TRANSPORT AND WORKS ACT 1992

TRANSPORT AND WORKS (INQUIRIES PROCEDURE) RULES 2004

THE NETWORK RAIL (CAMBRIDGE RE-SIGNALLING) ORDER

PROOF OF EVIDENCE – TRAFFIC MODELLING

STATEMENT OF NICOLAS CONTENTIN

15 March 2023

1. INTRODUCTION

1.1 My name is Nicolas Contentin. I am a Director of Modelling Group, appointed on behalf of Network Rail in partnership with Tracsis Traffic Data Ltd, to analyse the traffic and congestion implications of upgrading 7 level crossings, as part of the Cambridge Re-Signalling Project.

1.2 I have over 20 years' experience working on a wide range of projects in the public and private sectors. These projects include modelling schemes for town centre regeneration, public transport improvement, providing modelling support for residential and commercial schemes, as well as for the energy sector.

2. INVOLVEMENT WITH THE PROJECT AND STRUCTURE OF THIS STATEMENT

2.1 I was appointed by Network Rail on the 7th of May 2021 and my involvement with the Project consisted of assessing the traffic impacts of the proposed level crossing upgrades on the local communities and the wider transport network.

2.2 The Project is described in detail in Ms Heria's evidence. My evidence covers traffic modelling matters in relation to the Project and addresses the matters raised at 3(b) of the Secretary of State's Statement of Matters dated 9 March 2023 (**Statement of Matters**): *"the impacts of the changes on crossing users including motorised vehicles, pedestrians, cyclists and other non-motorised users."*

3. TRAFFIC MODELLING UNDERTAKEN FOR THE PROJECT

3.1 Modelling Group, in partnership with Tracsis Traffic Data Ltd, have been appointed by Network Rail to analyse traffic and congestion implications of upgrading 7 level crossings to MCB-OD[1] / MCB-CCTV[2], with a view to understanding the impacts the proposed upgrades will have on the local communities.

3.2 In this scenario, traffic modelling is the assessment of the vehicular capacity and traffic flows of the existing level crossings to determine the impacts of the proposed upgrades on traffic movements. The traffic modelling is undertaken using sophisticated software (as described in detail below) and provides an accurate prediction of the impact of a change in traffic patterns and volumes.

3.3 Modelling Group has assessed the proposed upgrades using PTV VISSIM 2021 to assess the impacts of the proposal on queue lengths, delays and journey times. VISSIM is a microsimulation modelling tool that is used to assess the complex interaction of vehicles with the road network. The model coded within the software is a simulated digital twin of the real-

[1] Manually controlled barriers monitored by obstacle detection.
[2] Manually controlled level crossing monitored by CCTV

world road network and uses observed traffic flows and behaviours to replicate (and therefore simulate) what is happening in the real world. VISSIM can model a variety of parameters, such as speed limit, traffic signals and "give way" and "stop" signs. VISSIM is a market leading multimodal traffic simulation software, used worldwide, which digitally reproduces the traffic patterns of the road users. It is commonly used in the industry by traffic planners and highway engineers.

3.4 Models for each of the seven level crossings listed below have been developed:

- Milton Fen, Fen Road, CB24 6AF. Ordinance Survey grid reference TL 484 623.
- Waterbeach, Clayhithe Road, CB25 9HS. Ordinance Survey grid reference TL 500 649
- Dimmocks Cote, Newmarket Road, CB6 3LJ. Ordinance Survey grid reference TL 526 730
- Croxton, A1075, IP24 2RQ. Ordinance Survey grid reference TL 902 867
- Six Mile Bottom, London Road, CB8 0UJ, Ordinance Survey grid reference TL 576 567
- Dullingham, Station Road, CB8 9UT. Ordinance Survey grid reference TL 618 585
- Meldreth, Meldreth Road, SG8 6XA. Ordinance Survey grid reference TL 388 477

3.5 The models have been developed to meet the following VISSIM modelling guidelines:

- DfT's TAG Unit 3.1 Guidelines – Highway Assignment Modelling **[NC1]**; and
- TfL, Traffic Modelling Guidelines – TfL Traffic Manager and Network Performance Best Practice, Version 4.0 **[NC2]**.

