

- 1. The Lincolnshire County Council (A15 Lincoln Eastern Bypass)
(Classified Road) (Side Roads) Order 2014**
- 2. The Lincolnshire County Council (A15 Lincoln Eastern Bypass)
Compulsory Purchase Order 2014**
- 3. Application In Relation To Proposed Compulsory Purchase Of
Land Held By The Canal & River Trust**

Department for Transport Reference: NATTRAN/EM/LAO/0084

Response to Objector's Rebuttal of Mr Smith's Proof of Evidence

Mr P Moore

Response from Lincolnshire County Council Mr Moore's Rebuttal of Mr Smith's Proof of Evidence

1 General Traffic Modelling

1.1 Mr Moore's Comments

1.1.1 Mr Moore does not dispute the wider applicability of the GLTM and assessment of the LEB however he has reservations over local detail for junction analysis.

1.2 LCC Response

1.2.1 The purpose of the LEB forecast exercise is primarily to assess the economic and operational efficiency of the scheme and secondarily to investigate the side road orders, namely the safe and reasonable alternatives.

1.2.2 As the primary role is of a strategic nature, the model was originally set up for this purpose and has been extended into the secondary role over time. Mr Moore is satisfied with the former but not the latter. However, the model has been proven as acceptable by adherence to Webtag criteria and by scrutiny from the DfT. From the outset of LCC's modelling for the LEB, the primary purpose has been to provide an understanding of the scheme at a broad level of detail and to assess the overall impact on scheme users and non-users alike. It is simply not common practice to consider close elements of local detail from the outset of the project, nor is it desirable to rebase the analysis to a localised level of detail towards the end of the process. A balance must be struck. The balance relies on a set of validation tests which are met for the base year. The current model is validated for the 2006 base year. However as an additional level of checking, LCC has introduced some survey analysis from 2015, following discovery of some anomalous data from 2006. It is important to stress that the inclusion of newer survey data into an older base model is a finely balanced approach which seeks to improve the model's predictive capability in forecast mode rather than to exactly replicate each and every traffic flow referenced as important by Mr Moore. It represents a process which is similar to a "present year validation" whereby the model is used in forecast mode to compare against a set of observations for a later forecast year. In the event that the model has mixed performance given the disparity between the survey and modelled year, and the complexities of the traffic assignment routine, there is often little benefit to be gained in readjusting the model to fit such a snapshot of flow information.

1.2.3 Modelling relies on simplification. A good model should be as simple as necessary for the purposes for which it is intended to be applied, but no simpler. The LEB model strikes this balance with broad movements accurately validated and the more peripheral elements represented at an appropriate level of detail. In this respect the LEB model approach does not differ from many other similar models which have been successfully developed and applied over the years.

2 Journey Time Data

2.1 Mr Moore's Comments

- 2.1.1 Mr Moore is not comfortable with the Hawthorn Road route subsequently passing through the Carlton Estate. He prefers the routes to start and end at a common point. Mr Moore suggests that traffic surveys were conducted on the wrong day when queuing varied from the expected norm.
- 2.1.2 Mr Moore suggests that the journey time surveys were all taken on one day when there appears to have been little queuing on Greetwell Road at its junction with Allenby Road/Outer Circle Road. Furthermore, Mr Moore suggests that, as detailed in his Proof of Evidence, queuing is highly variable on Greetwell Road and often forms queues even without the excess traffic on Greetwell Road diverted due to the delays caused by the Canwick Junction Improvement works. The highly variable and platooned nature of traffic travelling along Greetwell Road (there are few safe overtaking opportunities on this road between Bardney and Lincoln) leads to very variable queuing at its junction with Allenby Road/Outer Circle Road and causes significant journey time variability which must be factored into the stated journey times. Kennel Lane also exhibits similar delay variability.

