The Secretary of State for Transport
c/o Transport Infrastructure Planning Unit
Department for Transport
Great Minster House
33 Horseferry Road
London SW1P 4DR
18 January 2023

Dear Secretary of State

**Statement of Case: Objection to Proposals for the Meldreth Road Level Crossing, Cambridge Resignalling, Relock and Recontrol Project**

Shepreth Parish Council accepts that safety must be paramount but regrets that a proposal of this importance to the village has been based on flawed, inconsistent and misleading data. It regrets an absence of direct engagement from Network Rail where many of these issues could have been addressed. It also regrets the obfuscation surrounding safety data, where the only information received (under obligation via Freedom of Information) was inaccurate. The Parish Council in consequence submitted its objections to the above proposal on 22 September 2022. This document is attached for convenience. In summary, the Parish Council's objections are as follows:

- A single four-hour study (section 8.2.1 on Page 34 of the Local Model Validation Report of 11 August, attached for convenience) is woefully inadequate. Moreover the barrier downtime estimates, which underpin the conclusion of "minimal impact on traffic" are flawed and contradictory. The maximum incremental delay of 65 seconds quoted in the Performance Report-Level Crossing Study of 14 June (also attached for convenience) is severely understated and should in fact be 184 seconds, which is not minimal.

- The Parish Council is at a loss to understand why real data relating to the relatively recent conversion of the Shepreth Station level crossing (a few seconds up the line) from half- to full-barrier does not have been considered by this proposal. This conversion has brought considerable delay and congestion to the village. The data for Shepreth level crossing shown in the Local Model Validation Report shows an average downtime of 208 seconds, with a maximum of 409 seconds. Network Rail's own data, along with daily lived experience of delay and congestion in Shepreth, thus shows that a conversion of this nature will have a far from "minimal" effect.

- The Parish Council notes that Meldreth Road level crossing is assigned a "D2" rating. There is no explanation of how this evaluation is reached and no safety history of the crossing. There appears to be no public data concerning historic incidents at Meldreth Road. The safety data obtained by residents under

Freedom of Information legislation shows 46 incidents on the level crossing since March 1997. Of these, however, 19 were attributable to other crossings in the area; 17 involved equipment failure and 4 were not relevant to the size of the barrier. Thus the safety data has been poorly and inaccurately assembled and the risks grossly overstated. It would be helpful to know whether the "D2" rating was derived from this misleading information.

- The Parish Council further notes that the proposal is close to a residential area on one side and a Site of Special Scientific Interest on the other. The reality of significantly longer queues than anticipated in the model means there will be increased pollution and deteriorating air quality. There does not appear to be an assessment of the impact of this on the surrounding environment.

- Furthermore, the Parish Council believes that there is no justification for the proposed depot and associated parking, which will destroy a sensitive visual environment. There is existing depot space at Shepreth Station (a space used prior to the Shepreth level crossing conversion as a car park. Network Rail had promised to return this to public use but then reneged and retained the space as a depot). There is also substantial depot space minutes away at Foxton.

The Parish Council is in receipt of a round robin email from Network Rail dated 23 November 2022 (attached for convenience) that purports to take local concerns into account. This letter is however silent on the impact of the proposal on the residential surroundings, notably on air quality, on the speed risk that will inevitably follow increased downtimes, and on the visual and environmental impact on the nearby Site of Special Scientific Interest. There is no attempt to justify the expropriation of land to build what is in the opinion of the Parish Council and unnecessary depot that will have a harmful effect on the visual and environmental amenity.

As regards safety, the email repeats the assertion that level crossing safety data is available for public viewing on Network Rail's website. This is not the case as the link points to a page showing the D2 categorisation and a grid reference, with no supporting data. The Parish Council notes with interest that a new survey appears to have been undertaken:

*"The Risk Assessment for Meldreth Level Crossing has recently been updated (Risk Assessment for Meldreth Road AHB Level Crossing' - Doc no. 157001-SRK-REP-ESS-000010 – 21 October 2022).*

*As part of this update a nine-day, 24-hour traffic census by continuous recording was carried out at the crossing between 18th and 26th June 2022. This is an update to the previous census carried out in April 2013, which served as the previous basis of the risk assessment.*

*During the nine-day census, a total of 70 incidents of RTL running were identified with incidents recorded on every day of the census. RTL running is categorised as a vehicle passing the lights after initiation with sufficient warning on approach. The Risk Assessment also includes ten years of Incident data up to August 2016 with 11 incidents recorded (versus an average of 18 for a crossing of this type).*

*The following recorded incidents are noteworthy at Meldreth Level Crossing:*

- *Two reported incidents of a 'near miss' with a pedestrian;*
- *One reported incident of a 'near miss' with a cyclist;*
- *One reported incident of a road vehicle obstructing the crossing; and*
- *Three reported incidents of other misuse by a road vehicle.*
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*More recent Safety Management Information System data, for one year to 13th March 2019, shows one reported incident of a road vehicle zig - zagging around the lowered barriers (16/12/2018)."*

The Parish Council regrets that yet again the level of detail is insufficient to permit a dispassionate analysis of the figures. Whilst a total of 70 RTL incidents is indeed deplorable, the Parish Council reserves judgment until it has sight of the detail, given the previous experience with Network Rail data. It notes that an RTL incident is defined as passing lights after initiation. This is presumably the amber light that precedes the lowering of the barrier. Critically, the analysis fails to separate the key data relating to the proposal, namely how many of these incidents would have realistically happened even with a full-width barrier.

The Parish Council would also seek reassurance that the 11 recorded incidents in the 10 years to August 2016 <u>exclude</u> equipment failures, as this was not the case in the previously provided information. The Parish Council is disappointed by the quality of Network Rail data, which has been shown to be deeply flawed and finds it difficult to accept the findings outlined above, given this seeming track record of obfuscatory and misleading information. The Parish Council hopes that the Inspectors will satisfy themselves as to the accuracy and integrity of all data underlying this proposal.

The Parish Council is in receipt of a Freedom of Information response dated 16 January 2023 from Network Rail to a resident, detailing near misses or incidents at Shepreth station level crossing for the period 2014-2022, ie four years either side of its conversion from half- to full-barrier. The data shows five incidents in the four years before and three in the four years following. Whilst there is no further detail, it would appear that full barriers do not eliminate risk.

As regards traffic modelling, the Parish Council notes from the table on Page 9 of the Network Rail letter of 23 November that the existing barrier downtime is **62 seconds** for peak times (both AM and PM) and this will rise to **169 seconds** should the barrier be upgraded, an **increase of 107 seconds**. We are told a few lines later that this increased downtime of 107 seconds will lead to a journey delay of only 22-28 seconds. The Parish Council struggles to accept the latter figures.

The average barrier downtime (bizarrely based on figures derived from other sites) quoted in Table 1.6 on page 12 of the Performance Report is severely overstated at 169 seconds. The actual data in the Local Model Validation Report suggests an average downtime of 50 seconds, which tallies with local observation. This difference means that the maximum incremental delay of 65 seconds as quoted in Table 9.1 on page 57 of the Performance Report is understated by 119 seconds and should on this basis be 184 seconds.

The most obvious data source appears to have been disregarded. Network Rail's own data for the neighbouring level crossing at Shepreth station following its conversion to full-width barriers shows **an average downtime of 208 seconds, with a maximum of 409 seconds**. The Parish Council finds it difficult to accept that the situation will be any different a few seconds down the line at Meldreth Road.

Furthermore, figure 8.1 on Page 51 of the Performance Report, whilst being somewhat difficult to read, suggests that if in the morning peak there is a train delay of 33 seconds, **the barriers will be down for 12 minutes**. The Parish Council would like to know whether the emergency services have been consulted on this proposal and would welcome their views.

Thus the modelling is fundamentally flawed and inaccurate. The blithe comment on Page 10 of the letter of 23 November that "the proposed upgrade will have a … 65 second delay to westbound traffic, which is not considered significant" is not only inconsistent with Network Rail's own data but is also quite simply untrue.

**Conclusion**
The Parish Council is disappointed that the quality of information underlying this important public consultation is generally poor, inconsistent and misleading. Proposed barrier downtimes have been severely underestimated. A proposal that will be detrimental to the village is relying on an unsupported playing of the safety card and a seeming unwillingness provide detailed safety information. The safety information winkled out of Network Rail is poorly compiled and misleading, which does not inspire confidence in the quality of the data quoted in the letter of 23 November.

The Parish Council will therefore wish to maintain its objections unless it can obtain reassurance from the Inspectors that i) they are satisfied as to the accuracy and integrity of the safety data and ii) that the considerable inconvenience that will be caused to the village by this proposal is indeed justified on genuine and proven safety grounds. Whatever the outcome, the Parish Council objects to the unnecessary and intrusive construction of a depot and associated parking.

The Parish Council would be open to discussions on possible mitigations that might improve the situation whilst retaining the half barriers, such as the installation of concrete islands to prevent crossovers and traffic cameras to act as a deterrent. It is not clear whether alternatives of this nature have been considered.

Nicholas Downer
Chairman, Shepreth Parish Council

The Secretary of State for Transport
c/o Transport Infrastructure Planning Unit
Department for Transport
Great Minster House
33 Horseferry Road
London SW1P 4DR
22 September 2022

Dear Secretary of State

**Objection to Proposals for the Meldreth Road Level Crossing, Cambridge Resignalling, Relock and Recontrol Project**

Shepreth Parish Council wishes to record its objection to the planned conversion of the half barriers at Meldreth Road Level Crossing to full barriers. The proposal will increase congestion in the village though substantially increased downtimes, increase the difficulty of traffic flow and the risk of speeding in one of the most densely populated parts of the village. There will also be a deterioration in air quality. In our opinion, the risks of such change outweigh the minimal safety benefits that will accrue.

Furthermore, the Parish Council is of the opinion that the data underlying the conclusion that the effects on the village will be "minimal" is seriously flawed, being either contradictory, based on averages from other areas or inaccurate. As a minimum, the Parish Council requires consistent data specific to the Meldreth Road and Shepreth crossings be collected, analysed and presented in a transparent and accessible manner before any final decision is made. Our objection is based on the following:

**1. Downtime**

A reading of a separate document "The Performance Report-Level Crossing Study" of 14 June (which appears not to figure on the list of documents submitted with the planning application) illustrates the data problem. On page 11, we read:

*"A set of absolute minimum barrier closure times for each crossing, with the exception of Meldreth where the times are proposed to be in line with the Shepreth crossing."*

Yet on page 12, we are told:

*"For the Meldreth level crossing, as no other data is available, the barrier down time has been based on the average time from all of the other level crossings."*

We are further told on page 44 of the Consultation Report of 26th July 2022:

*"Network Rail undertook Traffic and Transport modelling for each of the seven no. level crossings"*

Another separate document entitled "The Local Model Validation Report" of 11 August (which also appears not to figure on the list of documents submitted with the planning application) contains a cursory one-day study of both the Meldreth Road and Shepreth level crossings. The data derived from this study appears to have been ignored. It is doubtless coincidental that this data points to longer downtimes than forecast and thus undermines the conclusion of a "minimal" impact on traffic. The single point of clarity in this proposal is that its conclusions are based on confusing and conflicting information and there is no detailed site-specific data on which to make a proper evidence-based evaluation.

The current average downtime (based on those figures derived from other sites) quoted in Table 1.6 on page 12 of the Performance Report is 169 seconds. The actual data in the Local Model Validation Report suggests an average downtime of 50 seconds. This difference means that the maximum incremental delay of 65 seconds as quoted in Table 9.1 on page 57 of the Performance Report is severely understated and should on this basis be 184 seconds. This renders much of the modelling of traffic queues inaccurate, underlines the need for site-specific data and certainly undermines the conclusion that the impact of the proposal is "minimal".

Data for Shepreth LC shown in the Local Model Validation Report suggests an average downtime of 208 seconds, with a maximum of 409 seconds. If the assumption on page 11 is to be used, the incremental downtime would likely be 158 seconds, with a maximum of 359 seconds, which is certainly not "minimal".

The above again reinforces the need for in-depth (ie more than a single day) accurate, site-specific information for both the Meldreth Road and Shepreth crossings. The failure to do so calls into question the integrity and validity of the proposal's conclusions.

There is further contradiction in table 8.1 on Page 51 of the Performance Report, where the data suggests that a 30 second delay will trigger a downtime of 12 minutes, which again cannot be described as "minimal". This could rather pose a serious impediment for emergency services and the Parish Council requests an impact study on fire engine and ambulance routes before a decision is taken.

The Parish Council further notes on page 27 of the Consultation Report that:

*"In response to comments from the Highways Authorities (Cambridgeshire and Norfolk County Council) and Highways England, the Project has undertaken traffic surveys and modelling to assess the potential impacts of longer barrier down times at the upgraded level crossing works areas. Further engagement with these authorities has been undertaken to discuss the outcomes and findings of this modelling."*

This is curious as we are told above that data for Meldreth has not been collected. The data that has in fact been collected seems to have been discarded. We would like confirmation that the views of the various Transport Officers at District and County Council level have been sought as part of this consultation.

**2. Safety**

The Consultation Report states on page 7 that the outcomes of the All Level Crossing Risk Model are shown in Appendix A. This is indeed true in that Meldreth Road LC is assigned a "D2" rating. There is however no explanation of how this evaluation is reached and no safety history of the crossing. Furthermore, we are told on Page 42 that:

*"Information based on the findings of the ALCRM for each of the seven no. level crossing was made available on request and could be viewed via Network Rails Level Crossing Safety page on their website"*

Other than the vague and unsupported rating described above, this is simply not the case and there is no source of, for example, historic incidents at Meldreth Road. The Parish Council is however grateful to a determined resident who has, under Freedom of Information legislation, winkled out some safety data on the Meldreth Road LC from Network Rail. Somewhat inevitably, this is poorly presented, poorly compiled and misleading.

The spreadsheet provided suggests there have been 46 incidents on the level crossing since March 1997. A rather painstaking analysis gives a completely different picture, suggesting that of these 46:

19 were attributable to other crossings in the area;
17 involved equipment failure; and
4 were not relevant to the size of the barrier.

On this basis, there have been six relevant incidents since 2002. Four involved individuals on the track (of which one was recorded as a near miss), though the narrative is inexact and it might be argued that at least three (including the near miss) may not have been prevented by a full barrier. The fifth was a marginal obstruction, and the sixth was an incident of a car zigzagging the crossing in 2018.

Thus there has, in the last 25 years, been only one incident that could definitively have been prevented by a full barrier and this was not classified as a near miss. The Parish Council does not believe that this proposal can be justified on the grounds of a poor safety record at the Meldreth Road level crossing. It would be good to know whether or not the "D2" rating was derived from this inaccurate information.

**3. Road Safety**

The Meldreth Road level crossing is barely 200m from John Breay Close and the most densely populated area of Shepreth. The Parish Council does not accept the downtime modelling of the Performance Report-Level Crossing Study of 14 June for the reasons outlined above, believing these to be materially understated. We believe typical downtimes will be similar to Shepreth, where delays of up to 7 minutes are common, and a 10 minute wait is by no means unusual. This will lead to much longer queues than those forecast in the model and chaos as long lines of traffic try to negotiate a narrow residential street with many parked cars.

Furthermore, we believe that is inevitable, once drivers are aware of the new extended downtimes, that a minority will accelerate rapidly to try and beat the barrier descent and enter the residential area at high speeds. The proposal is thus designing in a severe risk that does not currently exist.

**4. Environment**

The Parish Council has no confidence in the traffic model and believes that the derived maximum queue length of 51m is woefully understated. Queues at Shepreth crossing have on occasion exceeded 300m. Yet again the absence of relevant data is potentially leading to a misinformed decision.

The Council further notes that the proposal is adjacent to a residential area on one side and a Site of Special Scientific Interest on the other. The reality of significantly longer queues than anticipated in the model means there will be increased pollution and deteriorating air quality. There does not appear to be an assessment of the impact of this on the surrounding environment. We would like to see the views of the relevant Environment Officers.

**Conclusion**

The Parish Council finds that this proposal is under-researched and misleading and that a conclusion that will have a wide-ranging impact on the village is based on flawed data barely relevant to the Meldreth Road Level Crossing. It believes that the risks occasioned by the proposal, notably those involving road safety, emergency access and air quality, far outweigh any benefits that may accrue. The Council objects in the strongest possible terms and calls for a transparent and proper analysis of site specific information for both Meldreth Road and Shepreth level crossings before any final decision is taken.

Yours sincerely

Nicholas Downer
Chairman, Shepreth Parish Council

Network Rail
One Stratford Place
Montfichet Road
London E20 1EJ

23 November 2022

Dear sir/madam

**Ref: Cambridge Resignalling, Relock and Recontrol (C3R) programme – Network Rail's response to objections received against proposed upgrade of Meldreth Road level crossing**

Network Rail are aware of the concerns raised by the residents of Meldreth and Shepreth in relation to the proposed safety upgrade at Meldreth level crossing, where a full barrier solution is being proposed to replace the existing half barrier as part of the wider Cambridge Resignalling (C3R) project.

We are writing to residents, interest groups and the Parish Council in response to their objections and representations made during the statutory objection period related to our submission of a Transport and Works Act Order (TWAO) in August 2022, to provide further information in relation to our proposals. Based on a review of these we have sought to provide further information in line with the broad themes of the objections and representations which are as follows:

- We have firstly set out the background to the project and the need for the level crossing upgrades as part of the wider C3R project;
- We have then set out the process of consultation that the project has gone through in terms of the submission of the TWAO;
- Based on the objections received with have provided a more detailed justification for the safety upgrade of the level crossing from the existing half barrier to a full barrier solution in line with Network Rails Risk Assessment of the existing level crossing;
- Commentary on the potential increased queue lengths and journey time delays that would result from a longer barrier downtime due to the safety upgrade of the level crossing has then been provided; and
- Finally we have set out the next steps in terms of further consents required and ongoing engagement and consultation with stakeholders.

**BACKGROUND TO THE CAMBRIDGE RE-SIGNALLING PROJECT**

The aim of the C3R project is the renewal of the signalling system in the Cambridge area. This is currently at the end of its life (life expired). This £194m investment will improve reliability for both passenger and freight users as well as reduced maintenance costs and a system compatible with more modern digital technologies.

The project includes the following works:

- An upgrade of the signalling control equipment at Cambridge power signal box;
- The upgrade of the signalling safety interlocking equipment with modern signalling technology;
- Decommissioning of three mechanical signal boxes and relocating control of signalling to the Cambridge power signal box;

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- Renewal of the telecommunications and power supplies to support the new systems; and
- Upgrade of seven level crossings from half barrier to full barriers to improve safety for all crossing users.

As part of this project Network Rail have identified cost benefits (combined signalling upgrade, reduced impact on train services and construction synergies) to undertaking the upgrade of the seven level crossings including Meldreth level crossing prior to the agreed renewal date as assessed in the Signalling Infrastructure Condition Assessment (SICA – i.e. the Route Asset Manager assessed date by which renewal of the crossing will be required). The SICA renewal date for Meldreth level crossing is currently the 5 March 2029.

**PUBLIC CONSULTATION UNDERTAKEN TO DATE**

A Public Consultation event was held in March 2021 (subject to ongoing Covid Restrictions at the time) to raise awareness of the project and invite feedback on the initial proposals. Our published Consultation Report explains the findings of that Public Consultation in full, along with other engagement and statutory consultations undertaken as part of the TWAO Process[1].

The March 2021 Public Consultation event was advertised in local media and through a leaflet drop in the communities surrounding the proposed level crossing upgrades. Including the consultation letters to statutory consultees, local authorities, councillors approx. 10,000 letters/leaflets were posted out. The consultation materials are still available to view at Network Rail - Citizen Space website[2].

In total the March 2021 Public Consultation received 244 contacts. The responses are summarised as follows:

- 215 no. responses were provided to the online survey;
- Responses from 29 no. individual stakeholders (5 no. stakeholders provided responses to both the online survey and via e-mail) including a variety of organisations, local stakeholder groups and the public were submitted to the project email address (CambridgeC3R@networkrail.co.uk); and
- During the consultation period, the project received 1 no. telephone call.

From the responses received, 11 % 'did not support' and 22 % 'strongly did not support' specifically the proposed level crossing safety upgrades as part of the project. Within these responses 11 % of the 'did not support' and 45 % of the 'strongly did not support' responses related specifically to the proposed Meldreth Level Crossing safety upgrade.

An information round leaflet providing updates on the project was posted to the local communities and parties in September 2022. As part of the information made available to the public we provided a set of Traffic Modelling undertaken in response to the concerns raised as part of March 2021 Public Consultation and a set of Frequently Asked Questions that are available to view from the project website[3].

In response to specific queries from the Meldreth, Shepreth and Foxton Community Rail Partnership a briefing was sent for discussion at their steering meeting in September 2022. The briefing

[1] www.networkrail.co.uk/cambridge-resignalling
[2] https://consultations.networkrail.co.uk/communications/c3r-consultation/
[3] https://www.networkrail.co.uk/running-the-railway/our-routes/anglia/improving-the-railway-in-anglia/cambridge-resignalling/

specifically setting out summary findings of traffic impacts and the TWAO Process – see Attachment A.

**TRANSPORT AND WORKS ACT ORDER APPLICATION OBJECTION PERIOD**

Although the majority of the works that make up the project can be undertaken on existing railway land, we may have to temporarily acquire land to carry out the renewal work. Some land may also be permanently acquired. At Meldreth level crossing these powers may be required for areas of land outside of existing operational and landownership boundaries.

On 5 August 2022, we submitted an application for a TWAO seeking the above powers to compulsory acquire land and rights in land at Meldreth level crossing (along with another 6 level crossings in the wider area). The powers sought will allow us to upgrade the level crossing by allowing temporary and permanent land for the proposed barrier upgrade.

Network Rail are engaged with the specific landowners at all seven of the level crossings areas as part of private treaty negotiations in relation to the required land and rights as part of a separate but related process to the powers sought as part of the TWAO. This process has continued throughout the process.

Following the submission of the TWAO to the Secretary of State for Transport, a period of objection opened and ran until Friday 23 September 2022 to allow anyone with an interest to register an objection or representation with the Department for Transport (DfT). As part of the statutory process for the TWAO we publicised the application and relevant documentation via the below:

- Published notices of the TWAO application in the Cambridge Independent, Cambridge News, Norwich Evening News and the London Gazette;
- Issued a Network Rail press release[4] to other local publishers and broadcasters across Anglia;
- Published the TWAO documents on our project webpage[5];
- Issued an email notice to statutory consultees;
- Issued an email notice to county, district and parish councils; and
- Issued an email to non-statutory consultees including over 200 members of the public who responded to the March 2021 consultation.

As part of this 'Objection Period' the DfT received 28 objections and five representations. Twenty-four of the objections from the public related to the proposed Meldreth level crossing safety upgrade. In summary the broad themes within these 24 objections were:

- Lack of justification for the safety upgrade of the level crossing from the existing half barrier to a full barrier solution;
- Concerns in relation to the increased queue lengths and journey time delays that would result from a longer barrier downtime due to the safety upgrade of the level crossing.

The below information sets out the projects response to each of these concerns:

[4] https://www.networkrailmediacentre.co.uk/news/powers-sought-to-upgrade-level-crossings-as-part-of-major-signalling-upgrade-programme-for-cambridge
[5] https://www.networkrailmediacentre.co.uk/news/powers-sought-to-upgrade-level-crossings-as-part-of-major-signalling-upgrade-programme-for-cambridge

**JUSTIFICATION FOR THE SAFETY UPGRADE OF THE MELDRETH LEVEL CROSSING FROM HALF BARRIER TO FULL BARRIER SOLUTION**

Level crossings are inherently dangerous as they provide an opportunity for people to come into contact with trains and we as Network Rail have a legal duty to keep people safe. They were built as part of a 19th Century rail network, when there were fewer and slower trains, with little or no vehicular traffic. Today's level crossings operate within a vastly different environment that extends beyond the railway, having economic as well as safety impacts with a number of significant changes evident:

- trains that are generally now more frequent, quieter and travel at higher speeds than before;
- the population has increased resulting in more and different types of road users with a higher level of interaction between these and existing level crossings;
- Changing population (e.g. increased diversity, access by more vulnerable people);
- Changes in public attitudes and expectations that risks are designed out, increasing the likelihood of errors; and
- the growth of personnel electronic equipment and other technologies that can distract such users when using level crossings.

If we were to build a railway today it would not have any level crossings with the majority of modern rail networks not including any (e.g. HS1 does not include any level crossings.).

The result of this is that existing level crossings are one of greatest risks to public and passenger safety on the rail network today.

Level crossing safety is a priority for The Office of Rail and Road (ORR), the independent safety and economic regulator for Britain's railways. It is responsible for ensuring that railway operators comply with health and safety law. The ORR have recently issued their annual safety statistics, including accidents and safety incidents to passengers, workforce and members of the public. The report states that '*Level crossings continue to be a major source of risk on the railway. The moving annual average for all level crossing events had worsened by 15.9% by the end of the year and fatalities at crossings worsened considerably. There was a total of seven level crossing fatalities over the year. This is three more than last year and two more than each of the preceding years*'[6].

We as Network Rail have an explicit legal duty under the Health and Safety at Work etc. Act 1974 (HSWA) to so far as reasonably practicable, not expose our passengers, the public or our workforce to risk at our level crossings.

We believe the most effective way of reducing level crossing risk is to eliminate the crossing completely by closing it. Where we practically cannot do this we will look at options to make the crossing safer. 'Enhancing Level Crossing Safety'[7] is our strategy to manage the safety and reliability of level crossings in Great Britain for the next 10 years. It is aligned to the rail industry strategy 'Leading Health and Safety on Britain's Railway'[8] which targets improved safety at level crossings as one of its 12 key priorities.

[6] Annual report of health and safety on Britain's railways - 2021-22 (orr.gov.uk)
[7] https://www.networkrail.co.uk/wp-content/uploads/2020/03/Enhancing-Level-Crossing-Safety-2019-2029.pdf
[8] Leading Health and Safety on Britain's Railway (LHSBR) (rssb.co.uk)

Meldreth level crossing

To inform the justification for the safety upgrade of a level crossing such as at Meldreth, Risk Assessments are undertaken by Network Rail and updated on an ongoing basis. The frequency at which Network Rail assesses a level crossing is dependent on the level of risk the crossing poses but generally is undertaken at intervals of between one and three years or if any significant changes are made.

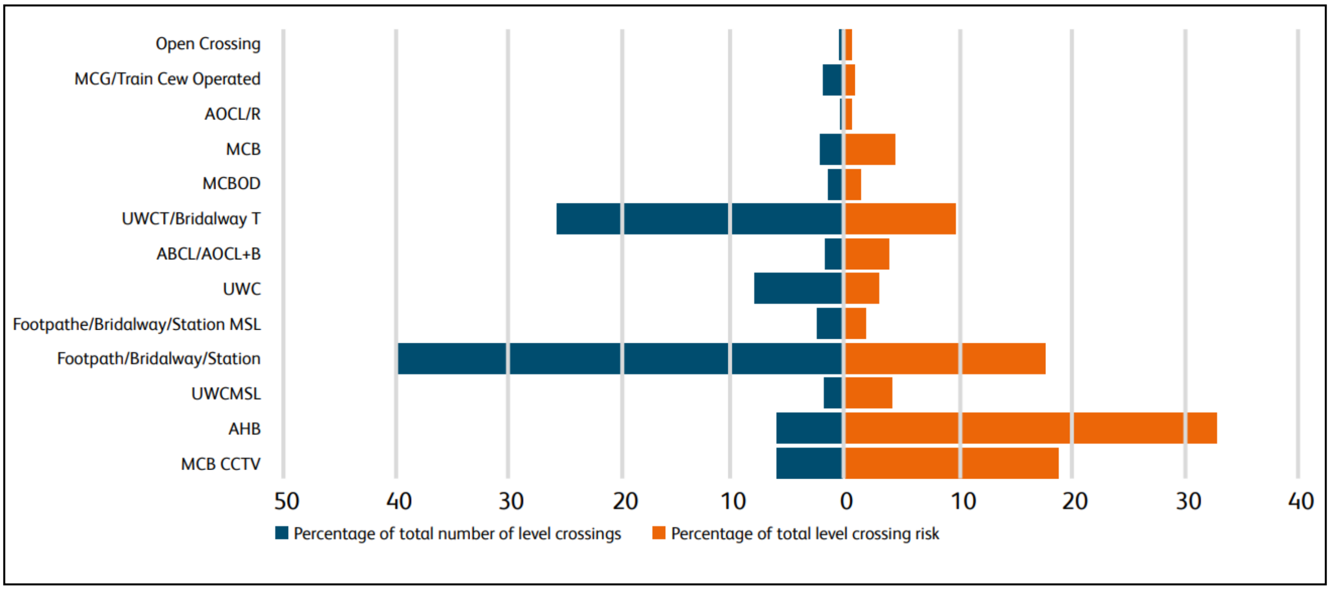
The Risk Assessments include the All Level Crossing Risk Model (ALCRM), a web-based risk tool used by Network Rail, to support it in managing the risk to crossing users, passengers and rail staff by assessing the risks at each crossing and targeting those crossings with the highest risk for remedial measures. The Risk Assessments also include an incident history at each level crossings including reporting of 'near misses' and level crossing misuse.

The findings of the ALCRM which supports Network Rail's level crossing safety assessments are available for public viewing via Network Rail's Level Crossing Safety page on their website[9]

Existing situation at Meldreth level crossing

Meldreth level crossing is located between Royston and Shepreth Branch Junction. There are two tracks at the crossing, and it is electrified with a 25kV overhead line. It is a highly utilised stretch of line with a weekday average of 139 trains per day (approximately 70 passenger trains in each direction). The level crossing is currently an Automatic Half Barrier (AHB) crossing, with two half-width barriers and four LED type Road Traffic Lights (RTL). The crossing is monitored from Cambridge signal box.

The overall ALCRM for the entire network identifies (see below) that while AHB crossings of this type account for just 6 % of the total estate, they hold 32 % of total modelled risk and 75 % of our level crossings require the user to make the decision on whether it is safe to cross. AHB type crossings are therefore higher risk crossings compared to other types or full closures.




[9] http://www.networkrail.co.uk/communities/safety-in-the%20community/level-crossing-safety/

Existing Pedestrian Environment

The ORR categorises pedestrian footways over crossings into three classes based upon usage by pedestrians and the frequency of rail traffic. The volume of pedestrian and train flow is determined by the train pedestrian value (TPV). The TPV is the product of the maximum number of pedestrians and the number of trains passing over the crossing within a period of 15 minutes. The TPV at Meldreth Road, based upon a 9-day census, is 8. This places the crossing in the lowest usage category – 'class C' (having a TPV of up to 150).

For this class, the ORR recommends that the footways are 1.5m wide. The ORR also indicates that the footway width can be reduced to 1.0m where the daily number of pedestrians is less than 25. Census data for the Meldreth site indicates a weekday average pedestrian frequency of 25 and a weekly average of 27. The footways are, therefore, not in compliance with the minimum width of 1.5m specified in ORR guidance for a pedestrian category C crossing. There are also no tactile thresholds on the footways at this barrier. As part of the proposed works at the level crossing Network Rail will be addressing this issues.

Incident/near miss history at Meldreth level crossing

As part of the TWAO 'Objection Period', a number of received objections queried the level of incidents or near misses at Meldreth level crossing stating that there have been no or little such recorded events.

The Risk Assessment for Meldreth Level Crossing has recently been updated (Risk Assessment for Meldreth Road AHB Level Crossing' - Doc no. 157001-SRK-REP-ESS-000010 – 21 October 2022).

As part of this update a nine-day, 24-hour traffic census by continuous recording was carried out at the crossing between 18th and 26th June 2022. This is an update to the previous census carried out in April 2013, which served as the previous basis of the risk assessment.

During the nine-day census, a total of 70 incidents of RTL running were identified with incidents recorded on every day of the census. RTL running is categorised as a vehicle passing the lights after initiation with sufficient warning on approach.

The Risk Assessment also includes ten years of Incident data up to August 2016 with 11 incidents recorded (versus an average of 18 for a crossing of this type).

The following recorded incidents are noteworthy at Meldreth Level Crossing:

- Two reported incidents of a 'near miss' with a pedestrian;
- One reported incident of a 'near miss' with a cyclist;
- One reported incident of a road vehicle obstructing the crossing; and
- Three reported incidents of other misuse by a road vehicle.

More recent Safety Management Information System data, for one year to 13th March 2019, shows one reported incident of a road vehicle zig - zagging around the lowered barriers (16/12/2018).

It is important to note that not all incidents or near misses are reported into Rail Safety and Standards Board Safety Management Intelligence System database and passed onto Network Rail.

Overall, the Risk Assessment of Meldreth level crossing shows:

- The Individual Risk ranking is **D** (the ranking allocates individual risk into rankings A to M, A is highest, L is lowest, and M is 'zero risk' e.g. temporary closed, dormant or crossings on mothballed lines)
- The Collective Risk ranking is **2** (this ranking allocates collective risk into rankings 1 to 13, 1 is highest, 12 is lowest, and 13 is 'zero risk' e.g. temporary closed, dormant or crossings on mothballed lines).

The ACLRM score is therefore D2, placing the level crossing in the high risk category of crossings. Network Rail in line with is legal duty under the HSWA Act 1974 and in line with their strategy of upgrading high risk AHB crossings are therefore required to look at options to minimise risks at this crossing, so far as is reasonably practicable.

Options considered for safety upgrade of Meldreth level Crossing

Noting the high risk ACLRM score Network Rail have considered a number of options to enhance safety at Meldreth Level Crossing.

The risks to individuals and the likelihood and severity of the consequences of an incident at a level crossing, have been taken into account along with the specific characteristics of the crossing.