3.6 Two scenarios were developed at each level crossing to test the impact of the proposed level crossings upgrades.

3.7 A 'Do Nothing' scenario was developed to test the impact of the Project in the opening year (2023 or 2024 depending on the level crossing location). This scenario includes a growth factor to take into account future growth on the road network, as well as a COVID-19 Factor (to factor up the flows, as a result of any reduction in traffic due to the pandemic). The growth factor was extracted from TEMPRO version 7.2b (which is an industry standard programme for obtaining growth forecast figures). This method is considered to be the most robust and allows for a worst-case assessment of the road network at each level crossing location.

3.8 Additional train movements were also added onto the railway, to allow for planned future rail service expansion in line with Network Rail's growth plans. The existing barrier downtimes were used in this scenario, as observed at the individual level crossings (and on the assumption that the existing level crossings will remain as they are).

3.9 A second scenario called 'Do-Something' was developed to model the impact of the proposed upgrades of the level crossings and the subsequent extended barrier downtime. This scenario includes longer barrier downtimes at each level crossing, based on timings derived and agreed with Network Rail.

3.10 The results of the modelling are summarised in the table below and described in detail in this Proof of Evidence.

Level Crossing	Increase in Level Crossing Use (Trains)	Traffic Flow (Veh.) – AM Peak	Traffic Flow (Veh.) – PM Peak	Ped Flow (Veh.) – AM Peak	Ped Flow (Veh.) – PM Peak	Max Queue Length Increase (m)	Max Journey Time Increase (s)	Max Average Delay (s)
Milton Fen	+1	16	14	221	10	6	46	31
Waterbeach	+2	605	480	43	26	525	53	21
Dimmocks Cote	+4	403	369	0	0	244	116	103
Croxton	+2	522	481	0	0	80	20	18
Six Mile Bottom	+1	1109	1060	3	0	322	12	13
Dullingham	+1	53	40	4	0	-2	-18	-17
Meldreth	+2	110	114	4	0	52	65	27

4. TRAFFIC MODELLING AT EACH LEVEL CROSSING

Milton Fen Level Crossing

Existing Position

4.1 Traffic data for Milton Fen Level Crossings was collected on Tuesday 6th of July 2021 and includes a total of 16 and 14 two-way flows (vehicles/hr) observed in the AM and PM peaks respectively, along with 21 and 10 two-way pedestrian flows for the AM and PM peaks respectively.

4.2 It was observed that the barrier came down 6 times during the AM peak and 7 times during the PM peak, with an average barrier downtime of 40s and 38s respectively.

Post-Project Position

4.3 The analysis undertaken at Milton Fen Level Crossings concluded that the proposed upgrade will have a minimal impact on the performance of the local network and will not cause any significant issues for road users. We anticipate a maximum increase in queuing of 6 metres during the PM peak, which is the equivalent of 1 vehicle (using the Passenger Car Unit (PCU) equivalent distance of 5.75m as defined in the “LinSig user guide version 3” page 262 **[NC3]**).

4.4 It is acknowledged that the barrier downtime will increase by an average of 165s in the AM peak and 167s in the PM peak period, and by a maximum of 282s and 276s during those peak periods.

4.5 A maximum of 21 pedestrians were observed using this crossing during the AM peak and the increased barrier downtime may impact pedestrian waiting times, if arriving when the barrier is down.

Waterbeach Level Crossing

Existing Position

4.6 Various traffic flow datasets have been captured at the Waterbeach Level Crossing. This includes data captured in 2018, 2021 and 2022. The data captured in 2021 showed high traffic flows through Waterbeach due to roadworks on the A10 near the A14 interchange, which encouraged drivers to divert through Waterbeach. This dataset was considered to be non-representative of a neutral weekday (which is needed to model the typical network conditions (as stated in TAG Unit M1.2, Paragraph 3.3.6 **[NC4]**)). Therefore, following discussions with Network Rail and Cambridgeshire County Council, it was agreed that the model would be developed using the 2022 data and a sensitivity test would be created with the 2018 data, making sure that the assessment is more accurate, as it is based on both the pre-pandemic data, as well as the post-pandemic data.

4.7 Both of the Do-Something options (2022 and 2018 flows) included the proposed relocation of the Waterbeach train station (approved by the local planning authority in 2018), which is linked to the outline planning application for Waterbeach New Town (approved in outline in January 2021) and its car park, which will reduce the number of trips across the level crossing (as stated in the WSP 'Waterbeach new town east, Full Planning Application: Station, Transport Assessment & Framework Travel Plan, dated: February 2018 - Section 6.3.1 Page 23 **[NC2]**).

