TRANSPORT AND WORKS ACT 1992

TRANSPORT AND WORKS (INQUIRIES PROCEDURE) RULES 2004

THE NETWORK RAIL (SUFFOLK LEVEL CROSSING REDUCTION) ORDER

PROOF OF EVIDENCE

-OF-

JOHN PREST

Document Reference	NR/31/1

INTRODUCTION

1.1 My name is John Prest. I am a Route Level Crossing Manager (RLCM) within the Anglia Route by profession with 10 months' experience. Since joining the rail industry in 2001, I have been employed in numerous positions including that of a Level Crossing Manager (LCM) for 4 years, gaining promotion to my current role in March 2017. I have worked within the maintenance department for 16 years with varied responsibilities in that time. My current responsibility, so far as is relevant to this public inquiry, is the day to day management of six LCMs on the West Anglia section of the Anglia Route

1.2 The Anglia route is split into 13 geographical areas, with each LCM having responsibility for risk assessment and asset inspections, liaison with local authorities, internal and external stakeholders along with a multitude of other duties relating to the management of level crossing operation and maintenance. The role of LCM was introduced in 2013 with an intensive 30 day training course covering risk management and assessment, ALCRM (The All Level Crossing Risk Model), interaction with level crossing users and stakeholders, and asset management and inspections. This was then followed by four weeks of mentorship from various relevant internal disciplines and a final competency assessment.

1.3 Previously, the activity of assessing level crossing risk was split between the Operational Risk Control Co-Ordinator and the Mobile Operations Manager. This fragmented approach meant the Operations Risk Control Co-Ordinators held responsibility for the risk assessments, but had often never visited the crossings. The current LCM structure allows for one individual to have responsibility for assessing risk and overseeing the maintenance of their specified crossings, and ensures that all components of the risk assessment are conducted by the person who has personal knowledge of the operation, and particular features of the level crossing.

1.4 I supervise and am accountable for the activities carried out by the LCMs along the West Anglia section of the Anglia Route, ensuring the risk at level crossings is kept as low as reasonably practicable. There is another RLCM responsible for the Great Eastern section of the Anglia Route; I have worked closely with the RLCM for Great Eastern in producing this proof of evidence.

2 SCOPE OF EVIDENCE

2.1 In this proof of evidence, I explain how the LCMs conduct the risk assessment in respect of a crossing for which they are responsible, and their general maintenance responsibilities. I then set out, in respect of each crossing contained in the Draft Order, its particular characteristics or features, risk score and any history of incidents.

3 RISK ASSESSMENT

3.1 As Mark Brunnen explains in his Proof of Evidence NR 27/1, there are three aspects to a risk assessment which are carried out in respect of each level crossing; namely:

(i) ALCRM

(ii) Qualitative Risk Assessment ("QRA");

(iii) Narrative Risk Assessment ("NRA")

3.2 LCMs undertake all of the above risk assessment processes, which ultimately lead to an optioneering exercise, to consider how risk at an individual crossing can be eliminated, mitigated or managed by the options submitted, and any recommendations which may be made to the route's Head of Maintenance and Head of Operations for the Anglia route as to which options are to be actioned.

3.3 I discuss each of those risk assessment processes below from a practical perspective – that is, the involvement of the LCMs conducting those assessments. I do not discuss how those risk assessment tools have been developed, or how they are regarded within the industry: that is dealt with in Mr Brunnen's Proof.

3.4 The LCM has to carry out a risk assessment once a year at the highest risk crossings, every two years at the medium risk crossings and every three years at the lower risk crossings. See table below for more

Category	Criteria	Assessment Frequency (Years)
Red	• Individual risk is A • Collective risk is 1 • Collective risk is 2 • Collision frequency (pedestrian + vehicle) is > 0.01	1.25
Yellow	• Individual risk is B • Individual risk is C • Collective risk is 3 • Collision frequency (pedestrian + vehicle) is > 0.001 • Sighting time is less than warning time by > 4 seconds **Note:** This does not take mitigations such as whistle boards and telephones into account	2.25
Double Yellow	Risk score is not M13 and no red or yellow criteria apply	3.25
Green	Risk score is M13	Not assessed

3.5 When there are either three reports of poor user behaviour within 12 months, one occasion requiring a train driver to apply an emergency brake, or an accidental fatality, a "triggered" risk assessment is undertaken within 6 weeks of the event.

3.6 There is also a requirement to carry out a new risk assessment if there is a planned increase to the train timetable or a requirement to run longer trains. Additionally, any changes to the layout of

the crossing or usage over the crossing would require a new assessment to be completed. Any of these may result in a change to the risk score and Fatality Weighted Index (FWI).

ALCRM

3.7 To calculate the level of risk for each level crossing, ALCRM requires specific information about each level crossing asset to be inputted in order for the 'risk score' to be calculated.

3.8 LCMs are responsible for collecting and consolidating the following information to ALCRM and contacting any authorised users and stakeholders, inviting them to participate in the assessment.

3.9 Firstly, information on the crossing is gathered from existing records held by Network Rail; most importantly from historic risk assessments, and incident data (i.e. any 'near miss' or deliberate misuse incidents), and from stakeholder engagement (primarily, with users of the crossing).