This has been weighed against the cost, time and effort of options to eliminate, reduce, or mitigate risk as summarised below.

| **Options Considered** | **Summary Outcome** |
|---|---|
| **Maintain existing AHB Crossing** | Renewal of a crossing with an ALCRM score of D2 as an AHB would be contrary to Network Rail's strategy of upgrading high risk AHB crossings when renewal is required. |
| **Closure of the crossing** | The crossing is on the main road between Meldreth and Shepreth. There is an alternative route along the busy and congested A10 and may involve a detour of up to 8km. Given the usage of the crossing (1,500 vehicles, 100 pedestrians and cyclists per day) this is not a viable closure option. |
| **Closure + pedestrian bridge** | Main use is road vehicles so would not enable closure as above. |
| **Closure + road bridge or underpass** | A road bridge or underpass at this location is not likely to be feasible without purchasing significant land and existing houses as exist in three corners of the level crossing currently and any potential route for an off-line bridge has been eliminated by recent house building on Collins Close. |
| **Closure with Bypass** | Diverting the road to Barrington Road and crossing the railway at Shepreth station was considered. It would need about 800m of new undesignated road. There would also need for an additional ramped footbridge at Meldreth Road. This was estimated as having a potential cost of £4.5m consisting of construction and land costs |
| **Renew as an Automatic Barrier Level Crossing, Locally-monitored** | Not a viable option due to the restriction in line speed that would be necessitated. |
| **Renew as an automatic full barrier (AHB+)** | Meldreth Road level crossing has a very high benefit to cost ratio for Controlled Barrier Level Crossing with Obstacle Detection (MCB-OD) rather than AHB+ as the costs of a MCB-OD or AHB+ are similar (there are no additional signals for the MCB-OD) and there is a higher safety benefit for the MCB-OD type. Other considerations are road closure time and the proximity of Meldreth Road to Shepreth Station CCTV level crossing. Having different modes of operation for two crossings in close proximity |

| | |
|---|---|
| | introduces additional hazards in the event of a signalling failure. This reinforces the case to upgrade Meldreth Road as an MCB-OD type crossing. |
| **Upgrade to an Manually-Controlled Barrier Level Crossing with CCTV** | Both options are considered feasible. They would however share the protecting signals with Shepreth (on Shepreth station platform) which would increase the road closure time. The other signal is about 200 metres from the crossing. Future 'busiest hour' road closure time of Shepreth station and Meldreth Road may not be sustainable. |
| **Controlled Barrier Level Crossing with Obstacle Detection** | |

In summary, the closure of the level crossing was not considered a preferred option noting the impact that this may have on the nearby Shepreth Level Crossing in terms of increased usage of an already busy crossing and so would also not reduce risk in the area. The capital cost of such options would also be in the region of twice as much as upgrading the existing half barriers to full barrier solutions as proposed and would have significant environmental effects both locally and in the wider area (land take, physical structures, environmental impacts such as noise, air quality, landscape & visual and construction related impacts).

Retaining the existing AHB crossing would not be the preferred option as it presents a high level of risk as shown by the ACLRM score (D2) with renewal of such crossing types being contrary to Network Rail's strategy of upgrading high risk AHB crossings when renewal is required.

Meldreth Road level crossing has a very high benefit to cost ratio when a Manually Controlled Barrier – Obstacle Detection (MCB-OD) or a Manually Controlled Barrier – CCTV (MCB-CCTV) barrier is installed versus that of an AHB+, as the costs of a MCB-OD and AHB+ are similar (there are no additional signals for the MCB-OD or CCTV) and there is a higher safety benefit for the MCB-OD (or MCB-CCTV) type when measured against the AHB+ crossing type. Other considerations are road closure time and the proximity of Meldreth Road to Shepreth Station CCTV level crossing. Having different modes of operation for two crossings in close proximity introduces additional hazards when in operating in degraded working scenarios (signal failures etc.). This reinforces the case to upgrade Meldreth Road as an MCB-OD (or MCB-CCTV) type crossing.

There is potential to control Meldreth Road level crossing from Foxton gate box at little or very low operational cost. Operationally, having the same type of crossing as Shepreth Station (also an MCB-CCTV type crossing) is more straightforward for the degraded mode situation (where signalling technology fails) where the shared protecting signals are at danger due to a right side signalling failure. An MCB-CCTV crossing is therefore concluded to have a slightly lower capital cost, similar operational cost and some operational simplicity benefits from having two similar type crossings between shared protecting signals. For these reasons, an MCB-CCTV type crossing is the preferred option at Meldreth level crossing.

**TRAFFIC IMPACTS OF PROPOSED UPGRADE**

As part of the March 2021 Public Consultation the potential for increased barrier downtimes as a result of the proposed upgrade was highlighted and queried as part of a number of responses.

In response to these comments and engagement with the relevant Highways Authorities, Network Rails Transport Consultant (Modelling Group, in partnership with Tracsis Traffic Data Ltd) undertook Traffic Surveys and Modelling to assess the potential impacts of the increased barrier downtimes at each level crossing on all roads users and the surrounding highway networks.

Ongoing meetings were held throughout 2021/2022 with the relevant Highways Authorities to agree the methodology for the Traffic Modelling with agreement on the locations of traffic surveys, the highways networks to be modelled and assessed with consideration of the ongoing Covid restrictions and their impact on traffic data discussed in July 2021. Traffic Surveys were undertaken in July 2021 (with further surveys undertaken in April 2022).

The following documentation and assessment have been produced and provided to the relevant Highways Authorities prior to meetings to discuss their outcomes:

- Level Crossing Study - Modelling Methodology;
- Level Crossing Study - Local Model Validation; and
- Level Crossing Study - Performance Report

The above documentation was made available via the project website.

The Traffic Modelling was based on 'do nothing' (this assessed a scenario with no upgrade at Meldreth Level Crossing but including future traffic demand) and 'do something' (this included the proposed crossing MCB-CCTV upgrade and future traffic demand) scenarios against the existing situation (existing scenario).

These scenarios were then used to assess the network performance including the average delays that may be experienced by road users. The agreed scenarios for Meldreth level crossing are shown below with the increased barrier downtimes shown for each scenario.

| **Scenario** | **Period – AM and PM** | **No. of times barrier called within period** | **Average Barrier Downtime (seconds)** |
|---|---|---|---|
| **Base Model - Existing Barrier Downtime** | AM Peak - 08:00 to 09:00 | 10 | 62 |
| | PM Peak - 16:30 to 17:30 | 9 | 62 |
| **Do-Nothing scenario - No barrier upgrade and future traffic demand** | AM Peak - 08:00 to 09:00 | 12 | 62 |
| | PM Peak - 16:30 to 17:30 | 10 | 62 |
| **Do-Something Scenario - future traffic demand and proposed barrier upgrade** | AM Peak - 08:00 to 09:00 | 12 | 169 |
| | PM Peak - 16:30 to 17:30 | 10 | 169 |

For the above scenarios the modelling shows that the 'Do Something' scenario would result in the existing 62 second barrier downtime increasing to 169 seconds in both the AM and PM peak **-** Downtimes would differ throughout the day depending on train timetables but these scenarios were modelled for both the AM and PM 'Peak' traffic periods to illustrate a reasonable worst case scenario.

Based on the above barrier downtimes and scenarios an assessment of network performance on the road was undertaken. This showed that the average delay at Meldreth Road after the upgrade will increase as shown below:

- In the AM Peak the average delay will increase from the existing figure of 63.9 seconds to 91.8 seconds ( an increase of 27.9 seconds)
- In the PM Peak the average delay will increase from the existing figure of 50.8 seconds to 72.3 seconds (an increase of 21.5 seconds).

The traffic modelling also shows that the following impacts as result of the proposed upgrade:

- Modest increases in the average and maximum queue lengths at the crossing. The highest increase is 52m, which is observed for the westbound direction in the AM peak. This equates to approximately 9 vehicles; and
- The proposed upgrade will have a minimal impact on eastbound journey times (2 seconds), with an approximate 65 second delay to westbound traffic, which is not considered significant.

In Summary

The risk to public safety at level crossings depends on their configuration, the volume of pedestrian and vehicle traffic traversing the crossing, and rail traffic and has been assessed through the Risk Assessment method as noted above. The only way to eliminate this risk completely is to close each crossing.

However, in relation to Meldreth Level Crossing, Network Rail consider its closure impracticable, given the impact on local road networks, nearby level crossings and the related costs with greater potential environmental and social impacts.

Network Rail's proposals to upgrade this level crossing therefore involves striking a balance between the convenience the local communities in being able to cross a railway and maintaining public safety in line with our legal requirements.

On balance it is considered that the proposal will increase safety at this location and result in the least environmental and social impacts, noting that a Do Nothing Scenario is not considered viable based on existing ACLRM score (D2) at the level crossing.

The proposed MCB-CCCTV option is considered to have a slightly lower capital cost, similar operational cost and some operational simplicity benefits from having two similar type crossings between shared protecting signals. For these reasons, an MCB-CCTV type crossing is the preferred option at Meldreth Level Crossing.

**NEXT STEPS**

Transport and Works Act Order

Following the end of the 'Objection Period' for the TWAO, the DfT will decide if a Public Inquiry is required on the 2 December 2022. If a Public Inquiry is required the inquiry must take place within 22 weeks of this date. This will be advertised in a similar manner to the TWAO application.

Planning Permission

The submitted TWAO, if granted (or made) by the Secretary of State for Transport does not include a request for planning permission to undertake the works at Meldreth level crossing. Network Rail intend to submit an application for full planning permission via the Town and Country Planning Act 1990 for the works associated with Meldreth level crossing to South Cambridgeshire District Council (SCDC) before the end of 2022. SCDC have provided an Environmental Impact Assessment (EIA) Screening Opinion (Cambridge Shared Planning Service Planning Refs: 21/03205/SCRE & 21/03253/SCRE) stating that the proposed development is not considered EIA development. As part of this request SCDC sought consultation responses from a number of consultees, receiving response from the following:

- Natural England;
- Cambridgeshire County Council (Highways Authority);
- The Environment Agency; and
- South Cambridgeshire and Cambridge City Council Health Development Officer and Ecology Department

Although the development is not considered EIA development, the application for full planning permission will be accompanied with a full set of planning documentation in line with the SCDC Local Validation planning list. This will include a full set of planning drawings; application forms and a suite of environmental documentation including a Transport Assessment; Construction Management Plan; Arboriculture Assessment and an Preliminary Ecological Assessment reporting the outcomes of ecology surveys on site and an assessment of potential impacts and proposed mitigation (Ecological Impact Assessment).

Further Consultation

The Planning and Compulsory Purchase Act 2004 requires that at any time a decision is made on an application for express planning permission, stakeholders and the local community should have the opportunity to comment on any aspect of the proposal.

Consultation on planning applications will take place with both statutory and non-statutory consultees. Who is consulted on each individual application will depend on the nature of the proposal and its location. All consultees have 21 days from the issue of the consultation notice to make comments on the application (extended as appropriate where the period extends over public or bank holidays). The minimum statutory requirements are set out in the Town and Country Planning (Development Management Procedure) (England) Order 2015.

The statutory consultation process for applications for express planning permission under the TCPA 1990, where required as part of the Scheme will be undertaken via SCDC once the application has been submitted providing further opportunity to raise and respond to issues.

We hope this response is helpful in setting out in more detail, the justification for upgrading the level crossing on Meldreth Road and Network Rail's position ahead of any possible Public Inquiry.

If you have any further queries, you can contact us by emailing CambridgeC3R@networkrail.co.uk or our 24/7 helpline, 03457 11 41 41 or visit www.networkrail.co.uk/contactus.

You can also follow us on Twitter @networkrailANG

Yours faithfully,

Stephen Deaville
Snr Communications Manager (Anglia)

Sent on behalf of the C3R project team.

# Performance Report – Level Crossing Study

MG0172 – Level Crossing Study

Nicolas Contentin

14 June 2022

NETWORK RAIL

# DOCUMENT CONTROL ISSUE SHEET

## Project & document details

| | |
|---|---|
| Project name | Level Crossing Study |
| Project number | MG0172 |
| Document title | Performance Report – Level Crossing Study |
| Document reference | Technical\Reports\Performance Report |

## Document history

| Issue | Status | Reason for issue | Issued to |
|---|---|---|---|
| 1 | DRAFT | Issued to NR for comments | Network Rail |
| 2 | DRAFT | NR comments have been addressed | Network Rail |
| 3 | DRAFT | NR comments have been addressed | Network Rail |
| 4 | Final | Final report update | NR and CCC |

## Issue control

| Issue | Date | Author | Contributors | Approved | Date |
|---|---|---|---|---|---|
| 1 | 04/11/2021 | NC | NC | DB | 04/11/2021 |
| 2 | 19/11/2021 | NC | NC | DB | 19/11/2021 |
| 3 | 16/05/2022 | NC | NC | DB | 16/05/2022 |
| 4 | 14/06/2022 | NC | NC | DB | 14/06/2022 |

# CONTENTS

## APPENDICES

***NO TABLE OF CONTENTS ENTRIES FOUND.***

# 1 INTRODUCTION

## 1.1 Introduction

1.1.1 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-OD2 / MCB-CCTV type operation, with a view to understanding the impacts the upgrades will have on the local communities and the wider transport network.

1.1.2 The purpose of this report is to assess the likely transport implications and issues which may arise from the conversion described above.

## 1.2 Study extents

1.2.1 The modelling study involves the assessment of 7 level crossings within Cambridgeshire and Norfolk. These include:

- 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

## 1.3 Overview of the methodology

1.3.1 A methodology report titled "**210603 Level Crossing Study - Modelling Methodology.pdf**" has been produced to detail the methodology, which can be summarised by the following topics:

- Study extents
- Traffic survey requirements
- Explanation of the calibration and validation of the VISSIM model

1.3.2 A Local Model Validation report titled "**210730 Level Crossing Study - LMVR v1.pdf**" has been developed which provides the requisite detail on the model development and its compliance with microsimulation guidelines.

1.3.3 For this study, the following scenarios have been tested:

- **Validated base model** – Existing flows and existing barrier down time.
- **Do-Nothing scenario** – Future year flows based on opening year (traffic future demand) and existing barrier down time.
- **Do-something scenario** – Future year flows based on opening year (traffic future demand) and proposed increased barrier down time.

| Scenario | Network Changes | Traffic Demand |
|---|---|---|
| Validated model | None | 2021 |
| Do-Nothing | None | Opening Yrs |
| Do-Something | Extended Barrier Down Time | Opening Yrs |

**TABLE 1.1: SCENARIO DESCRIPTIONS**

1.3.4 The opening year is defined as the year when changes to the operation of the level crossing take place.

## 1.4 Future year development

### Traffic growth

1.4.1 The following future years are proposed for the upgraded level crossings, in line with Network Rail's anticipated commissioning dates:

- Milton Fen – 2023 (prospective start May 2023)
- Waterbeach – 2023 (prospective start May 2023)
- Dimmocks Cote – 2023 (prospective start May 2023)
- Croxton – 2024 (prospective start April 2024)
- Six Mile Bottom – 2024 (prospective start December 2024)
- Dullingham – 2024 (prospective start December 2024)
- Meldreth – 2023 (prospective start December 2023)

1.4.2 To develop these future year flows, growth factors have been calculated using Tempro 7.2b which is the industry standard software to calculate vehicle traffic increased, as detailed in Table 1.2.

| Level Crossing | MSOA bdry | Opening Years | AM Peak | PM Peak |
|---|---|---|---|---|
| Milton Fen | E02003781 | 2023 | 1.0176 | 1.0186 |
| Waterbeach | E02003778 | 2023 | 1.0158 | 1.0168 |
| Dimmocks Cote | E02003736 | 2023 | 1.0169 | 1.0183 |
| Croxton | E02005516 | 2024 | 1.0332 | 1.0342 |
| Six Mile Bottom | E02003785 | 2024 | 1.0307 | 1.0323 |
| Dullingham | E02006825 | 2024 | 1.0308 | 1.0339 |
| Meldreth | E02003792 | 2023 | 1.0171 | 1.0187 |

**TABLE 1.2: GROWTH FACTOR TABLE**

1.4.3 These growth factors have been applied to each individual peak period modelled.

## 1.5 Readjustment factor – COVID-19 related

1.5.1 Due to the base traffic flows being collected in 2021, when the COVID-19 pandemic was still in effect, a readjustment factor has been applied to these flows to account for any reduction in traffic as a result of the pandemic.

| Level Crossing | 2021 Total Weekday Daily Flow | Historical Data | Historical total Weekday Daily Flow | Readj. Factor |
|---|---|---|---|---|
| Milton Fen | 221 | 28/04/2018 to 06/05/2018 | 182 | 0.82 |
| Waterbeach | 8,081 | 02/06/2018 to 10/06/2018 | 5,802 | 0.72 |
| Dimmocks Cote | 4,350 | | | |
| Croxton | 6,043 | 05/09/2016 to 18/09/2016 | 6,383 | 1.06 |
| Six Mile Bottom | 10,778 | - | - | |
| Dullingham | 674 | - | - | |
| Meldreth | 1,329 | - | - | |
| | | | COVID 19 Readj. Factor | 1.06 |

**TABLE 1.3: READJUSTEMENT FACTOR TABLE**

1.5.2 Traffic data captured on the 6th of July 2021 has been compared against historical data available for Milton Fen, Waterbeach and Croxton locations.

1.5.3 A large increase in traffic was observed at the Waterbeach level crossing due to roadworks present on the A10 Ely Road in the southbound direction. A similar trend was also observed on Milton Fen and as a result, these two sites have been removed from the calculation of the average.

1.5.4 This readjustment factor has not been applied to Milton Fen because the 2021 figures were higher than the 2018 figures (and therefore already represents a worst-case scenario).

1.5.5 A readjustment factor of 1.06 has been applied to Dimmocks Cote, Croxton, Six Mile Bottom, Dullingham and Meldreth to take account of the impact that the COVID-19 pandemic had on local traffic. It should be noted that whilst we have no evidence that the traffic has reduced in these locations, we have assumed that it has for robustness and a worst-case scenario test.

1.5.6 The methodology summarised in Figure 1.1 has been applied to each of the level crossing models.

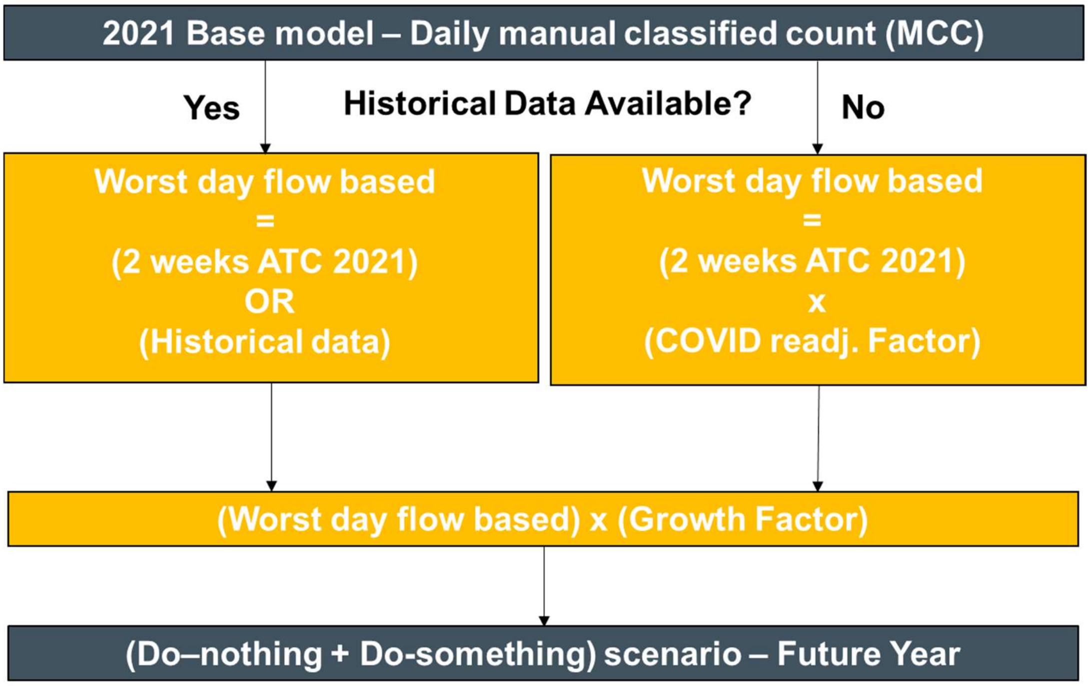



**FIGURE 1.1: TRAFFIC FLOW METHODOLOGY**

## 1.6 Train frequency growth

1.6.1 A review of the train demand was carried out to assess the impact of the COVID-19 pandemic on each level crossing. The results of this analysis are presented in Table 1.4 and Table 1.5.

| Level Crossing | COVID readjustment (train number) |
|---|---|
| Milton Fen | 1 |
| Waterbeach | 2 |
| Dimmocks Cote | 4 |
| Croxton | 0 |
| Six Mile Bottom | 1 |
| Dullingham | 1 |
| Meldreth | 2 |

**TABLE 1.4: ADDITIONAL TRAIN NUMBERS – AM PEAK**

| Level Crossing | COVID readjustment (train number) |
|---|---|
| Milton Fen | 0 |
| Waterbeach | 0 |
| Dimmocks Cote | 0 |
| Croxton | 2 |
| Six Mile Bottom | 1 |
| Dullingham | 1 |
| Meldreth | 1 |

**TABLE 1.5: ADDITIONAL TRAIN NUMBERS – PM PEAK**

1.6.2 These additional trains have been added to the existing train demand to ensure a suitable number of trains were modelled for the study.

## 1.7 Do-Something Network changes

1.7.1 The only physical change introduced to the Do-Something network is an extended barrier down time which is the result of the changes to the railway system, when introducing the safety improvements.

1.7.2 To inform the proposed barrier down times for the upgraded level crossings, Network Rail has provided Modelling Group with the following data:

- A set of absolute minimum barrier closure times for each crossing, with the exception of Meldreth where the times are proposed to be in line with the Shepreth crossing.
- Barrier down times for the Hinxton level crossing from 11th December 2017, which has been upgraded to MCB-OD control.

1.7.3 To develop suitable barrier down times for each level crossing, the Hinxton level crossing data has been analysed and plotted to show the variation across the day, as well as the median time from all of the samples. This is shown in Figure 1.2.

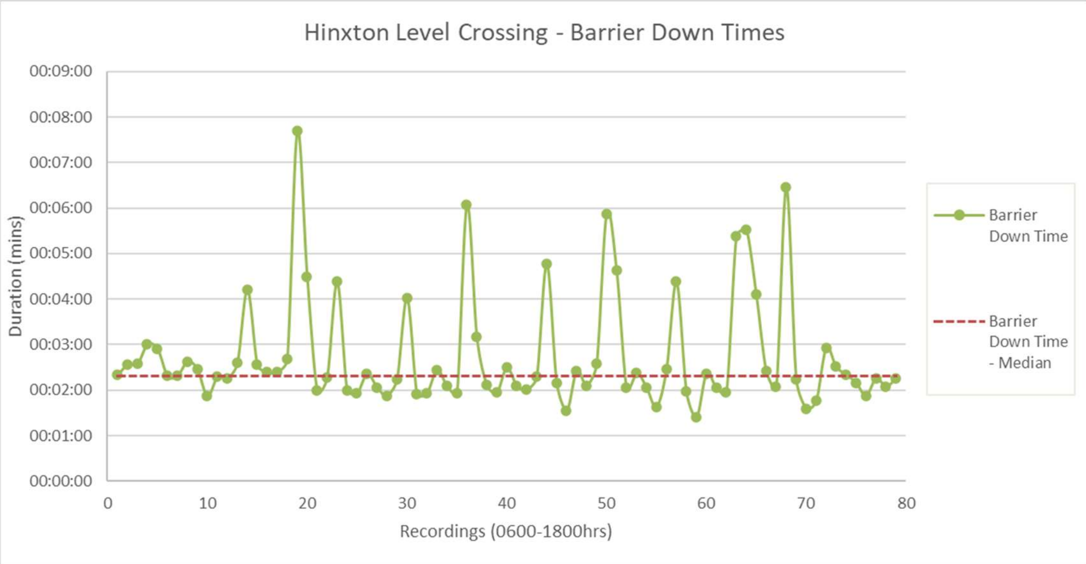



**FIGURE 1.2: HINXTON LEVEL CROSSING – BARRIER DOWN TIMES**

1.7.4 From the Hinxton level crossing data, the absolute minimum barrier down time was 84 seconds (01:24), whilst the median barrier down time was 139 seconds (2:19). The strike-in time of Hinxton is not consistent hence using the median rather than the average value provides a fair estimate of the average barrier down time. The difference between the absolute minimum down time and the average was therefore 55 seconds (00:55).

1.7.5 To calculate the average barrier times for each of the level crossings, the absolute minimum times and the difference between the minimum and median times from the Hinxton crossing have been used. The resulting barrier down times proposed to be used for each of the upgraded level crossings are shown in Table 1.6.

| No. | Level Crossing | Min Barrier Down Time (s) | Min Barrier Down Time + Hinxton Difference (s) | Min Barrier Down Time + Hinxton Difference (mm:ss) |
|---|---|---|---|---|
| 1 | Milton Fen | 150 | 205 | 03:15 |
| 2 | Waterbeach | 125 | 180 | 03:00 |
| 3 | Dimmocks Cote | 149 | 204 | 03:14 |
| 4 | Croxton | 119 | 174 | 02:54 |
| 5 | Six Mile Bottom | 140 | 140** | 02:20** |
| 6 | Dullingham | 113 | 168 | 02:48 |
| 7 | Meldreth | | 169* | 02:49 |

**TABLE 1.6: CALCULATED BARRIER DOWN TIMES FOR UPGRADED LEVEL CROSSINGS**

**For the Meldreth level crossing, as no other data is available, the barrier down time has been based on the average time from all of the other level crossings.*

***For Six Mile Bottom, the Hinxton difference has not been applied due to the very consistent strike-in time, as specified by Network Rail.*

# 2 MILTON FEN VISSIM MODEL

## 2.1 Traffic Data

2.1.1 The barrier down time of the Do-Nothing and Do-something scenario has been updated in line with Table 1.4 and Table 1.5.

2.1.2 Figure 2.1 and Figure 2.2 show the barrier down time across the peak periods. A longer barrier down time in line with Table 1.6 is observed in the Do-Something scenario. It was observed that this longer barrier down time allows multiple trains to pass through at once, whilst the shorter barrier down time only allows one train to pass through at a time.

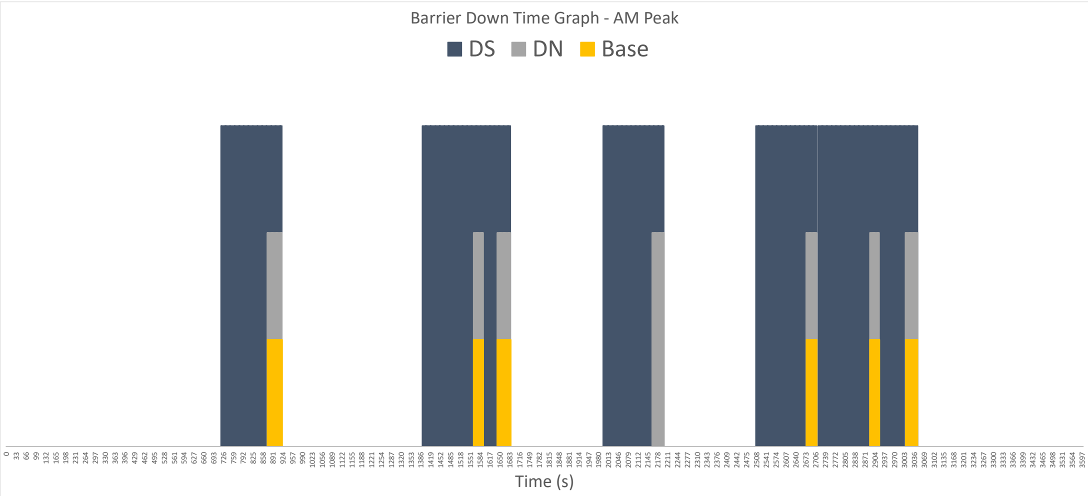



**FIGURE 2.1: BARRIER DOWN TIMES – MILTON FEN – AM**

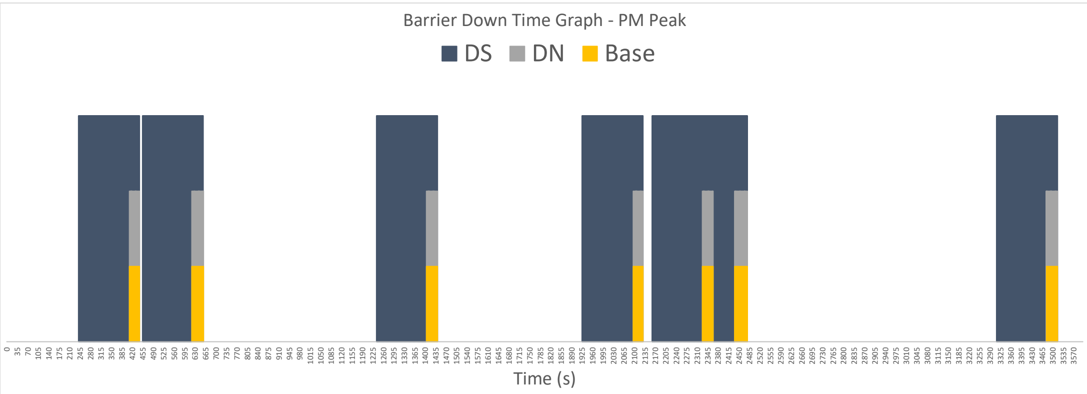



**FIGURE 2.2: BARRIER DOWN TIMES – MILTON FEN – PM**

2.1.3 The network performance results in Table 1.7 show that the average delay will not exceed 1 minute and that there is no latent demand. This implies that the upgraded crossing will not have a significant impact on the network.

| | Average Delay (s) | | | Average Speed (mph) | | | Latent Demand | |
|---|---|---|---|---|---|---|---|---|
| **Peak** | **DN** | **DS** | **Diff.** | **DN** | **DS** | **Diff.** | **DN** | **DS** |
| **AM** | -9.1 | 9.6 | 18.7 | 34.4 | 24.8 | -9.6 | 0 | 0 |
| **PM** | -31.3 | -0.1 | 31.2 | 28.7 | 21.4 | -7.4 | 0 | 0 |

**TABLE 2.1: NETWORK PERFORMANCE – MILTON FEN**

2.1.4 The proposed upgraded level crossing will increase the journey times as a result of the longer barrier down time, however this is by less than 1 minute on average and is not considered significant.


**FIGURE 2.3: JOURNEY TIME ROUTE – MILTON FEN**

| Journey time (s) | | | | |
|---|---|---|---|---|
| **Direction** | **Peak** | **DN** | **DS** | **Diff.** |
| **EB** | **AM** | 70 | 99 | 30 |
| **EB** | **PM** | 178 | 184 | 5 |
| **WB** | **AM** | 77 | 123 | 46 |
| **WB** | **PM** | 78 | 105 | 27 |

**TABLE 2.2: JOURNEY TIMES – MILTON FEN**

2.1.5 A slight increase in the queue lengths has been observed in the eastbound and westbound directions with the upgraded level crossing, however it is not an issue because the traffic flow is very low at this crossing and the queue lengths equate to one vehicle length at most.

| Queue Length (m) | | | | |
|---|---|---|---|---|
| | AM | | PM | |
| Direction | Max | Avg | Max | Avg |
| DN Eastbound | 1 | 1 | 1 | 0 |
| DS Eastbound | 6 | 2 | 7 | 3 |
| Diff. | 5 | 1 | 6 | 2 |
| DN Westbound | 1 | 0 | 3 | 1 |
| DS Westbound | 3 | 1 | 4 | 2 |
| Diff. | 2 | 1 | 1 | 0 |