4.8 A growth factor, derived from TEMPRO (DfT's Trip End Model Presentation Programme), was applied to the baseline traffic to take into account any committed development (the Waterbeach development, for example).

4.9 From the traffic data captured on Tuesday 29th March 2022, a total of 330 two way (vehicles per hour) were observed during the AM peak and 333 two-way flows were observed during the PM peak along with 43 and 26 two-way pedestrian flows for the AM and PM peaks respectively.

4.10 It was observed that the barrier came down 8 times during the AM peak period and 8 times during the PM peak period, with an average barrier downtime of 56s and 52s respectively.

Post-Project Position

4.11 The analysis undertaken (in relation to the AM peak only) concluded that the impact of the proposed upgrade of Waterbeach level crossing will have a significant impact if the 2018 data is considered, with queues reaching a maximum of 562m in the eastbound direction for approximately 30 minutes before it recovers. However, the post pandemic situation shows an acceptable level of queuing in the eastbound direction when the more recent (2022) data is used, with a maximum increase of 172m. In practice, we are not in a position to exactly predict any future traffic flows and whether they are likely to resume back to the 2018 level or remain at the 2022 level. This is why the assessment incorporated both scenarios and provided a broader understanding of the implications of the proposed upgrade.

4.12 It is acknowledged that the barrier downtime will increase by an average of 124s and 128s in the AM and PM peak periods respectively, and by a maximum of 231s and 113s.

4.13 It is further acknowledged that the waiting time for pedestrians wanting to cross the level crossing will increase, in accordance with the proposed barrier downtime. A maximum of 43 pedestrians were observed wanting to cross the level crossing. However, in the long term, it is anticipated that the train station will be relocated, and the delays experienced by pedestrians will be mitigated following the installation of a pedestrian footbridge across the line, which will in turn reduce the usage of the existing level crossing.

Dimmocks Cote Level Crossing

Existing Position

4.14 Traffic data was collected on Tuesday 6th July 2021 and includes a total of 403 and 369 two-way flows (vehicles/hr) in the AM and PM peaks. No pedestrians were observed using this crossing during the AM and PM peaks.

4.15 It was observed that the barrier came down 8 times during the AM peak and 7 times during the PM peak, with an average barrier downtime of 38s and 43s respectively.

Post Project Position

4.16 The analysis undertaken concluded that the proposed upgrade of Dimmock Cote level crossing will have a significant impact on the level of queuing at the level crossing. We anticipate a maximum increase in queuing of 216 metres (approximately 37 vehicles) in the eastbound direction and 244 metres (42 vehicles) in the westbound direction during the AM peak periods – However, the modelling also demonstrates that the queues will clear when the barrier goes up. Impacts are also likely to be limited to this location, as there are no other feasible alternative routes for drivers to take. Drivers are therefore likely to sit in the queue and wait for the barriers to open to proceed.

4.17 No pedestrians were observed crossing this level crossing; hence the upgrade will not have an impact on pedestrian performance.

4.18 It is acknowledged that the barrier downtime will increase by an average of 166s and 161s in the AM and PM peak periods respectively, and a maximum of 522s and 274s.

Croxton Level Crossing

Existing Position

4.19 Traffic data was collected on Tuesday 6 July 2021 and includes a total of 522 two-way flows (vehicless/hr) in the AM peak period and 481 two-way flows in the PM peak periods. No pedestrians were observed using this crossing during the AM and PM peaks.

4.20 It was observed that the barrier came down 3 times in the AM peak and 2 times during the PM peak, with an average barrier downtime of 75s and 53s respectively.

Post Project Position

4.21 The analysis undertaken concluded that the proposed upgrade of Croxton level crossing will not have a significant impact on the road network and, given the lack of alternative routes, drivers will be likely to wait in any additional queues before progressing with their journey.

4.22 We anticipate a maximum increase in queuing of 80 metres (approximately 13 vehicles) and 60 metres (10 vehicles) in the eastbound and westbound direction respectively, during the AM peak.

4.23 It is acknowledged that the barrier downtime will increase by an average of 99s and 121s in the AM and PM peak respectively, with a maximum of 65s and 116s.

4.24 No pedestrians were observed crossing this level crossing; hence the upgrade will not have an impact on pedestrian performance.

