results from the area not being within the cordon of original RSI's from which the model was developed. As a result, traffic has been synthesised within this area of the model in order to match observed traffic flows in the area, with individual route distributions developed from select link analyses.

2.3.7 Junction and link capacities have been confirmed as generally valid, with no major alterations undertaken. However, significant changes have been made to parts of the A60 corridor, in the vicinity north of Cotes where capacities were previously unduly low.

2.3.8 The model has been revalidated after the application of these updates, and as the central part of the model has not been affected (as global matrix estimation or similar processes have not been applied) overall aggregate validation of the model is also improved. The revised highway model validation shows that (83-94% of counts are validated, with 94% of screenlines also validated). Three counts in the PM peak only marginally miss the required validation thresholds by under 30 vehicles per hour; otherwise 90% would also therefore be achieved.

2.3.9 In summary, therefore, DMRB and DfT validation criteria are met, or exceeded, in the vicinity of each development option, and the model is therefore a robust tool for development option appraisal and testing.

### Public Transport Model

2.3.10 Counts of public transport patronage, passenger boardings and alightings have been obtained from the bus operators, Network Rail and Leicestershire County Council.

2.3.11 In total, 95% of bus routes validate during AM and PM peaks in terms of passenger boardings at a route level.

2.3.12 100% of central bus stops validate for passenger boarding and alighting during AM peak and 90% of central bus stops validate during the PM peak.

2.3.13 100% validation has been achieved for total of boardings and alightings for specific services at central bus stops for both the AM and PM peaks.

### Overall Conclusions

- 2.3.14 The validation statistics for both highway and public transport networks show that the model is validated to the required standards as set by the DfT and TAG, and can be reliably used for future year forecasting and assessments.
- 2.3.15 The highway validation results show that the model has an improved level of validation than before, especially in the area relating to the proposed distributor roads to the east and the west, and the new developments. Model validation in the areas of future development and proposed mitigation schemes now meets and exceeds DfT criteria, which previously was not the case.
- 2.3.16 The public transport validation results show that the model is validated across all the criteria set out by TAG, including network and service validation, assignment validation and trip matrix validation.
- 2.3.17 As a result, the multi-modal model is considered suitable for the purposes of development and mitigation testing within and around Loughborough.

### 2.4 Overall Methodology

- 2.4.1 The approach and modelling methodology detailed above is able to provide objective and consistently derived transport assessments for each of the development options, which incorporate the following requirements and best practice:
- The impact of all transport modes is assessed;
  - All options compared on an equal and consistent basis;
  - Both **flows** and **capacities** are included in the assessments and results;
  - The model and approach is consistent with analysis undertaken within the rest of the Borough;
  - Non highway mitigation measures are assessed and reported separately from highway mitigation;
  - Mitigation is strategically developed from the individual transport issues arising from each development option, with variations in option location and access to existing local facilities to be incorporated;
  - Mitigation is applied consistently and effectively within a multi-modal framework and cost per dwelling basis;
  - Interactions between residential and employment elements of the sites are assessed; and,
  - Outputs are provided as a series of clear, concise and comparative set of key indicators that may be transferred to other bodies and organisations such as the Highways Agency.
- 2.4.2 Robust and comparative analysis has been the key determinate of the overall methodology outlined within this chapter, and adopted within the overall study.

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- 2.4.3 MVA Consultancy has also undertaken a significant amount of stakeholder interaction with ATKINS, AECOM, Charnwood Borough Council, Leicestershire County Council, and the Highways Agency in terms of developing and applying the methodology adopted. Each has been involved in, and has agreed to, the modelling methodology adopted.