**TABLE 2.3: QUEUE LENGTHS – MILTON FEN**

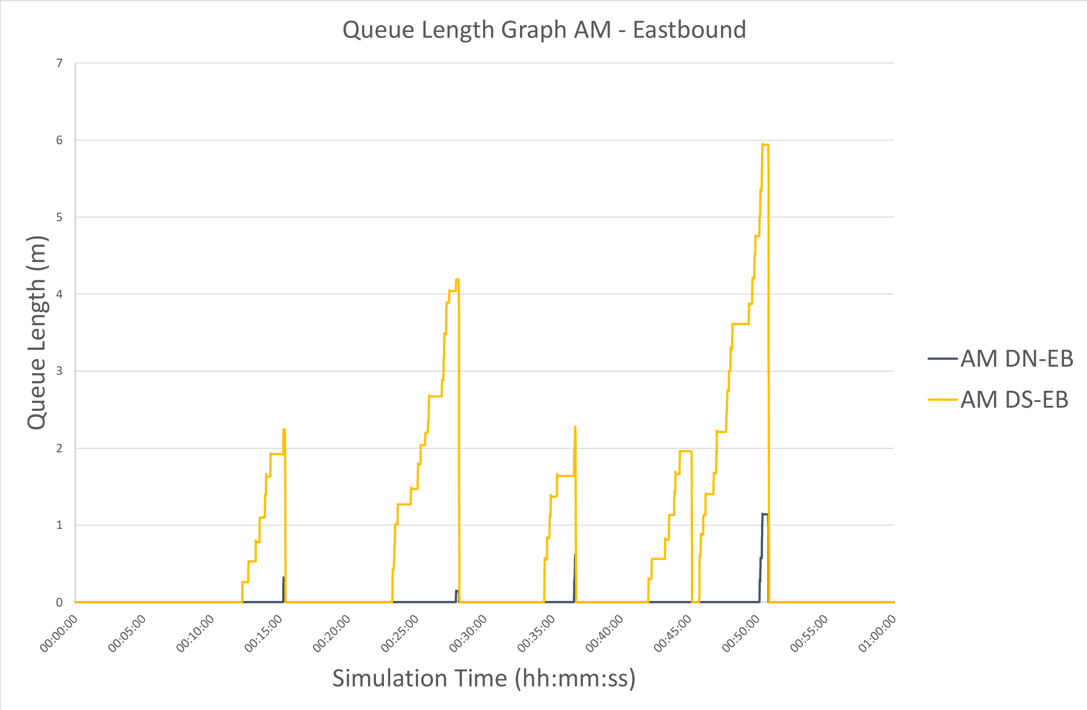



**FIGURE 2.4: QUEUES – EASTBOUND - AM PEAK – MILTON FEN**

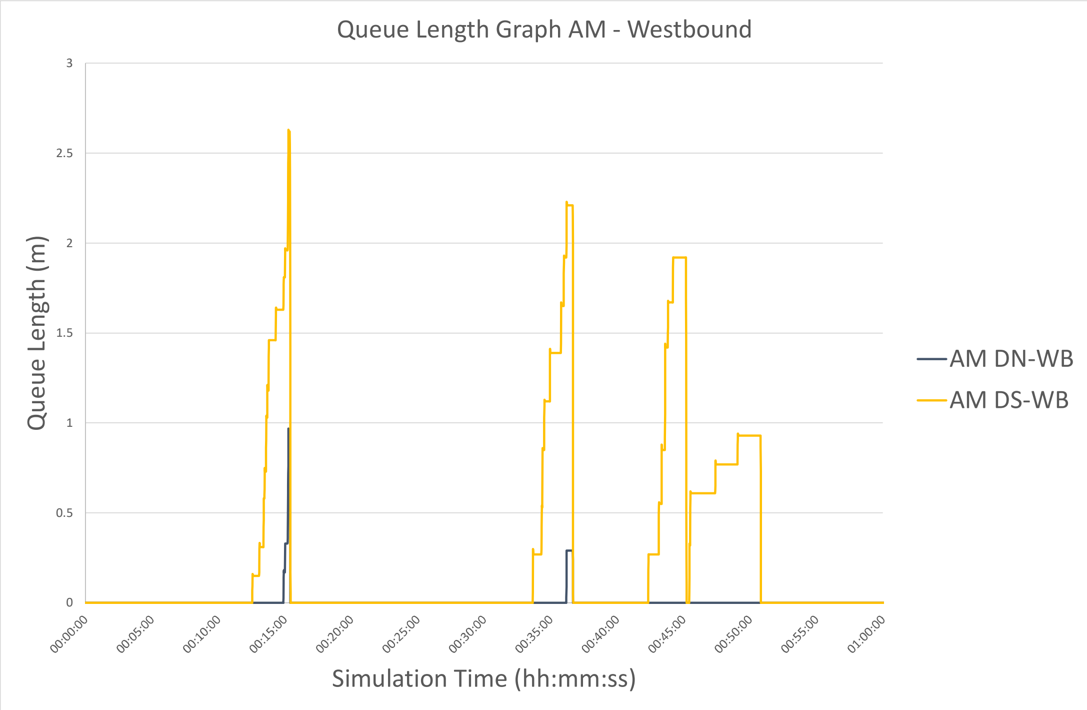



**FIGURE 2.5: QUEUES – WESTBOUND - AM PEAK – MILTON FEN**

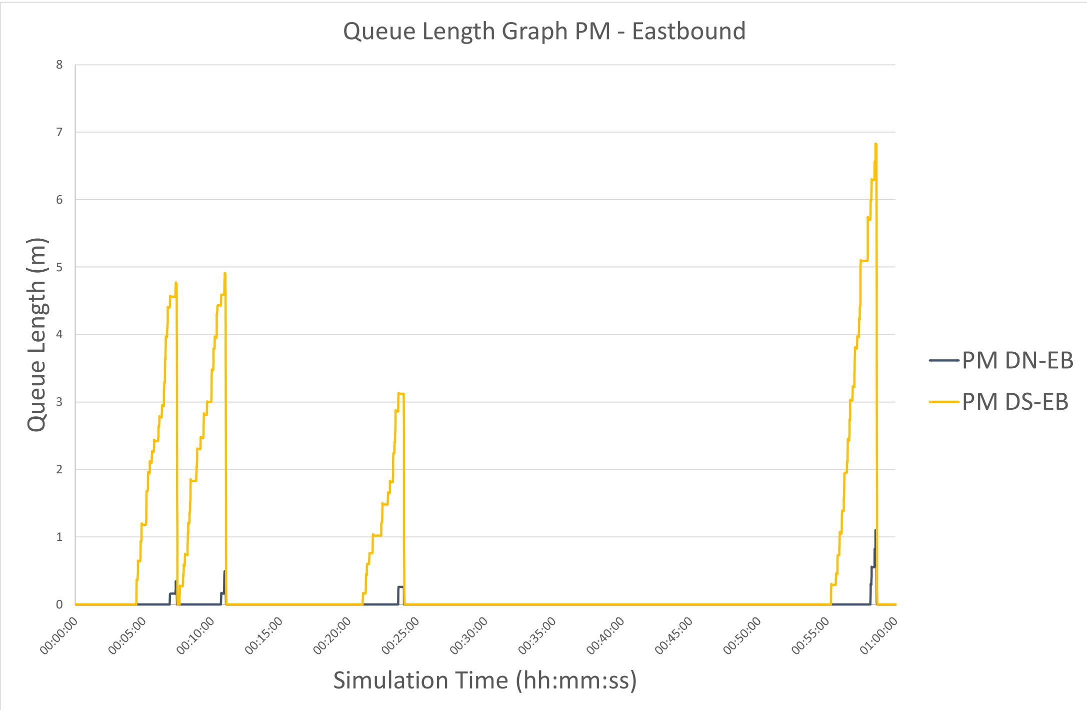



**FIGURE 2.6: QUEUES – EASTBOUND - PM PEAK – MILTON FEN**

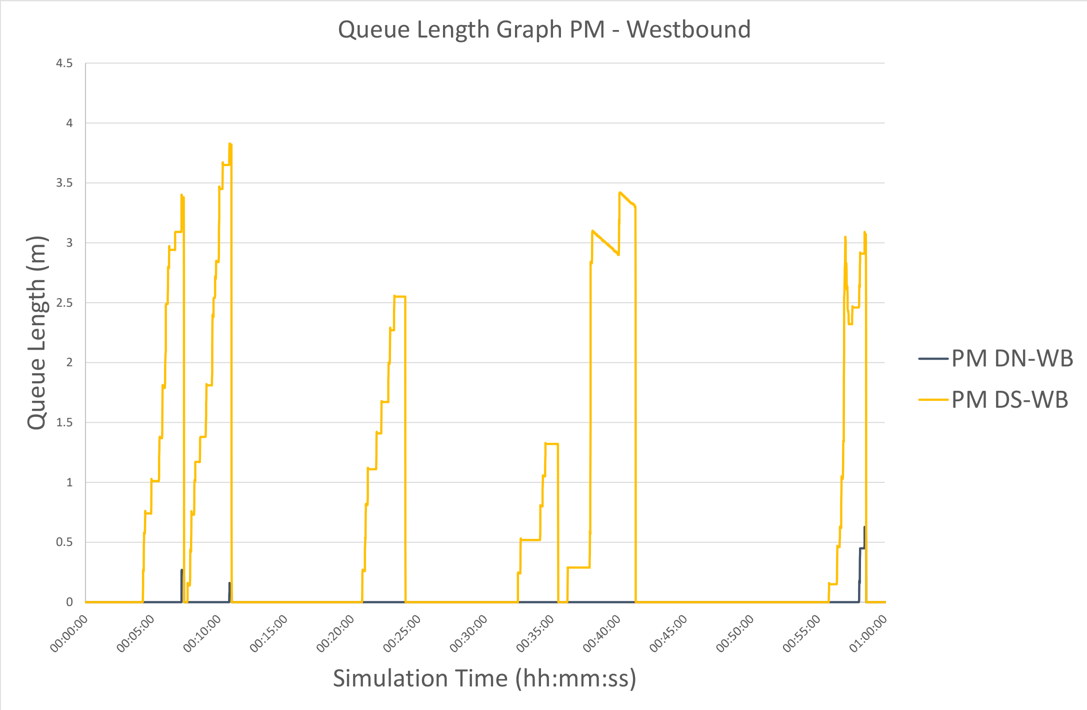



**FIGURE 2.7: QUEUES – WESTBOUND - PM PEAK – MILTON FEN**

## 2.2 Conclusion

2.2.1 The analysis above show that the upgraded Milton Fen level crossing will have a minimal impact on the performance of the network and will not cause any significant issues.

# 3 WATERBEACH VISSIM MODEL

## 3.1 Traffic Data

3.1.1 The barrier down time of the Do-Nothing and Do-something scenario has been updated in line with Table 1.4 and Table 1.5.

3.1.2 Figure 3.1 and Figure 3.2 show the barrier down time across the peak periods. A longer barrier down time in line with Table 1.6 is observed in the Do-Something. It was observed that this longer barrier down time allows multiple trains to pass through at once, whilst the shorter barrier down time only allows one train to pass through at a time.

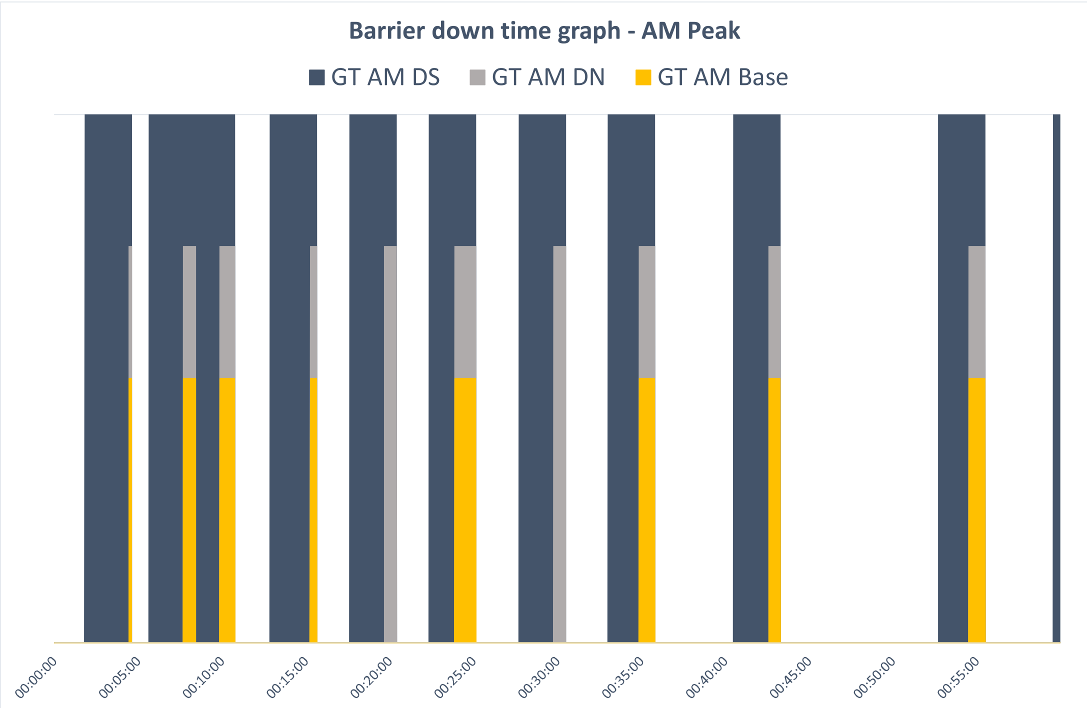



**FIGURE 3.1: BARRIER DOWN TIMES – WATERBEACH – AM**

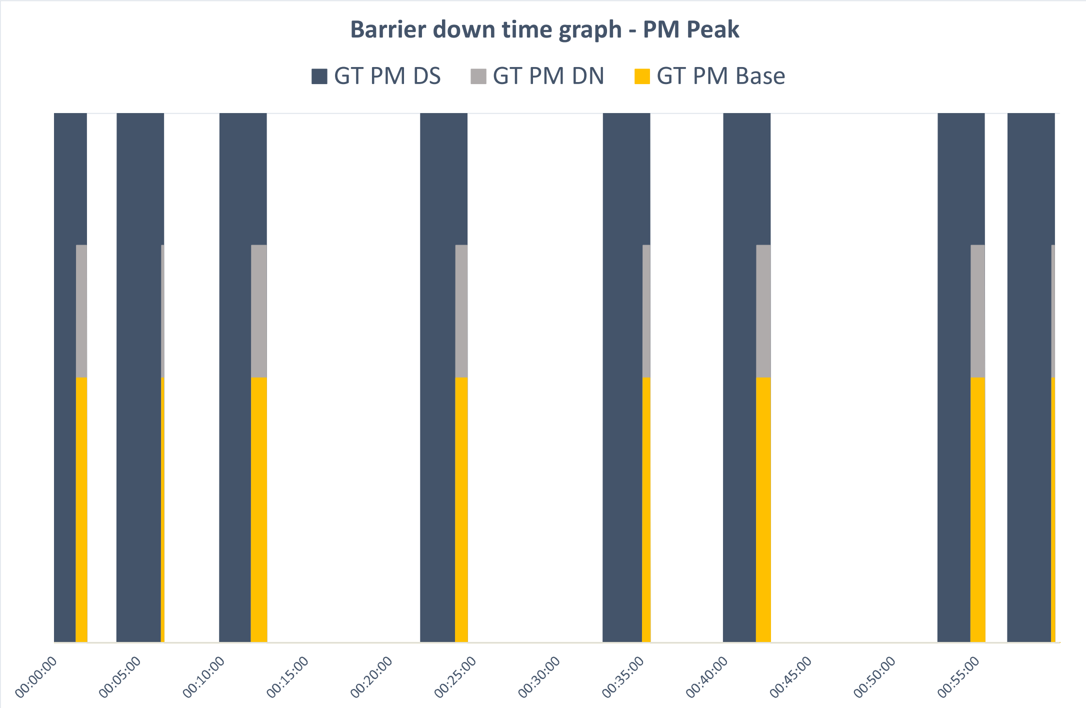



**FIGURE 3.2: BARRIER DOWN TIMES – WATERBEACH – PM**

3.1.3 Census data have been captured and compared for year 2018, 2021 and 2022 at the Waterbeach level crossing as shown in Figure 3.1and Figure 3.2.

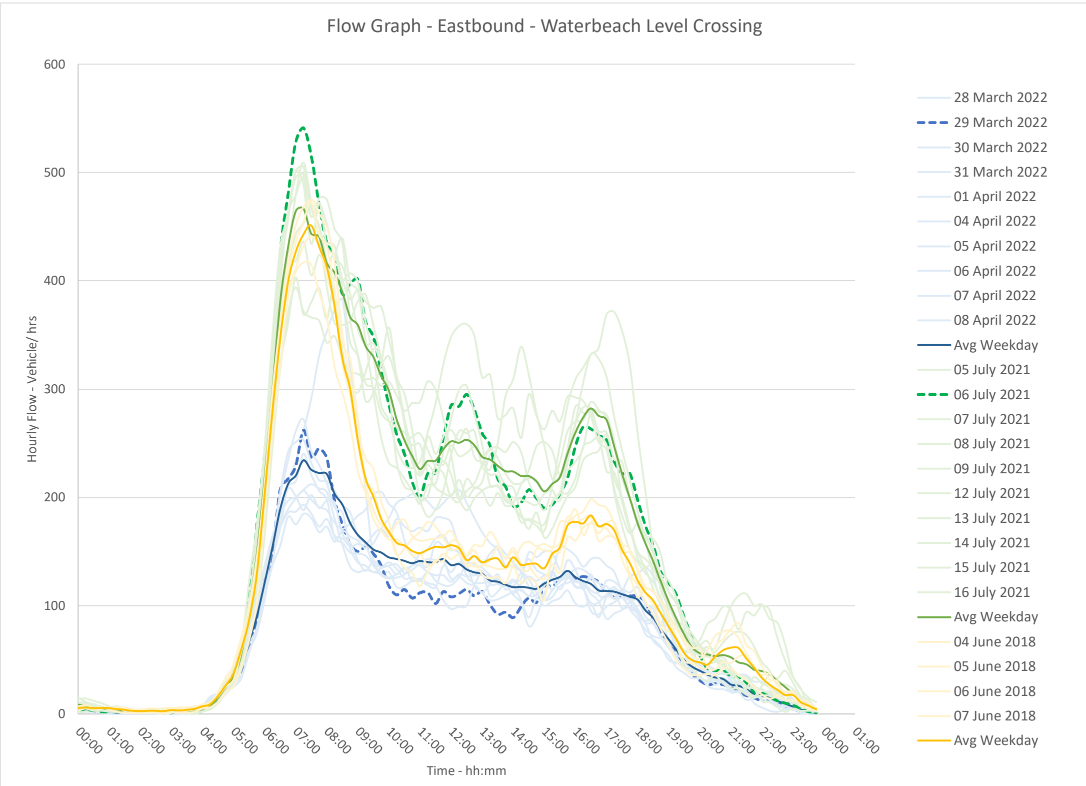



**FIGURE 3.3: EASTBOUND HOURLY TRAFFIC FLOW**

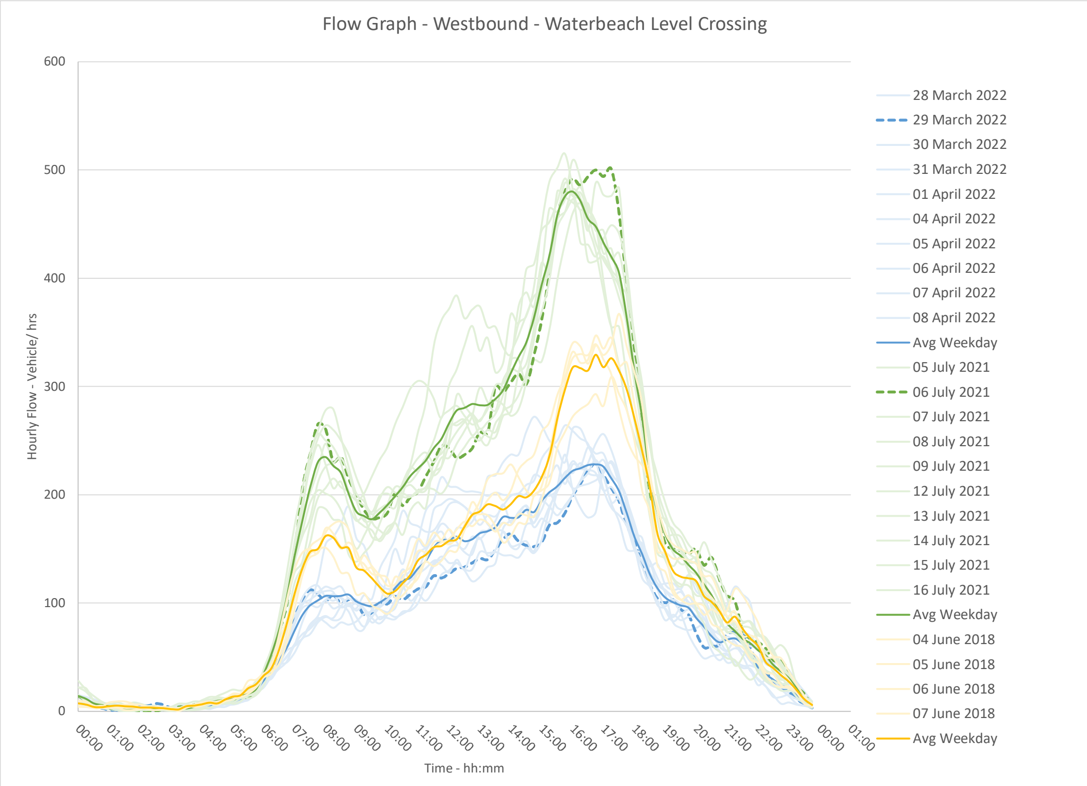



**FIGURE 3.4: WESTBOUND HOURLY TRAFFIC FLOW**

3.1.4 The data presented includes weekday hourly flow data only and weekend has been excluded. The data shows that the traffic pattern is tidal across the day with a high number of vehicles travelling eastbound during the morning peak and westbound during the afternoon peak period.

3.1.5 The 2021 data shows high traffic levels in both directions due to road works on the A10 near the A14 interchange. Congestion around the interchange has encouraged drivers to divert through Waterbeach, which consequently made the data invalid because it is not representative of a typical weekday. As a result, this data has not been used to assess the scheme.

3.1.6 Data was also captured outside COVID-19 restrictions in 2018 and 2022. It shows that the data captured in 2022 is lower than in 2018 in both peak periods. Discussions have taken place with Cambridge County Council (CCC) regarding the validity of the 2022 and they are currently reviewing traffic level across the county. CCC have observed instability in the dataset post COVID-19, however traffic levels were periodically back to normal level. It was agreed to proceed with a sensitivity test to assess the impact of the 2018 data on the network as a wort-case situation.

3.1.7 Three scenarios have been tested as part of this assessment and consists of the following:

- **DN** - 2023 Do-Nothing Scenario
- **DS 1** - 2023 Do-Something Scenario based on the 2022 Data and with the Train Station Relocation
- **DS 2** - Sensitivity test - 2023 Do-Something Scenario based on the 2018 Data and with the Train Station Relocation

3.1.8 A full planning application was granted for the relocation of the Waterbeach Train Station. The relocated station planning application was designed to Network Rail's GRIP 3 stage. The station relocation is linked to the outline planning application for Waterbeach New Town (as enabling works), which then went through the planning process as a separate application and received outline approval in January 2021.

3.1.9 The scheme includes the relocation of the Train Station as well as its car park as shown in Figure 3.5. It is estimated that the relocation of the car park will reduce the number of trips across the level crossing and will consequently improve its safety.

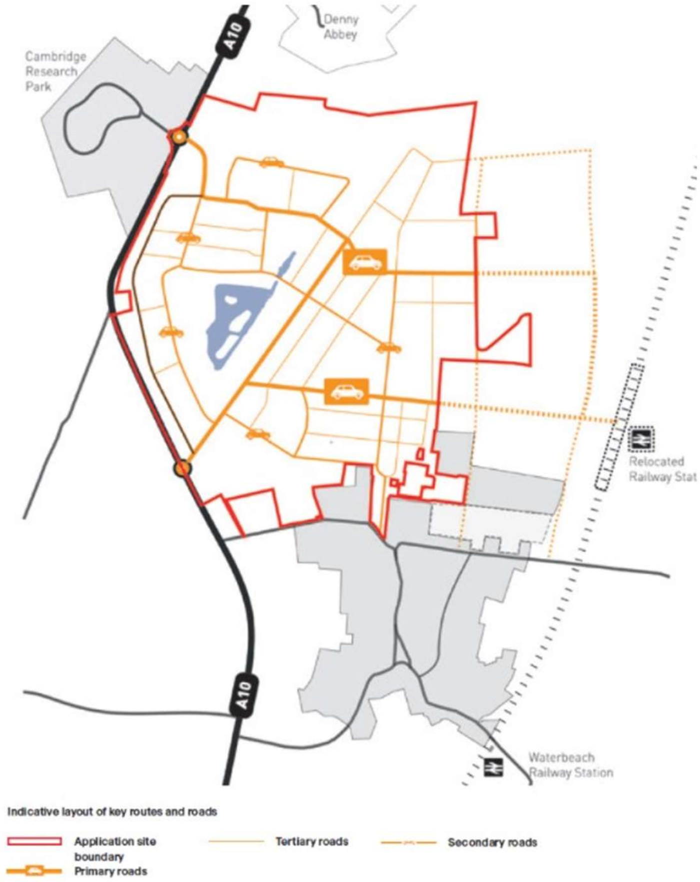



**FIGURE 3.5: WATERBEACH TRAIN STATION RELOCATION**

3.1.10 The network performance table shows that the average delay will not exceed 1 minute and that there is no latent demand. It also show a small decrease in average speed.

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |
| AM | 18.7 | 25.8 | 39.6 | 7.2 | 21.0 |
| | | | | | |

**TABLE 3.1: NETWORK PERFORMANCE – AVERAGE DELAY**

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |
| AM | 29.7 | 27.9 | 24.8 | -1.8 | -4.8 |
| | | | | | |

**TABLE 3.2: NETWORK PERFORMANCE – AVERAGE SPEED (MPH)**

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |
| AM | 0 | 0 | 0 | 0.0 | 0.0 |
| | | | | | |

**TABLE 3.3: NETWORK PERFORMANCE – LATENT DEMAND**

3.1.11 The proposed upgraded level crossing will increase the journey times as a result of the longer barrier down time, however this is by less than 1 minute on average and is not considered significant.

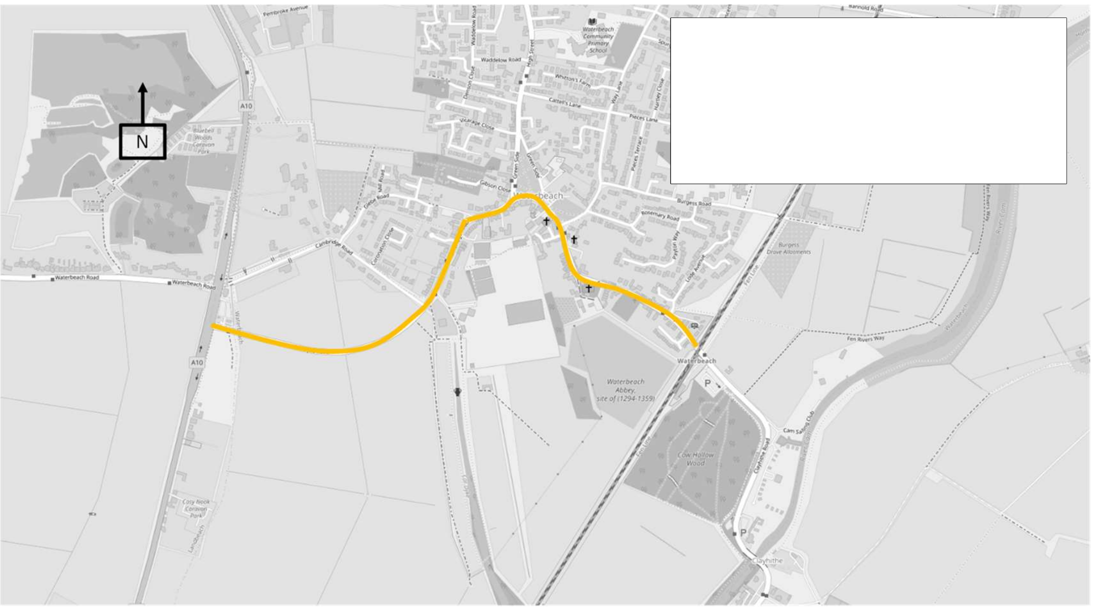



**FIGURE 3.6: JOURNEY TIME ROUTE**

| Journey time (s) | | | | | | |
|---|---|---|---|---|---|---|
| Direction | Peak | DN | DS1 | DS2 | Diff. DS1 DN | Diff. DS2 DN |
| EB | AM | 127 | 180 | 180 | 53 | 53 |
| EB | PM | 131 | 169 | 175 | 37 | 44 |
| WB | AM | 132 | 136 | 136 | 4 | 4 |
| WB | PM | 132 | 136 | 190 | 4 | 58 |

**TABLE 3.4: JOURNEY TIME TABLE**

3.1.12 The maximum queue length will increase considerably in the eastbound direction in scenario 2, by up to 525 metres during the AM peak period. This queue is expected to be present for 30 minutes during the AM peak hour. The impact of the upgraded crossing increases exponentially when the queue reaches the section of on-street parking described in Figure 3.7. The complex interaction between vehicles giving way to each other along Station Road contributes to reducing the throughput considerably. The Do-Something 1 scenario is based on 2022 data and shows a best-case situation, with queue increases of 175m for approximately 5 minutes, which is acceptable.


**FIGURE 3.7: ON STREET PARKING LOCATION**

| Queue Length (m) | | | | |
|---|---|---|---|---|
| | AM | | PM | |
| Direction | Max | Avg | Max | Avg |
| DN Eastbound | 37 | 11 | 13 | 4 |
| DS1 Eastbound | 212 | 48 | 46 | 19 |
| DS2 Eastbound | 562 | 214 | 67 | 28 |
| Diff. DS1 DN | 175 | 37 | 33 | 15 |
| Diff. DS2 DN | 525 | 203 | 53 | 24 |
| DN Westbound | 12 | 4 | 24 | 8 |
| DS1 Westbound | 52 | 15 | 76 | 32 |
| DS2 Westbound | 70 | 20 | 118 | 50 |
| Diff. DS1 DN | 40 | 11 | 52 | 24 |
| Diff. DS2 DN | 58 | 17 | 94 | 42 |