Six Mile Bottom Level Crossing

Existing Position

4.25 Traffic data was collected on Tuesday 6th July 2021 and includes a total of 1109 and 1060 two-way flows (vehicles/hr) in the AM and PM peak periods. There were 3 pedestrians observed using the crossing in the AM peak, with none observed in the PM peak.

4.26 It was observed that the barrier came down 2 times during the AM peak and 1 time during the PM peak, with an average barrier downtime of 53s and 51s respectively.

Post Project Position

4.27 The proposed upgrade of Six Mile Bottom level crossing will have a considerable impact on the surrounding road network.

4.28 We anticipate a maximum increase in queuing of 322 metres (56 vehicles) eastbound during the PM peak, while the westbound direction will increase by 147 metres (25 vehicles). Whilst these are large increases, it should be noted that this level of queuing is only likely to occur 3 times in the AM peak and twice in the PM peak (and after each occasion, the queue level drops to a minimal level).

4.29 It is acknowledged that the barrier downtime will increase by an average of 87s and 89s in the AM and PM peak respectively, with a maximum of 87s and 89s.

4.30 Three pedestrians were observed to cross the level crossing in the AM peak and the increased barrier downtime may impact the waiting time if pedestrians arrive when the barrier is down.

Dullingham Level Crossing

Existing Position

4.31 Traffic data was collected on Tuesday 6th July 2021 and includes a total of 53 and 40 two-way flows (vehicles/hr) in the AM and PM peak periods. There were 4 pedestrians observed using the crossing in the AM peak, with none observed in the PM peak.

4.32 It was observed that the barrier came down 1 time during the AM peak and 2 times during the PM peak, with an average barrier downtime of 249s and 281s respectively.

Post Project Position

4.33 The proposed upgrade of Dullingham level crossing will have a modest improvement to the network in this location. This is largely due to the slight reduction in the time the barriers are down (81s in the AM peak and 113s in the PM peak), attributed to the automation of the crossing.

4.34 A maximum of 4 pedestrians have been observed to cross this level crossing in the AM peak and the reduction in barrier downtime with the level crossing upgrade will benefit pedestrian waiting times if they arrive when the crossing is down.

Meldreth Level Crossing

Existing Position

4.35 Traffic data was captured on Tuesday 6[t] July 2021 and includes a total of 110 and 114 two-way flows (vehicles/hr) in the AM and PM peak periods. There were 4 pedestrians observed using the crossing in the AM peak, with none observed in the PM peak.

4.36 It was observed that the barrier came down 10 times during the AM peak and 9 times during the PM peak, with an average barrier downtime of 62s and 62s respectively.

Post Project Position

4.37 The analysis undertaken concluded that the proposed upgrade of Meldreth level crossing will have no significant impacts on the road network. There are modest increases in the journey times for vehicles travelling westbound and there are some minor increases in queues in both directions.

4.38 We anticipate a maximum increase in queuing of 52 metres (10 vehicles) eastbound during the AM peak, while the westbound direction will increase by 39 metres (7 vehicles) during the PM peak.

4.39 It is acknowledged that the barrier downtime will increase by an average of 107s in both the AM and PM peak respectively, with a maximum of 428s and 302s.

4.40 A maximum of 4 pedestrians were observed using this crossing during the AM peak and the increased barrier downtime may impact the waiting time if pedestrians arrive when the barrier is down.

4.41 We anticipate a maximum of 59 and 79 vehicles to travel through both crossings respectively during the AM and PM peak (based on analysis of the recent traffic flow data collected). A proportion of these drivers may decide to divert through the A10 via Frog End or Fowlmere Road if they decide that the delay at the Meldreth Level Crossing is unacceptable as these routes are comparable length.

5. RESPONSE TO OBJECTIONS

5.1 In this section I summarise and respond to objections lodged in relation to the Order, so far as those objections relate to the traffic modelling undertaken in relation to the Project and other matters within my expertise.

5.2 Generally, a number of objections raise an issue in relation to the proposed upgrade of Meldreth Level Crossing from an Automatic Half Barrier Crossing to a Manually Controlled Barrier with Closed Circuit Television. Objections also raise the potential traffic impacts of the upgrade resulting from longer barrier downtimes.

5.3 Given the number of objections raised in relation to the proposed Level Crossings upgrades (in particular the proposed upgrade of Meldreth Level Crossing and Waterbeach Level Crossing) I do not, in this proof of evidence, address each objection. Instead, I concentrate on the technical points raised in the individual objections and reiterated in the third parties' Statements of Case, as further outlined below.

