Document LCC 04

Lincolnshire County Council

NORTH HYKEHAM RELIEF ROAD

Proof of Evidence : Traffic Modelling

June, 2025

Ian Turvey (BSc., MSc., MCLT, MIEnv.Sc.)

Public Inquiry in respect of the following Orders:

THE LINCOLNSHIRE COUNTY COUNCIL (A1461 NORTH HYKEHAM RELIEF ROAD) COMPULSORY PURCHASE ORDER 2024:

THE LINCOLNSHIRE COUNTY COUNCIL (A1461 NORTH HYKEHAM RELIEF ROAD) (CLASSIFIED ROAD) (SIDE ROADS) ORDER 2024

Introduction and Executive Summary

1. My name is Ian Turvey and I hold a Master of Science Degree in Transport Planning and Engineering and an Honours Degree in Environmental Science.

2. I am a Chartered Member of the Institute of Logistics and Transport (CMILT), and a Member of both the Institution of Environmental Science (MIEnvSc) and also the Transport Planning Society (TPS).

3. This evidence has been prepared in respect of the Traffic Modelling of the North Hykeham Relief Road, by the promoting authority.

4. The North Hykeham Relief Road (NHRR) is located to the south of the Lincoln and Hykeham urban areas and will be a dual carriageway road linking the Lincoln Eastern Bypass to the east with the A46 to the west.

5. It is a long standing ambition of the County Council, as part of a set of measures, to address transport issues and problems in the vicinity of Lincoln.

6. Traffic forecasts have been used to support a Transport Strategy for the Greater Lincoln area and specifically to determine the design criteria and Scheme benefits for the North Hykeham Relief Road.

7. Lincolnshire County Council first invested in the development of a traffic model in the early 1990's to investigate the likely effects of both traffic management and local capital schemes in and around Lincoln.

8. The detailed City Centre model was expanded in geographical coverage in subsequent years and used to identify broad options for both the Lincoln Eastern Bypass and the North Hykeham Relief Road.

9. The findings allowed for a programme of future model development to emerge so that a number of improvements could be made to add further confidence to the determination of a Preferred Scheme and its highway design.

10. In 2012, data were collected to allow the Strategic and Outline (OBC) Business Cases for a Scheme to be submitted to DfT, and following acceptance of the appraisal methodology, DfT approved the OBC submission in 2018, based on a 2016 traffic model base year.

11. The SATURN model was used to support the Planning Application for the North Hykeham Relief Road and as is usual, modelling of traffic is an activity which is reviewed regularly and updated to reflect changing circumstances.

12. Given the need for a Final Business Case (FBC) to be prepared, which was required to reflect the most up to date position, the modelling has also been updated to inform decisions going forward.

13. The opportunity presented by that update has been taken to ensure that matters derived from and dependent upon the traffic information, such as the assessment of air quality implications, noise and design have been examined on the basis of the revised traffic information.

14. The adoption of the revised Local Plan for the area has also been accommodated through this process and accordingly, an updated version of the model has been created to inform the decision, and will be the basis of the FBC with a 2023 post Covid Base Year.

15. The latest model is based on up to date traffic information representing the same three vehicle classes (Cars (Business, Commute, Other), Light Goods Vehicles (LGV's) and Heavy Goods Vehicles (HGV's)) over three weekday model periods (morning (AM) and evening (PM) peaks and an inter-peak (IP) period).

16. All base models are calibrated and validated to DfT Transport Appraisal guidelines.

17. Forecasting has been undertaken to test the impact of the NHRR for an FBC Opening Year of 2028 and Design Year of 2043 using a Development Log that contains committed and proposed Housing and Employment developments, consistent with the revised Central Lincolnshire Local Plan.

18. Having developed a validated base year and forecast year model, the tool was subsequently used to assist in the detailed consideration of design parameters and of the economic vitality of the NHRR.

19. At Outline Business Case stage, in the Economic Dimension, a Benefit to Cost Ratio of 2.31 was achieved, rating the Scheme as providing high value for money.

20. The investment in the development of a robust modelling tool has assisted in the evaluation of the potential impacts associated with a diverse range of potential planning and highway interventions.

21. In all cases, the model compares very well with the observed situation, and meets DfT validation criteria.

22. On this basis, it has been demonstrated that the base year traffic model, for each of the three modelled time periods, provides an accurate representation of the current traffic demands in the wider Lincoln area, and is considered to be fit for purpose.

23. It is a robust model, and therefore provides a reliable basis for forecasting, containing highway, public transport, variable demand and forecast components.

24. I have worked on the transport modelling of schemes in the vicinity of Lincoln since 1989 and have previously had direct involvement with the traffic model forecasts and with transport planning in respect of the Lincoln Eastern Bypass, the dualling of Tritton Road, and the East-West Link Road schemes in Lincoln, as well as the University campus development planning and the Brayford Wak scheme over the Foss Dyke at Brayford Pool..

Background to GLTM

25 The Modelling of traffic movement in the vicinity of Lincoln has taken place over many years and the models developed for that purpose have been known by various names but each in turn has been superseded by an updated version to more accurately reflect the location and development proposals for use in decision making.

26 Given the gestational period for the NHRR, dating back as it does to the 1990's as part of a larger scheme, modelling has developed over that time.

27 The most up to date model that has been developed, and the one which will now be used in respect of the Scheme for the NHRR is the Greater Lincoln Traffic Model (the GLTM).

28 The Greater Lincoln Traffic Model (GLTM) area contains a population in excess of 130,000 people and the level of anticipated future year development growth

and potential attendant transportation issues necessitate an appropriate tool to evaluate and appraise potential outcomes.

29 The Greater Lincoln Transport Model (GLTM) is needed to enable modelling and appraisal for new projects being developed by Lincolnshire County Council and its partners.

30 The GLTM has provided the analytical basis for undertaking transport forecasting across a range of local studies including the NHRR OBC, updating the Lincoln Transport Strategy, development testing and network operational (traffic management) projects.

31 Traffic forecast model outputs have also been used to undertake economic and environmental appraisal in the relevant cases.

32 The transport model provides a robust tool for analysis and appraisal towards the four key objectives defined within the Model Specification Reports (MSR) [doc refs 8.104/5].

33 The four key objectives are identified as being, to assist in Development Management matters, to inform the development of Business Cases and to assist in the evaluation of emerging schemes, to inform High Level Policy evaluations, and finally to reflect both important strategic, and also Local Traffic Management, effects in relation to movement and environmental aspects.

34 These applications align with the range of objectives in the Lincoln Transport Strategy (LTS) [doc ref 4.2], including,

- Supporting growth and the local economy
- Improving access to employment, training and key services
- Providing and maintaining an inclusive and reliable transport network
- Contributing to a healthier community and addressing the environmental impact of travel

35 The model was prepared in accordance with the Department for Transport appraisal guidance which defines the standards for traffic modelling [doc ref 8.108].

Model Description and Specification

36 There are four primary modelling components to GLTM,

- Greater Lincoln Highway Assignment Model (GLHAM)

  A highway assignment model developed within SATURN (Simulation and Assignment of Traffic in Urban Road Networks) to determine journeys travelling on the highway network including traffic flows, speed, delays, route choice and journey costs.

- Greater Lincoln Public Transport Model (GLPTM)

  A public transport assignment model developed within CUBE Voyager to predict journeys travelling on public transport routes including occupancy and journey costs.

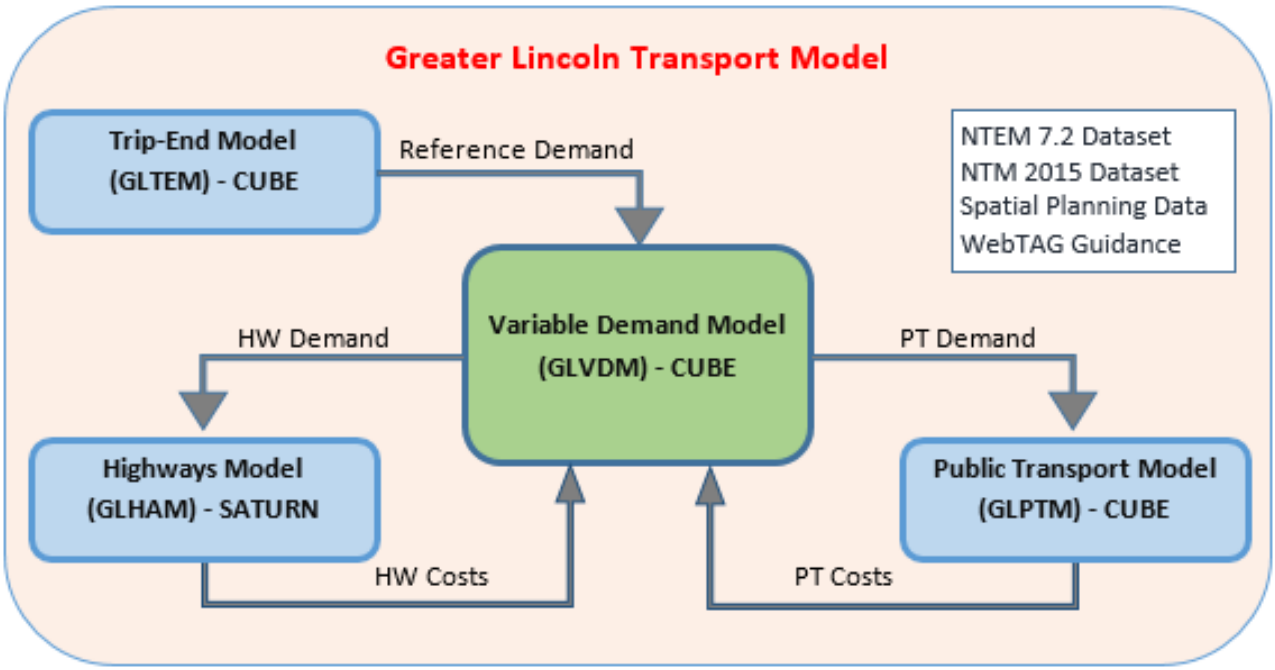
- Greater Lincoln Trip End Model (GLTEM)

  A trip end model developed within CUBE Voyager to consider the trip generation impacts of land use changes or shifts in scale and pattern of economic activity.