**TABLE 3.5: QUEUE LENGTHS – WATERBEACH**

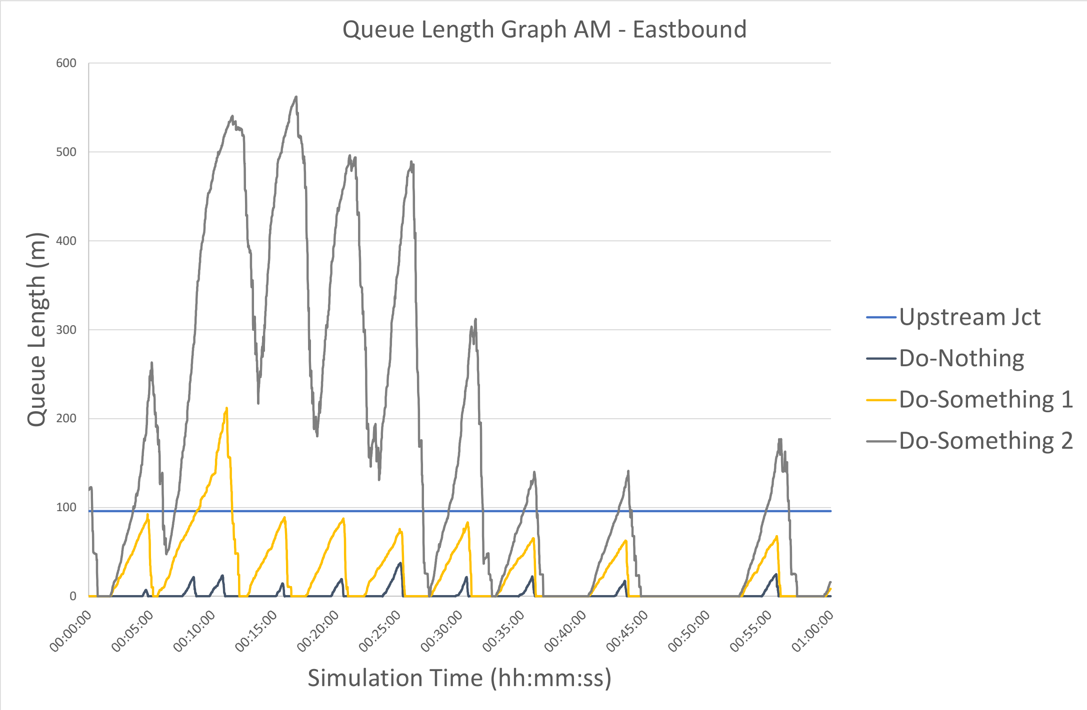



**FIGURE 3.8: QUEUES – EASTBOUND – AM PEAK – WATERBEACH**

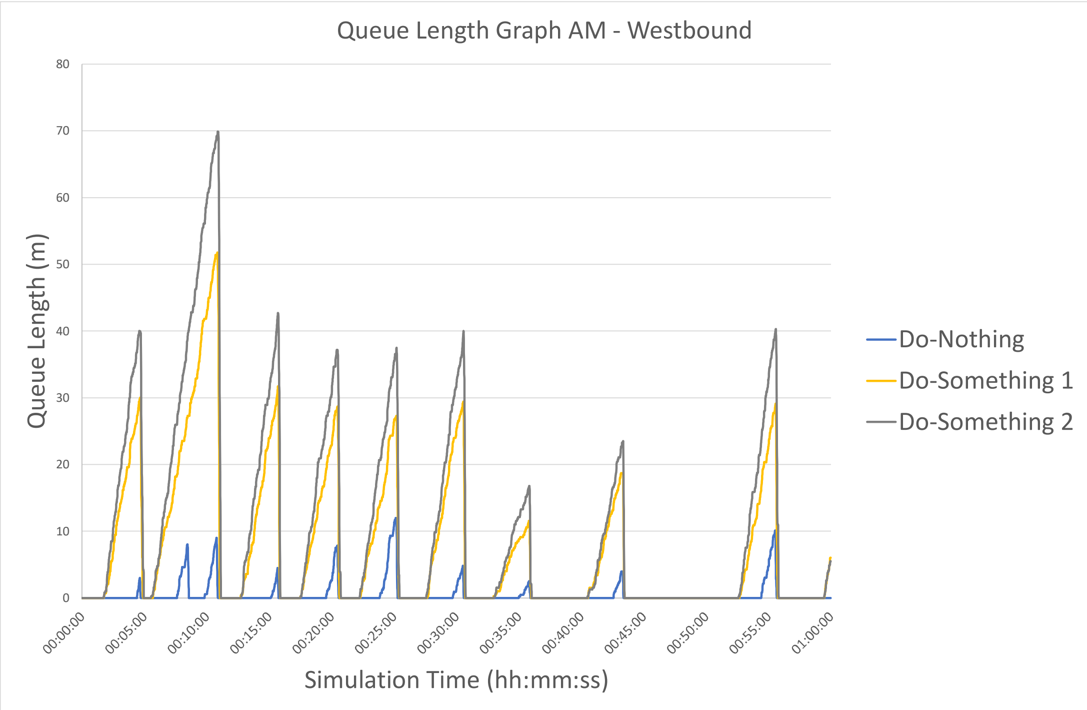



**FIGURE 3.9: QUEUES – WESTBOUND – AM PEAK – WATERBEACH**

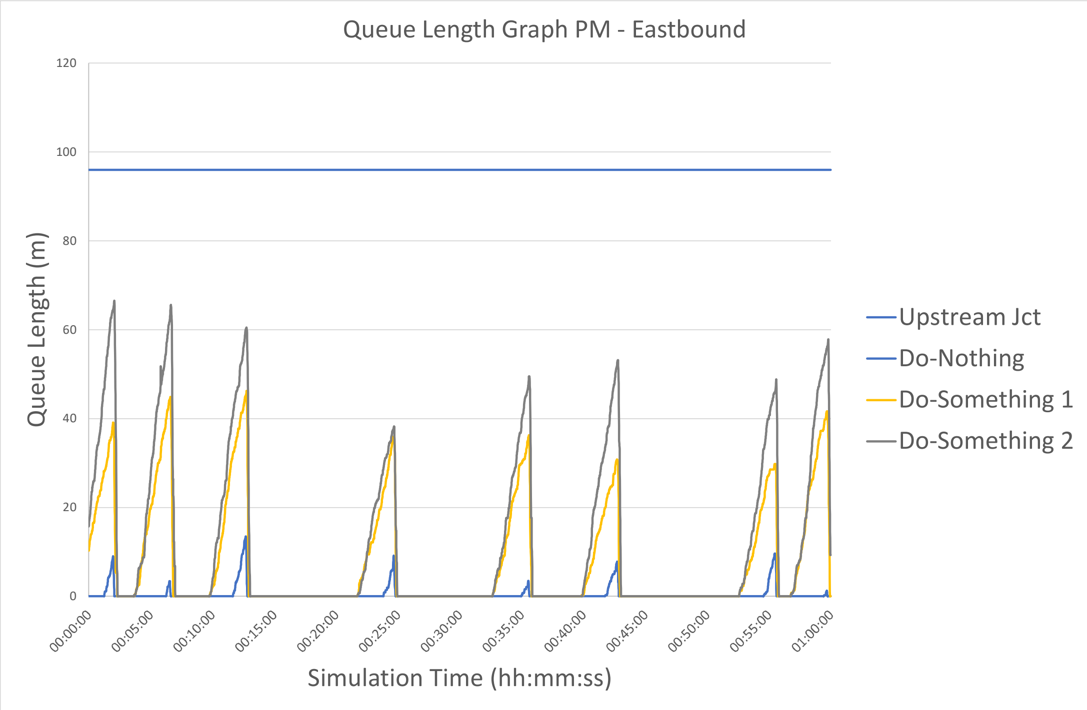



**FIGURE 3.10: QUEUES – EASTBOUND – PM PEAK – WATERBEACH**

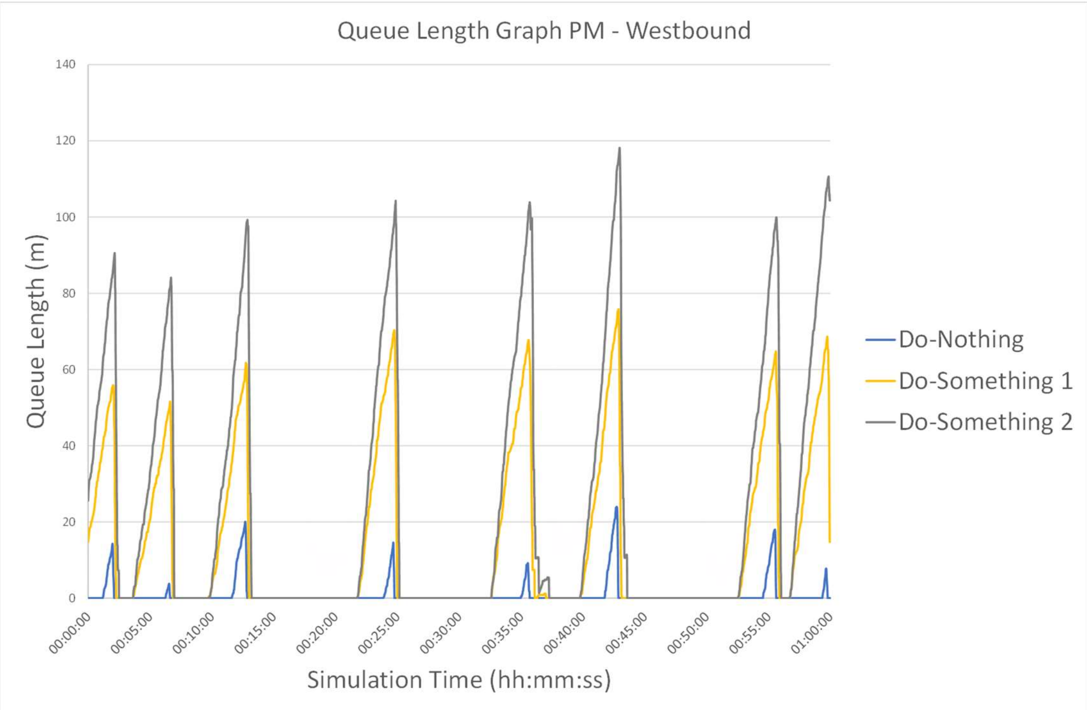



**FIGURE 3.11: QUEUES – WESTBOUND – PM PEAK – WATERBEACH**

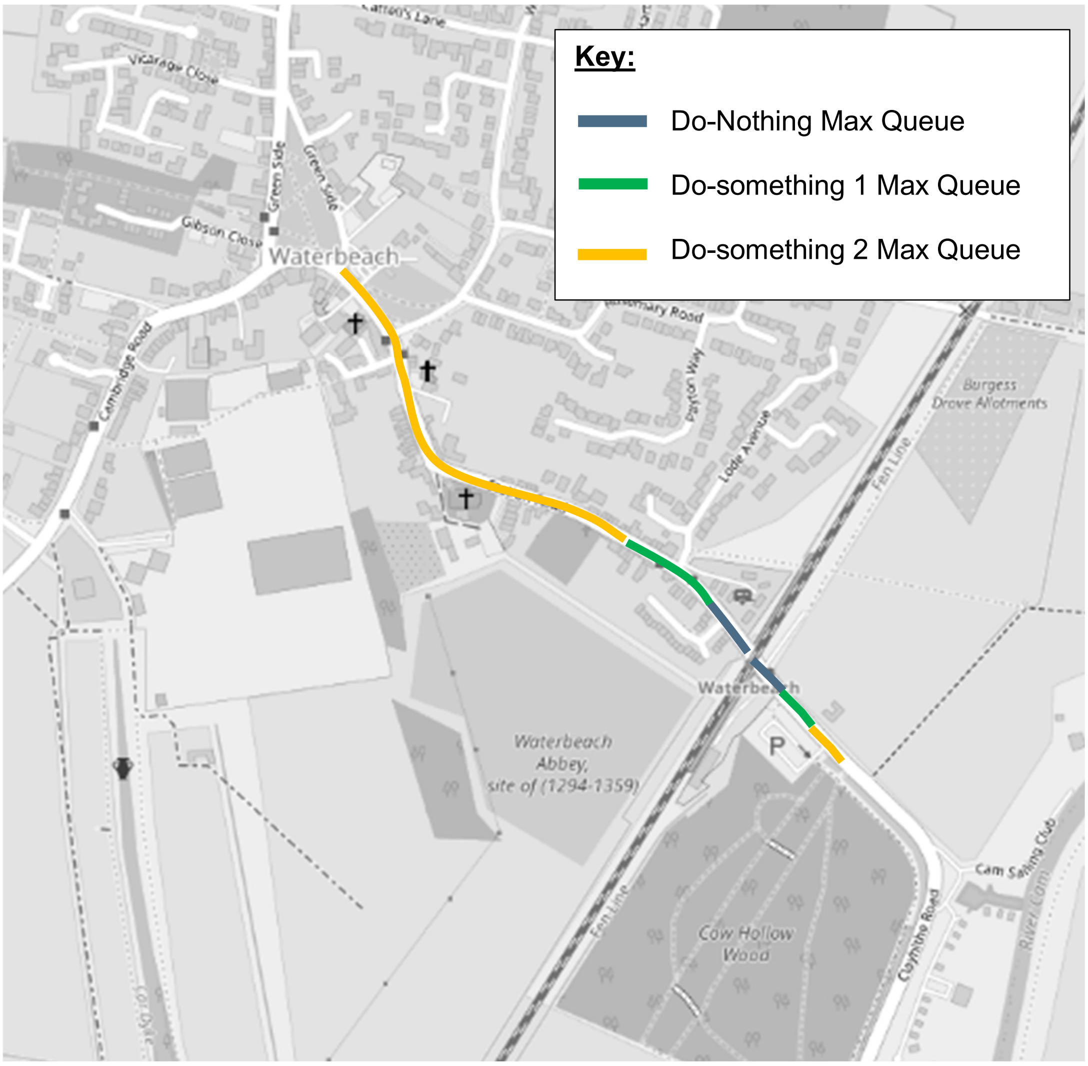



**FIGURE 3.12: MAXIMUM QUEUE LENGTHS - WATERBEACH**

## 3.2 Conclusion

3.2.1 It can be concluded that the impact of the upgraded level crossing will have a significant impact if the 2018 data is compared. However, the best-case situation shows an acceptable level of queuing in the eastbound direction when the 2022 data is used. There are encouraging signs that the level of traffic has dropped in 2022 compared to 2018 and Cambridge County Council is actively monitoring the level of traffic across the county to confirm that traffic levels are back to normal - post pandemic.

3.2.2 The current on-street parking conditions on Station Road reduces the throughput of the eastbound movement and access to driveways and side roads will need to be addressed with potential yellow boxes suggested as one possible mitigation measure.

# 4 DIMMOCKS COTE VISSIM MODEL

## 4.1 Traffic Data

4.1.1 The barrier down time of the Do-Nothing and Do-something scenario has been updated in line with Table 1.4 and Table 1.5.

4.1.2 Figure 4.1 and Figure 4.2 show the barrier down time across the peak period. A longer barrier down time in line with Table 1.6 is observed in the Do-Something. It was observed that this longer barrier down time allows multiple trains to pass through at once, whilst the shorter barrier down time only allows one train to pass through at a time.

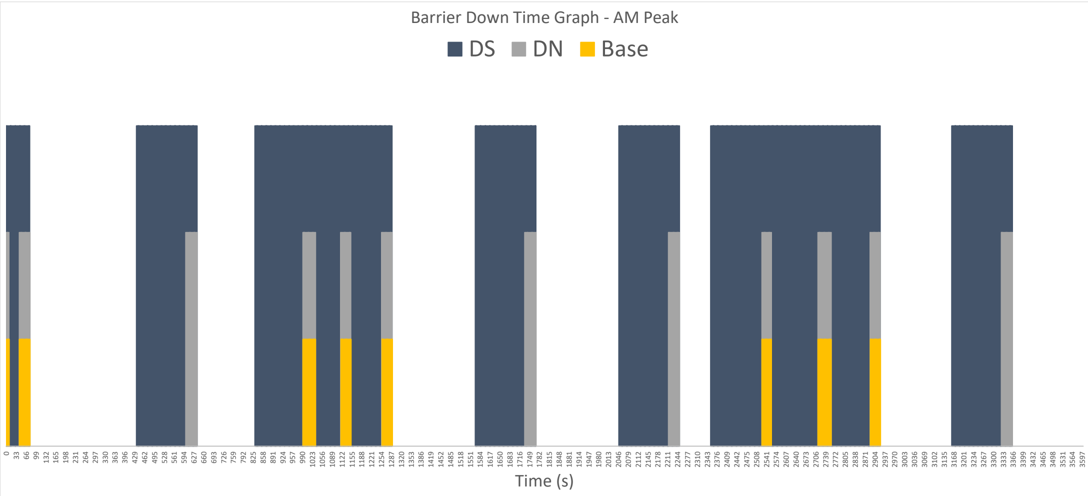



**FIGURE 4.1: BARRIER DOWN TIMES – DIMMOCKS COTE – AM**

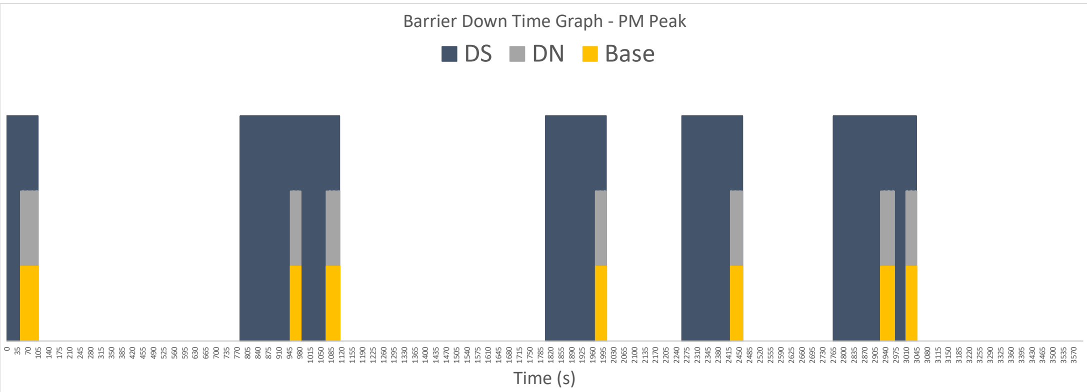



**FIGURE 4.2: BARRIER DOWN TIMES – DIMMOCKS COTE – PM**

4.1.3 The network performance table shows that the average delay will not exceed 2 minutes with the upgraded level crossing in place. There is also no latent demand which indicates that all traffic can enter the network.

| | Average Delay (s) | | | Average Speed (mph) | | | Latent Demand | |
|---|---|---|---|---|---|---|---|---|
| Peak | DN | DS | Diff. | DN | DS | Diff. | DN | DS |
| AM | 6.5 | 109.9 | 103.4 | 52.0 | 23.6 | -28.4 | 0 | 0 |
| PM | 6.3 | 48.2 | 41.9 | 52.3 | 35.3 | -17.0 | 0 | 0 |

**TABLE 4.1: NETWORK PERFORMANCE – DIMMOCKS COTE**

4.1.4 The proposed upgrade to the level crossing will increase the journey times by 45-116s in both directions during both peak periods. Whilst this increase is around 124% more than in the Do-Nothing scenario, the lack of alternative routes available means that drivers are likely to wait for longer to pass the crossing.


**FIGURE 4.3: JOURNEY TIME ROUTE – DIMMOCKS COTE**

| Journey Time (s) | | | | |
|---|---|---|---|---|
| Direction | Peak | DN | DS | Diff. |
| EB | AM | 91.5 | 205.5 | 113.9 |
| EB | PM | 90.9 | 136.9 | 46.0 |
| WB | AM | 91.3 | 208.3 | 116.9 |
| WB | PM | 90.4 | 135.5 | 45.1 |

**TABLE 4.2: JOURNEY TIMES – DIMMOCKS COTE**

4.1.5 The queue length comparisons show that there will be increases in both the eastbound and westbound directions. When considering the maximum queue lengths, the westbound direction in the AM peak has the highest increase (244m), whist there are increases of 216m, 133m and 124m for the other maximum queue results.

4.1.6 The average queue lengths all increase by around 46-66m with the upgraded level crossing.

| Queue Length (m) | | | | |
|---|---|---|---|---|
| | AM | | PM | |
| Direction | Max | Avg | Max | Avg |
| DN Eastbound | 15 | 5 | 26 | 9 |
| DS Eastbound | 230 | 71 | 159 | 62 |
| Diff. | 216 | 66 | 133 | 53 |
| DN Westbound | 17 | 6 | 18 | 7 |
| DS Westbound | 261 | 89 | 142 | 52 |
| Diff. | 244 | 83 | 124 | 46 |

**TABLE 4.3: QUEUE LENGTHS – DIMMOCKS COTE**

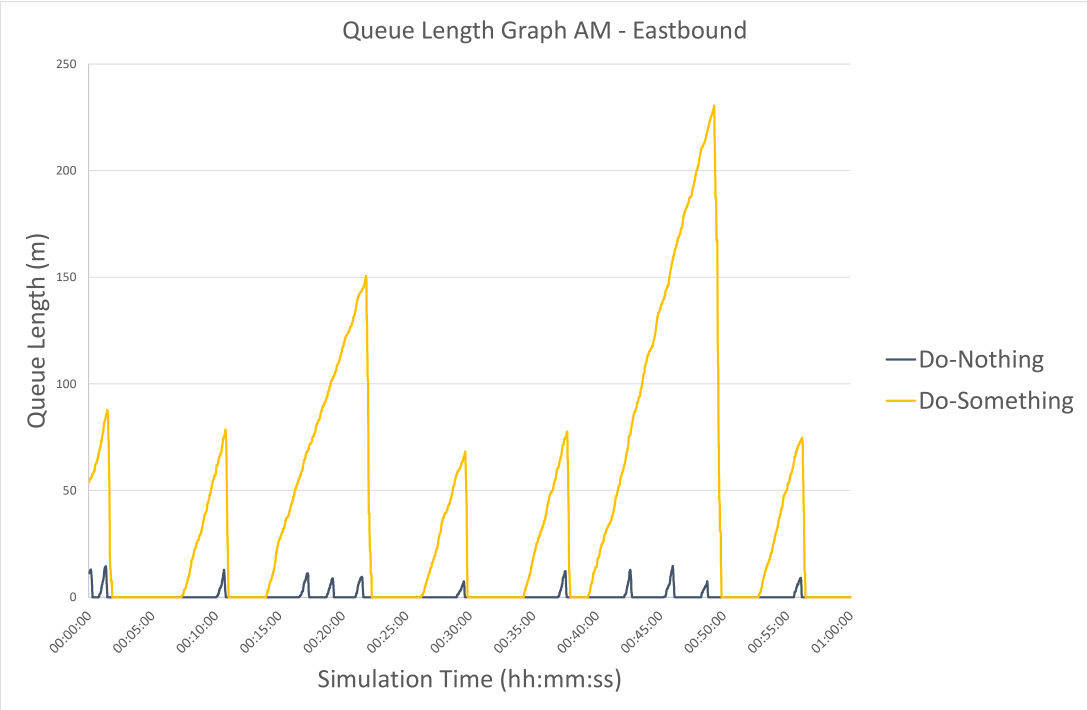



**FIGURE 4.4: QUEUES – EASTBOUND - AM PEAK – DIMMOCKS COTE**

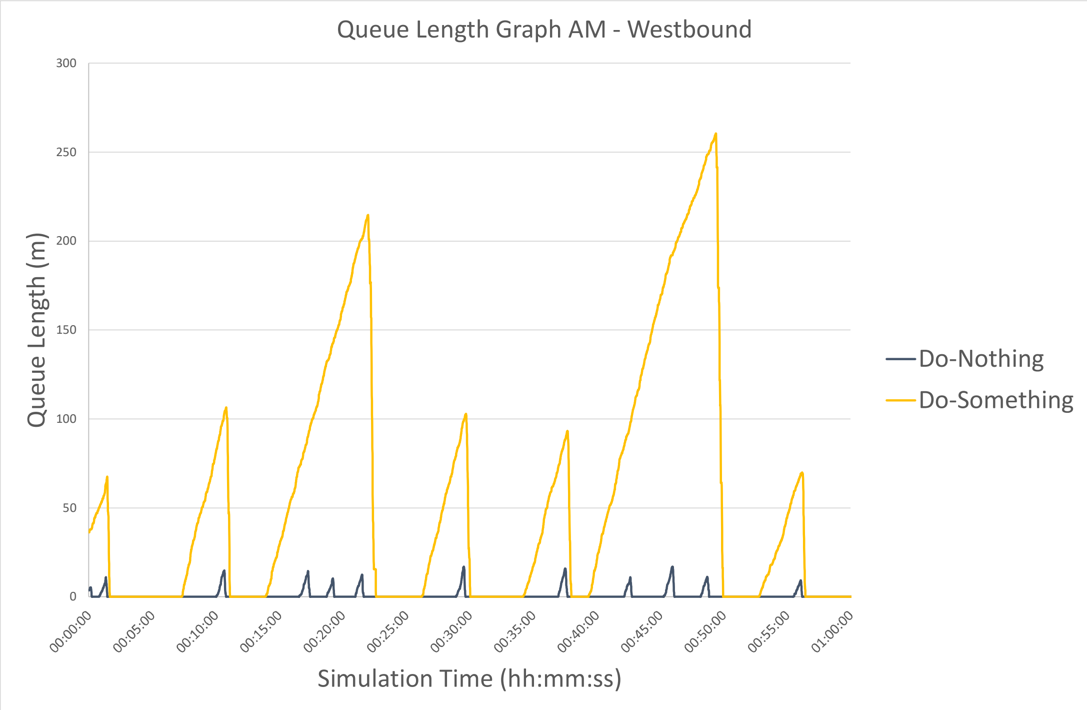



**FIGURE 4.5: QUEUES – WESTBOUND - AM PEAK – DIMMCOKS COTE**

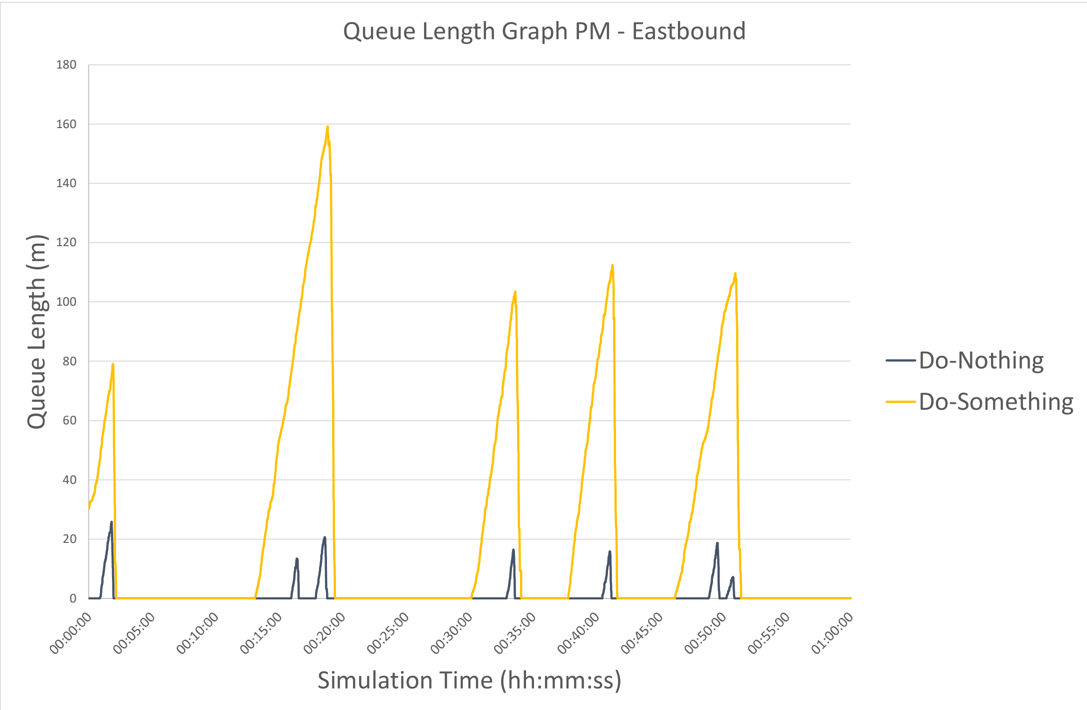



**FIGURE 4.6: QUEUES – EASTBOUND – PM PEAK – DIMMOCKS COTE**

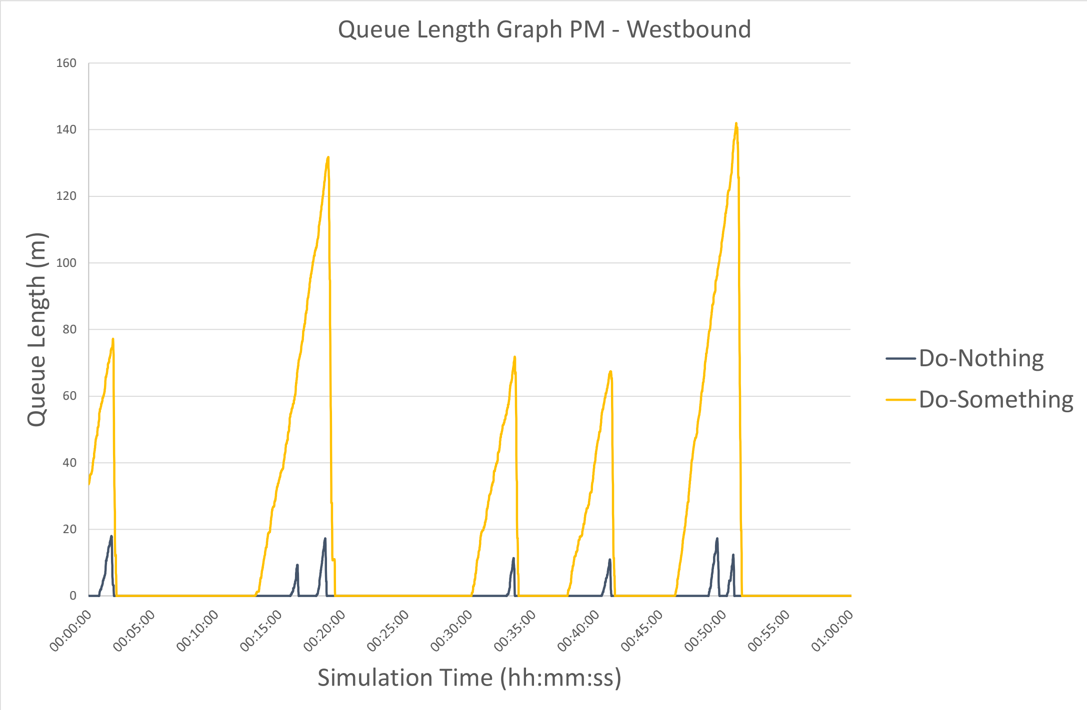



**FIGURE 4.7: QUEUES – WESTBOUND – PM PEAK – DIMMOCKS COTE**


**FIGURE 4.8: MAXIMUM QUEUE LENGTHS – DIMMOCKS COTE**

## 4.2 Conclusion

4.2.1 The proposed upgrade to the level crossing at Dimmocks Cote will have an impact on the journey times and queue lengths at this location. However, it is felt that the impacts will be limited to this location, as there are no other feasible alternative routes for drivers to take. Drivers are likely therefore to sit in the queue and wait for the barriers to open to proceed.

# 5 CROXTON VISSIM MODEL

## 5.1 Traffic Data

5.1.1 The barrier down time of the Do-Nothing and Do-something scenario has been updated in line with Table 1.4 and Table 1.5.

5.1.2 Figure 5.1 and Figure 5.2 show the barrier down time across the peak period. A longer barrier down time in line with Table 1.6 is observed in the Do-Something. It was observed that this longer barrier down time allows multiple trains to pass through at once, whilst the shorter barrier down time only allows one train to pass through at a time.

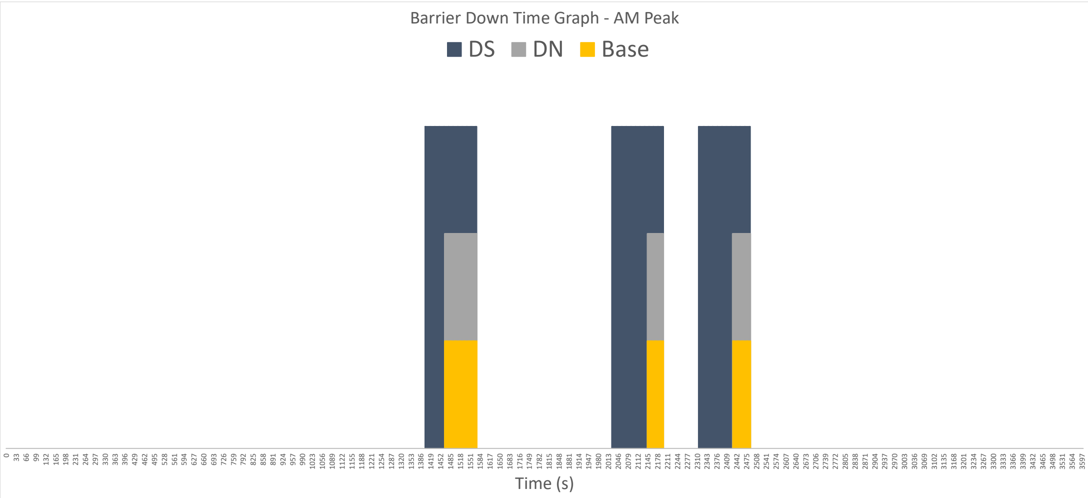



**FIGURE 5.1: BARRIER DOWN TIMES– CROXTON – AM**

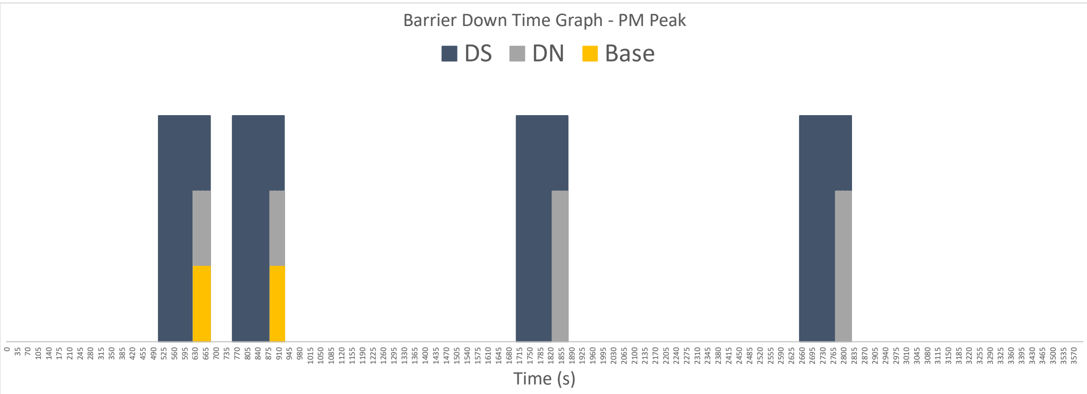



**FIGURE 5.2: BARRIER DOWN TIMES– CROXTON – PM**

5.1.3 The network performance table shows that the average delay will not exceed 1 minute with the upgraded level crossing. This, along with no latent demand indicate that all traffic can enter the network.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | | | | | | |
| | 18.3 | 36.4 | 18.1 | 41.4 | 37.1 | -4.3 | 0 | 0 |

**TABLE 5.1: NETWORK PERFORMANCE - CROXTON**

5.1.4 The proposed increase barrier down time will increase the journey time by less than 1 minute for both directions during both peak periods. This is not considered a significant increase.


**FIGURE 5.3: JOURNEY TIME ROUTE - CROXTON**

| Journey time (s) | | | | |
|---|---|---|---|---|
| Direction | Peak | DN | DS | Diff. |
| EB | AM | 171 | 184 | 13 |
| EB | PM | 163 | 183 | 20 |
| WB | AM | 164 | 173 | 9 |
| WB | PM | 169 | 188 | 19 |

**TABLE 5.2: JOURNEY TIMES - CROXTON**

5.1.5 The upgraded level crossing will increase the average and maximum queues. The biggest of these increases is the maximum queue eastbound in the PM peak, where there is an additional 80m of queue.

5.1.6 Whilst there are increases in the queue lengths, the modest increases in journey times and lack of viable alternative routes means that drivers will likely wait for the barrier to open before progressing with their journey.

| Queue Length (m) | | | | |
|---|---|---|---|---|
| | AM | | PM | |
| Direction | Max | Avg | Max | Avg |
| DN Eastbound | 43 | 13 | 35 | 14 |
| DS Eastbound | 71 | 23 | 115 | 57 |
| Diff. | 28 | 10 | 80 | 43 |
| DN Westbound | 73 | 26 | 23 | 8 |
| DS Westbound | 134 | 63 | 83 | 37 |
| Diff. | 62 | 37 | 60 | 29 |