2.2 LCC Response

- 2.2.1 In Dr Billington's proof of evidence, it is stated "*In order to provide an indicative assessment of, what in reality would be a multitude of individual trips with a variety of origins and destinations, representative start and end points for three sample routes have been identified. Distances and journey time data between a location at the centre of the area of interest and junctions on Outer Circle Road have been surveyed. The three routes considered have one common end point at the eastern end, but different end points on Outer Circle Road. This is because Outer Circle Road provides a number of destinations in its own right but also affords access to many destinations within the city, which can be reached via a number of onward routes.*" It is also made clear that "*it is recognised that each individual trip on any given day will have a specific origin and destination and will follow its own specific route. It would be impossible to map all of these for every trip originating in the Cherry Willingham, Reepham and Carlton estate areas and so the routes identified should only be considered as being representative of the wider range of movements*"
- 2.2.2 It is clear that the routes and end points chosen are representative of the large variety of journeys that could be made to and from Cherry Willingham and Reepham and are not intended to be definitive in any way. Other start and end points could have been chosen which lengthen or shorten the alternatives, but the conclusion regarding the relative distances and times would remain the same.
- 2.2.3 In deciding which routes to compare, the County Council has taken account of a variety of journey purposes and issues raised in previous discussions and also the need to consider both east and west bound travel. The Hawthorn Road/Carlton Boulevard route was identified as the most direct route between the villages and Outer Circle Road and hence the most advantageous for objectors wishing to promote maintaining the Hawthorn Road over bridge. This route had previously been identified by objectors as important for driving from Carlton Estate to the schools in Cherry Willingham and Reepham and, indeed, this route is identified by Mrs Lidbury as "*the most convenient route for Carlton Estate residents travelling to Cherry Willingham and Reepham*"

2.2.4 It is agreed, and indeed, made clear in Dr Billington's proof, that the three routes considered do not have a common end point at the western end. This is because Outer Circle Road provides a number of destinations in its own right but also affords access to many destinations within the city, which can be reached via a number of onward routes. It would be possible to artificially fix a common end point but as the traffic on the routes will have a variety of destinations, and these will vary on a daily basis, the County Council does not accept that not having a common end point renders the conclusions invalid. As concluded in Dr Billington's proof of evidence, *"the distances and times shown above are only representative and individuals' journeys will vary considerably. However, I conclude that currently, there are reasonably convenient alternative routes which allow movements to be made between Cherry Willingham and Reepham and Outer Circle Road, and then onward to many destinations in and around Lincoln, without incurring excessive additional distances or time."*

2.2.5 The journey times for the alternative routes referred to in Dr Bilington's Proof of Evidence were obtained from survey data collected by a reputable data collection company over all time periods on a typical weekday. This information also includes both east and west bound travel. The times include delays recorded at all of the junctions providing access to Outer Circle Road. The County Council accepts the point made by Mr Moore that *"queuing is highly variable on Greetwell Road"* but this statement only applies to the west bound direction in the AM peak. Taking all of the information into account, the Council maintains that the analysis of the representative routes demonstrates that *"currently, there are reasonably convenient alternative routes which allow movements to be made between Cherry Willingham and Reepham and Outer Circle Road, and then onward to many destinations in and around Lincoln, without incurring excessive additional distances or time"*.

3 Development Data

3.1 Mr Moore's Comments

3.1.1 Mr Moore states that Cherry Willingham may receive 900 new homes within 5 years. Other sites in the vicinity have capacity for 550 homes accessing Hawthorn Road. Severing Hawthorn Road is short sighted and would result in undue pressure on the highway network. Other developments in peripheral villages further away have not been explicitly included.

3.2 LCC Response

3.2.1 Mr Moore correctly references that there is no commitment for these development sites. As part of our research into likely developments, one of the sites identified by Mr Moore is included in the development log. However, this was deemed as 'less than 50% certain' and thus being highly speculative was not included in the assessment.

3.2.2 In line with best practice, local sources of uncertainty categorised as near certain should be included in the core scenario, whilst all sources categorised as hypothetical should be excluded. Between these two categories, an element of judgement may be required, but usually it would be expected that those inputs categorised as more than likely will be included in the core scenario, whilst those

categorised as reasonably foreseeable will be excluded. In short the core scenario should include developments which are more likely than not to occur. On this count the sites in Cherry Willingham identified by Mr Moore fail this criteria. Hence they have been excluded.