- Greater Lincoln Variable Demand Model (GLVDM)

  A variable demand model (VDM) developed within CUBE Voyager to predict the future demand for private vehicle travel through consideration of cost change impacts on trip distribution and mode split. GLVDM facilitates mode choice between private highway and public transport assignments.

Figure 1: **Traffic Model Composition add words**



37 The model components are explained in Figure 1 and show how overall travel demand forecasts taken from the DfT's National Trip End Model (NTEM) are used to inform the relationship between the Highway Model (HW) travel demand and costs, and the Public Transport (PT) travel demand and costs, in order to arrive at an iterative traffic situation on the roads.

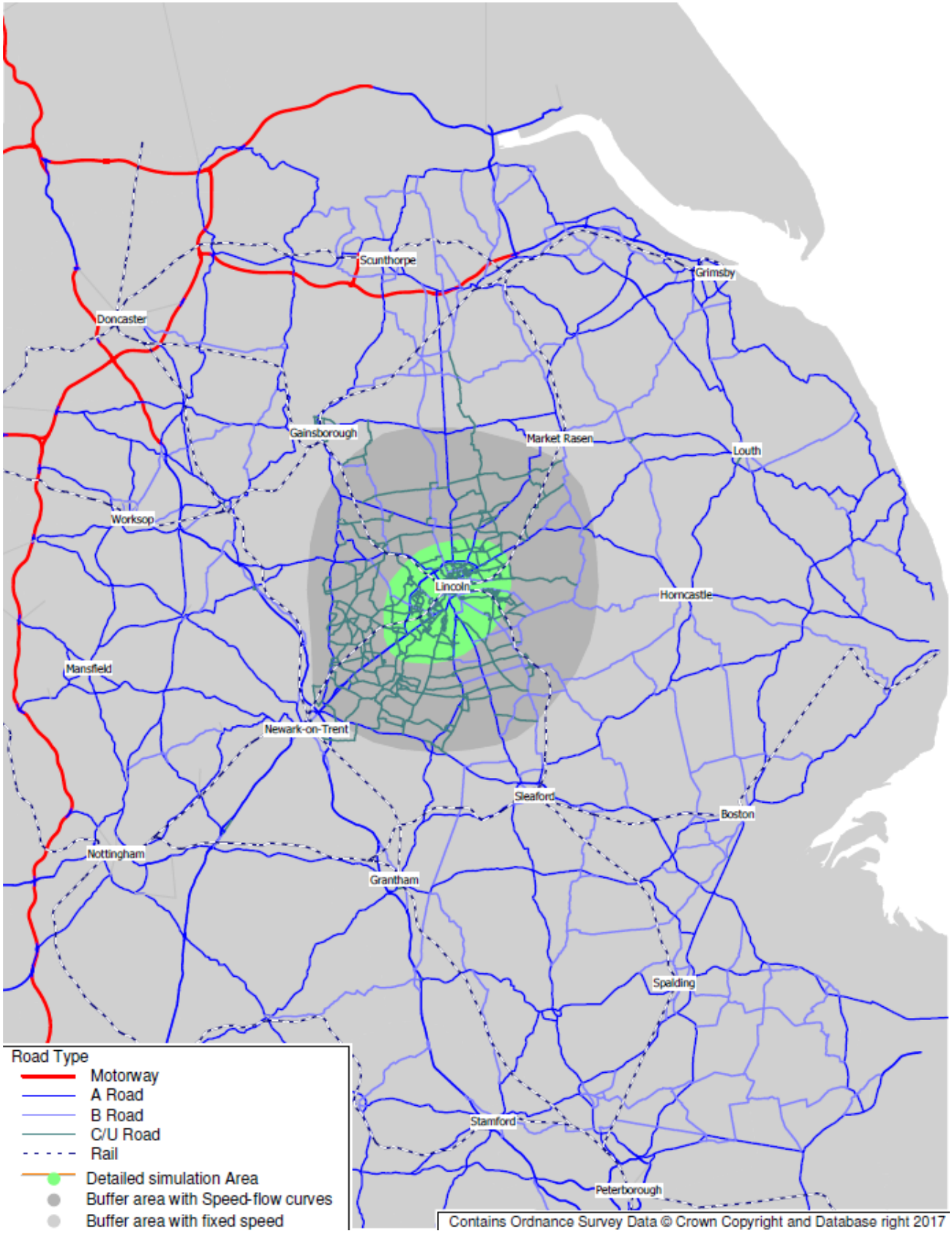
38 The traffic model road network (all the roads that traffic is predicted for) and zoning (spatial sectors that feed traffic onto the network) has a detailed 'simulation' coding area with a less detailed 'buffer' area beyond.

39 The 'buffer' area allows traffic detail to be generated for road 'link' sections between connection nodes whilst the 'simulation' area provides both traffic detail on links as well as performance information at junctions, including delays, queues and turning movements.

40 The model extent is shown in Figure 2, where,

- The inner green area is the model 'simulation' area, including the City centre, Hykeham and the bypasses, including the NHRR – this is the area that models traffic flow and performance at junctions in detail.
- The grey areas represent the 'buffer' network which looks at traffic in a less granular detail.
- The dark grey area represents the area immediately surrounding the 'simulation' area, and uses 'speed-flow' relationships to determine traffic behaviour - Speed-flow curves illustrate the relationship between the speed of traffic and the flow (volume) of vehicles and they are used to predict traffic behaviour and the congestion that may in turn influence driver route choice.
- The light grey area represents a coarse remote road network where speeds only reflect posted speed limits and where travel demand chooses to enter the main model areas shown as the inner green area.

Figure 2: **Traffic Model Extents**



Modelled Periods

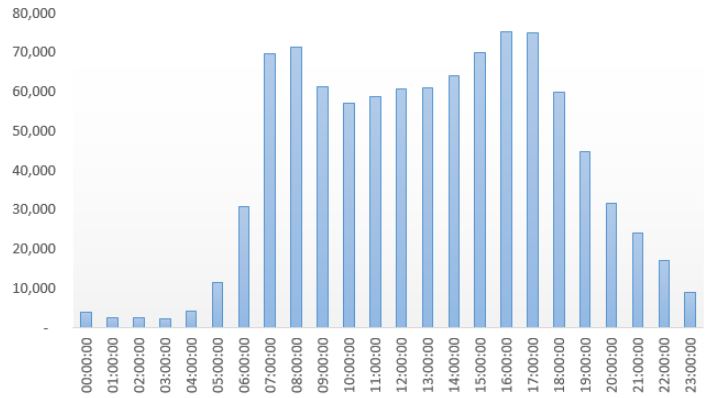
41 Traffic patterns, journey purpose (work, leisure, education etc), traffic volume and vehicle compositions and congestion vary by time of days and day of weeks. WebTAG states that highway assignment models should therefore normally represent the morning and evening peak and the inter-peak periods separately.

42 The base year of GLTM was defined as an average weekday in an average neutral month, as agreed with the County Council, and with the following time periods.

- AM peak hour (08:00-09:00)
- Inter peak average hour (10:00-16:00)
- PM peak hour (17:00-18:00)

43 The peak hours are consistent with those from the previous GLTM, evidenced by analysis of the flow profile from commissioned automatic traffic count (ATC) surveys, as shown in Figure 3.

Figure: 3: **Weekday Flow Profile**



User Classes

44 Operating travel costs vary by vehicle types and values of time vary by the purpose of the trip being made. This means that different combinations of vehicle and trip purposes have different characteristics and should be modelled separately as they are likely to choose different routes.

45 Travel demand is segmented into user classes to reflect the impact of varying values of time on vehicle operating costs on route choice for different trip purposes.

46 Five user classes are modelled,

- User Class 1: Employers Business
- User Class 2: Commute
- User Class 3: Other
- User Class 4: Light Goods Vehicles (LGVs)
- User Class 5: Heavy Goods Vehicles (HGVs)

47 The demand segments produced for journey purposes and user classes during the development of the highway demand matrices are aggregated to provide a composite travel demand prior to conducting highway assignments.