**TABLE 5.3: QUEUE LENGTHS – CROXTON**

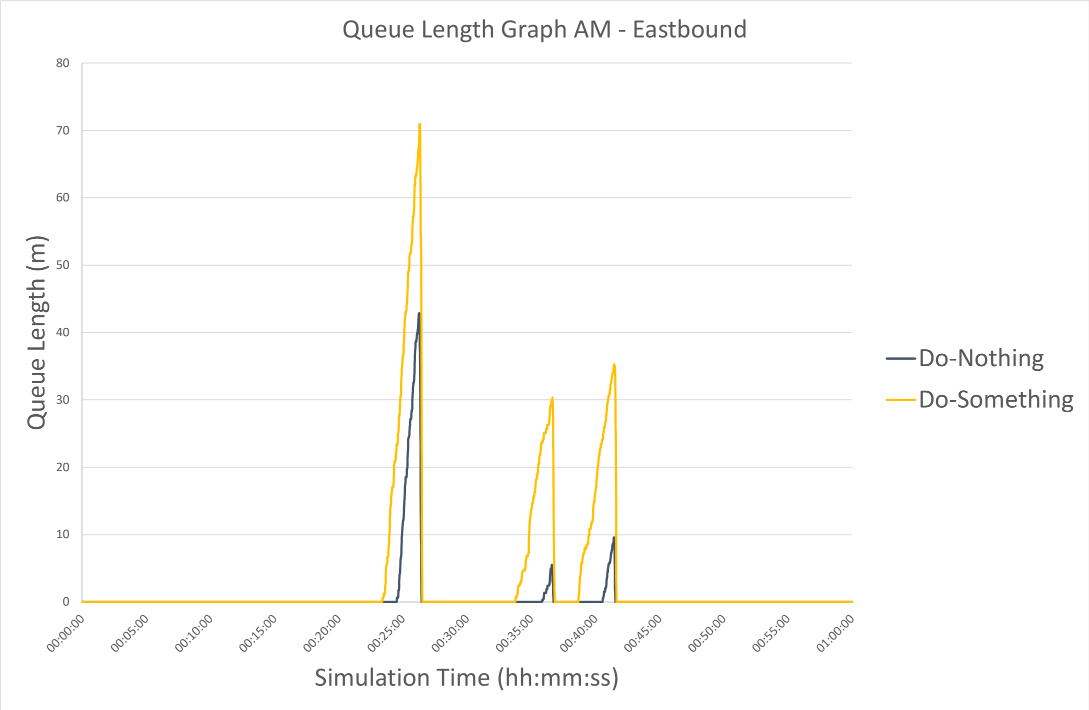



**FIGURE 5.4: QUEUES – EASTBOUND – AM PEAK – CROXTON**

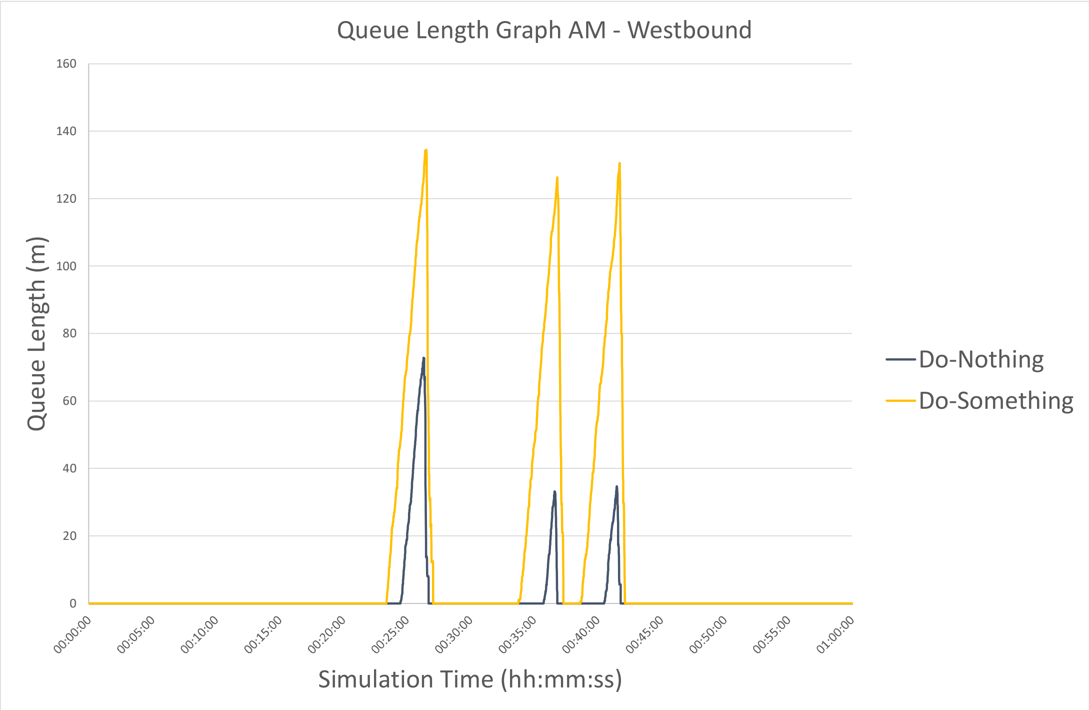



**FIGURE 5.5: QUEUES – WESTBOUND – AM PEAK – CROXTON**

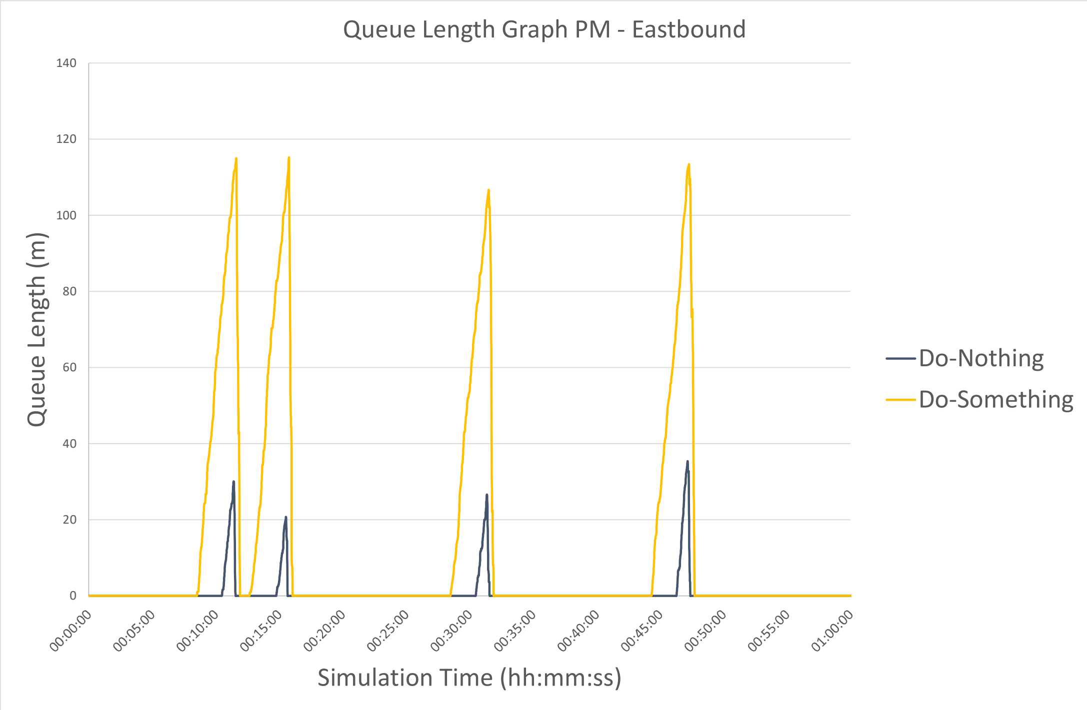



**FIGURE 5.6: QUEUES – EASTBOUND – PM PEAK – CROXTON**

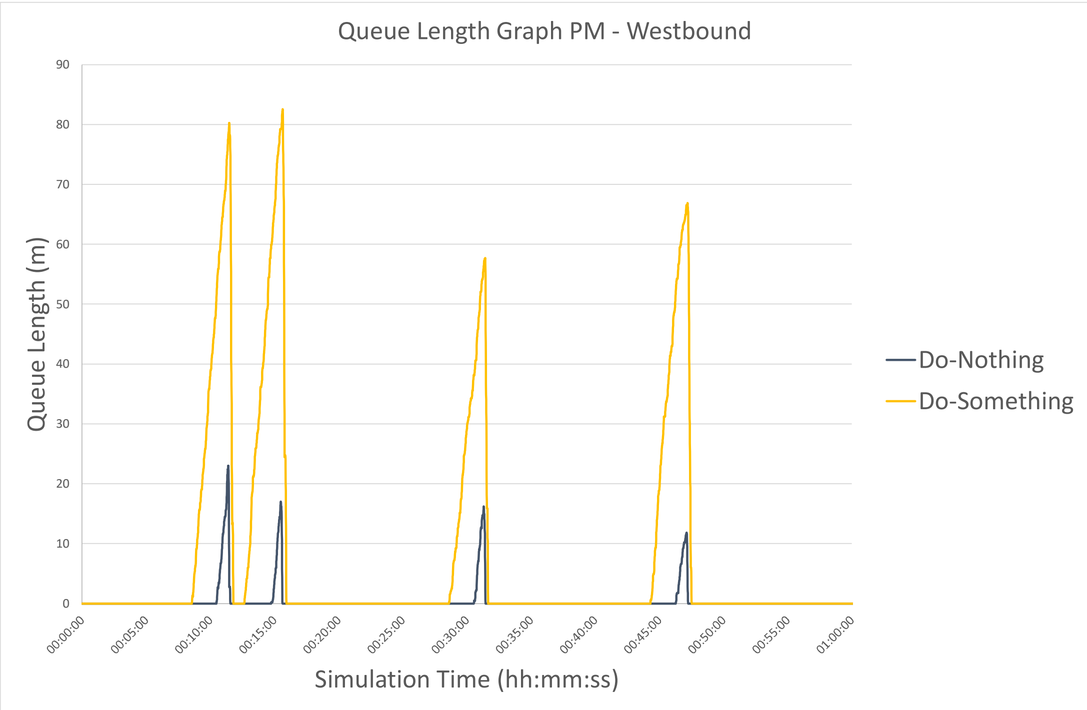



**FIGURE 5.7: QUEUES – WESTBOUND – PM PEAK – CROXTON**

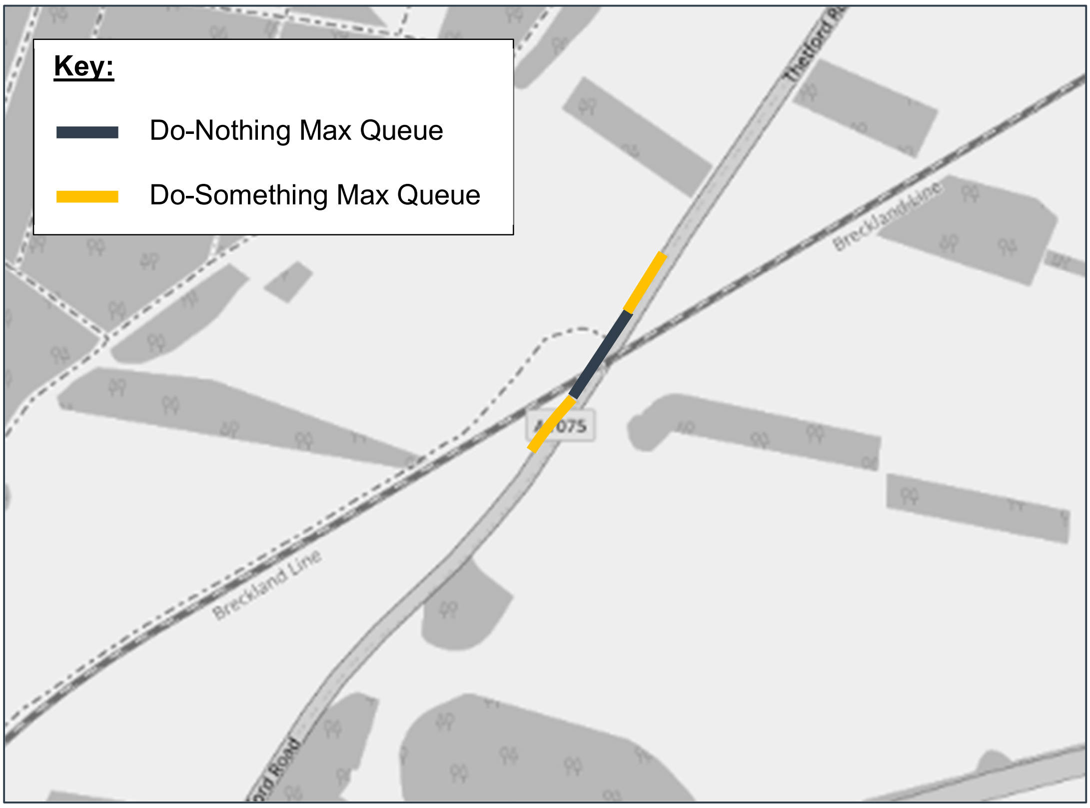



**FIGURE 5.8: MAXIMUM QUEUE LENGTHS - CROXTON**

## 5.2 Conclusion

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

# 6 SIX MILE BOTTOM VISSIM MODEL

## 6.1 Traffic Data

6.1.1 The barrier down time of the Do-Nothing and Do-something scenario has been updated in line with Table 1.4 and Table 1.5.

6.1.2 Figure 6.1 and Figure 6.2 show the barrier down time across the peak period. A longer barrier down time in line with Table 1.6 is observed in the Do-Something. It was observed that this longer barrier down time allows multiple trains to pass through at once, whilst the shorter barrier down time only allows one train to pass through at a time.

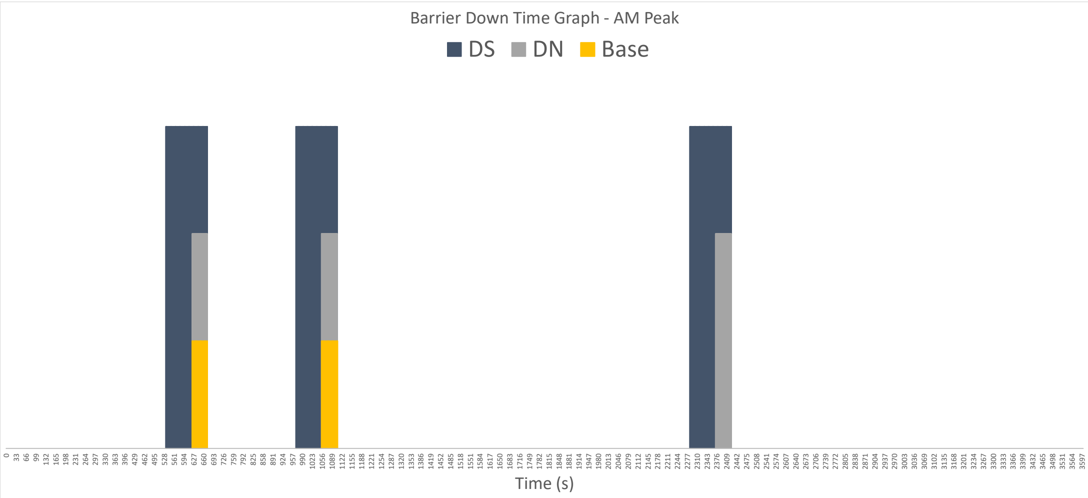



**FIGURE 6.1: BARRIER DOWN TIMES – SIX MILE BOTTOM – AM**

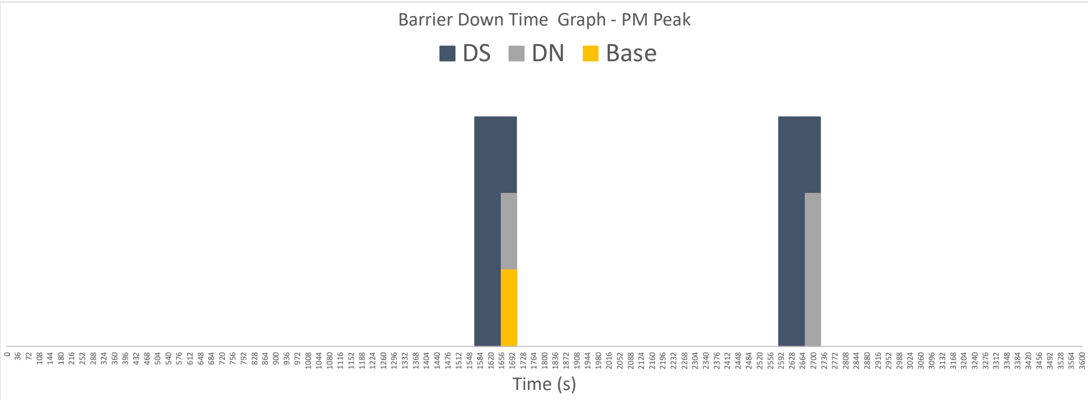



**FIGURE 6.2: BARRIER DOWN TIMES – SIX MILE BOTTOM – PM**

6.1.3 The network performance table shows that the average delay will not exceed 1 minute with the upgraded level crossing. However, this is a significant increase on the Do-Nothing scenario.

6.1.4 There is no latent demand in the model, which indicates that all traffic can enter the network.

| | Average Delay (s) | | | Average Speed (mph) | | | Latent Demand | |
|---|---|---|---|---|---|---|---|---|
| **Peak** | **DN** | **DS** | **Diff.** | **DN** | **DS** | **Diff.** | **DN** | **DS** |
| **AM** | 16.7 | 30.4 | 13.7 | 33.4 | 29.9 | -3.5 | 0 | 0 |
| **PM** | 25.1 | 35.5 | 10.4 | 31.5 | 29.2 | -2.3 | 0 | 0 |

**TABLE 6.1: NETWORK PERFORMANCE – SIX MILE BOTTOM**

6.1.5 The proposed upgrade to the level crossing will increase the journey times, with increases of 6-12s observed. However, as there are no viable alternative routes, drivers will likely wait for the barrier to open before progressing with their journey.


**FIGURE 6.3: JOURNEY TIME ROUTE – SIX MILE BOTTOM**

| Journey time (s) | | | | |
|---|---|---|---|---|
| Direction | Peak | DN | DS | Diff. |
| EB | AM | 138 | 150 | 11 |
| EB | PM | 158 | 169 | 12 |
| WB | AM | 129 | 141 | 12 |
| WB | PM | 115 | 121 | 6 |

**TABLE 6.2: JOURNEY TIMES – SIX MILE BOTTOM**

With the upgraded level crossing in place, there are some considerable increases in the queue lengths. The Westbound direction in the PM peak will increases, with an average queue increase of 71m and a maximum queue increase of 147m. This will have an impact on the A1304 London Road / Brinkley Road junction and the queue on Brinkley Road in the westbound direction will reach the level crossing located further upstream. This will have some safety implications which will need to be reviewed further.

6.1.6 In the eastbound direction, the queues are likely to reach the slip road from the A11. Whilst these do not look like directly impacting on the A11, it is recommended that National Highways are consulted to understand their views on this queuing.

| Queue Length (m) | | | | |
|---|---|---|---|---|
| | AM | | PM | |
| Direction | Max | Avg | Max | Avg |
| DN Eastbound | 43 | 18 | 162 | 24 |
| DS Eastbound | 119 | 42 | 485 | 110 |
| Diff. | 76 | 25 | 322 | 87 |
| DN Westbound | 95 | 43 | 25 | 11 |
| DS Westbound | 242 | 114 | 81 | 38 |
| Diff. | 147 | 71 | 56 | 27 |

**TABLE 6.3: QUEUE LENGTHS – SIX MILE BOTTOM**

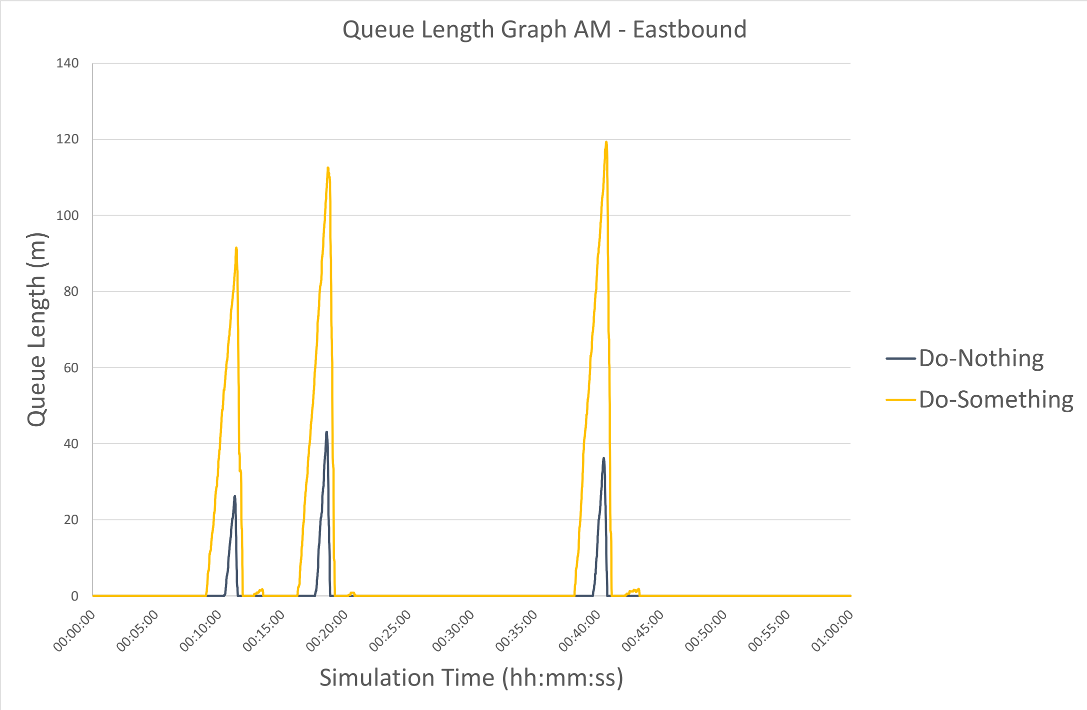



**FIGURE 6.4: QUEUES – EASTBOUND – AM PEAK – SIX MILE BOTTOM**

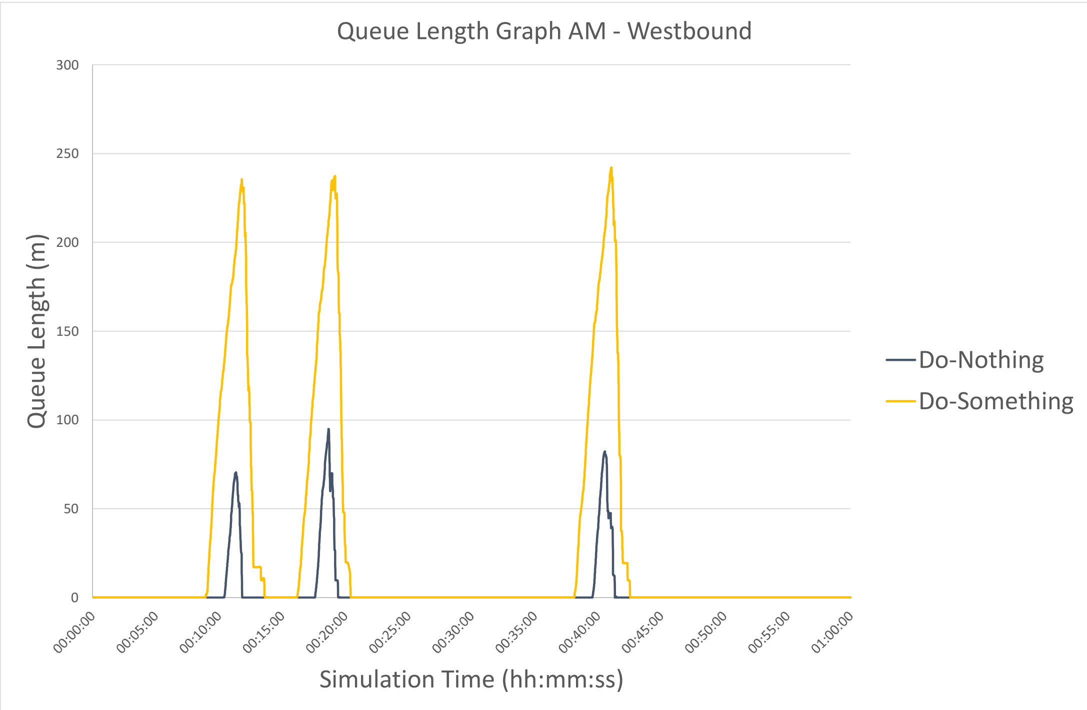



**FIGURE 6.5: QUEUES – WESTBOUND – AM PEAK – SIX MILE BOTTOM**

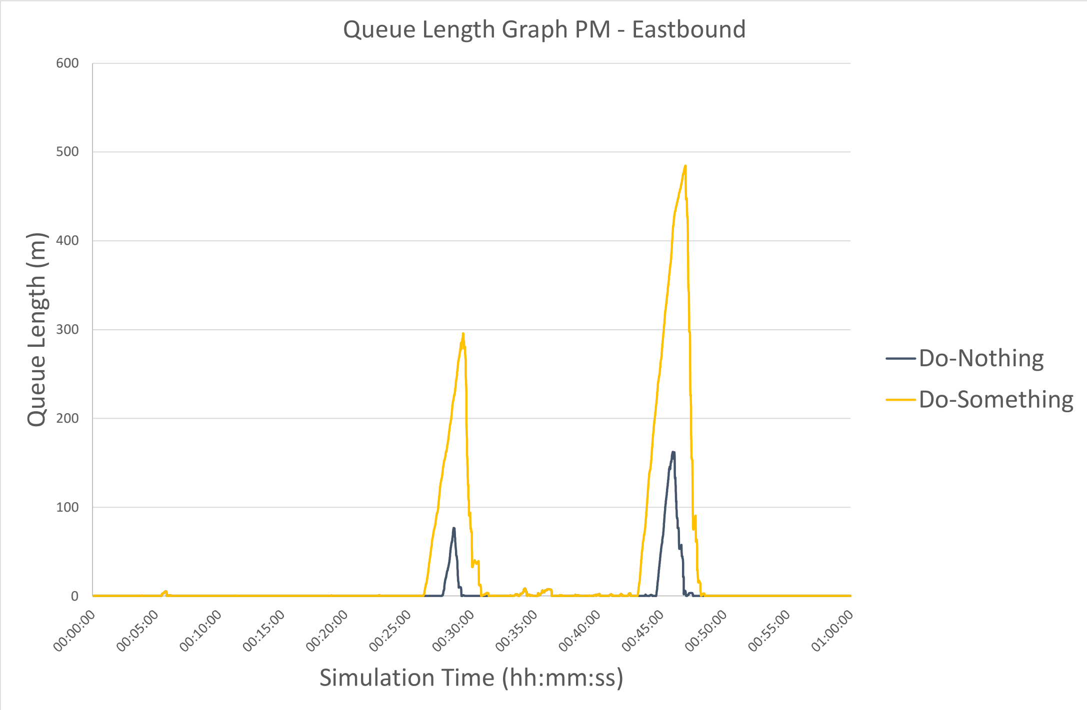



**FIGURE 6.6: QUEUES – EASTBOUND – PM PEAK – SIX MILE BOTTOM**

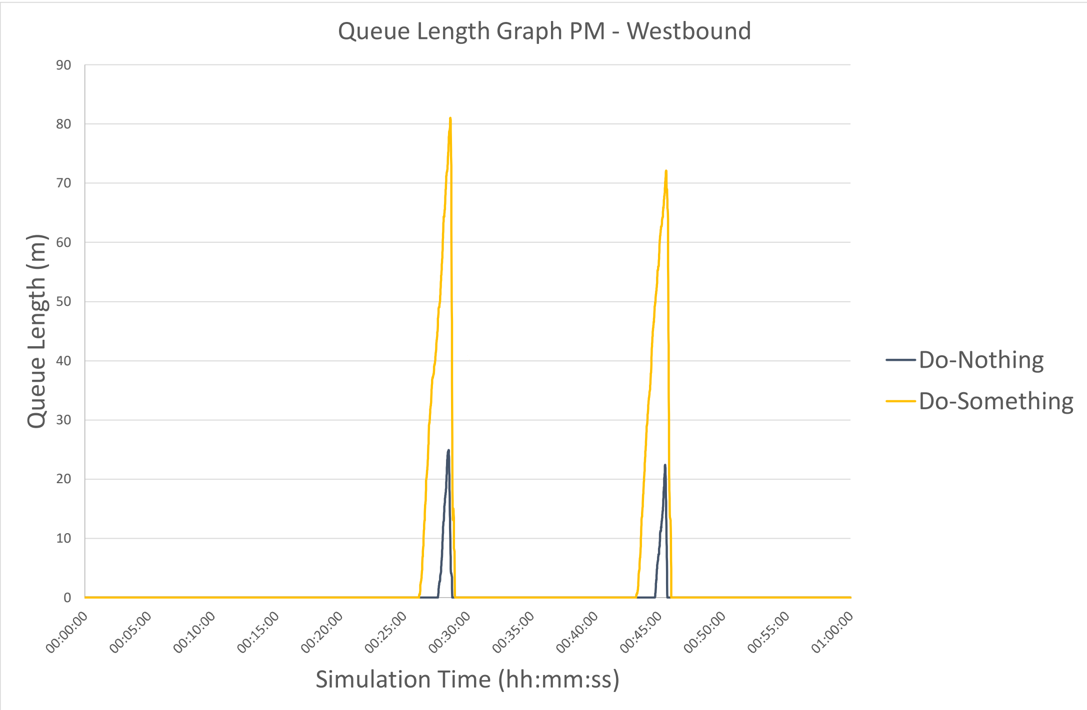



**FIGURE 6.7: QUEUES – WESTBOUND – PM PEAK – SIX MILE BOTTOM**

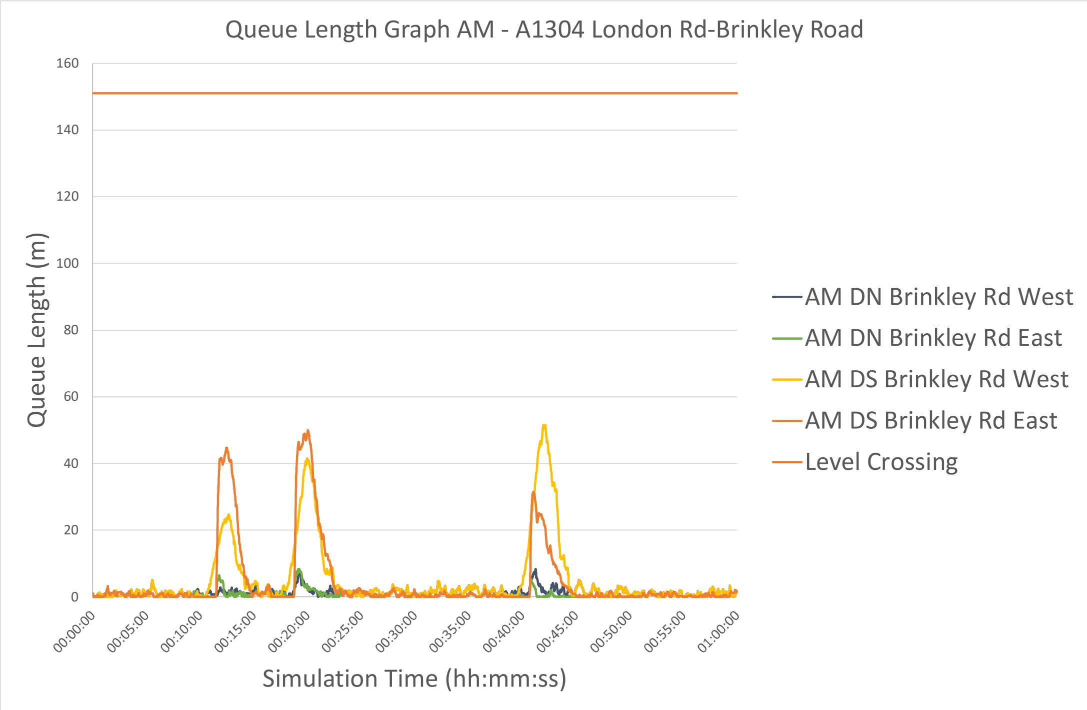



**FIGURE 6.8: QUEUES – AM PEAK - A1304 LONDON RD-BRINKLEY RD JCT**

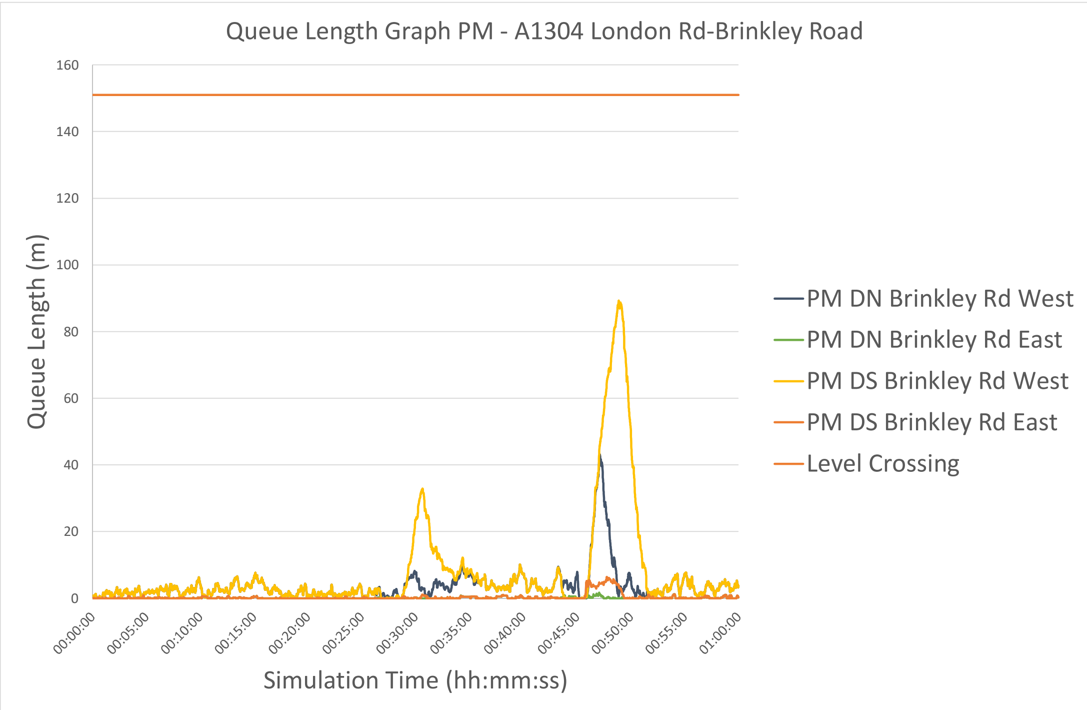



**FIGURE 6.9: QUEUES – PM PEAK – LONDON RD – BRINKLEY RD JCT**


**FIGURE 6.10: MAXIMUM QUEUE LENGTHS – SIX MILE BOTTOM**

## 6.2 Conclusion

6.2.1 The upgraded crossing at Six Mile Bottom will have a considerable impact on the surrounding road network.

6.2.2 In the eastbound direction, whilst the queuing will not reach the A11, they will be onto the slip road and the view of National Highways should be sought to understand their views on this queuing.

6.2.3 The westbound direction will have an impact on the A1304 London Road / Brinkley Road junction and the queue on Brinkley Road in the westbound direction will reach the level crossing located upstream. This will have some safety implication which will need to be reviewed further.

# 7 DULLINGHAM VISSIM MODEL

## 7.1 Traffic Data

7.1.1 The barrier down time of the Do-Nothing and Do-something scenario has been updated in line with Table 1.4 and Table 1.5.

7.1.2 **Error! Reference source not found.** and **Error! Reference source not found.** show the barrier down time across the peak period. The Dullingham level crossing is a manual crossing with a long barrier down time of approximately 281 seconds. The introduction of a MCB-OD2 / MCB-CCTV level will reduce the barrier down time to 168s.

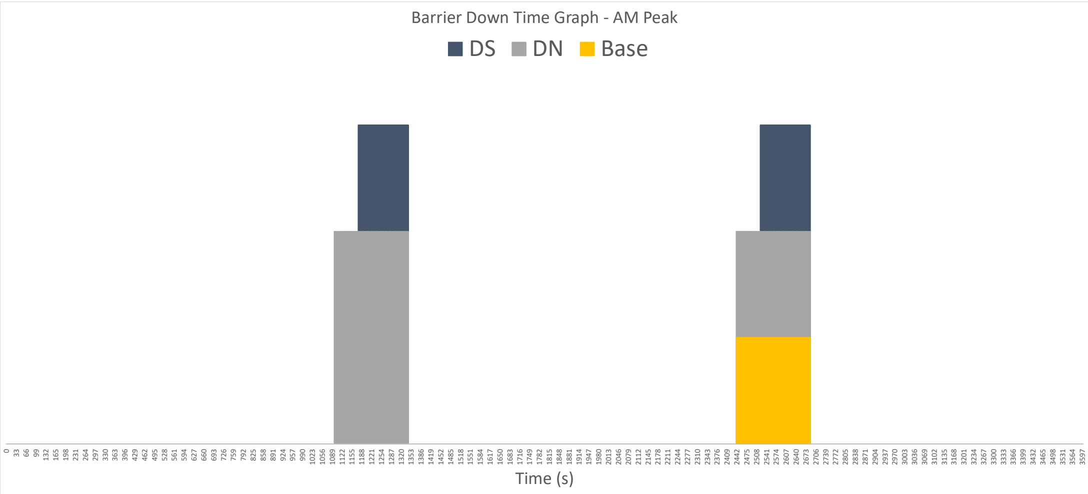



**FIGURE 7.1: BARRIER DOWN TIMES – DULLINGHAM – AM**

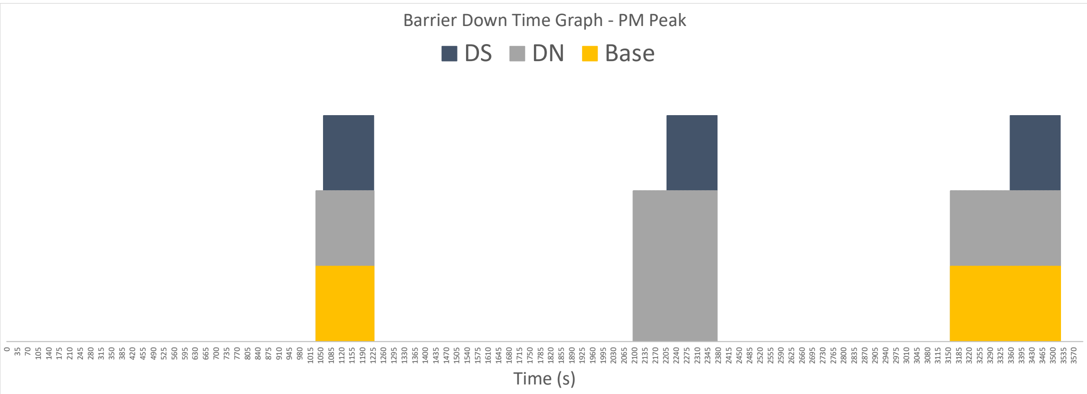



**FIGURE 7.2: BARRIER DOWN TIMES – DULLINGHAM – PM**

7.1.3 The network performance table shows that the average delay is reduced as a result of the upgraded crossing and that the improvement will have no significant impact on the network. The results show that there is no latent demand and that all traffic can enter the network.

| | Average Delay (s) | | | Average Speed (mph) | | | Latent Demand | |
|---|---|---|---|---|---|---|---|---|
| Peak | DN | DS | Diff. | DN | DS | Diff. | DN | DS |
| AM | 32.0 | 9.9 | -22.2 | 27.1 | 35.2 | 8.1 | 0 | 0 |
| PM | 33.0 | 15.8 | -17.3 | 27.1 | 32.8 | 5.7 | 0 | 0 |

**TABLE 7.1: NETWORK PERFORMANCE - DULLINGHAM**

7.1.4 The proposed level crossing upgrade will provide a modest reduction in journey times in both directions and in both peak periods compared to the Do-Nothing scenario.