Statement of Case of Mr Roger James (Meldreth Parish Council)

5.4 In his Statement of Case dated 20 January 2023, Mr James states that the Project, whilst presented as an upgrade, represents a significant downgrade to the local residents and users of Meldreth Road.

5.5 Mr James questions the traffic modelling undertaken by the Modelling Group and suggests that it does not incorporate a realistic understanding of the train traffic patterns and provides definitive conclusions and categorical reassurances in reliance on averages, without acknowledging that the problem of traffic delays is a stochastic process.

5.6 This statement is not correct. The Meldreth level crossing model was not built using average values. It is based on a data collection exercise undertaken at the level crossing, which includes vehicle, pedestrian and cyclist counts every 15 minutes, as well as train counts. In accordance with the industry standard practice, any data so collected were then uploaded to the modelling software and averages of the generated results were relied upon for the reporting purposes.

5.7 Accordingly, notwithstanding Mr James' comments, the model undertaken includes all scenarios, which could in reality arise at the level crossing (including clustering of trains as a result of interaction between Meldreth and Shepreth level crossings).

5.8 To account for any stochastic processes, the Modelling Group used the VISSIM software, which allows for the daily randomness of vehicles and traffic conditions to be incorporated into the model. This is achieved via a random number generator used by VISSIM, which allows to simulate stochastic variations of vehicle arrivals in the network.

5.9 Mr James' also points out that the road traffic survey data used in the traffic modelling comes from July 2021 and April 2021 and cannot be considered representative as it was collected during the national pandemic.

5.10 It is acknowledged that the model does rely on the data captured during the pandemic. However, it is noted that at the time, no lockdown was in place. In any case, a COVID readjustment factor has been calculated using historical data and applied to Dimmocks Cote, Croxton, Six Mile Bottom, Dullingham and Meldreth. This readjustment factor was not applied to Milton Fen because the values captured in 2021 were higher than the historical data captured in 2018. This readjustment factor was not applied to Waterbeach either because the model relied on the 2018 data (pre-pandemic) and 2022 data (post-pandemic) ,i.e. the COVID readjustment factor was not relevant in this particular case. Furthermore, all models incorporate observed data, as well as future predicted increases in train movements, provided by Network Rail.

5.11 Mr James' Statement of Case also mentions the adjacent Shepreth Station Crossing, which has been recently upgraded, claiming that the upgrade led to delays of up to 20 minutes being reported on regular basis.

5.12 The Modelling Group has undertaken a review of the barrier downtime at the Shepreth Crossing over a period of 6 months. The review took place between 1 September 2022 and 28 February 2023 and the results (as set out in the table below) clearly set out that the upgraded barrier was down for a period of more than 10 minutes only in 91 instances (out of a total 20,730 instances), which represents 0.44% of the overall downtime and confirms that the significant delays mentioned in Mr James' Statement of Case do not in fact occur on a regular basis.