Data

48 To develop the Highway Model to a robust level which is compliant with the DfT's Transport Appraisal Guidance (TAG) [doc ref 3.4], a variety of data types are required either through existing sources or the commission of new surveys including,

- Counts of vehicles on links or at junctions
- Journey times on links throughout the detailed area of modelling
- Observed person travel demand data.

49 These data arrive by various routes,

Travel Demand Data

50 These data are taken from,

- Mobile Phone Origin-Destination Data
- *TrafficMaster* (now *Basemap*) provides Origin-Destination Data and Journey Time data throughout the UK

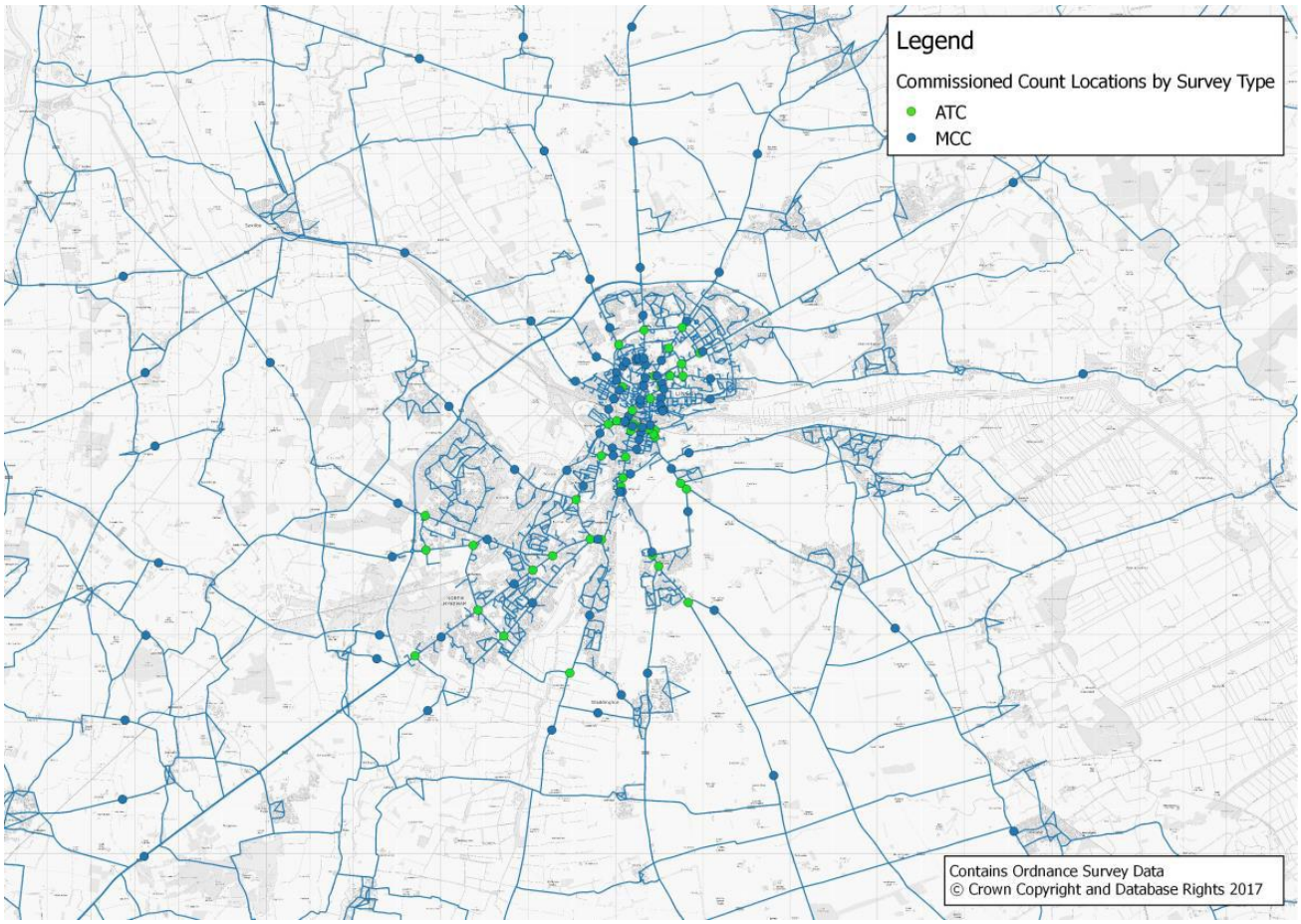
Traffic Count Data

51 The increased GLTM study area necessitated a new commission of traffic surveys, undertaken in November 2016 and June 2017 and which included,

- Ninety-nine automatic traffic counts (ATCs): permanent or temporary counters to measure daily traffic volumes, subset into intervals of an hour or less, at a particular location observed over a suitable period of time to gather sufficient data to understand travel behaviour and day to day variability at that location
- Forty-four manual classified counts (MCCs): single day video surveys undertaken to measure the vehicle split composition at a certain location and, in most cases, undertaken at junctions with data recorded by turning movements added an additional layer of information about traffic patterns and routeing at those locations.

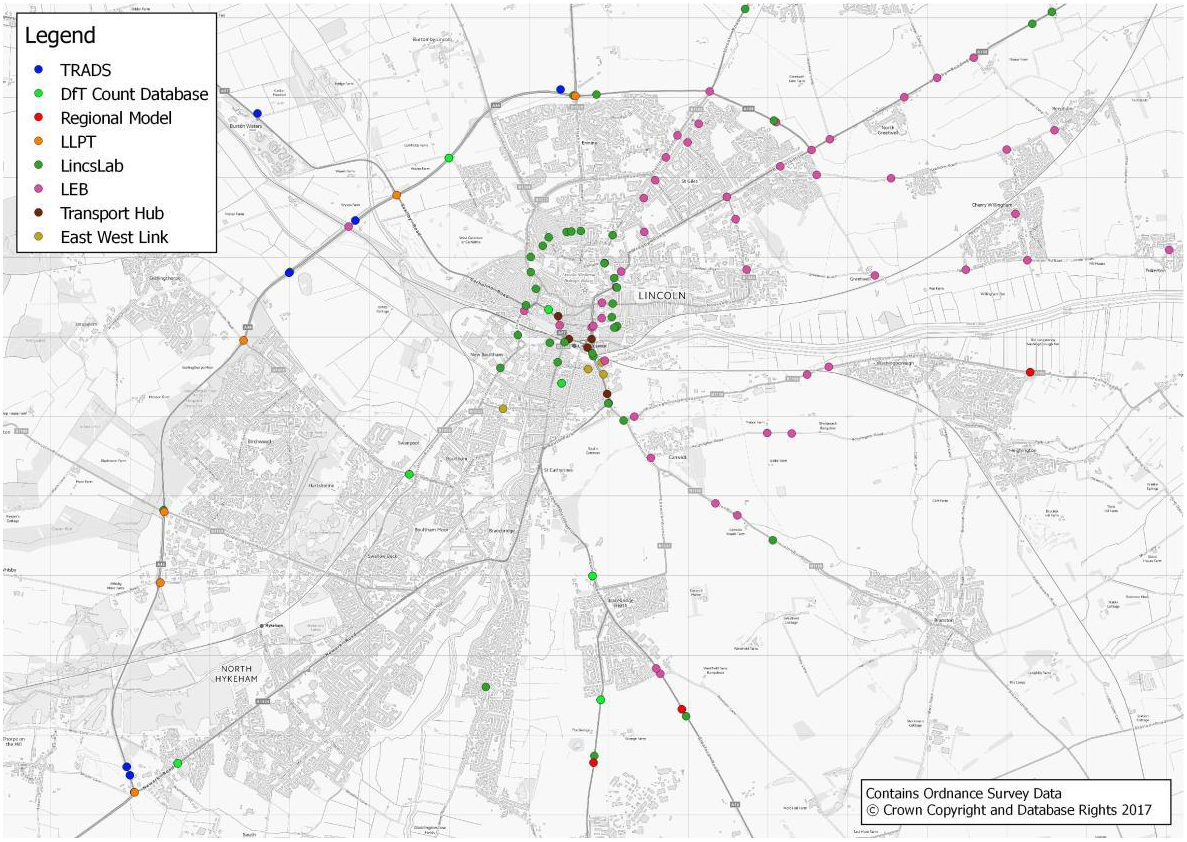
52 These are shown in Figure 4.

Figure 4: **Data Sites**



53 In addition to the new traffic counts, a number of historic counts were also available and these are shown in Figure 5.