**FIGURE 7.3: JOURNEY TIME ROUTE – DULLINGHAM**

| Journey time (s) | | | | |
|---|---|---|---|---|
| Direction | Peak | DN | DS | Diff. |
| EB | AM | 117 | 82 | -35 |
| EB | PM | 103 | 85 | -18 |
| WB | AM | 100 | 78 | -21 |
| WB | PM | 109 | 85 | -24 |

**TABLE 7.2: JOURNEY TIMES - DULLINGHAM**

7.1.5 The queue results show similar average and maximum queue lengths in the Do-Nothing and Do-Something scenarios, indicating that the upgraded crossing will not have an impact on the network.

| Queue Length (m) | | | | |
|---|---|---|---|---|
| | AM | | PM | |
| Direction | Max | Avg | Max | Avg |
| DN Eastbound | 18 | 6 | 48 | 20 |
| DS Eastbound | 8 | 4 | 30 | 12 |
| Diff. | -10 | -3 | -18 | -8 |
| DN Westbound | 18 | 7 | 14 | 5 |
| DS Westbound | 9 | 3 | 6 | 3 |
| Diff. | -10 | -3 | -8 | -2 |

**TABLE 7.3: QUEUE LENGTHS - DULLINGHAM**

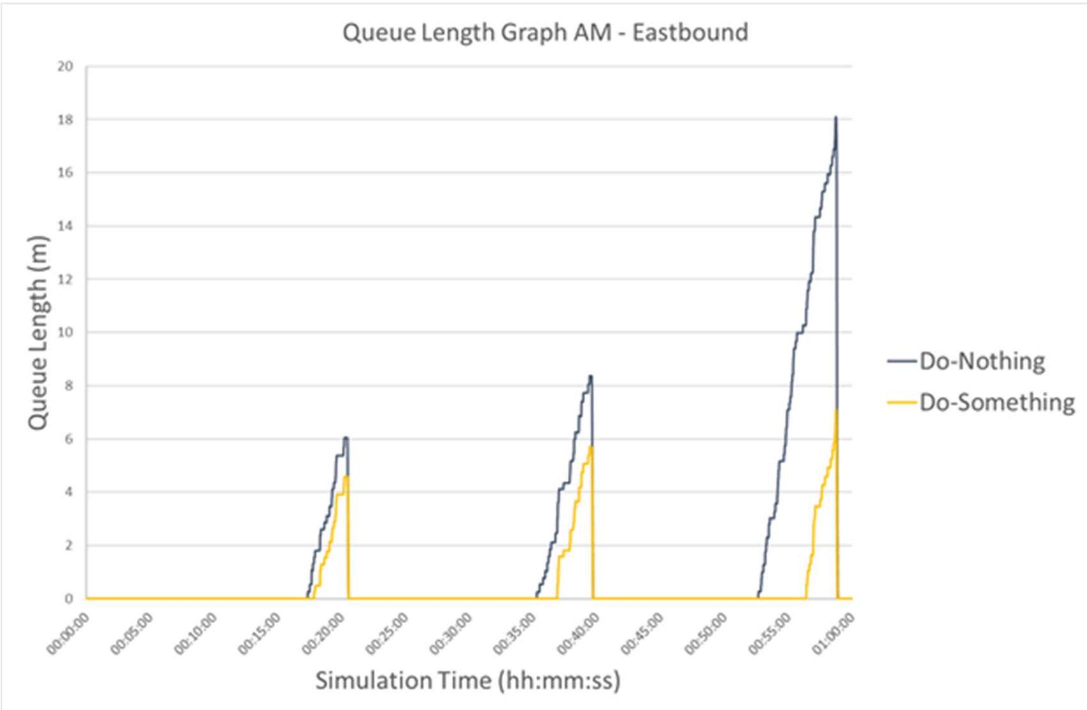



**FIGURE 7.4: QUEUES – EASTBOUND - AM PEAK – DULLINGHAM**

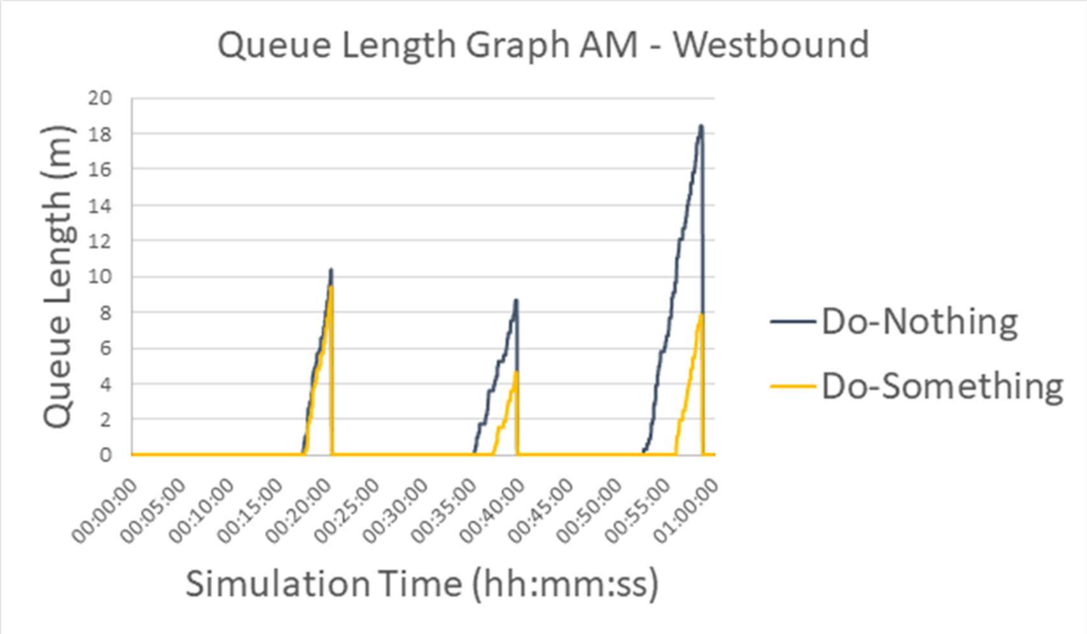



**FIGURE 7.5: QUEUES – WESTBOUND - AM PEAK – DULLINGHAM**

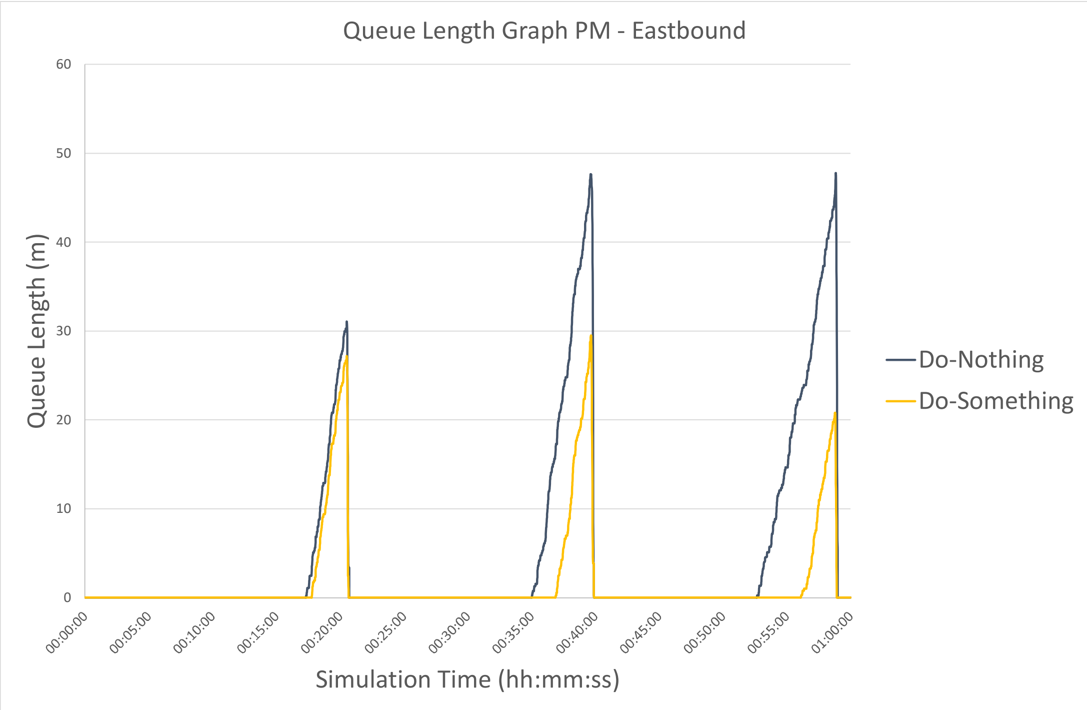



**FIGURE 7.6: QUEUES – EASTBOUND - PM PEAK – DULLINGHAM**

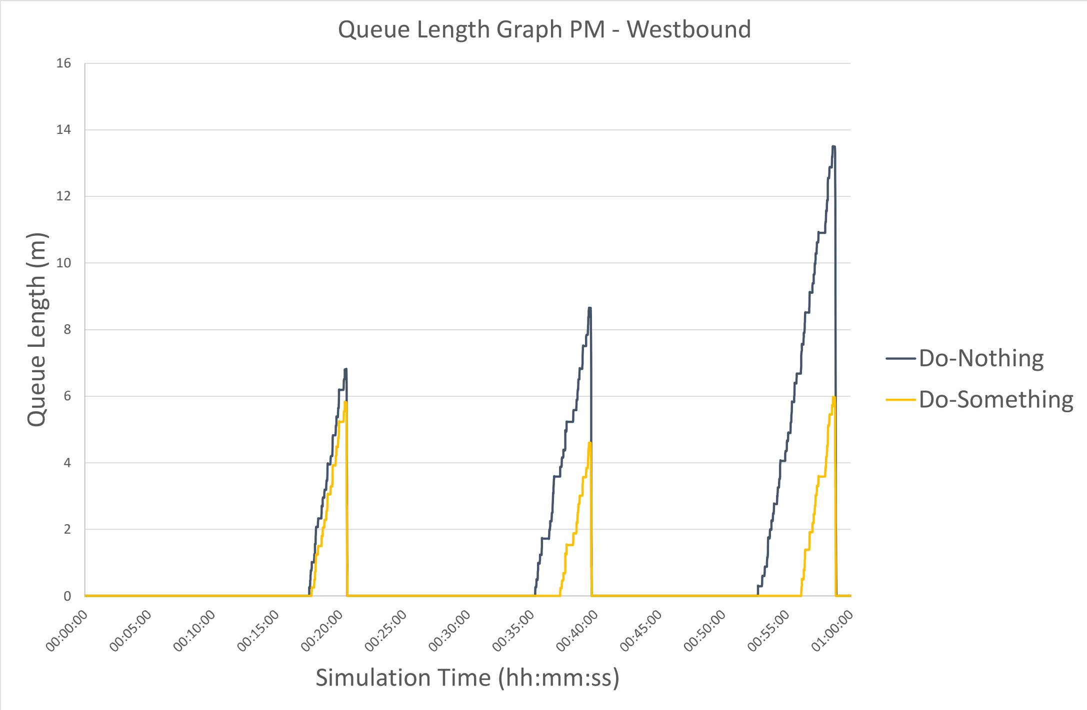



**FIGURE 7.7: QUEUES – WESTBOUND - PM PEAK – DULLINGHAM**

## 7.2 Conclusion

7.2.1 It can be concluded that the proposed level crossing upgrade at Dullingham 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, attributed to the automation of the crossing.

# 8 MELDRETH VISSIM MODEL

## 8.1 Traffic Data

8.1.1 The barrier down time of the Do-Nothing and Do-something scenario has been updated in line with Table 1.4 and Table 1.5.

8.1.2 Figure 8.1 and Figure 8.2 show the barrier down time across the peak period. A longer barrier down time in line with Table 1.6 is observed in the Do-Something. It was observed that this longer barrier down time allows multiple trains to pass through at once, whilst the shorter barrier down time only allows one train to pass through at a time.

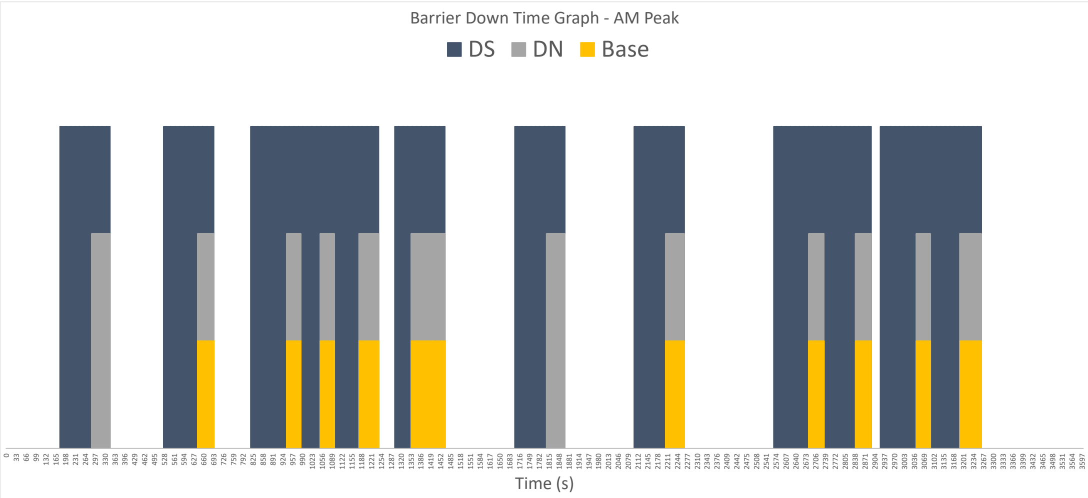



**FIGURE 8.1: BARRIER DOWN TIMES – MELDRETH – AM**

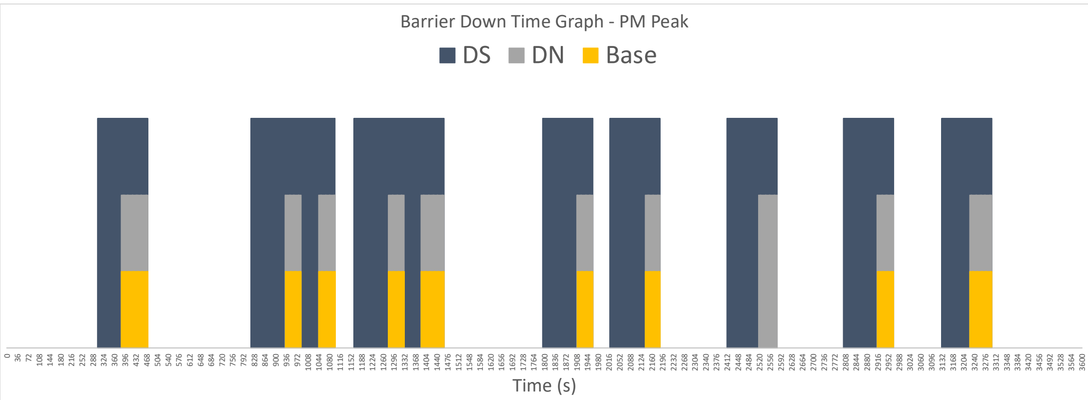



**FIGURE 8.2: BARRIER DOWN TIMES – MELDRETH – PM**

8.1.3 The network performance table shows that the average delay will not exceed 1 minute which indicates no significant impact on the network. There is no latent demand which demonstrates that all traffic can enter the network.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | 50.8 | 72.3 | 21.5 | 18.8 | 16.1 | -2.6 | 0 | 0 |

**TABLE 8.1: NETWORK PERFORMANCE – MELDRETH**

8.1.4 The proposed upgrade to the level crossing will have a minimal impact on the eastbound journey times.

8.1.5 In the westbound direction, the highest increase is 65s, which is not considered significant.


**FIGURE 8.3: JOURNEY TIME ROUTE**

| Journey Time (s) | | | | |
|---|---|---|---|---|
| **Direction** | **Peak** | DN | DS | Diff. |
| **EB** | **AM** | 46 | 48 | 2 |
| **EB** | **PM** | 46 | 48 | 2 |
| **WB** | **AM** | 47 | 112 | 65 |
| **WB** | **PM** | 46 | 91 | 46 |

**TABLE 8.2: JOURNEY TIMES - MELDRETH**

With the upgraded level crossing in place, the queue results show that there are modest increases in the average and maximum queue lengths. The highest increase is 52m, which is observed for the westbound direction in the AM peak. This equates to approximately 9 vehicles.

| Queue Length (m) | | | | |
|---|---|---|---|---|
| | AM | | PM | |
| Direction | Max. | Avg. | Max. | Avg. |
| DN Eastbound | 18 | 4 | 10 | 3 |
| DS Eastbound | 69 | 19 | 44 | 15 |
| Diff. | 52 | 15 | 34 | 11 |
| DN Westbound | 10 | 3 | 13 | 4 |
| DS Westbound | 40 | 12 | 51 | 15 |
| Diff. | 30 | 9 | 39 | 11 |

**TABLE 8.3: QUEUE LENGTHS – MELDRETH**

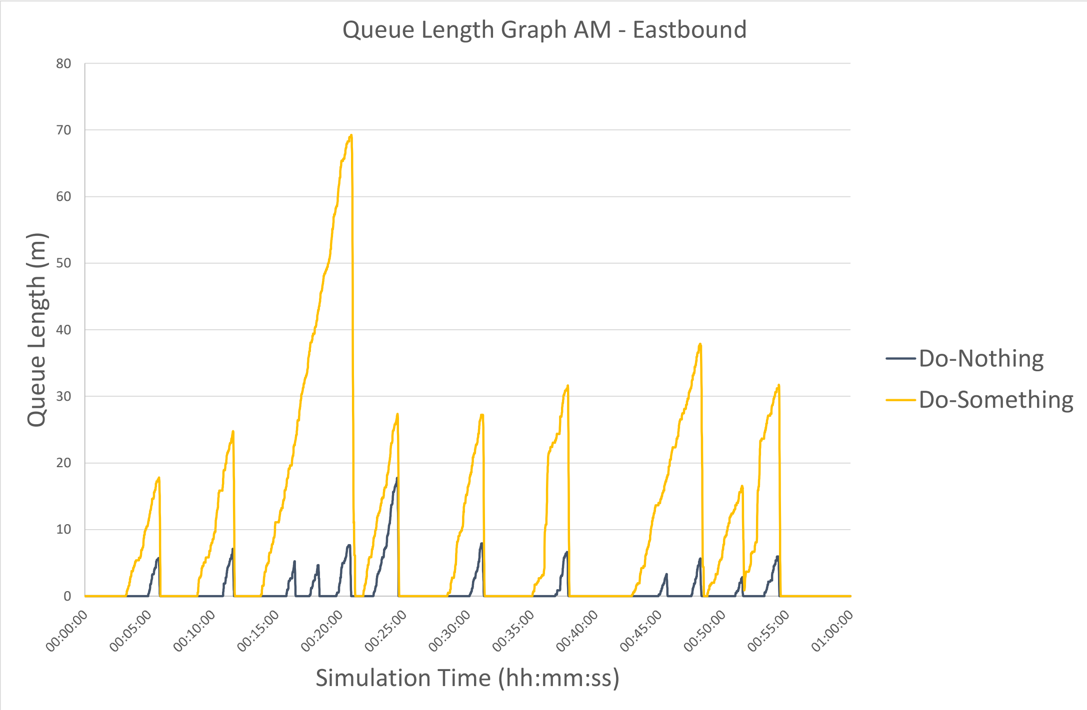



**FIGURE 8.4: QUEUES – EASTBOUND - AM PEAK – MELDRETH**

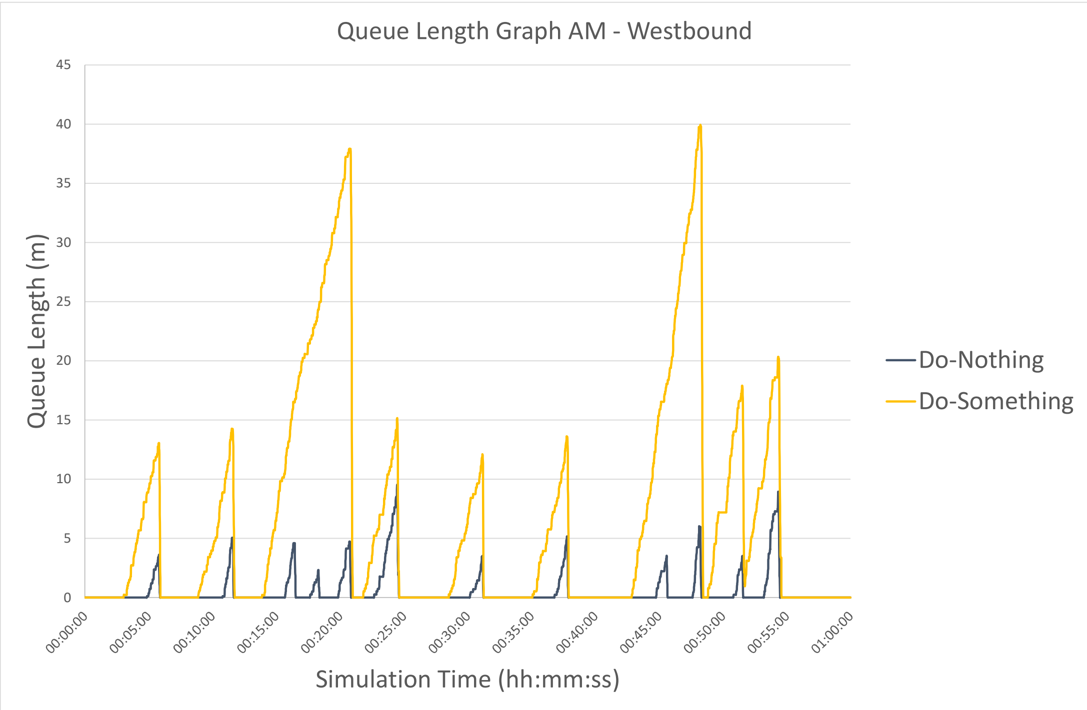



**FIGURE 8.5: QUEUES – WESTBOUND – AM PEAK – MELDRETH**

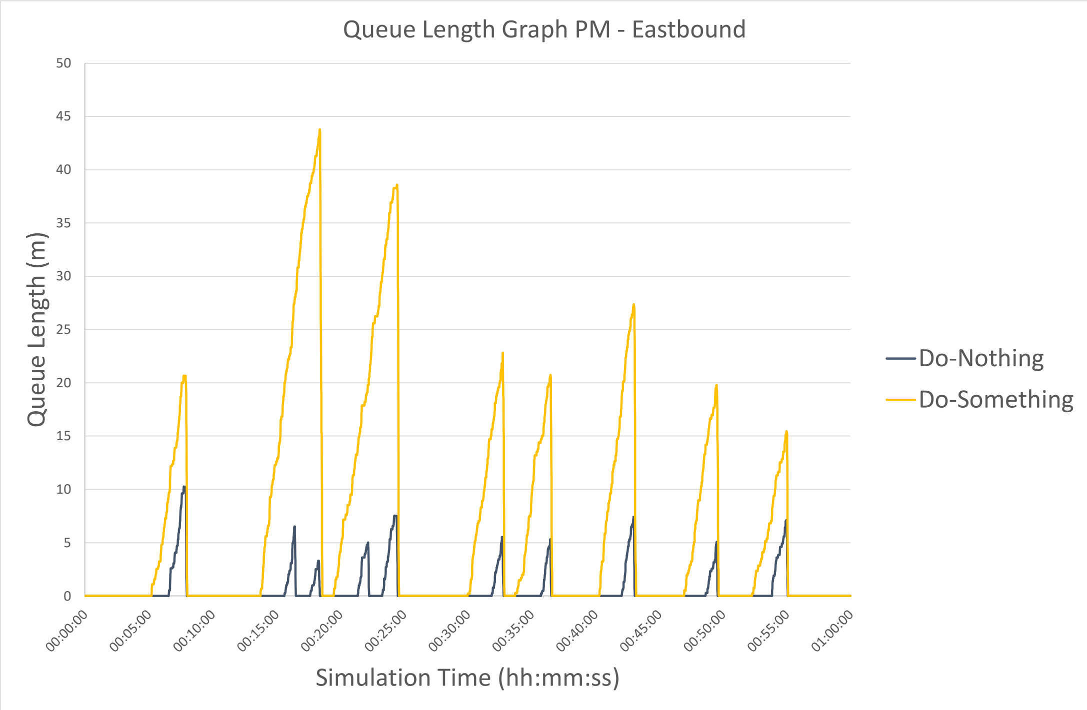



**FIGURE 8.6: QUEUES – EASTBOUND – PM PEAK – MELDRETH**

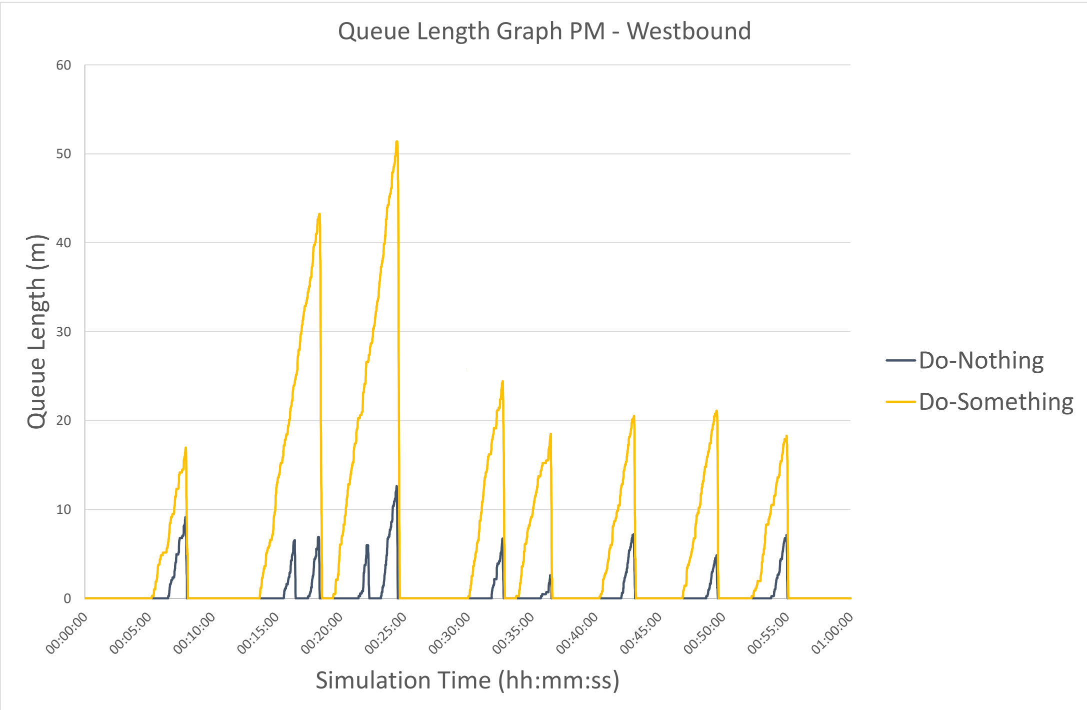



**FIGURE 8.7: QUEUES – WESTBOUND – PM PEAK – MELDRETH**

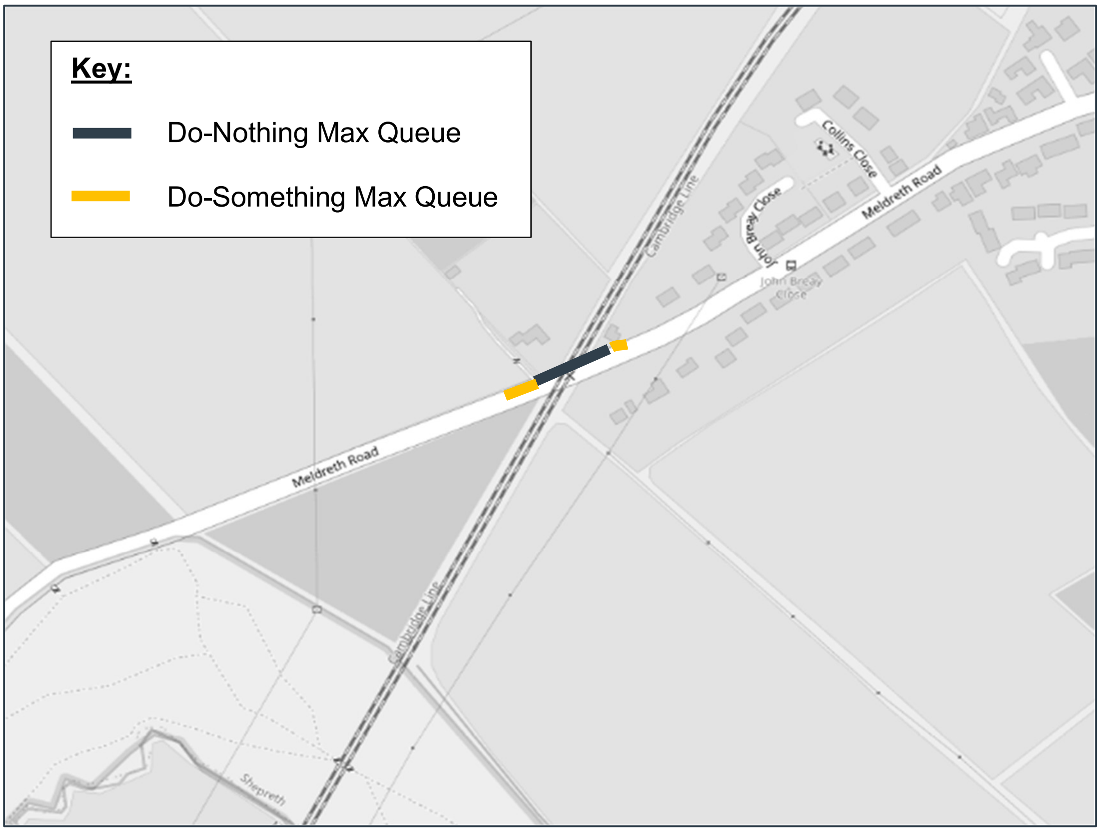



**FIGURE 8.8: MAX QUEUE LENGTHS - MELDRETH**

## 8.2 Conclusion

8.2.1 The proposed upgrade to the level crossing at Meldreth is shown to have no significant impacts on the network.

8.2.2 There are modest increases in the journey times for vehicles travelling westbound and there are some minor increases in queues in both directions.

# 9 CONCLUSION

9.1.1 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-OD2 / MCB-CCTV type operation, with a view to understanding the impacts the upgrades will have on the local communities and the wider transport network.

9.1.2 The results of the modelling is summarised in Table 9.1.

| Level Crossing | Increase in Level Crossing Use | 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 | 21 | 10 | 6 | 46 | 31 |
| Waterbeach | +2 | 605 | 480 | 43 | 26 | 175 | 53 | 7.2 |
| 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 |

**TABLE 9.1: PERFORMANCE SUMMARY**

9.1.3 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.

9.1.4 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 for Waterbeach, and average delay increases of up to 103 seconds for Dimmocks Cote. These results should be presented to the local authorities for further discussion on the impact to road users and the local road network.

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# Local Model Validation Report – Level Crossing Study

MG0172 Level Crossing study

Nicolas Contentin

11 August 2022

NETWORK RAIL

# DOCUMENT CONTROL ISSUE SHEET

### Project & document details

| | |
|---|---|
| Project name | Level Crossing study |
| Project number | MG0172 |
| Document title | Local Model Validation Report – Level Crossing Study |
| Document reference | Technical\Reports\LMVR |

### Document history

| Issue | Status | Reason for issue | Issued to |
|---|---|---|---|
| 1 | DRAFT | Issued to NR for comments | Network Rail |
| 2 | DRAFT | Issued to NR for comments | Network Rail |
| 3 | FINAL | Issued to NR | Network Rail |

### Issue control

| Issue | Date | Author | Contributors | Approved | Date |
|---|---|---|---|---|---|
| 1 | 31/08/2021 | NC | NC | DB | 31/08/2021 |
| 2 | 05/05/2022 | NC | NC | DB | 05/05/2022 |
| 3 | 11/08/2022 | NC | NC | DB | 11/08/2022 |

# CONTENTS

## APPENDICES

***NO TABLE OF CONTENTS ENTRIES FOUND.***

# 1 INTRODUCTION

## 1.1 Introduction

1.1.1 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-OD2 / MCB-CCTV type operation, with a view to understanding the impacts the upgrades will have on the local communities and the wider transport network.

## 1.2 Study Extents

1.2.1 The modelling study involves the assessment of 7 level crossings within Cambridgeshire and Norfolk. These include:

- 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

## 1.3 Model setup

1.3.1 A microsimulation model for each of these level crossings has been developed using VISSIM 2021 SP09.

1.3.2 The following vehicle compositions have been used for all models:

- Lights (Cars + Light Goods Vehicles (LGVs))
- Heavies (Medium Class Vehicles (MGVs) + Heavy Goods Vehicles (HGVs))
- Cyclists (PCLs)

1.3.3 The model has been calibrated against manual classified count (MCCs) data and validated against automatic traffic count (ATC) data collected in 2021, using the GEH statistic criteria.