- 3.2.3 There is no requirement to undertake a “high” growth alternative where specific extra developments are included. In the case of NEQ, the development is contingent on NEQ and therefore exists in the Do Something case. No such specification has been agreed for other locations.
- 3.2.4 The objective of the current exercise is not to make the traffic case for or against future potential development, however, in respect of the figures quoted and high level analysis undertaken, it is suggested that traffic constraints may exist under all do minimum, do something or objectors alternatives (1 through 6). LCC has conducted some analysis into this, however, no cross reference to these issues has been made as the guidance suggests exclusion, the issue is not critical to the Side Road Order and it may prejudice future investigation into site allocation, which is occurring via a separate process,
- 3.2.5 Background growth is included in the model to ensure that the uncertain development is not simply removed, but “generalised” in terms of location and impact, given that there are significant questions over the precise location of development in future until local plan allocations have been adopted.

4 The Sensitivity Test Model

4.1 Mr Moore’s Comments

- 4.1.1 Mr Moore suggests that flows are inaccurate not just on Hawthorn Road but in other locations on alternative routes. The sensitivity test model does not address all of this and is a “dead end” model.

4.1.2 LCC Response

- 4.1.3 We refer back to the response related to item 1 of Paul Moore’s further comments. Mr Moore continually refers to “poor validation”. The validation of the model is acceptable, it is simply that Mr Moore continues to examine minute elements of detail rather than the broader picture. Not every site represents a validation opportunity. Mr Moore is confusing the close level of detail of junction modelling where assignment is normally static and only queues and delays are dynamic. In the case of the LEB model it is important to maintain a dynamic assignment model whereby base trips are projected forward predicated on spatially differentiated background economic growth and addition of specific land use allocations. The value of the model lies in its ability to reconcile demand (trip) and supply (network availability) over a wide area for both base and future, using the interaction between capacity and demand to allocate traffic. In refining the model, LCC has sought to disaggregate the traffic demand data to smaller areas of consideration (zones) and to review and refine the network where beneficial. This has been undertaken to maintain consistency with the original 2006 trip survey data, wherever possible. It is the correct approach to follow and is at odds of Mr Moore’s preferred approach of including later data into an earlier model and

making arbitrary comparisons across different years to reach inappropriate conclusions.

- 4.1.4 Mr Moore's Table 1 demonstrates a number of flow differences for links and turns. The actual criteria is $GEH < 5$ and, importantly, for flows < 700 vehicles, volumes should be within 100 vehicles. This takes account of the fact that there is less certainty surrounding smaller traffic volumes. Under these criteria, two of the three statistics presented are acceptable. Webtag suggests "*the acceptability guideline should be applied to link flows but may be difficult to achieve for turning movements*". Irrespective of this, the locations referenced are not validation sites and should not be judged in this manner anyway.
- 4.1.5 Mr Moore refers to the sensitivity test as a dead end model. This is far from the case. The sensitivity test model is used to test all critical conclusions, from the economic performance of the scheme through to the detailed operational assessment of junctions. All junctions have been evaluated for both scenarios and the conclusions have been found to be consistent. This provides reassurance that the Sensitivity Test traffic distribution is immaterial to the overall conclusions being reached.

5 Junction Strategy for the LEB

5.1 Mr Moore's Comments

- 5.1.1 Mr Moore questions the manual intercept corrections on the Wragby Road LEB roundabout. He questions a static flow between 2018 and 2033 and suggests a mismatch between strategic and junction model capacities. Mr Moore uses the poor performance of the Hawthorn Road LILLO to question the robustness of Hawthorn Road flows and capacity for additional development.