Figure 5: **Other Data**

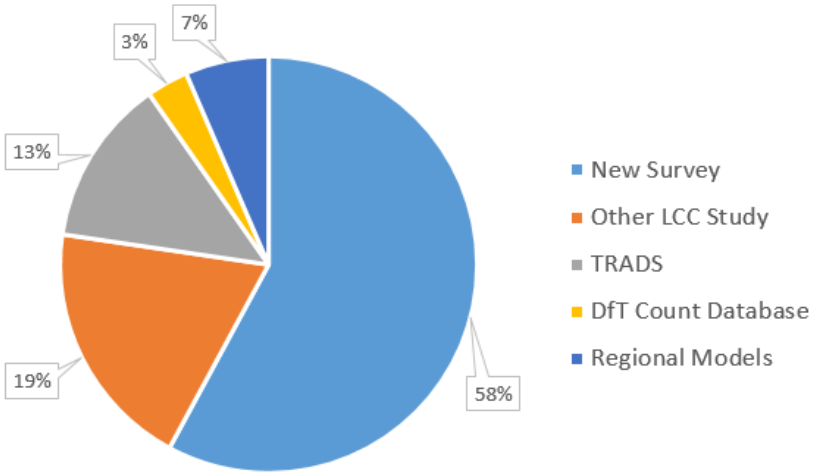


54 In total, 48 other LCC counts were used, plus 56 counts from other sources including the Midlands Regional Transport Model and the DfT Count Database.

55 These data sources are examined in detail to ensure that the information is compatible, free from errors and omissions, and consistently represents a particular point in time.

56 The final OBC dataset was made up of the components shown in Figure 6,

Figure 6: **Data Composition**



57 Around 85% of the data used was therefore from new surveys, or current regional models or data.

Journey Time Data

58 TrafficMaster Journey Time (TMJT) is a dataset owned by the Department for Transport (DfT) which is sourced via Global Positioning System (GPS) data gathered from devices and trackers fitted to a variety of fleet vehicles (Cars, LGVs and HGVs) and buses.

59 The Journey Time Routes are shown in Figures 7 and 8.

60 The traffic models are supported by a suite of documents and the key descriptors are included in the GLTM Local Model Validation Reports at doc ref 8.39 to 8.42.

61 Post OBC and following the Covid pandemic, there has been a further round of data collection and modelling to prepare for the FBC and ensure that the traffic forecasts are based on the most recent data and remain compliant with current DfT requirements.

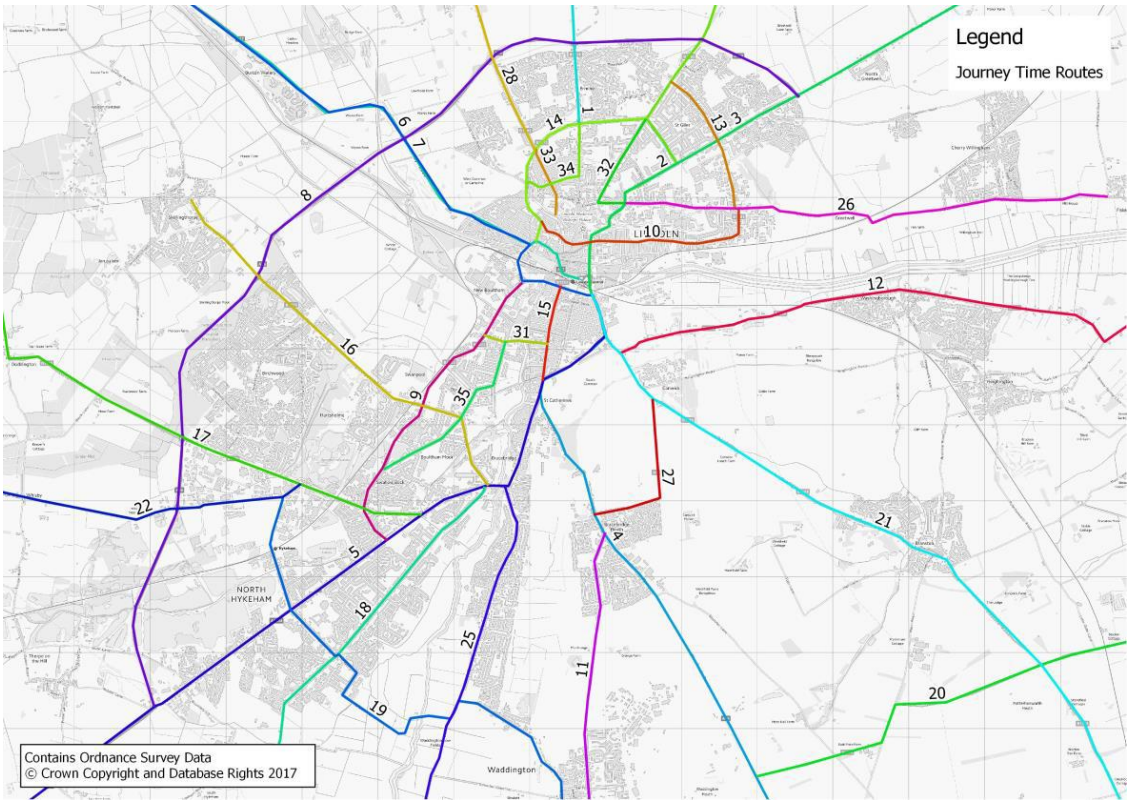
62 All the ATC and MCC locations that were required in 2016/17 were resurveyed in 2023 plus additional surveys to enhance the traffic model. In total, some156 new ATC surveys have therefore been undertaken, along with 80 junction counts and 11 new ANPR (automatic number plate recognition) surveys.

63 The corresponding 2023 Local Model Validation Reports are at doc ref 8.106 and 8.107.

64 Figure 9 shows the composite Journey Time routes used in the 2023 traffic model analysis, and it emphasises the use of an increased data set to allow detailed examination of the impact of a range of demand forecasts and road network interventions..

65 The reports describe in full the model inputs, process and performance, set against DfT criteria.

Figure 7: **Journey Time Routes (central area) – 2016 Model**



Note: colours refer to composite data collection routes across, round or through the model area