## 1.4 Model guidelines

1.4.1 The model has been developed to meet the following VISSIM modelling guidelines:

- DfT's TAG Unit 3.1 Guidelines – Highway Assignment Modelling
- TfL, Traffic Modelling Guidelines – TfL Traffic Manager and Network Performance Best Practice, Version 3.0

# 2 MILTON FEN VISSIM MODEL

## 2.1 Model Extents & Survey Locations

2.1.1 The model extents for the Milton Fen VISSIM model are shown in Figure 2.1.

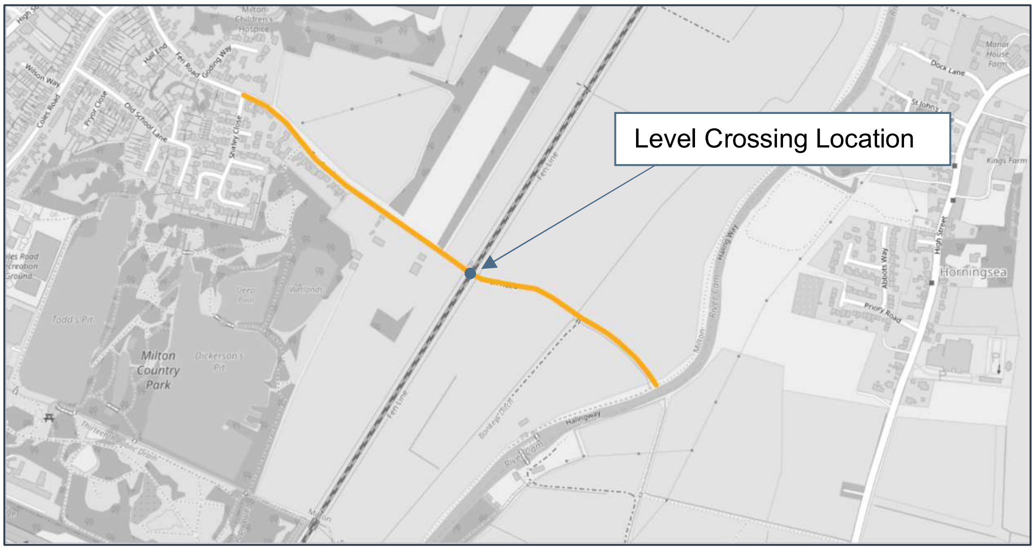



**FIGURE 2.1: MODEL EXTENTS – MILTON FEN**

2.1.2 The traffic survey data that has been captured is shown in Figure 2.2.

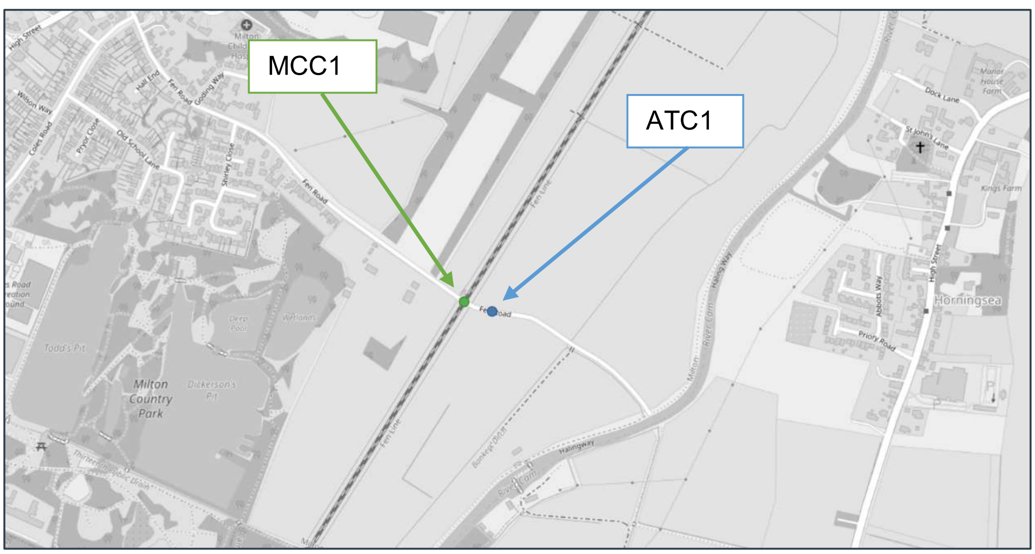



**FIGURE 2.2: PROPOSED SURVEY LOCATIONS – MILTON FEN**

## 2.2 Model Time Periods & Demands

2.2.1 The peak periods have been calculated using the sum of all entry points based on the MCCs. The following peak periods have been identified for the Milton Fen model:

- AM Peak - 1115-1215hrs
- PM Peak – 1630-1730hrs

2.2.2 A 15-minute warm-up and cool-down period has also been applied to the model.

Census data has been captured on Tuesday 6th of July 2021 and is summarised in Table 2.1 and Table 2.2.

| Surveyed | | | | |
|---|---|---|---|---|
| Mvt # | Lights | Heavies | Cyclists | Total |
| Westbound | 8 | 0 | 2 | 10 |
| Eastbound | 3 | 0 | 3 | 6 |

**TABLE 2.1: AM PEAK FLOW – MILTON FEN**

| Surveyed | | | | |
|---|---|---|---|---|
| Mvt # | Lights | Heavies | Cyclists | Total |
| Westbound | 3 | 0 | 2 | 5 |
| Eastbound | 8 | 0 | 1 | 9 |

**TABLE 2.2: PM PEAK FLOW – MILTON FEN**

2.2.3 A total of 21 and 10 pedestrians were observed crossing the level crossing during the AM and PM peak periods respectively.

## 2.3 Model Calibration – Flows

2.3.1 The model has been calibrated against the turning count as shown in Table 2.3.

| Calibration | |
|---|---|
| Total number of counts considered | 2 |
| | |
| VISSIM model counts with GEH <3 | 2 |
| % of VISSIM counts with GEH <3 | 100% |
| | |
| VISSIM model counts with GEH <5 | 2 |
| % of VISSIM counts with GEH <5 | 100% |
| | |
| VISSIM model counts with GEH <10 | 2 |
| % of VISSIM counts with GEH <10 | 100% |
| | |
| VISSIM model counts meeting WebTAG Unit 3.1 criteria | 2 |
| % of VISSIM counts meeting WebTAG Unit 3.1 flow criteria | 100% |

**TABLE 2.3: FLOW CALIBRATION – AM AND PM PEAK – MILTON FEN**

## 2.4 Model Validation – Flows

2.4.1 The model has been validated against the ATC data as shown in Table 2.4.

| Validation | |
|---|---|
| Total number of counts considered | 2 |
| | |
| VISSIM model counts with GEH <3 | 2 |
| % of VISSIM counts with GEH <3 | 100% |
| | |

| Validation | |
|---|---|
| VISSIM model counts with GEH <5 | 2 |
| % of VISSIM counts with GEH <5 | 100% |
| | |
| VISSIM model counts with GEH <10 | 2 |
| % of VISSIM counts with GEH <10 | 100% |
| | |
| VISSIM model counts meeting WebTAG Unit 3.1 criteria | 2 |
| % of VISSIM counts meeting WebTAG Unit 3.1 flow criteria | 100% |

**TABLE 2.4: FLOW VALIDATION – AM AND PM PEAK – MILTON FEN**

2.4.2 Flow consistency checks have also been undertaken between the observed and modelled values for the crossing within the study area for light and heavy vehicles. The results show a GEH <3 for at least 85% of cases in all peaks, as recommended by the modelling guidelines.

## 2.5 Model Validation – Barrier Down Time

2.5.1 The barrier down time was also captured as part of this study and was used to set up the model as shown in Table 2.5.

| AM | | | PM | | |
|---|---|---|---|---|---|
| Number of call | | | Number of call | | |
| Surveyed | Modelled | Diff. | Surveyed | Modelled | Diff. |
| 6 | 6 | 0 | 7 | 7 | 0 |
| Barrier down time (s) | | | Barrier down time (s) | | |
| Surveyed | Modelled | Diff. | Surveyed | Modelled | Diff. |
| 38 | 38 | 0 | 22 | 22 | 0 |
| 21 | 21 | 0 | 27 | 27 | 0 |
| 33 | 33 | 0 | 25 | 25 | 0 |
| 24 | 24 | 0 | 21 | 21 | 0 |
| 20 | 20 | 0 | 24 | 24 | 0 |
| 29 | 29 | 0 | 31 | 31 | 0 |
| - | - | - | 26 | 28 | 2 |

**TABLE 2.5: BARRIER DOWN TIME – MILTON FEN**

2.5.2 From the results above, it can be seen that the model validates well with the observed data in term of the barrier down time and number of activations.

## 2.6 Model Validation – Queue Lengths

2.6.1 The queue lengths in the model have also been compared with the observed data as shown in Table 2.6 and Table 2.7.

| Max Queue Length (Vehicle) AM Peak | | | | | | |
|---|---|---|---|---|---|---|
| | WB | | | EB | | |
| Call # | Surveyed | Modelled | Diff. | Surveyed | Modelled | Diff. |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 0 | 0 | 0 | 0 | 0 | 0 |
| Avg | 0 | 0 | 0 | 0 | 0 | 0 |

**TABLE 2.6: QUEUE LENGTHS – AM PEAK – MILTON FEN**

| Max Queue Length (Vehicle) PM Peak | | | | | | |
|---|---|---|---|---|---|---|
| | WB | | | EB | | |
| Call # | Surveyed | Modelled | Diff. | Surveyed | Modelled | Diff. |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 | 0 | 0 | 0 | 0 | 0 | 0 |
| Avg | 0 | 0 | 0 | 0 | 0 | 0 |

**TABLE 2.7: QUEUE LENGTHS – PM PEAK – MILTON FEN**

2.6.2 From the results above, it can be seen that the queue lengths in the model are similar to those observed.

# 3 WATERBEACH VISSIM MODEL

## 3.1 Model Extents & Survey Locations

3.1.1 The model extents for the Waterbeach VISSIM model are shown in Figure 3.1.

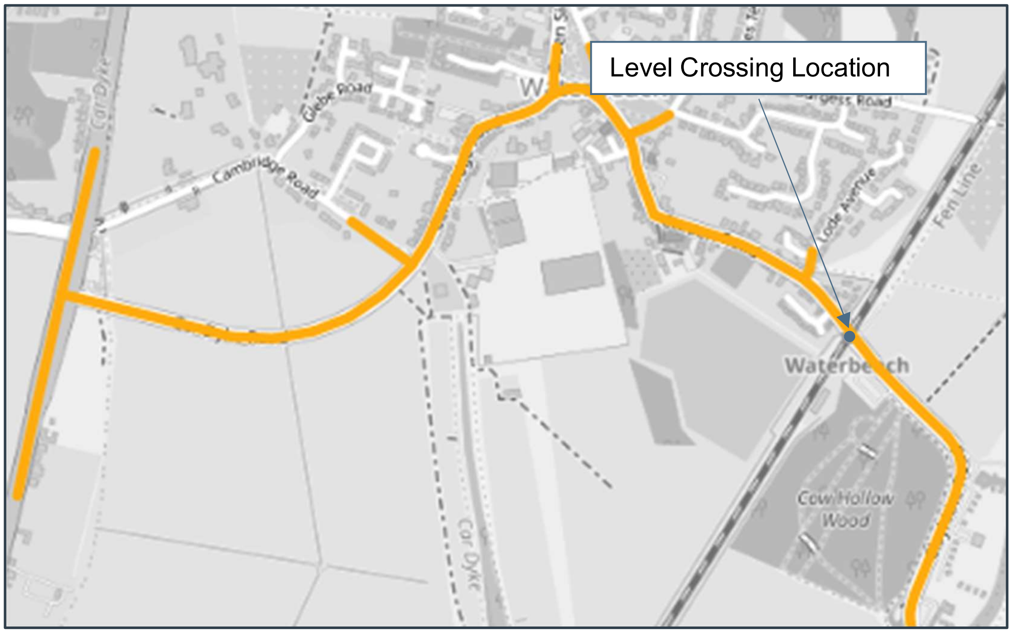



**FIGURE 3.1: MODEL EXTENTS – WATERBEACH**

3.1.2 The traffic survey data that has been captured is shown in Figure 3.2.

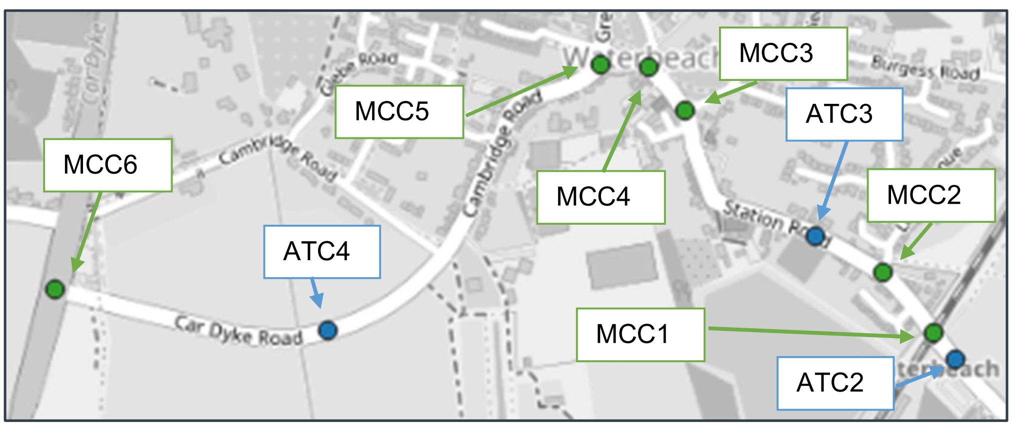



**FIGURE 3.2: PROPOSED SURVEY LOCATIONS – WATERBEACH**

## 3.2 Model Time Periods & Demands

3.2.1 The peak periods have been calculated using the sum of all entry points based on the MCCs. The following peak periods have been identified for the Waterbeach model:

- AM Peak – 0800-0900hrs
- PM Peak – 1630-1730hrs

3.2.2 A 15-minute warm-up and cool-down period has also been applied to the model.

3.2.3 Census data has been captured on Tuesday 29th of March 2022 and is summarised in Table 3.1 and Table 3.2.

| | | | |
|---|---|---|---|
| | | | |
| | | | |
| | 225 | 2 | 227 |

**TABLE 3.1: AM PEAK FLOW – WATERBEACH**

| | | | |
|---|---|---|---|
| | | | |
| | | | |
| | 118 | 2 | 120 |

**TABLE 3.2: PM PEAK FLOW – WATERBEACH**

3.2.4 A total of 43 and 26 pedestrians uses the level crossing during the AM and PM peak period. This is mainly due to the access of the platforms which are located on each side of the level crossing.

## 3.3 Model Specifics & Site Observations

3.3.1 On street parking was observed on Station Road, with the sections highlighted in Figure 3.3 showing the main locations.


**FIGURE 3.3: ON STREET PARKING LOCATION**

3.3.2 These sections have been modelled in VISSIM using invisible signals and a demand dependent signal logic profile, to provide an accurate representation of the give way behaviour. The model has also been setup to hold traffic where double yellow line sections are located as highlighted in Figure **3.4**.

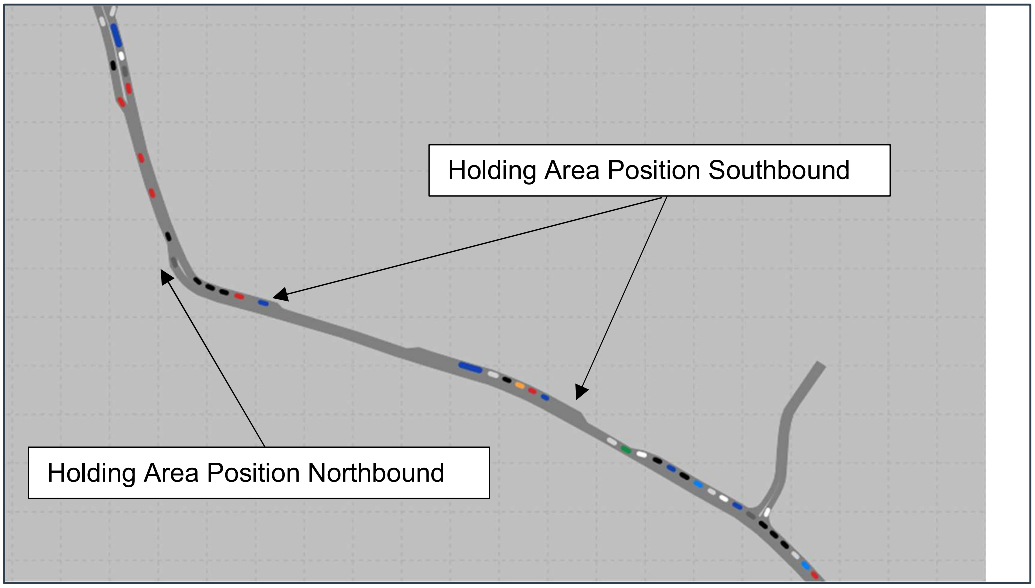



**FIGURE** 3.4: **TRAFFIC HOLDING POSITION MAP**

## 3.4 Model Calibration – Flows

3.4.1 The model has been calibrated against the turning count as shown in Table 3.3.

| Calibration | |
|---|---|
| Total number of counts considered | 42 |
| | |
| VISSIM model counts with GEH <3 | 41 |
| % of VISSIM counts with GEH <3 | 97.62% |
| | |
| VISSIM model counts with GEH <5 | 42 |
| % of VISSIM counts with GEH <5 | 100% |
| | |
| VISSIM model counts with GEH <10 | 42 |
| % of VISSIM counts with GEH <10 | 100% |
| | |
| VISSIM model counts meeting WebTAG Unit 3.1 criteria | 42 |
| % of VISSIM counts meeting WebTAG Unit 3.1 flow criteria | 100% |

**TABLE 3.3: FLOW CALIBRATION – AM AND PM PEAK – WATERBEACH**

## 3.5 Model Validation – Flows

3.5.1 The model has been validated against the ATC data as shown in Table 3.4.

| Validation | |
|---|---|
| Total number of counts considered | 42 |
| | |
| VISSIM model counts with GEH <3 | 42 |
| % of VISSIM counts with GEH <3 | 100% |
| | |
| VISSIM model counts with GEH <5 | 42 |
| % of VISSIM counts with GEH <5 | 100% |
| | |
| VISSIM model counts with GEH <10 | 42 |
| % of VISSIM counts with GEH <10 | 100% |
| | |
| VISSIM model counts meeting WebTAG Unit 3.1 criteria | 42 |
| % of VISSIM counts meeting WebTAG Unit 3.1 flow criteria | 100% |

**TABLE 3.4: FLOW VALIDATION – AM AND PM PEAK – WATERBEACH**

3.5.2 Flow consistency has been checked between the observed and modelled values for the crossing within the study area for light and heavy vehicles. The results show a GEH <3 for at least 85% of cases in all peaks, as recommended by the modelling guidelines.

## 3.6 Model Validation – Barrier Down Time

3.6.1 The barrier down time was also captured as part of this study and was used to set up the model as shown in Table 3.5.

| AM | | | PM | | |
|---|---|---|---|---|---|
| Number of call | | | Number of call | | |
| Surveyed | Modelled | Diff. | Surveyed | Modelled | Diff. |
| 8 | 8 | 0 | 8 | 8 | 0 |
| Barrier down time (s) | | | Barrier down time (s) | | |
| Surveyed | Modelled | Diff. | Surveyed | Modelled | Diff. |
| 77 | 77 | 0 | 78 | 78 | 0 |
| 9 | 9 | 0 | 36 | 36 | 0 |
| 44 | 44 | 0 | 8 | 8 | 0 |
| 53 | 53 | 0 | 54 | 54 | 0 |
| 23 | 23 | 0 | 41 | 41 | 0 |
| 76 | 76 | 0 | 26 | 26 | 0 |
| 56 | 56 | 0 | 49 | 49 | 0 |
| 41 | 41 | 0 | 49 | 49 | 0 |

**TABLE 3.5: BARRIER DOWN TIME - WATERBEACH**

3.6.2 From the results above, it can be seen that the model validates well with the observed data in term of the barrier down time and number of activations.

## 3.7 Model Validation – Queue Lengths

3.7.1 The queue lengths in the model have also been compared with the observed data as shown in Table 2.6 and Table 3.7.

| Max Queue Length (Vehicle) AM Peak | | | | | | |
|---|---|---|---|---|---|---|
| | WB | | | EB | | |
| Call # | Surveyed | Modelled | Diff. | Surveyed | Modelled | Diff. |
| 1 | 0 | 1 | 1 | 15 | 5 | -10 |
| 2 | 0 | 0 | 0 | 2 | 0 | -2 |
| 3 | 0 | 1 | 1 | 24 | 5 | -19 |
| 4 | 1 | 0 | -1 | 12 | 0 | -12 |
| 5 | 2 | 6 | 4 | 2 | 14 | 12 |
| 6 | 13 | 0 | -13 | 18 | 0 | -18 |
| 7 | 12 | 2 | -10 | 6 | 7 | 1 |
| 8 | 16 | 0 | -16 | 8 | 0 | -8 |
| Avg | 6 | 1 | -4 | 11 | 4 | -7 |

**TABLE 3.6: QUEUE LENGTHS – AM PEAK – WATERBEACH**

| Max Queue Length (Vehicle) PM Peak | | | | | | |
|---|---|---|---|---|---|---|
| | WB | | | EB | | |
| Call # | Surveyed | Modelled | Diff. | Surveyed | Modelled | Diff. |
| 1 | 7 | 4 | -3 | 0 | 2 | 2 |
| 2 | 11 | 0 | -11 | 8 | 0 | -8 |
| 3 | 14 | 13 | -1 | 8 | 6 | -2 |
| 4 | 3 | 0 | -3 | 2 | 0 | -2 |
| 5 | 1 | 11 | 10 | 2 | 6 | 4 |
| 6 | 13 | 0 | -13 | 10 | 0 | -10 |
| 7 | 11 | 4 | -7 | 11 | 4 | -7 |
| Avg | 9 | 5 | -4 | 6 | 3 | -3 |

**TABLE 3.7: QUEUE LENGTHS – PM PEAK – WATERBEACH**

3.7.2 From the results above, it can be seen that the queue lengths in the model are similar to those observed.

## 3.8 Model Validation – Journey Times

3.8.1 The journey times in the model have also been compared, using the journey time section as shown in Figure 3.5.

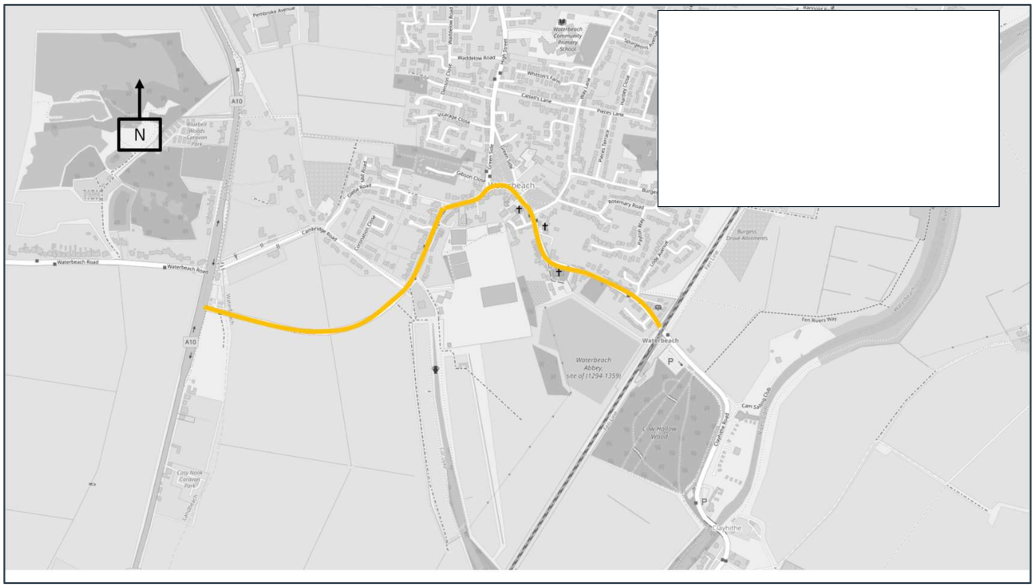



**FIGURE 3.5: JOURNEY TIME MAP – WATERBEACH**

| | AM JT(s) | | | | PM JT(s) | | | |
|---|---|---|---|---|---|---|---|---|
| Section | Observed | Modelled | Diff. | % Diff. | Observed | Modelled | Diff. | % Diff. |
| EB Section | 147 | 125 | -21 | -15% | 146 | 130 | -15 | -10% |
| WB Section | 154 | 132 | -21 | -14% | 128 | 132 | 3 | 3% |

**TABLE 3.8: JOURNEY TIMES – AM AND PM PEAK – WATERBEACH**

3.8.2 From the results above, it can be seen that the modelled journey times are not within 15% of the observed times However, they are within 60s and are considered representative against DfT's TAG Unit 3.1 guidance.

# 4 DIMMOCKS COTE VISSIM MODEL

## 4.1 Model Extents & Survey Locations

4.1.1 The model extents for the Dimmocks Cote VISSIM model are shown in Figure 4.1.

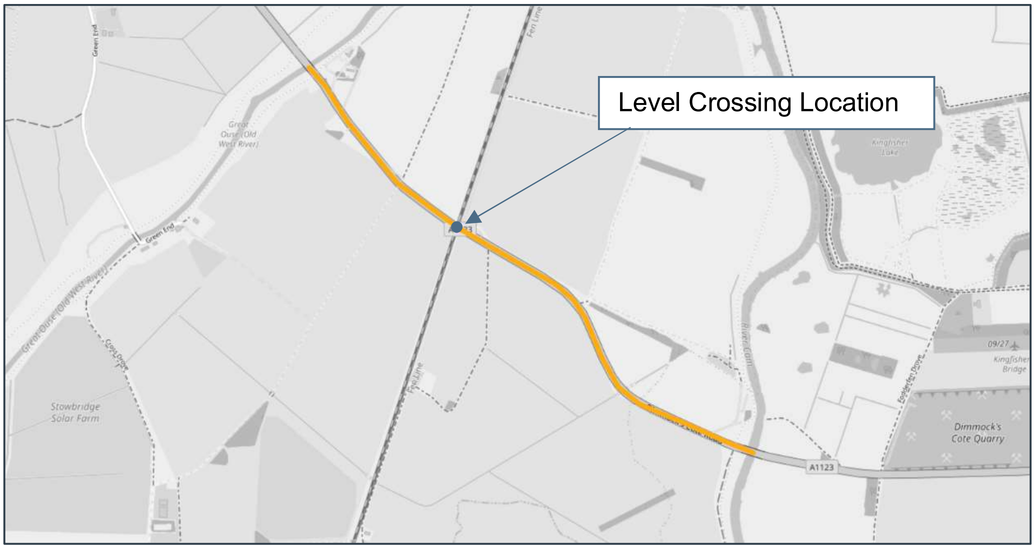



**FIGURE 4.1: MODEL EXTENTS – DIMMOCKS COTE**

4.1.2 The traffic survey data that has been captured is shown in Figure 4.2.

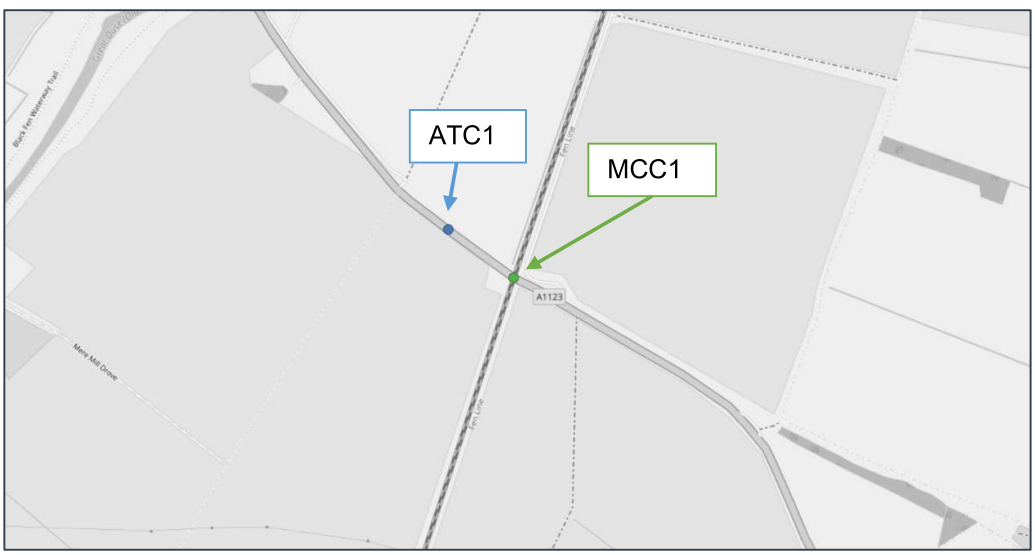



**FIGURE 4.2: PROPOSED SURVEY LOCATIONS – DIMMOCKS COTE**

## 4.2 Model Time Periods & Demands

4.2.1 The peak periods have been calculated using the sum of all entry points based on the MCCs. The following peak periods have been identified for the Dimmocks Cote model:

- AM Peak - 0715-0815hrs
- PM Peak – 1630-1730hrs

4.2.2 A 15-minute warm-up and cool-down period has also been applied to the model.

4.2.3 Census data have been captured on Tuesday 6th of July 2021 and have been summarised in Table 4.1 and Table 4.2.

| | Surveyed | | | |
|---|---|---|---|---|
| **Mvt #** | **Lights** | **Heavies** | **Cyclists** | **Total** |
| **Westbound** | 210 | 11 | 0 | 221 |
| **Eastbound** | 167 | 15 | 0 | 182 |

**TABLE 4.1: AM PEAK FLOW – WATERBEACH**

| | Surveyed | | | |
|---|---|---|---|---|
| **Mvt #** | **Lights** | **Heavies** | **Cyclists** | **Total** |
| **Westbound** | 197 | 6 | 1 | 204 |
| **Eastbound** | 160 | 4 | 1 | 165 |

**TABLE 4.2: PM PEAK FLOW - WATERBEACH**

4.2.4 No pedestrian was observed using the level crossing during both peak periods.

## 4.3 Model Calibration – Flows

4.3.1 The model has been calibrated against the turning count as shown in Table 4.3.

| Calibration | |
|---|---|
| Total number of counts considered | 2 |
| | |
| VISSIM model counts with GEH <3 | 2 |
| % of VISSIM counts with GEH <3 | 100% |
| | |
| VISSIM model counts with GEH <5 | 2 |
| % of VISSIM counts with GEH <5 | 100% |
| | |
| VISSIM model counts with GEH <10 | 2 |
| % of VISSIM counts with GEH <10 | 100% |
| | |
| VISSIM model counts meeting WebTAG Unit 3.1 criteria | 2 |
| % of VISSIM counts meeting WebTAG Unit 3.1 flow criteria | 100% |

**TABLE 4.3: FLOW CALIBRATION - AM AND PM PEAK – DIMMOCKS COTE**

## 4.4 Model Validation – Flows

4.4.1 The model has been validated against the ATC data as shown in Table 4.4.

| Validation | |
|---|---|
| Total number of counts considered | 2 |
| | |
| VISSIM model counts with GEH <3 | 2 |
| % of VISSIM counts with GEH <3 | 100% |
| | |
| VISSIM model counts with GEH <5 | 2 |
| % of VISSIM counts with GEH <5 | 100% |
| | |
| VISSIM model counts with GEH <10 | 2 |
| % of VISSIM counts with GEH <10 | 100% |
| | |
| VISSIM model counts meeting WebTAG Unit 3.1 criteria | 2 |
| % of VISSIM counts meeting WebTAG Unit 3.1 flow criteria | 100% |

**TABLE 4.4: FLOW VALIDATION – AM AND PM PEAK – DIMMOCKS COTE**

4.4.2 Flow consistency has been checked between the observed and modelled values for the crossing within the study area for the light and heavy vehicles. The results show a GEH <3 for at least 85% of cases in all peaks, as recommended by the modelling guidelines.

## 4.5 Model Validation – Barrier Down Time

4.5.1 The barrier down time was also captured as part of this study and was used to set up the model as shown in Table 4.5.

| AM | | | PM | | |
|---|---|---|---|---|---|
| Number of call | | | Number of call | | |
| Surveyed | Modelled | Diff. | Surveyed | Modelled | Diff. |
| 8 | 8 | 0 | 7 | 7 | 0 |
| Barrier down time (s) | | | Barrier down time (s) | | |
| Surveyed | Modelled | Diff. | Surveyed | Modelled | Diff. |
| 31 | 31 | 0 | 47 | 47 | 0 |
| 24 | 24 | 0 | 23 | 23 | 0 |
| 31 | 31 | 0 | 33 | 33 | 0 |
| 22 | 22 | 0 | 24 | 24 | 0 |
| 23 | 23 | 0 | 29 | 29 | 0 |
| 20 | 20 | 0 | 33 | 33 | 0 |
| 33 | 33 | 0 | 23 | 23 | 0 |
| 22 | 22 | 0 | - | - | - |

**TABLE 4.5: BARRIER DOWN TIME – DIMMOCKS COTE**

4.5.2 From the results above, it can be seen that the model validates well with the observed data in term of the barrier down time and number of activations.