5.13

	AM Peak			PM Peak			All Day		
Time	# Occurance	% occurance	Cum %	# Occurance	% occurance	Cum %	# Occurance	% occurance	Cum %
1-2min	29	2.57%	2.57%	39	3.34%	3.34%	634	3.06%	3.06%
2-3min	537	47.61%	50.18%	525	44.91%	48.25%	9866	47.59%	50.65%
3-4min	283	25.09%	75.27%	291	24.89%	73.14%	4928	23.77%	74.42%
4-5min	156	13.83%	89.10%	173	14.80%	87.94%	3008	14.51%	88.93%
5-6min	84	7.45%	96.54%	92	7.87%	95.81%	1492	7.20%	96.13%
6-7min	25	2.22%	98.76%	24	2.05%	97.86%	475	2.29%	98.42%
7-8min	9	0.80%	99.56%	12	1.03%	98.89%	168	0.81%	99.23%
8-9min	2	0.18%	99.73%	3	0.26%	99.14%	68	0.33%	99.56%
9-10min	2	0.18%	99.91%	4	0.34%	99.49%	48	0.23%	99.79%
10-11min	0	0.00%	99.91%	4	0.34%	99.83%	12	0.06%	99.85%
11-12min	1	0.09%	100.00%	1	0.09%	99.91%	9	0.04%	99.89%
12-13min	0	0.00%	100.00%	1	0.09%	100.00%	7	0.03%	99.92%
13-14min	0	0.00%	100.00%	0	0.00%	100.00%	3	0.01%	99.94%
14-15min	0	0.00%	100.00%	0	0.00%	100.00%	5	0.02%	99.96%
15-16min	0	0.00%	100.00%	0	0.00%	100.00%	2	0.01%	99.97%
16-17min	0	0.00%	100.00%	0	0.00%	100.00%	2	0.01%	99.98%
17-18min	0	0.00%	100.00%	0	0.00%	100.00%	0	0.00%	99.98%
18-19min	0	0.00%	100.00%	0	0.00%	100.00%	0	0.00%	99.98%
19-20min	0	0.00%	100.00%	0	0.00%	100.00%	0	0.00%	99.98%
20-21min	0	0.00%	100.00%	0	0.00%	100.00%	1	0.00%	99.99%
21-22min	0	0.00%	100.00%	0	0.00%	100.00%	0	0.00%	99.99%
22-23min	0	0.00%	100.00%	0	0.00%	100.00%	1	0.00%	99.99%
23-24min	0	0.00%	100.00%	0	0.00%	100.00%	0	0.00%	99.99%
24-25min	0	0.00%	100.00%	0	0.00%	100.00%	1	0.00%	100.00%
25-26min	0	0.00%	100.00%	0	0.00%	100.00%	0	0.00%	100.00%
26-27min	0	0.00%	100.00%	0	0.00%	100.00%	0	0.00%	100.00%
27-28min	0	0.00%	100.00%	0	0.00%	100.00%	0	0.00%	100.00%
28-29min	0	0.00%	100.00%	0	0.00%	100.00%	0	0.00%	100.00%
29-30min	0	0.00%	100.00%	0	0.00%	100.00%	0	0.00%	100.00%
30min +	0	0.00%	100.00%	0	0.00%	100.00%	1	0.00%	100.00%
Total	1128	100.00%		1169	100.00%		20731	100.00%	

Statement of Case of Shepreth Parish Council

5.14 The Statement of Case submitted on behalf of Shepreth Parish Council in relation to the proposed Meldreth Level Crossing upgrade provides that a single four-hour study undertaken by the Modelling Group is "woefully inadequate" and the estimated barrier downtime, which underpins the overall conclusion, is flawed and contradictory. The overall conclusion of the Statement of Case is that the maximum incremental delay of 65 seconds quoted in the Performance Report – Level Crossing Study is severely understated and should be 184 seconds, which is not minimal.

5.15 As described in detail in paragraph 3, as well as in paragraphs 5.6 to 5.10 above, the Modelling Group has undertaken a detailed analysis of the existing situation at each level crossing and assessed impacts of the proposed upgrades. The Modelling Group has extensive experience of undertaking traffic modelling and interpreting the results; the industry standard software has been used to support the modelling exercise and accounts for any stochastic processes. I, therefore, do not agree that the modelling undertaken in relation to the Project is in any way flawed or inaccurate.

5.16 The 65 seconds quoted in paragraph 5.14 is not a maximum value but an average value over a period of an hour. The model is clear that a maximum delay can be of up to 428s.

5.17 Similarly to Mr James' Statement of Case, Shepreth Parish Council's Statement of case mentions the adjacent Shepreth Level Crossing and claims that an average downtime at that crossing following the upgrade is between 208 and 409 seconds. This point is already dealt with at paragraph 5.12 above.

5.18 In addition to the above, Shepreth Parish Council's Statement of Case questions the need for the proposed upgrade (which is dealt with in Mr Prest's Proof of Evidence) and justification for the proposed depot (albeit I am advised that no depot is proposed to be constructed as part of the Project). This point is dealt with in detail in Ms Heria's Proof of Evidence).

Statement of Case of the Fen Line Users Association

5.19 The Statement of Case submitted on behalf of the Fen Line Users Association (**FLUA**) relates to the proposed upgrade of the Waterbeach level crossing and provides that the modelling undertaken in relation to the Project:

a. does not show the worst-case time the crossing will be closed; and

b. underestimates the average time a typical road user will need to wait for the crossing to open.

5.20 The FLUA's Statement of Case also:

a. raises the issue of the impact of the proposed upgrade on rail passengers, who use the crossing to access the station (suggesting that the impact on such passengers has not been considered as part of the modelling exercise undertaken in relation to the Project); and

b. states that the assumption (adopted for the purpose of the modelling exercise) that Waterbeach station will be closed to passengers by the time the crossing is converted is incorrect; instead FLUA argues that the upgraded level crossing will remain open for at least two and a half years from the planned closure date

5.21 I note that main purpose of the modelling undertaken in relation to the Project was to assess the likely transport implications arising from the proposed upgrade of the Waterbeach Level Crossing. The detailed modelling of rail passenger movements to and from the station was not incorporated into the modelling exercise.