Figure 8: **Journey Time Routes (wider area) – 2016 Model**

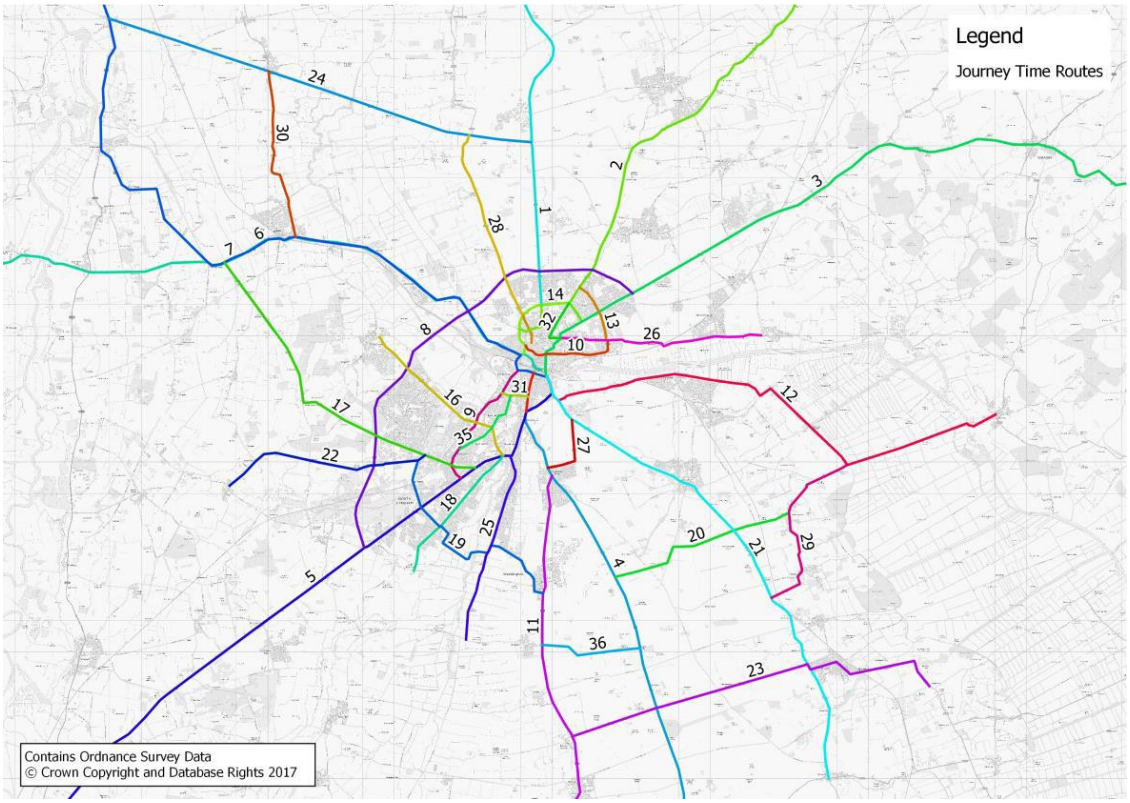


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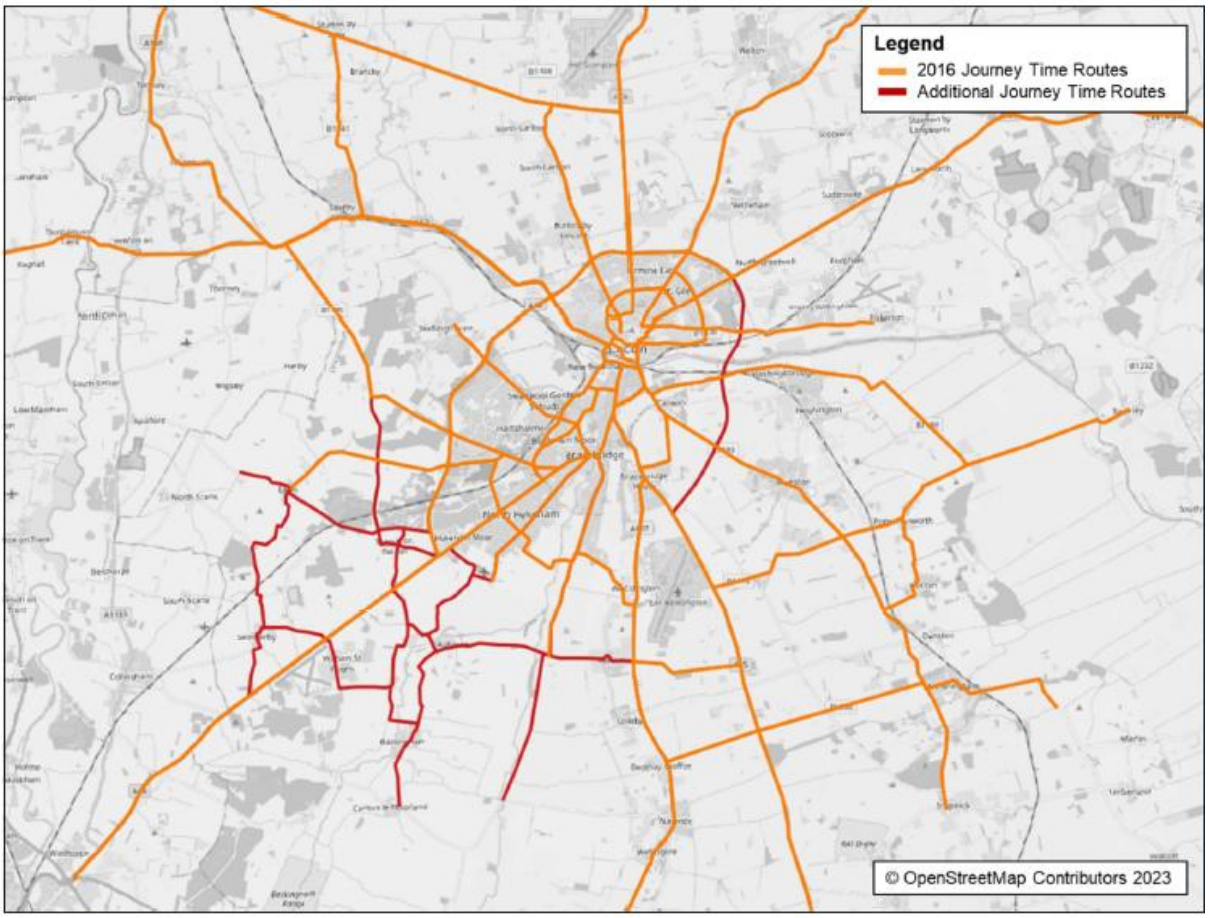
Figure 9: **Composite 2023 Model Journey Time Routes**



Traffic Signal Data

66 Traffic signal data were required for all signalised junctions within the simulation area.

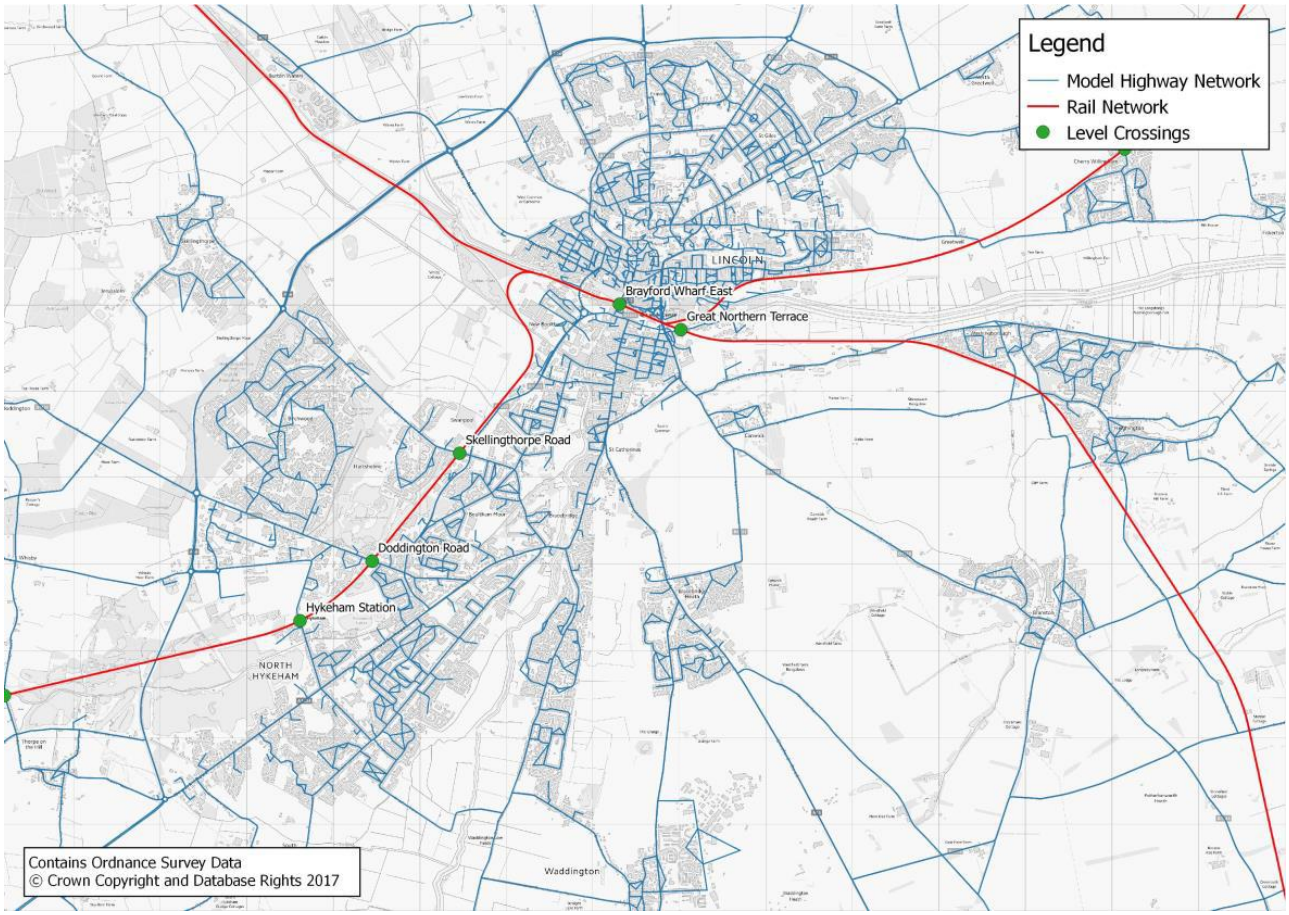
67 Traffic signal specifications were obtained from LCC for the junctions as follows,

- Phase and stage diagrams
- Phase minimum/maximum settings
- Timetables defining minimum and maximum settings to apply by time period
- Phase intergreen times

68 In total, data was received for forty-eight sites in Lincoln and fifteen sites in North Kesteven.

69 Additionally, observed barrier downtime data was obtained from LCC for the level crossings within the simulation area as shown in Figure 10.

Figure 10: **Level Crossing Locations**



70 All of the data sources combined (demand/counts/journey times/traffic signal data etc) allowed a comprehensive road network to be modelled as shown in Figure 11, and similarly for a 'feeder network' to control the external inputs to the model, as shown in Figure 12.

71 These figures show the situation prior to the LEB opening and therefore the LEB, improvements at Riseholme Roundabout, the A46 Welton junction and at the Lincoln Transport Hub have since been incorporated in the 2023 traffic model, as shown in Figure 13.

72 In summary, this provided over ten thousand road links within the model, with a total length of over fifteen thousand kilometres.

73 Over two thousand five hundred junctions are coded in the model within over seven hundred geographical zones – four hundred being within the area within the bypasses (east, NHRR, west and north).

74 The Local Model Validation Reports detail the process of calibration and validation of the model and presents the screenline, link and junction results.

The outcomes satisfied the DfT in the assessment of the NHRR OBC and resulted in the Scheme approval and award of a financial contribution.