5.1.2 LCC Response

- 5.1.3 As a default, ARCADY assumes equal lane usage across all entry arms and calculates the intercepts accordingly. Manual intercept correction factors have been applied to relevant arms where unequal lane usage is forecast to occur. This is standard practice and is in accordance with the *paper 'ARCADY Health Warning: Account for Unequal Lane Usage or Risk Damaging the Public Purse'*.
- 5.1.4 With regard to the same entry flow occurring at the Wragby Road East approach in the 2018 and 2033 models, the static flow has been checked and found to be correct. The interpretation of the reasoning is not accepted. It may be so if "actual" flows are used and flow metered by upstream junctions but in this case, for design purposes, "demand" flows have been used. The growth within the matrix has been reviewed and found to be appropriate. The growth in traffic across a screenline for traffic entering the localised area from the east of Lincoln has also been found to be appropriate. An occurrence of the same flow is purely coincidental and is based on the complexities of a traffic assignment across a wide area.
- 5.1.5 Through the Sensitivity Test, LCC has taken the time and effort to adjust Hawthorn Road flow downwards, in line with evidence from a range of counts, including 2015 surveys, compared to the higher values used in the 2006 model calibration. These flows are now sufficiently close and suggest no "error" by WebTAG standards. With

Hawthorn Road severed, all traffic needs to route via LEB, Wragby Road or Greetwell Road. The fact that the RFC operates at 0.808 suggests the slip does work, but that there may not be much additional capacity to cater for additional development in Cherry Willingham and Reepham. This would need to be fully reviewed during site allocation analyses and development specific transport assessments.

6 Local Traffic and Junction Issues

6.1 Mr Moore's Comments

6.1.1 Mr Moore focuses on relief to the network west of LEB with respect to accurate traffic flows and appropriate junction modelling. He refers to the core model flows along Hawthorn Road.

6.2 LCC Response

6.2.1 Mr Moore again fails to make use of the Sensitivity Test flows, which are significantly lower along Hawthorn Road, to support his analysis. His questioning of the access and egress direction for Carlton Estate traffic fails to accept that not all traffic wishes to travel north. For traffic travelling south, the Outer Circle Road is preferable, for traffic travelling west, the usage is split between Outer Circle Road and Wragby Road. Again the flows reference the core model rather than the Sensitivity Test. The opening of the LEB will result in a modest diversion away from the Carlton Estate.

Hawthorn Road / Bunkers Hill

6.2.2 For completeness an additional test has been undertaken which assesses the impact of the Sensitivity Test matrices on the alternative scheme networks, thus with the lower flows on Hawthorn Road westbound. The resulting flows were used to undertake additional junction modelling at the Bunkers Hill / Hawthorn Road junction. The results are presented in Table 1 below.

Table 1 – Additional Bunkers Hill / Hawthorn Road Junction Performance

Movement	AM		PM	
	Max RFC	Max Queue	Max RFC	Max Queue
2033 Do-Something Alternative Option 1 Sensitivity Test				
Hawthorn Road Left Turn	1.218	32	0.295	0
Hawthorn Road Right Turn	1.206	38	0.350	1
Bunkers Hill Right Turn	0.245	0	0.669	2
2033 Do-Something Alternative Option 2 Sensitivity Test				
Hawthorn Road Left Turn	0.675	2	0.162	0
Hawthorn Road Right Turn	0.775	3	0.282	0
Bunkers Hill Right Turn	0.202	0	0.867	7

- 6.2.3 The above results indicate that the junction would still operate above capacity with the Alternative Option 1 scheme. The junction is forecast to be slightly above practical capacity in the PM peak of the Alternative Option 2 scenario.
- 6.2.4 The option of adding an additional turn lane here is noted. It would not be possible to improve current layout without considerable utility diversion costs. The layout would resolve any over-capacity associated with the left turn out of Hawthorn Road, although the RFC for this movement in the Alternative 1 is in excess of 0.8 by 2033, suggesting that any further development or flow disturbance could jeopardise the operational performance. However the layout would still not resolve the right turn, for which RFC rises to 1.258 under the Alternative Option 1 (with this assuming an infinite length of parallel left and right turn queue lane on Hawthorn Road – clearly an overly optimistic assumption). Under the preferred scheme this does not occur as the Hawthorn Road through-traffic is redistributed across the network.
- 6.2.5 On further consideration of improvements at this junction, the AADT flows on the major and minor arms range from 14,500 and 8,000 respectively in DM through to 10,500 and 4,800 in DS. The flows associated with the Alternative Option 1 are similar to DM as relatively less relief is afforded by the forecast scheme. These flows suggest (according to TD42/95) that under the circumstances the most appropriate junction types would be either a roundabout or a signalised junction. A roundabout would be costly and was looked at last year but removed from consideration. In any case roundabouts do not generally provide efficient solutions where flows are not reasonably balanced. The only effective treatment at this location, given the imbalance in flows by arm, would be conversion to a signalised junction.