5.22 Furthermore, whilst it is acknowledged that there will be a period of time where the new upgraded level crossing will have a significant impact on passengers, such an impact will be temporary only given that the new station will be built and open for use in due course.

5.23 The FLUA's Statement of Case also raises a number of technical issues, including, for example, whether it is appropriate to use the median of the data to establish a "fair estimate of the average. I have provided my comments below but am not proposing to cover these technical points in detail. I reiterate that the Modelling Group has undertaken its modelling in the industry standard way and in accordance with the usual practice and the applicable guidelines issued by the Department for Transport and the Transport for London and I do not consider its results to be in any way flawed or inaccurate.

5.24 In relation to the FLUA's comment that the model does not show the worst-case scenario - in line with the Department for Transport's TAG Unit 3.1 and the Transport for London Modelling Guidelines (v4), the traffic models have been developed using data observed at the individual level crossings to ensure that the models match the on-street conditions. This included incorporation of the existing train timetables, which allowed the model outputs to be checked and verified against the actual observed train numbers.

5.25 Whilst it is acknowledged that late running of trains does occur and timetable changes happen periodically throughout the year, any traffic modelling has to be undertaken in the way described above in order to comply with the modelling guidelines and cannot rely on any alternative data. A ‘typical' day must be modelled.

5.26 The "bespoke logic" developed to model the operation of the barriers (as mentioned in the Modelling Methodology) refers to the coding exercise undertaken via the VISSIM software (as further described above) to obtain more accurate results. As it stands, the trains arrive at the station at different (rather than fixed) intervals.

5.27 In relation to the assessment of barrier down times at the Waterbeach level crossing, timing data from the Hinxton level crossing was utilised, as it had recently been upgraded to MCB-OD. This meant that Modelling Group could observe the actual downtimes of a level crossing of the same type, and subsequently use this data to inform the proposed model for the Waterbeach level crossing.

5.28 The approach required the creation of an aggregated barrier downtime value for use with the same barrier type. A methodology was agreed with Network Rail, whereby the arithmetic median (used in order to disregard the highest and lowest values due to inconsistent strike-in time at Hinxton) was first calculated. It was decided to take the difference between the absolute minimum barrier downtime and the median which is 55 seconds.

5.29 This difference of 55 seconds observed at Hinxton was then added to the minimum barrier downtime for each level crossing to calculate the updated barrier down time.

5.30 It is acknowledged that the speed of the train varies between Hinxton and Waterbeach where the nearby train station is located hence, as an additional sensitivity check, the barrier downtime at Waterbeach (180s) was compared to the Shepreth Level Crossing, where 6 months of data is available, and which has similar characteristics to the Waterbeach crossing; namely – there is a mix of trains passing through the station at speed and trains slowing down to stop at the station.

5.31 Whilst the Performance Report produced by Modelling Group to assess the barrier down times at the level crossings, does not specifically mention the maximum closure times at the Waterbeach level crossing, thesewere considered as part of our modelling work. An average of 180s and a maximum of 319s have been observed during the AM peak period (the most congested peak). 180s and 319s represent 75.27% and 96.54% respectively of the AM peak occurrences at Shepreth, and 73.14% and 95.81% respectively of the PM peak occurrences at Shepreth. Accordingly it can be concluded that the timings are representative of a similar site and the comparisons with the Shepreth crossing provided further validation of our assessments.

5.32 As to the proposed closure of the station car park and the associated impact on traffic over the crossing, we anticipate a reduction of 15 and 9 vehicles respectively during the AM and PM peak, which is minimal. The relocation of the train station will therefore benefit pedestrians more than drivers due to the introduction of a pedestrian footbridge.

5.33 The FLUA's Statement of Case also questions the traffic data used for the purposes of the Modelling, suggesting that the traffic levels are increased "especially mid-week". It further suggests that the traffic data relied upon by the Modelling Group is underestimated as "pre-lockdown" eastbound queues form in the AM and the PM peaks.