Figure 11: **Road Network**

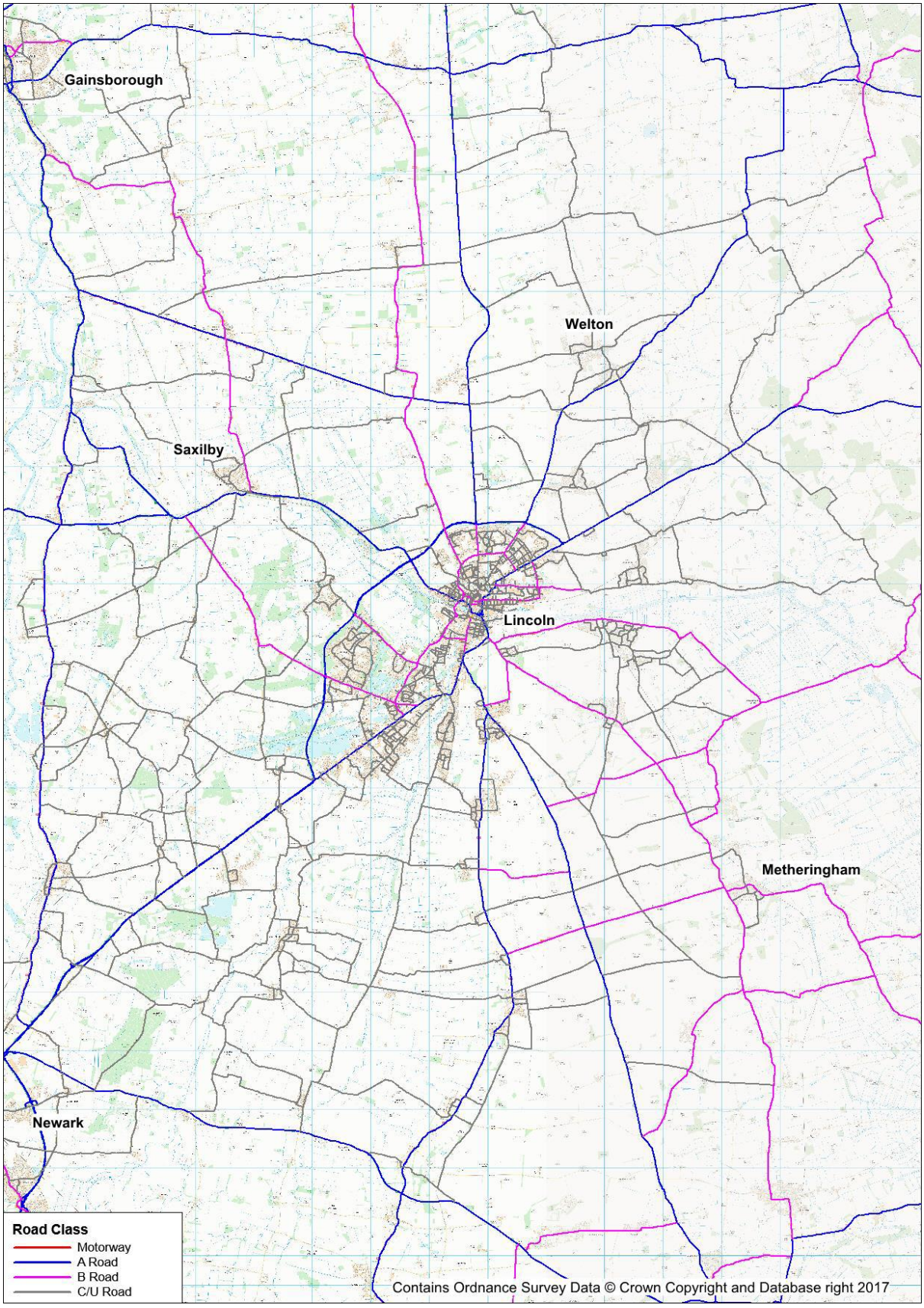


Figure 12: **Feeder Network**

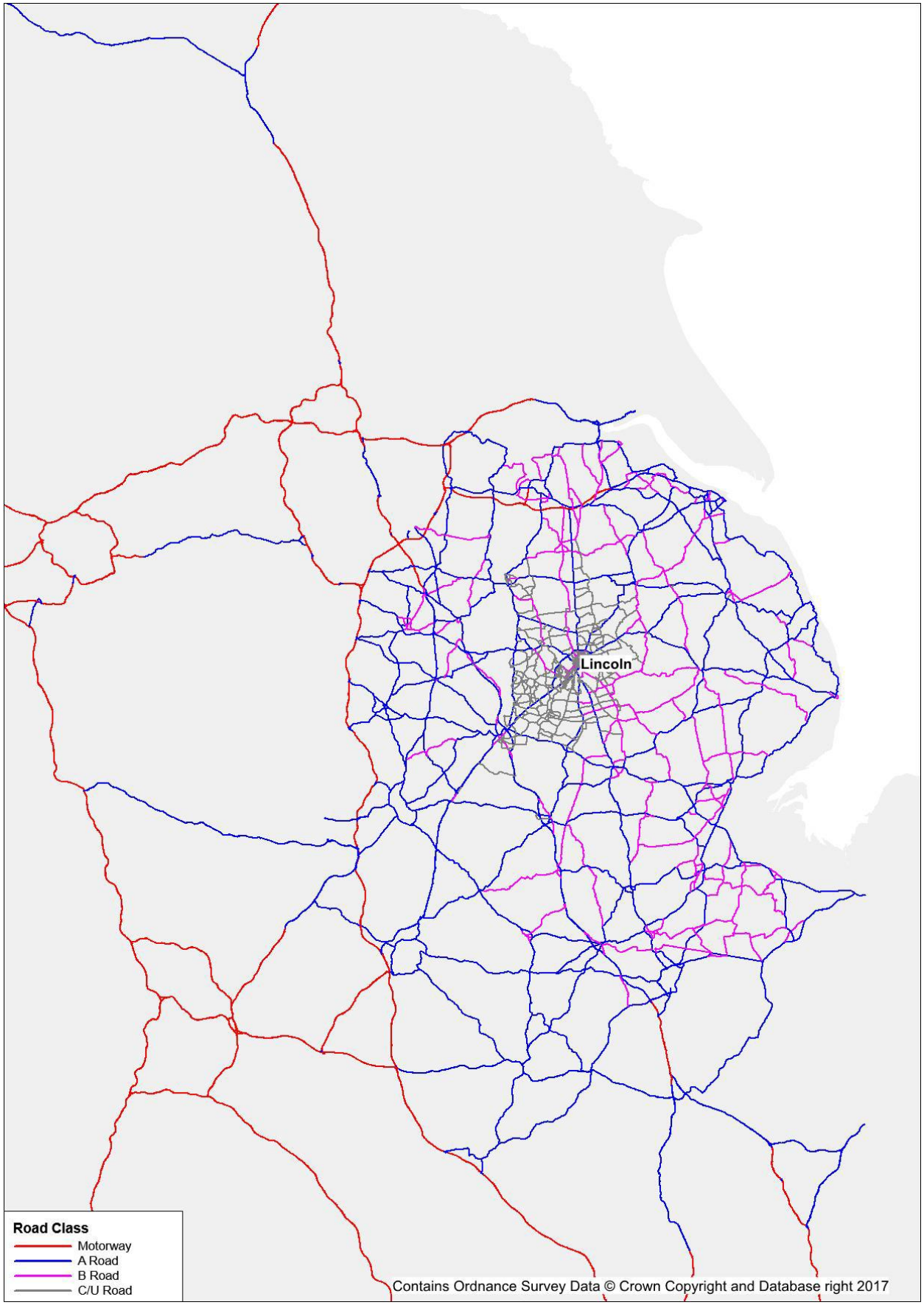
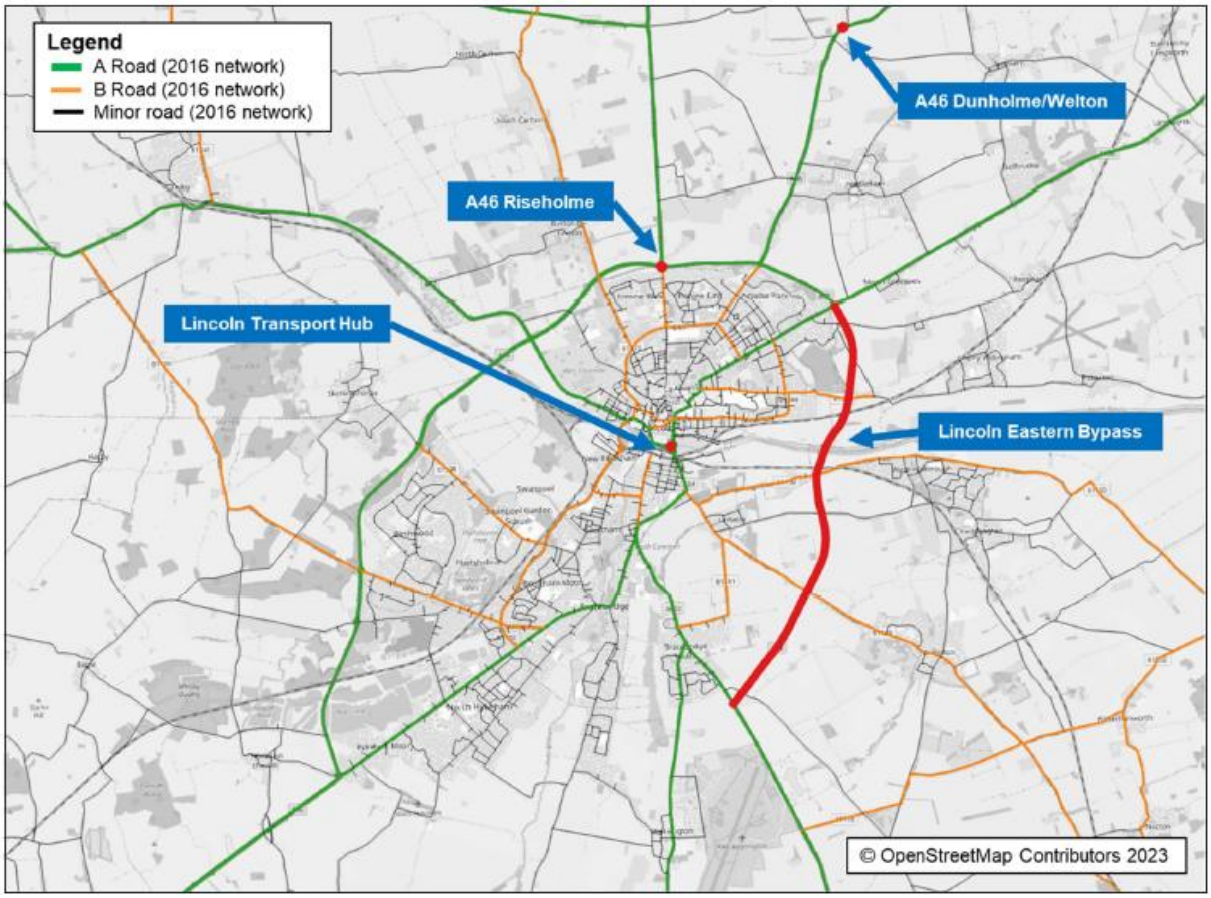