Wragby Road / Outer Circle Road

- 6.2.6 Contrary to Mr Moore's opinion the flows, at this junction match survey data sufficiently well for most turns and links, although it is already stated that it is not the overriding requirement to do so whilst losing the forecast capability of the model.
- 6.2.7 The issues with the LINSIG modelling of this junction are noted, namely lane arrangements and pedestrian related matters. Updates to the modelling have been tested. Overall, this increases the capacity of the junction, however, the results are similar to those already reported. The latest results are included in the table below.
- 6.2.8 This shows that the junction is forecast to be over 'practical' capacity in Do-Min and the two alternative options. It is forecast to be within capacity within the Core Do-Something scenario, which represents the worst case in flow terms, compared to the Sensitivity Test.

Table 2 – Wragby Road / Outer Circle Road Revised Junction Performance

Movement	AM		PM	
	DoS (%)	Mean Max Queue	DoS (%)	Mean Max Queue
2015 Surveyed				
Wragby Road East	88	22	77	10
Outer Cir Road	62	10	80	14
Wragby Road West Lane 1	21	3	56	9
Wragby Road West Lane 2 + 3	80	7	81	10
Outer Cir Drive	85	9	77	9
2033 Do-Minimum				
Wragby Road East	97	28	83	12
Outer Cir Road	95	19	83	14
Wragby Road West Lane 1	20	3	56	10
Wragby Road West Lane 2 + 3	50	4	60	10
Outer Cir Drive	95	95	82	9
2033 Do-Something				
Wragby Road East	79	13	80	10
Outer Cir Road	78	13	85	15
Wragby Road West Lane 1	18	3	40	7
Wragby Road West Lane 2 + 3	43	3	51	7
Outer Cir Drive	79	8	81	9
2033 Do-Something Alternative Option 1				
Wragby Road East	91	20	89	11
Outer Cir Road	91	16	86	15
Wragby Road West Lane 1	13	2	48	9
Wragby Road West Lane 2 + 3	34	4	58	10
Outer Cir Drive	92	11	86	9
2033 Do-Something Alternative Option 2				
Wragby Road East	91	20	87	9
Outer Cir Road	90	15	90	14
Wragby Road West Lane 1	16	3	54	10
Wragby Road West Lane 2 + 3	35	3	58	10
Outer Cir Drive	92	11	91	10

6.2.9 The suggestions provided by Mr Moore provide a valuable increase in the capacity of the junction but do not serve to change the outcome of the analysis.

7 Conclusions

- 7.1.1 Again, Mr Moore concentrates on detailed points of analysis which are well suited to traffic impact assessment for Transport Assessments but are largely unsuitable and not applicable for highway assignment modelling where forecast responsiveness is of equal importance to modelled flow accuracy. This is not to say that flow and delay accuracy is not important, but that the emphasis placed on this must be proportionate. In all cases the model presented is compliant with the DfT guidance on models used to forecast highway schemes. Beyond these formalised validation points, the model still performs well, and the sensitivity model better still.
- 7.1.2 Some areas of detailed junction evaluation have been critiqued by Mr Moore, with justification for the LCC approach provided where necessary. In some cases an alternative approach has been investigated based on commentary made by Mr Moore. Irrespective of this, the conclusions remain as per the original assessment.