5.34 The Performance Report produced by the Modelling Group shows the comparisons of the Census data from 2018, 2021 and 2022 and clearly illustrates that the amount of traffic recorded in 2022 is lower than in 2018 (both in the AM peak and in the PM peak). However, notwithstanding that, Network Rail has worked closely with the affected highway authorities in undertaking the traffic modelling exercise and, following consultation with the Cambridgeshire County Council, has amended its traffic modelling to make sure that both the 2022 and the 2018 flow-sets are relied upon when testing the impacts of the proposed upgrades, to provide a fair assessment of the scheme. No objections have been raised by the highways authorities on this approach.

5.35 Traffic surveys were collected on neutral months and days as specified in DfT TAG guidance (Unit M1.2 – Paragraph 3.3.7) with the peak periods calculated on the basis of when there were the largest numbers of vehicles in the network (DfT TAG Unit 3.1 – Section 2.5). Whilst it is acknowledged that more survey days could have been useful, the data collection exercise (including durations) was fully agreed with Network Rail and no objections have been raised by the affected highways authorities, which were consulted throughout the traffic modelling exercise.

5.36 It is acknowledged that the queue lengths reported on do not always perfectly match the surveyed values at each level crossing. This occurs as a result of the stochastic nature of the VISSIM model (i.e. how each model run generate traffic via the random number generator). Because of the sporadic nature of the queue and the effects of the stochastic input of the vehicles on the formation of queues, the more important check is that the vehicle volumes (table 3.3 and 3.4 in “220811 Level Crossing Study – LMVR Final.pdf”) and average journey times (table 3.6 and 3.7 in “220811 Level Crossing Study – LMVR Final.pdf”)) are correct, which they are. This is support by TfL's guideline on modelling, which acknowledges difficulties of measuring queue lengths on street in the same way as in a model and clearly provides that journey time validation is a more reliable indicator of congestion levels.

5.37 In any case, however, as the flows are not different for the Do-Nothing and the Do-Something scenario (the only change is to the level crossing operation), we are still in a position to understand and assess the proportional impacts of the proposed level crossing upgrade on the queue lengths.

Statement of Case of Mr Hugh Wood

5.38 Mr Hugh Wood has not submitted a formal Statement of Case. However, he did issue comments on the Statement of Case submitted by Network Rail on 25 January 2023. In his response, Mr Wood questions differences between the risk assessments undertaken by Network Rail (and in particular barrier downtimes mentioned within those risk assessments) and the traffic modelling undertaken in relation to the Project.

5.39 I note that any risk assessments undertaken by Network Rail at its level crossings are high-level assessments and are not representative of the realistic barrier down times. This is why the Modelling Group has been appointed to undertake a more detailed and accurate observance of the existing situation at each level crossing.

5.40 The Modelling Group's VISSIM modelling is a highly accurate, industry standard modelling tool utilised to assess potential road network impacts. Therefore, while useful as a starting point, any values detailed within the Network Rail risk assessments are superseded by the more accurate analysis undertaken by the Modelling Group and its results should be relied upon in assessing the traffic impacts of the proposed level crossings upgrade.

6. CONCLUSION

6.1 A model of each level crossing has been developed to the highest level using industry standard modelling guidelines.

6.2 The modelling results show that the impacts of the upgrades on Milton Fen, Croxton, Dullingham and Meldreth level crossings are minimal, with queue increase below 100m and average delays per vehicle below 60s. Although, it should be noted that these values are an average over a period of an hour and some vehicles will experience longer delays.

6.3 The impact of the upgrades on the other level crossings (Waterbeach, Dimmocks Cote and Six Mile Bottom) includes an increase in queue lengths, ranging from 244m for Dimmocks Cote and 175m (best case)/ 525m (worst case) for Waterbeach, and average delay increases of up to 103 seconds for Dimmocks Cote.

6.4 We anticipate longer barrier downtimes at all level crossings, which may generate longer waiting times in line with the maximum barrier downtime values listed in this report. This will affect the level of delay potentially experienced by both traffic and pedestrian users of these sites.

7. WITNESS DECLARATION

7.1 This proof of evidence includes all facts which I regard as being relevant to the opinions that I have expressed, and that the Inquiry's attention has been drawn to any matter which would affect the validity of that opinion.

7.2 I believe that facts I have stated in this proof of evidence are true and that the opinions expressed are correct.

7.3 I understand my duty to the Inquiry to help with the matters within my expertise and I have complied with that duty.

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Nicolas Contentin

Dated: 15 March 2023