Figure 13: **Completed Schemes – 2023 Traffic Model**



75 The results of the model calibration and validation process demonstrates that the base year traffic model provides an excellent representation of the current traffic demands and conditions in the study area.

76 This makes the model suitable for evaluating the impacts of the North Hykeham Relief Road as part of a Full Business Case as well as other potential highway network intervention or land use changes within the Lincoln area.

Traffic Forecasts

77 The forecast years at OBC were,

- 2026: Scheme opening year
- 2041: design year (fifteen years after opening)

78 The Core Scenario, representing the best basis for decision-making given current evidence is based on more certain, unbiased assumptions and consideration of some sources of uncertainty.

79 There are two forecasts in the Core Scenario,

- Without Scheme forecast referred to as the Do Minimum (DM)
- With Scheme forecast refer to the Do Something (DS) which consists of the Do Minimum assumptions plus the dual carriageway NHRR as the preferred option.

80 Other alternative network configurations have been modelled such as Next Best Alternative (NB) and Low Cost Option (LC) options at OBC and Behavioural, Technological and High Growth alternatives as part of the preparation for the FBC.

81 These alternatives test the impact of the Scheme under higher and lower background growth assumptions and in particular, this shows whether the Scheme is still effective with higher growth and whether the Scheme is still economically viable with lower growth.

82 The Scheme is viable with low future growth in traffic, as well as being able to cater for higher levels of predicted traffic.

83 A dependent development assessment has also been undertaken for South West Quadrant (SWQ) development site to show,

- development without the Preferred Scheme
- development with the Preferred Scheme

84 The whole of the SWQ development was determined to be dependent on the Scheme, with an unacceptable level of service at A46/Pennell's Roundabout and rat-running on local roads adjacent to the site without the NHRR.

85 An assessment of the benefits from unlocking dependent development at OBC estimated the monetised value to be £18.8m (doc ref 8.38 para 5.9.7).

86 An 'Uncertainty Log' has been maintained throughout the modelling process to record the assumptions in the model that may affect travel demand and supply in the future, including the certainty of new developments being built.

87 This enables traffic forecasts to be constructed for specific years whilst avoiding over estimation of traffic where development is speculative

88 Sources of uncertainty were considered at a national and local level.

- National uncertainty refers to national projections such as demographic changes, GDP growth and fuel price trends. This forms part of the

background growth and is reflected in the data obtained from national models such as NTEM and NTM

- Local uncertainty considers whether developments or other planned transport schemes will go ahead in the vicinity of the Scheme. This information is documented in the Uncertainty Log.

89 The classifications of uncertainty are presented in Table 1.

Table 1: **Classifications of Uncertainty**

Classification	Status
Near Certain (NC) The outcome will happen or there is a high probability that it will happen.	Intent announced by proponent to regulatory agencies. Approved development proposals. Projects under construction.
More than Likely (MTL) The outcome is likely to happen but there is some uncertainty.	Submission of planning or consent application imminent. Development application within the consent process.
Reasonably Foreseeable (RF) The outcome may happen but there is significant uncertainty.	Identified within a development plan. Not directly associated with the transport Scheme but may occur if the scheme is implemented. Development conditional upon the transport Scheme proceeding. A committed policy goal, subject to tests (e.g. of deliverability) whose outcomes are subject to significant uncertainty.
Hypothetical (H) There is considerable uncertainty whether the outcome will ever happen.	Conjecture based upon currently available information. Discussed on a conceptual basis, One of a number of possible inputs in an initial consultation process. A policy aspiration.

90 Major development includes the sustainable urban extensions (SUEs) which involve the planned expansion of an existing area through mixed use development supported by the necessary facilities and infrastructure to contribute to creating sustainable patterns of development.

- North East Quadrant (NEQ): Land at Greetwell, north east of Lincoln City Centre to deliver 1,400 homes and up to 5ha of employment land plus community facilities and green space.
- South East Quadrant (SEQ): Land at Canwick Heath south east of Lincoln City Centre to deliver 6,000 homes and up to 7ha of land for employment, community facilities and open space.
- South West Quadrant (SWQ): Land at Grange Farm south west of Lincoln City Centre to deliver 2,000 homes and up to 5ha of land for employment, community facilities and open space.
- Western Growth Corridor (WGC): Land to the west of Lincoln City Centre to deliver 3,200 homes during the Plan Period and up to 20ha of land for mixed-use development including commercial, leisure, retail, community facilities and open space.

91 There are four such locations which are relevant and shown in Figure 14 and the key OBC assumptions for each site are shown in Table 2.

Figure 14: **Urban Extensions**

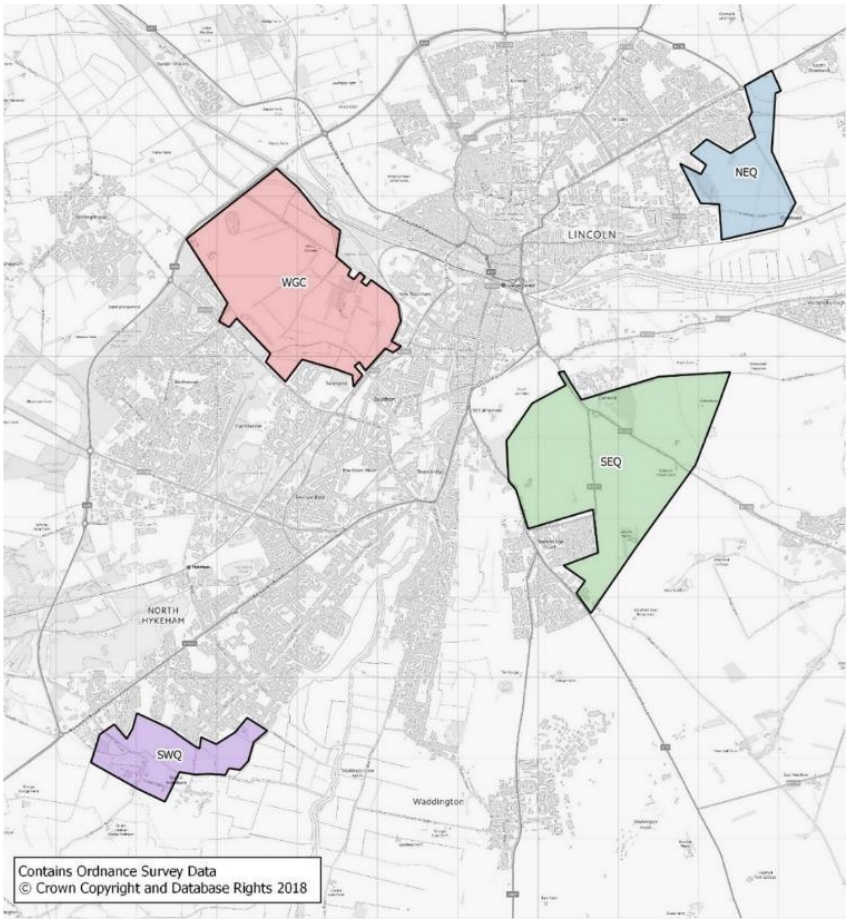


Table 2: **Uncertainty Assumptions – SUEs**

Site	Current Status	Uncertainty Assumption
NEQ	Outline planning permission granted for Phase 1 (500 homes).Phase 2 (900 homes) was dependent on the opening of the LEB	Phase 1 classified as More than Likely (MTL). Phase 2 classified as Reasonably Foreseeable (RF).
SEQ	Scenario for 3,600 dwellings up to 2036 at the end of the Local Plan period. Outputs were provided to developer consultant to feed into TA.	3,600 dwellings up to 2036 classified as MTL. 2,400 dwellings post-2036 classified as RF.
SWQ	Linked to the delivery of the NHRR in the Local Plan. The dependent development test has been undertaken.	Full development classified as RF. (Dependent development test undertaken as part of the economic appraisal).
WGC	Scenario for full development delivered by 2036.	Full development classified as MTL.