## 4.6 Model Validation – Queue Lengths

4.6.1 The queue lengths in the model have also been compared with the observed data as shown in Table 4.6 and Table 4.7.

| Max Queue Length (Vehicle) AM Peak | | | | | | |
|---|---|---|---|---|---|---|
| | WB | | | EB | | |
| Call # | Surveyed | Modelled | Diff. | Surveyed | Modelled | Diff. |
| 1 | 3 | 3 | 0 | 1 | 1 | 0 |
| 2 | 2 | 3 | 1 | 1 | 1 | 0 |
| 3 | 0 | 2 | 2 | 2 | 1 | -1 |
| 4 | 2 | 2 | 0 | 0 | 1 | 1 |
| 5 | 2 | 3 | 1 | 2 | 2 | 0 |
| 6 | 7 | 2 | -5 | 1 | 2 | 1 |
| 7 | 1 | 1 | 0 | 3 | 2 | -1 |
| 8 | 2 | 2 | 0 | 2 | 2 | 0 |
| Avg | 0 | 2 | 2 | 4 | 3 | -1 |

**TABLE 4.6: QUEUE LENGTHS – AM PEAK – DIMMOCKS COTE**

| Max Queue Length (Vehicle) PM Peak | | | | | | |
|---|---|---|---|---|---|---|
| | WB | | | EB | | |
| Call # | Surveyed | Modelled | Diff. | Surveyed | Modelled | Diff. |
| 1 | 2 | 2 | 0 | 4 | 4 | 0 |
| 2 | 0 | 2 | 2 | 6 | 2 | -4 |
| 3 | 4 | 2 | -2 | 7 | 3 | -4 |
| 4 | 2 | 2 | 0 | 3 | 2 | -1 |
| 5 | 0 | 3 | 3 | 9 | 3 | -6 |
| 6 | 1 | 3 | 2 | 5 | 3 | -2 |
| 7 | 4 | 3 | -1 | 2 | 2 | 0 |
| Avg | 2 | 2 | 1 | 5 | 3 | -2 |

**TABLE 4.7: QUEUE LENGTHS – PM PEAK – DIMMOCKS COTE**

4.6.2 From the results above, it can be seen that the queue lengths in the model are similar to those observed.

# 5 CROXTON VISSIM MODEL

## 5.1 Model Extents & Survey Locations

5.1.1 The model extents for the Croxton VISSIM model are shown in Figure 5.1.

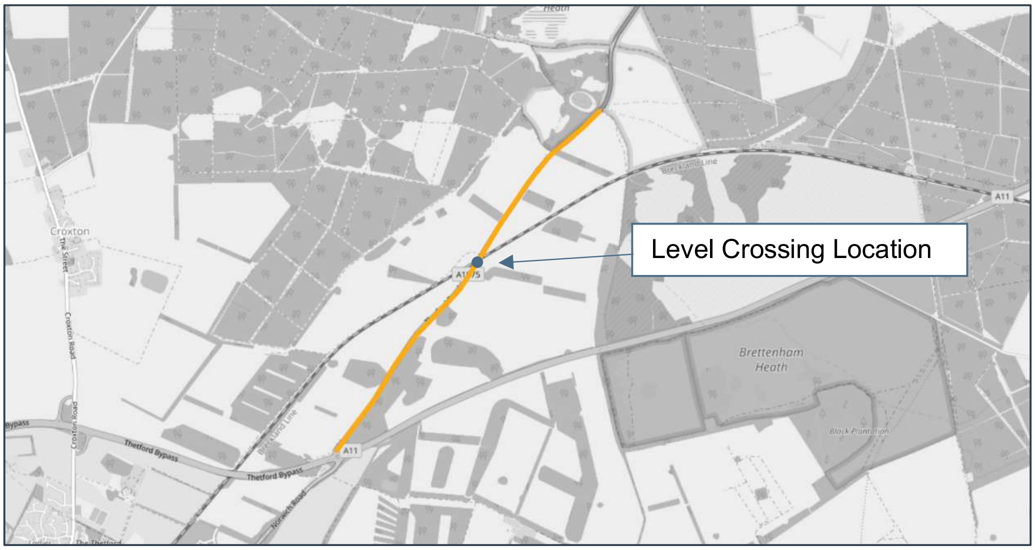



**FIGURE 5.1: MODEL EXTENTS – CROXTON**

5.1.2 The traffic survey data that has been captured is shown in Figure 5.2.


**FIGURE 5.2: PROPOSED SURVEY LOCATIONS – CROXTON**

## 5.2 Model Time Periods & Demands

5.2.1 The peak periods have been calculated using the sum of all entry points based on the MCCs. The following peak periods have been identified for the Croxton model:

- AM Peak - 0715-0815hrs
- PM Peak – 1645-1745hrs

5.2.2 A 15-minute warm-up and cool-down period has also been applied to the model.

5.2.3 Census data have been captured on Tuesday 6th of July 2021 and have been summarised in Table 5.1 and Table 5.2.

| | Surveyed | | | |
|---|---|---|---|---|
| **Mvt #** | **Lights** | **Heavies** | **Cyclists** | **Total** |
| **Westbound** | 317 | 10 | 0 | 327 |
| **Eastbound** | 182 | 13 | 0 | 195 |

**TABLE 5.1: AM PEAK FLOW – CROXTON**

| | Surveyed | | | |
|---|---|---|---|---|
| **Mvt #** | **Lights** | **Heavies** | **Cyclists** | **Total** |
| **Westbound** | 279 | 9 | 8 | 296 |
| **Eastbound** | 181 | 2 | 2 | 185 |

**TABLE 5.2: PM PEAK FLOW - CROXTON**

5.2.4 No pedestrian was observed using the level crossing during both peak periods.

## 5.3 Model Calibration – Flows

5.3.1 The model has been calibrated against the turning count as shown in Table 5.3.

| Calibration | |
|---|---|
| Total number of counts considered | 2 |
| | |
| VISSIM model counts with GEH <3 | 2 |
| % of VISSIM counts with GEH <3 | 100% |
| | |
| VISSIM model counts with GEH <5 | 2 |
| % of VISSIM counts with GEH <5 | 100% |
| | |
| VISSIM model counts with GEH <10 | 2 |
| % of VISSIM counts with GEH <10 | 100% |
| | |
| VISSIM model counts meeting WebTAG Unit 3.1 criteria | 2 |
| % of VISSIM counts meeting WebTAG Unit 3.1 flow criteria | 100% |

**TABLE 5.3: FLOW CALIBRATION – AM AND PM PEAK – CROXTON**

## 5.4 Model Validation – Flows

5.4.1 The model has been validated against the ATC data as shown in Table 5.4.

| Validation | |
|---|---|
| Total number of counts considered | 2 |
| | |
| VISSIM model counts with GEH <3 | 2 |
| % of VISSIM counts with GEH <3 | 100% |
| | |
| VISSIM model counts with GEH <5 | 2 |
| % of VISSIM counts with GEH <5 | 100% |
| | |
| VISSIM model counts with GEH <10 | 2 |
| % of VISSIM counts with GEH <10 | 100% |
| | |
| VISSIM model counts meeting WebTAG Unit 3.1 criteria | 2 |
| % of VISSIM counts meeting WebTAG Unit 3.1 flow criteria | 100% |

**TABLE 5.4: FLOW VALIDATION – AM AND PM PEAK – CROXTON**

5.4.2 Flow consistency has been checked between the observed and modelled values for the crossing within the study area for light and heavy vehicles. The results show a GEH <3 for at least 85% of cases in all peaks, as recommended by the modelling guidelines.

## 5.5 Model Validation – Barrier Down Time

5.5.1 The barrier down time was also captured as part of this study and was used to setup the model as shown in Table 5.5.

| AM | | | PM | | |
|---|---|---|---|---|---|
| Number of call | | | Number of call | | |
| Surveyed | Modelled | Diff. | Surveyed | Modelled | Diff. |
| 3 | 3 | 0 | 2 | 2 | 0 |
| Barrier down time (s) | | | Barrier down time (s) | | |
| Surveyed | Modelled | Diff. | Surveyed | Modelled | Diff. |
| 96 | 96 | 0 | 45 | 45 | 0 |
| 42 | 42 | 0 | 36 | 36 | 0 |
| 48 | 48 | 0 | - | - | - |

**TABLE 5.5: BARRIER DOWN TIME - CROXTON**

5.5.2 From the results, it can be seen that the model validates well with the observed data in term of the barrier down time and number of activations.

## 5.6 Model Validation – Queue Lengths

5.6.1 The queue lengths in the model have also been compared with the observed data as shown in Table 5.6 and Table 5.7.

| Max Queue Length (Vehicle) AM Peak | | | | | | |
|---|---|---|---|---|---|---|
| | NB | | | SB | | |
| Call # | Surveyed | Modelled | Diff. | Surveyed | Modelled | Diff. |
| 1 | 7 | 13 | 6 | 9 | 7 | -2 |
| 2 | 1 | 6 | 5 | 3 | 1 | -2 |
| 3 | 1 | 6 | 5 | 3 | 1 | -2 |
| Avg | 3 | 8 | 5 | 5 | 3 | -2 |

**TABLE 5.6: QUEUE LENGTHS – AM PEAK – CROXTON**

| Max Queue Length (Vehicle) PM Peak | | | | | | |
|---|---|---|---|---|---|---|
| | NB | | | SB | | |
| Call # | Surveyed | Modelled | Diff. | Surveyed | Modelled | Diff. |
| 1 | 4 | 3 | -1 | 2 | 5 | 3 |
| 2 | 1 | 3 | 2 | 7 | 4 | -3 |
| Avg | 3 | 3 | 1 | 5 | 5 | 0 |

**TABLE 5.7: QUEUE LENGTHS – PM PEAK – CROXTON**

5.6.2 From the results above, it can be seen that the queue lengths in the model are similar to those observed.

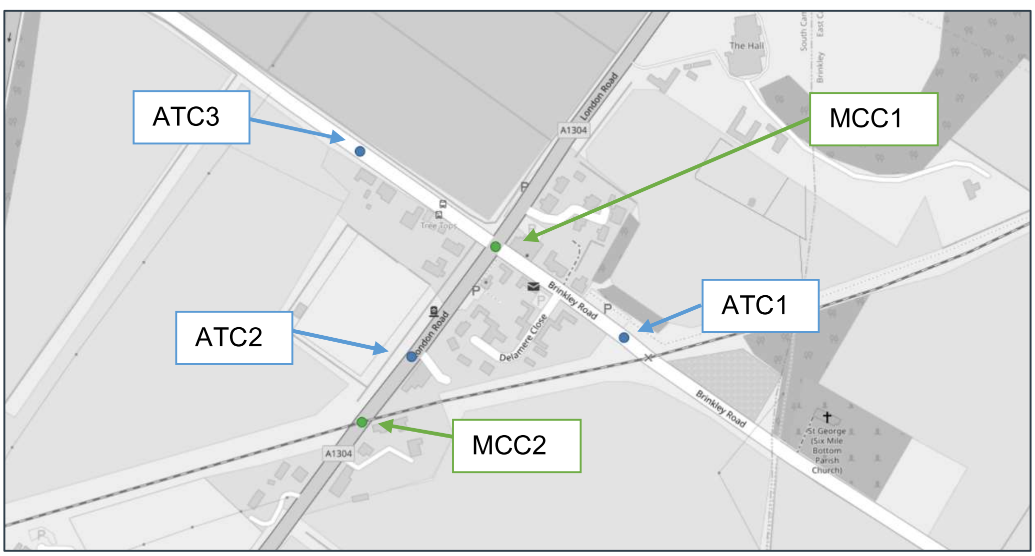
# 6 SIX MILE BOTTOM VISSIM MODEL

## 6.1 Model Extents & Survey Locations

6.1.1 The model extents for the Six Mile Bottom VISSIM model are shown in Figure 6.1.


**FIGURE 6.1: MODEL EXTENTS – SIX MILE BOTTOM**

6.1.2 The traffic survey data that has been captured is shown in Figure 6.2.




6.1.3

**FIGURE 6.2: PROPOSED SURVEY LOCATIONS – SIX MILE BOTTOM**

## 6.2 Model Time Periods & Demands

6.2.1 The peak periods have been calculated using the sum of all entry points based on the MCCs. The following peak periods have been identified for the Six Mile Bottom model:

- AM Peak - 0745-0845hrs
- PM Peak – 1530-1630hrs

6.2.2 A 15-minute warm-up and cool-down period has also been applied to the model.

6.2.3 Census data have been captured on Tuesday 6th of July 2021 and have been summarised in Table 6.1 and Table 6.2.

| | Surveyed | | | |
|---|---|---|---|---|
| **Mvt #** | **Lights** | **Heavies** | **Cyclists** | **Total** |
| **Westbound** | 355 | 11 | 1 | 367 |
| **Eastbound** | 731 | 10 | 1 | 742 |

**TABLE 6.1: AM PEAK FLOW – SIX MILE BOTTOM**

| | Surveyed | | | |
|---|---|---|---|---|
| **Mvt #** | **Lights** | **Heavies** | **Cyclists** | **Total** |
| **Westbound** | 761 | 31 | 3 | 795 |
| **Eastbound** | 262 | 3 | 0 | 265 |

**TABLE 6.2: PM PEAK FLOW – SIX MILE BOTTOM**

6.2.4 3 pedestrians were observed to cross the level crossing during the AM peak only.

## 6.3 Model Calibration – Flows

6.3.1 The model has been calibrated against the turning count as shown in Table 6.3.

| Calibration | |
|---|---|
| Total number of counts considered | 2 |
| | |
| VISSIM model counts with GEH <3 | 2 |
| % of VISSIM counts with GEH <3 | 100% |
| | |
| VISSIM model counts with GEH <5 | 2 |
| % of VISSIM counts with GEH <5 | 100% |
| | |
| VISSIM model counts with GEH <10 | 2 |
| % of VISSIM counts with GEH <10 | 100% |
| | |
| VISSIM model counts meeting WebTAG Unit 3.1 criteria | 2 |
| % of VISSIM counts meeting WebTAG Unit 3.1 flow criteria | 100% |

**TABLE 6.3: FLOW CALIBRATION – AM AND PM PEAK – SIX MILE BOTTOM**

## 6.4 Model Validation – Flows

6.4.1 The model has been validated against the ATC data as shown in Table 6.4.

| Validation | |
|---|---|
| Total number of counts considered | 2 |
| | |
| VISSIM model counts with GEH <3 | 2 |
| % of VISSIM counts with GEH <3 | 100% |
| | |
| VISSIM model counts with GEH <5 | 2 |
| % of VISSIM counts with GEH <5 | 100% |
| | |
| VISSIM model counts with GEH <10 | 2 |
| % of VISSIM counts with GEH <10 | 100% |
| | |
| VISSIM model counts meeting WebTAG Unit 3.1 criteria | 2 |
| % of VISSIM counts meeting WebTAG Unit 3.1 flow criteria | 100% |

**TABLE 6.4: FLOW VALIDATION – AM AND PM PEAK – SIX MILE BOTTOM**

6.4.2 Flow consistency has been checked between the observed and modelled values for the crossing within the study area for the light and heavy vehicles. The results show a GEH <3 for at least 85% of cases in all peaks, as recommended by the modelling guidelines.

## 6.5 Model Validation – Barrier Down Time

6.5.1 The barrier down time was also captured as part of this study and was used to set up the model as shown in Table 6.5.

| AM | | | PM | | |
|---|---|---|---|---|---|
| Number of call | | | Number of call | | |
| Surveyed | Modelled | Diff. | Surveyed | Modelled | Diff. |
| 2 | 2 | 0 | 1 | 1 | 0 |
| Barrier down time (s) | | | Barrier down time (s) | | |
| Surveyed | Modelled | Diff. | Surveyed | Modelled | Diff. |
| 39 | 39 | 0 | 38 | 38 | 0 |
| 42 | 42 | 0 | - | - | - |

**TABLE 6.5: BARRIER DOWN TIME - SIX MILE BOTTOM**

6.5.2 From the results above, it can be seen that the model validates well with the observed data in term of the barrier down time and number of activations.

6.5.3 The timings associated with the level crossing on Brinkley Road are identical to those used at the Six Mile Bottom crossing, due the same crossing type and close proximity.

## 6.6 Model Validation – Queue Lengths

6.6.1 The queue lengths in the model have also been compared with the observed data as shown in Table 6.6 and Table 6.7.

| Max Queue Length (Vehicle) AM Peak | | | | | | |
|---|---|---|---|---|---|---|
| | NB | | | SB | | |
| Call # | Surveyed | Modelled | Diff. | Surveyed | Modelled | Diff. |
| 1 | 2 | 5 | 3 | 16 | 16 | 0 |
| 2 | 4 | 6 | 2 | 22 | 18 | -4 |
| Avg | 3 | 6 | 3 | 19 | 17 | -2 |

**TABLE 6.6: QUEUE LENGTHS– AM PEAK – SIX MILE BOTTOM**

| Max Queue Length (Vehicle) PM Peak | | | | | | |
|---|---|---|---|---|---|---|
| | NB | | | SB | | |
| Call # | Surveyed | Modelled | Diff. | Surveyed | Modelled | Diff. |
| 1 | 22 | 18 | -4 | 6 | 4 | -2 |
| Avg | 22 | 18 | -4 | 6 | 4 | -2 |

**TABLE 6.7: QUEUE LENGTHS– PM PEAK – SIX MILE BOTTOM**

6.6.2 From the results above, it can be seen that the queue lengths in the model are similar to those observed.

# 7 DULLINGHAM VISSIM MODEL

## 7.1 Model Extents & Survey Locations

7.1.1 The model extents for the Dullingham VISSIM model are shown in Figure 7.1.


**FIGURE 7.1: MODEL EXTENTS – DULLINGHAM**

7.1.2 The traffic survey data that has been captured is shown in Figure 7.2.

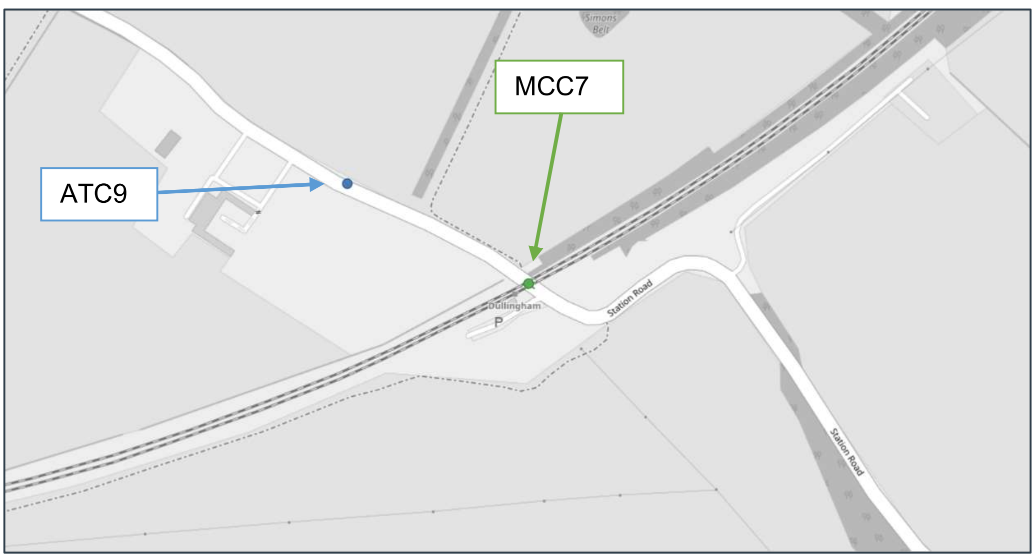



**FIGURE 7.2: PROPOSED SURVEY LOCATIONS – DULLINGHAM**

## 7.2 Model Time Periods & Demands

7.2.1 The peak periods have been calculated using the sum of all entry points based on the MCCs. The following peak periods have been identified for the Dullingham model:

- AM Peak - 0815-0915hrs
- PM Peak – 1600-1700hrs

7.2.2 A 15-minute warm-up and cool-down period has also been applied to the model.

7.2.3 Census data have been captured on Tuesday 6th of July 2021 and have been summarised in Table 7.1 and Table 7.2

| | Surveyed | | | |
|---|---|---|---|---|
| **Mvt #** | **Lights** | **Heavies** | **Cyclists** | **Total** |
| **Westbound** | 29 | 3 | 0 | 32 |
| **Eastbound** | 20 | 1 | 0 | 21 |

**TABLE 7.1: AM PEAK FLOW – DULLINGHAM**

| | Surveyed | | | |
|---|---|---|---|---|
| **Mvt #** | **Lights** | **Heavies** | **Cyclists** | **Total** |
| **Westbound** | 23 | 0 | 0 | 23 |
| **Eastbound** | 16 | 1 | 0 | 17 |

**TABLE 7.2: PM PEAK FLOW – DULLINGHAM**

7.2.4 A maximum of 4 pedestrians were observed to cross the level crossing during the AM peak period.

## 7.3 Model Calibration – Flows

7.3.1 The model has been calibrated against the turning count as shown in Table 7.3.

| Calibration | |
|---|---|
| Total number of counts considered | 2 |
| | |
| VISSIM model counts with GEH <3 | 2 |
| % of VISSIM counts with GEH <3 | 100% |
| | |
| VISSIM model counts with GEH <5 | 2 |
| % of VISSIM counts with GEH <5 | 100% |
| | |
| VISSIM model counts with GEH <10 | 2 |
| % of VISSIM counts with GEH <10 | 100% |
| | |
| VISSIM model counts meeting WebTAG Unit 3.1 criteria | 2 |
| % of VISSIM counts meeting WebTAG Unit 3.1 flow criteria | 100% |

**TABLE 7.3: FLOW CALIBRATION – AM AND PM PEAK – DULLINGHAM**

## 7.4 Model Validation – Flows

7.4.1 The model has also been validated against the ATC data as shown in Table 7.4.

| Validation | |
|---|---|
| Total number of counts considered | 2 |
| | |
| VISSIM model counts with GEH <3 | 2 |
| % of VISSIM counts with GEH <3 | 100% |
| | |
| VISSIM model counts with GEH <5 | 2 |
| % of VISSIM counts with GEH <5 | 100% |
| | |
| VISSIM model counts with GEH <10 | 2 |
| % of VISSIM counts with GEH <10 | 100% |
| | |
| VISSIM model counts meeting WebTAG Unit 3.1 criteria | 2 |
| % of VISSIM counts meeting WebTAG Unit 3.1 flow criteria | 100% |

**TABLE 7.4: FLOW VALIDATION – AM AND PM PEAK – DULLINGHAM**

7.4.2 Flow consistency has been checked between the observed and modelled values for the crossing within the study area for the Lights and Heavies vehicles. The results show a GEH <3 for at least 85% of cases in all peaks, as recommended by the modelling guidelines.

7.4.3 The barrier down time was also captured as part of this study and was used to setup the model as shown in Table 7.5.

| AM | | | PM | | |
|---|---|---|---|---|---|
| Number of call | | | Number of call | | |
| Surveyed | Modelled | Diff. | Surveyed | Modelled | Diff. |
| 1 | 1 | 0 | 2 | 2 | 0 |
| Barrier down time (s) | | | Barrier down time (s) | | |
| Surveyed | Modelled | Diff. | Surveyed | Modelled | Diff. |
| 236 | 236 | 0 | 181 | 181 | 0 |
| - | - | - | 356 | 356 | 0 |

**TABLE 7.5: BARRIER DOWN TIME - DULLINGHAM**

7.4.4 Overall, the model validates well with the observed data in term of the barrier down time and number of activations.

| Max Queue Length (Vehicle) AM Peak | | | | | | |
|---|---|---|---|---|---|---|
| | NB | | | SB | | |
| **Call #** | **Surveyed** | **Modelled** | **Diff.** | **Surveyed** | **Modelled** | **Diff.** |
| **1** | 0 | 2 | 2 | 3 | 2 | -1 |
| **Avg** | 0 | 2 | 2 | 3 | 2 | -1 |

**TABLE 7.6: QUEUE LENGTHS – AM PEAK – DULLINGHAM**

| Max Queue Length (Vehicle) PM Peak | | | | | | |
|---|---|---|---|---|---|---|
| | NB | | | SB | | |
| **Call #** | **Surveyed** | **Modelled** | **Diff.** | **Surveyed** | **Modelled** | **Diff.** |
| **1** | 0 | 1 | 1 | 4 | 6 | 2 |
| **2** | 0 | 3 | 3 | 5 | 0 | -5 |
| **Avg** | 0 | 2 | 2 | 5 | 3 | -2 |

**TABLE 7.7: QUEUE LENGTHS – PM PEAK – DULLINGHAM**

7.4.5 From the results above, it can be seen that the queue lengths in the model are similar to those observed.

# 8 MELDRETH VISSIM MODEL

## 8.1 Model Extents & Survey Locations

8.1.1 The model extents for the Meldreth VISSIM model are shown in Figure 8.1.


**FIGURE 8.1: MODEL EXTENTS - MELDRETH**

8.1.2 The traffic survey data that has been captured is shown in Figure 8.2.

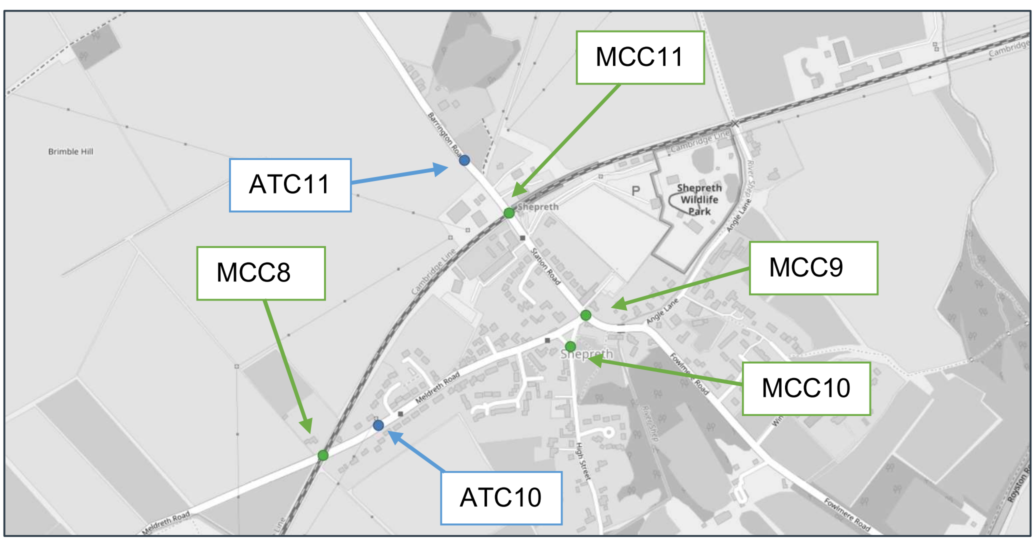



**FIGURE 8.2: PROPOSED SURVEY LOCATIONS - MELDRETH**

## 8.2 Model Time Periods & Demands

8.2.1 The peak periods have been calculated using the sum of all entry points based on the MCCs. The following peak periods have been identified for the Meldreth model:

- AM Peak - 0745-0845hrs
- PM Peak – 1645-1745hrs

8.2.2 A 15-minute warm-up and cool-down period has also been applied to the model.

8.2.3 Two pedestrians have been captured crossing the level crossing during the AM peak period.

8.2.4 Census data have been captured on Tuesday 6th of July 2021 and have been summarised in Table 8.1 and Table 8.2.

| | Surveyed | | | |
|---|---|---|---|---|
| **Mvt #** | **Lights** | **Heavies** | **Cyclists** | **Total** |
| **Westbound** | 52 | 0 | 1 | 53 |
| **Eastbound** | 57 | 0 | 0 | 57 |

**TABLE 8.1: AM PEAK FLOW – MELDRETH**

| | Surveyed | | | |
|---|---|---|---|---|
| **Mvt #** | **Lights** | **Heavies** | **Cyclists** | **Total** |
| **Westbound** | 59 | 0 | 1 | 60 |
| **Eastbound** | 51 | 1 | 2 | 54 |

**TABLE 8.2: PM PEAK FLOW – MELDRETH**

8.2.5 A maximum of 4 pedestrians were observed to cross the level crossing during the AM peak period.

## 8.3 Model Calibration – Flows

8.3.1 The model has been calibrated against the turning count as shown in Table 8.3.

| Calibration | |
|---|---|
| Total number of counts considered | 2 |
| | |
| VISSIM model counts with GEH <3 | 2 |
| % of VISSIM counts with GEH <3 | 100% |
| | |
| VISSIM model counts with GEH <5 | 2 |
| % of VISSIM counts with GEH <5 | 100% |
| | |
| VISSIM model counts with GEH <10 | 2 |
| % of VISSIM counts with GEH <10 | 100% |
| | |
| VISSIM model counts meeting WebTAG Unit 3.1 criteria | 2 |
| % of VISSIM counts meeting WebTAG Unit 3.1 flow criteria | 100% |

**TABLE 8.3: FLOW CALIBRATION – AM AND PM PEAK – MELDRETH**

## 8.4 Model Validation – Flows

8.4.1 The model has been validated against the ATC data as shown in Table 8.4.

| Validation | |
|---|---|
| Total number of counts considered | 2 |
| | |
| VISSIM model counts with GEH <3 | 2 |
| % of VISSIM counts with GEH <3 | 100% |
| | |
| VISSIM model counts with GEH <5 | 2 |
| % of VISSIM counts with GEH <5 | 100% |
| | |
| VISSIM model counts with GEH <10 | 2 |
| % of VISSIM counts with GEH <10 | 100% |
| | |
| VISSIM model counts meeting WebTAG Unit 3.1 criteria | 2 |
| % of VISSIM counts meeting WebTAG Unit 3.1 flow criteria | 100% |

**TABLE 8.4: FLOW VALIDATION – AM AND PM PEAK – MELDRETH**

8.4.2 Flow consistency has been checked between the observed and modelled values for the crossing within the study area for the light and heavy vehicles. The results show a GEH <3 for at least 85% of cases in all peaks, as recommended by the modelling guidelines.

## 8.5 Model Validation – Barrier Down Time

8.5.1 The barrier down time was also captured as part of this study and was used to setup the model as shown in Table 8.5 and Table 8.6.

| AM | | | PM | | |
|---|---|---|---|---|---|
| Number of call | | | Number of call | | |
| Surveyed | Modelled | Diff. | Surveyed | Modelled | Diff. |
| 10 | 10 | 0 | 9 | 9 | 0 |
| Barrier down time (s) | | | Barrier down time (s) | | |
| Surveyed | Modelled | Diff. | Surveyed | Modelled | Diff. |
| 43 | 43 | 0 | 77 | 77 | 0 |
| 36 | 36 | 0 | 41 | 41 | 0 |
| 36 | 36 | 0 | 43 | 43 | 0 |
| 54 | 54 | 0 | 40 | 40 | 0 |
| 102 | 102 | 0 | 65 | 65 | 0 |
| 51 | 51 | 0 | 41 | 41 | 0 |
| 40 | 40 | 0 | 37 | 37 | 0 |
| 41 | 41 | 0 | 43 | 43 | 0 |
| 36 | 36 | 0 | 62 | 62 | 0 |
| 60 | 60 | 0 | - | - | - |

**TABLE 8.5: BARRIER DOWN TIME – MELDRETH**

| AM | | | PM | | |
|---|---|---|---|---|---|
| Number of call | | | Number of call | | |
| Surveyed | Modelled | Diff. | Surveyed | Modelled | Diff. |
| 6 | 6 | 0 | 7 | 7 | 0 |
| Barrier down time (s) | | | Barrier down time (s) | | |
| Surveyed | Modelled | Diff. | Surveyed | Modelled | Diff. |
| 248 | 248 | 0 | 123 | 123 | 0 |
| 209 | 209 | 0 | 218 | 218 | 0 |
| 409 | 409 | 0 | 252 | 252 | 0 |
| 152 | 152 | 0 | 110 | 110 | 0 |
| 257 | 257 | 0 | 144 | 144 | 0 |
| 322 | 322 | 0 | 155 | 155 | 0 |
| - | - | - | 111 | 111 | 0 |

**TABLE 8.6: BARRIER DOWN TIME – SHEPRETH**

8.5.2 From the results, it can be seen that the model validates well with the observed data in term of the barrier down time and number of activations.

## 8.6 Model Validation – Queue Lengths

8.6.1 The queue lengths in the model have also been compared with the observed data as shown in Table 8.7 and Table 8.8.

| Max Queue Length (Vehicle) AM Peak | | | | | | |
|---|---|---|---|---|---|---|
| | WB | | | EB | | |
| Call # | Surveyed | Modelled | Diff. | Surveyed | Modelled | Diff. |
| 1 | 1 | 0 | -1 | 1 | 1 | 0 |
| 2 | 1 | 0 | -1 | 2 | 0 | -2 |
| 3 | 0 | 0 | 0 | 1 | 1 | 0 |
| 4 | 1 | 0 | -1 | 0 | 0 | 0 |
| 5 | 2 | 1 | -1 | 3 | 1 | -2 |
| 6 | 2 | 0 | -2 | 2 | 0 | -2 |
| 7 | 1 | 0 | -1 | 2 | 2 | 0 |
| 8 | 1 | 0 | -1 | 1 | 0 | -1 |
| 9 | 3 | 1 | -2 | 0 | 4 | 4 |
| 10 | 0 | 0 | 0 | 1 | 0 | -1 |
| Avg | 1 | 0 | -1 | 1 | 1 | 0 |

**TABLE 8.7: QUEUE LENGTHS – AM PEAK – MELDRETH**

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | |
| | | | | | | |
| | 2 | 1 | -1 | 1 | 2 | 1 |
| | | | | | | |
| | 2 | 1 | -1 | 2 | 1 | -1 |
| | | | | | | |
| | 2 | 1 | -1 | | 1 | 1 |
| | | | | | | |
| | | 1 | 1 | 2 | 1 | -1 |
| | | | | | | |
| | 1 | 1 | 0 | | 2 | 2 |
| | | | | | | |

**TABLE 8.8: QUEUE LENGTHS – PM PEAK – MELDRETH**

8.6.2 From the results, it can be seen that the queue lengths in the model are similar to those observed.

## 8.7 Model Validation – Journey Times

8.7.1 The journey times in the model have also been compared, using the journey time section as shown in Figure 8.3.


**FIGURE 8.3: JOURNEY TIME MAP – MELDRETH**

| | AM JT (s) | | | | PM JT (s) | | | |
|---|---|---|---|---|---|---|---|---|
| Section | Surveyed | Modelled | Diff. | % Diff. | Surveyed | Modelled | Diff. | % Diff. |
| EB Section | 47 | 46 | 0 | -1% | 55 | 46 | -8 | -15% |
| WB Section | 44 | 44 | 0 | -1% | 40 | 43 | 4 | 9% |

**TABLE 8.9: JOURNEY TIMES – AM AND PM PEAK – MELDRETH**

8.7.2 From the results above, it can be seen that the modelled journey times correlate well with the observed times and are within the 15% criteria required within the DfT's TAG Unit 3.1 guidance.

# 9 CONCLUSION

9.1.1 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-OD2 / MCB-CCTV type operation, with a view to understanding the impacts the upgrades will have on the local communities and the wider transport network.

9.1.2 This report has detailed the steps taken to develop base VISSIM models suitable for undertaking further testing at the following level crossing locations:

- 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

9.1.3 In summary, the calibration and validation results for each crossing demonstrate a suitable fit between modelled and surveyed data.

9.1.4 As such, the base models are considered an appropriate starting point in which to undertake any further network testing.

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Roger Faires
By email: <request-929705-e4451125@whatdotheyknow.com>

Network Rail
Freedom of Information
The Quadrant
Elder Gate
Milton Keynes
MK9 1EN

**E** FOI@networkrail.co.uk

16 January 2023

Dear Roger Faires

**Information request**
**Reference number: FOI2022/01494**

Thank you for your email of 17 December 2022, in which you requested the following information:

> *'I'm making a request for the statistics for near misses/incidents in relation to the level crossing adjacent to Shepreth Station for the last 8 years please.'*

I have processed your request under the terms of the Freedom of Information Act 2000 (FOIA) and I can confirm that Network Rail holds this information.

Please see the table below which contains the statistics for near misses/incidents in relation to the level crossing adjacent to Shepreth Station for the last eight years as you requested:

| Year | Number of near misses/incidents |
|---|---|
| **2014** | 3 |
| **2015** | 2 |
| **2019** | 2 |
| **2020** | 1 |
| **Total** | **8** |

I should also note that, under FOIA, when we publicly disclose details of incidents that have occurred at specific named locations in response to requests, we always add a caveat to our response which neither confirms nor denies whether any further information is held under section 38(2) of the Act. This section of the FOIA removes our duty to confirm whether or not information is held if doing so would itself endanger the mental health or physical safety of any individual. We do this as part of our wider work in suicide prevention, to protect whether or not a suicide/suicide attempt may have occurred at any particular location. This is because research has shown that identifying locations where deaths have occurred, whether or not by suicide, also potentially creates a trigger for vulnerable individuals who are considering suicide. For this reason, we include this caveat with all FOIA responses which ask for incident details at specific locations.

If you have any enquiries about this response, please contact me in the first instance at FOI@networkrail.co.uk. Details of your appeal rights are below.

Please remember to quote the reference number at the top of this letter in all future communications.

Yours sincerely

**Elliot Palk**
**Information Officer**

You are encouraged to use and re-use the information made available in this response freely and flexibly, with only a few conditions. These are set out in the Open Government Licence for public sector information. For further information please visit our website.

**Appeal rights**

If you are unhappy with the way your request has been handled and wish to make a complaint or request a review of our decision, please write to the Compliance and Appeals team at Network Rail, Freedom of Information, The Quadrant, Elder Gate, Milton Keynes, MK9 1EN, or by email at ComplianceandAppealsFOI@networkrail.co.uk. Your request must be submitted within 40 working days of receipt of this letter.

If you are not content with the outcome of the internal review, you have the right to apply directly to the Information Commissioner for a decision. The Information Commissioner (ICO) can be contacted at Information Commissioner's Office, Wycliffe House, Water Lane, Wilmslow, Cheshire, SK9 5AF or you can contact the ICO through the 'Make a Complaint' section of their website on this link: https://ico.org.uk/make-a-complaint/

The relevant section to select will be "Official or Public Information".