Summary and Conclusions from Model Outcomes

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107 Having developed a validated base year and forecast year model, the tool was subsequently used to assist in the detailed consideration of design parameters and of the economic vitality of the NHRR.

108 At Outline Business Case stage, in the Economic Dimension [doc ref 8.38, p27], a Benefit to Cost Ratio of 2.4 was achieved, rating the Scheme as providing high value for money.

109 The investment in the development of a robust modelling tool has assisted in the evaluation of the potential impacts associated with a diverse range of potential planning and highway interventions, including environmental (noise, pollution, greenhouse gases) and physical road improvements at points of congestion.

110 The NHRR FBC is currently being developed and since OBC many factors have intervened, including inflation spikes, the Covid pandemic, the development of a new traffic model and appraisal tools, emerging DfT appraisal guidance and changes in the price discount guidance.

111 However, work in progress indications are that the FBC will also deliver a scheme of high value for money.

112 It will also provide a range of benefit to cost scores in accordance with the DfT's Common Analytical Scenarios – namely, a low growth Behavioural and a Technological assessment, plus a high demand growth assessment, in addition to the 'core' assessment.

113 In all cases, as the base model compares very well with the observed situation, and meets DfT validation criteria, and there is confidence in the outcomes.

114 On this basis, it has been demonstrated that the base year traffic model, for each of the three modelled time periods, provides an accurate representation of the current traffic demands in the wider Lincoln area, and is considered to be fit for purpose.

115 It is a robust model, and therefore provides a reliable basis for forecasting, containing highway, public transport, variable demand and forecast components.

116 The findings of the GLTM model output have been used to support the OBC and NHRR Planning Application, and the post Covid GLTM2 model is now being used to evidence the FBC.

117 In summary the key outcomes show that,

- Future land-uses and policies identify significant levels of planned growth and forecast development includes four SUEs which contribute to a 50% increase in dwellings in Lincoln by 2036.
- The LEB provides much needed mitigation for some of the traffic and transport problems affecting Lincoln, however, several residual issues remain, and in particular the lack of strategic east-west connectivity is a significant problem which continues to exacerbate the existing congestion problems on radial routes and roads into Lincoln.
- Travel demand is forecast to increase substantially over the next 20 years within the Lincoln model area and increases in traffic of over 20% by 2041 are forecast.
- The forecast traffic growth results in a deterioration in conditions on key areas of the network, particularly on the western side of Lincoln including the A46 WRR, A1434 Newark Road and sections of the A15.
- The forecast impact of the future level of travel demand on infrastructure is illustrated by link capacity, junction capacity and average speeds, which indicate issues of congestion and low speeds on the road network, including the A46 WRR and the A1434 Newark Road, and on local routes in the south of Lincoln and North Hykeham area. This includes Meadow Lane and Brant Road – the main east-west crossing of the River Witham in the south of Lincoln.

118 At OBC and Planning Approval stage, Table 3 (containing the initial 2026 Opening Year figures) gives an indication of how the local network is predicted to be impacted by the introduction of the NHRR.

119 Of note at a daily metric considering the roads that directly feed the NHRR or run to the south of it,

- There is a traffic increase at A46 (south) and along the southern section of LEB, directly attributable to strategic traffic using LEB and NHRR to travel along A46 to and from the south.
- For those other roads in close proximity to NHRR that show a reduced level of traffic, there is about a twelve percent reduction in aggregate traffic when the NHRR is introduced.

- Depending on the road section, daily traffic forecast to use NHRR ranges from 24,950 vehicles to 26,550 vehicles per day at Opening Year, thereby justifying the proposed design - compared to 24,700 vehicles to 29,500 vehicles per day with the new post Covid model: a very similar forecast given changes in the Opening Year and travel behaviour generally.

Table 3: **OBC Scheme Impact - 2026**

Link (2 way, vehicles)		2026 without NHRR	2026 with NHRR	*Change*
A46 North		32,250	31,750	*-500*
Newark Road		19,850	18,150	*-1,700*
NHRR	A46 to South Hykeham Road		26,550	*26,550*
A46 South		38,800	45,000	*6,200*
Middle Lane	at A46	3,350	3,950	*600*
Boundary Lane		2,500	200	*-2,300*
Meadow Lane		8,050	6,900	*-1,150*
Haddington Lane		2,500	1,650	*-850*
Blackmoor Road		6,950	1,350	*-5,600*
Low Road		5,850	5,650	*-200*
South Hykeham Road	South	2,550	2,950	*400*
South Hykeham Road	North	2,500	5,250	*2,750*
NHRR	South Hykeham Road to Brant Road		24,950	*24,950*
Brant Road north	North	6,100	9,750	*3,650*
Brant Road south	South	5,850	5,650	*-200*
Station Road		6,700	2,900	*-3,800*
Somerton Gate		1,150	0	*-1,150*
Grantham Road north	North	14,850	12,900	*-1,950*
Grantham Road south	South	14,850	13,300	*-1,550*
NHRR	Brant Road to Grantham Road		26,200	*26,200*
Sleaford Road north	North	9,550	7,800	*-1,750*
Sleaford Road south	South	14,500	14,000	*-500*
NHRR	Grantham Road to Sleaford Road		25,000	*25,000*
LEB		15,650	25,550	*9,900*
Tower Lane		4,850	2,750	*-2,100*
Heath Lane		4,950	1,250	*-3,700*

120 The revised 2023 traffic model outputs adjacent to the NHRR, being prepared for the FBC, indicate around a 4.9% increase in traffic at the Opening Year of 2028, due to traffic growth generally and confirmation of both a return to general pre-Covid traffic levels and expected traffic growth between 2026 and 2028.

121 This is also reflected in an average increase in traffic along NHRR from 25,675 vehicles to 26,825 vehicles, between the OBC and the work to prepare for the FBC.

122 Behavioural changes in traffic, modified Scheme design and a refined model road network have also led to an increase traffic on the A46 (north) and a reduction in traffic on South Hykeham Road, north of NHRR – increasing the

local road traffic reduction to around eighteen percent, where reduced traffic is forecast.

123 Table 4 shows the revised comparison being prepared for the FBC.

Table 4: Current Traffic Model – 2028 Scheme Impact

Link (2 way, vehicles)		2028 without NHRR	2028 with NHRR	*Change*
A46 North		33,650	34,850	*1,200*
Newark Road		20,450	14,550	*-5,900*
NHRR	A46 to South Hykeham Road		29,500	*29,500*
A46 South		43,150	47,400	*4,250*
Middle Lane	at A46	1,850	3,050	*1,200*
Boundary Lane		5,600	1,300	*-4,300*
Meadow Lane		11,300	7,100	*-4,200*
Haddington Lane		2,850	1,600	*-1,250*
Blackmoor Road		6,400	500	*-5,900*
Low Road		4,100	6,100	*2,000*
South Hykeham Road	South	2,150	4,250	*2,100*
South Hykeham Road	North	5,300	1,500	*-3,800*
NHRR	South Hykeham Road to Brant Road		26,900	*26,900*
Brant Road north	North	4,000	7,250	*3,250*
Brant Road south	South	4,750	6,650	*1,900*
Station Road		6,500	3,300	*-3,200*
Somerton Gate		1,300	600	*-700*
Grantham Road north	North	15,700	11,450	*-4,250*
Grantham Road south	South	15,700	15,550	*-150*
NHRR	Brant Road to Grantham Road		26,200	*26,200*
Sleaford Road north	North	12,300	7,750	*-4,550*
Sleaford Road south	South	14,250	14,050	*-200*
NHRR	Grantham Road to Sleaford Road		24,700	*24,700*
LEB		14,700	25,450	*10,750*
Tower Lane		5,500	2,850	*-2,650*
Heath Lane		3,650	1,550	*-2,100*

124 This confirms that the current traffic conditions are both captured in the latest model and also that the forecasts are consistent with those presented previously, particularly in respect of the projected use of NHRR.

125 At OBC the Scheme provided a high value for money with a benefit to cost ratio of 2.6, and although work is still being undertaken, the 2023 model forecasts suggest that the Scheme remains a high value for money scheme.

126 In summary, the 2023 traffic model, which was one of the first to be updated nationally following the Covid pandemic, provides further confidence that the NHRR scheme and its associated effects are captured in both Scheme appraisal and in design.