3.10 Secondly, an important aspect of the information gathering exercise is the site visit completed by the LCM. The site visit will provide the following information for input into the ALCRM model:

i. The type of crossing surface or deck and its configuration. Different types of crossing surface have different non slip properties.

ii. The distance from the decision point* to the nearest rail and also the distance from the decision point to 2 metres beyond the furthest rail. These measurements are vitally important to calculating the traverse time and thus the required sighting distance. (*A decision point is the last point of safety, where an individual would stand and make an informed decision whether or not it is safe to cross, the CC03 - Stop Look Listen sign is usually positioned at this point).

iii. Whether the signs are positioned so that they are clearly visible to a crossing user as they approach the crossing.

iv. Sighting distances measured in all directions from both sides of the track. This is the distance measured from the decision point to where a train is first visible to a crossing user as it approaches the level crossing.

v. Are there any obstructions that make it difficult to see an approaching train?

vi. Any adjacent sources of light or noise which could affect the user's ability to see or hear an approaching train.

vii. Whether a second train passes the crossings within 20 seconds of the first and if the second train would be visible to a crossing user.

viii. The orientation and layout of the crossing is used to assess sun glare risk, where either approaching trains and or warning equipment could be masked by bright or low sunshine.

ix. Is there anything that can be done to improve sighting?

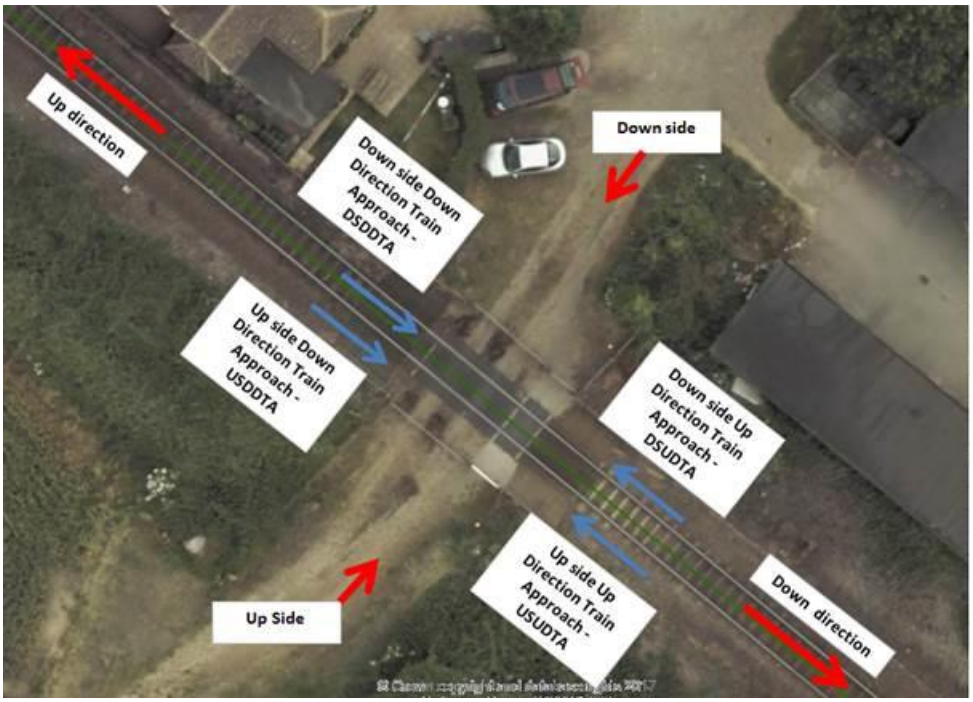
x. Are there whistle boards providing additional warning at the crossing?

xi. If there are any new or planned developments in the area. New residential or retail/business developments can increase or even decrease the level of use over a crossing.

xii. Photographs are taken of all of the crossings approaches, road and railway signage plus crossing equipment and rail approaches. These will give a true and accurate representation of how the crossing looked on the day of the data collection.

Measuring Sightlines

3.12 The picture below is a typical layout of a crossing to help explain the terminology used to assess sighting distances.



3.13 As set out in the Statement of Case, the time available to a user of the crossing to see an approaching train and to cross safely is dependent on the speed of the train and variation in train speeds.

3.14 The required sighting distance is calculated by multiplying the time taken to cross the railway safely by the line speed for the section of line at issue.

3.15 The first step is to calculate the required time to traverse the crossing safely. This is done by dividing traverse distance by the average walking pace (1.18 metres per second). The traverse distance is the distance measured from the decision point (see para 3.10(ii) above) to a point 2m from the line on the opposite side of the railway. Eg, the traverse time for a traverse

distance of 9m would be calculated as 9 metres ÷ 1.18 metres per second = 7.57 seconds. This gives the average time a user would take to walk from one position of safety to another (i.e. from the 'decision point' to a point 2m from the track at the other side of the crossing).

3.16 The traverse time is then multiplied by the maximum line speed (converted from miles per hour to metres per second) to give the required sighting distance. E.g.. 7.57 seconds x 31.29 metres per second (70mph) = 236.86 metres.

3.17 Variations to the above calculation are used when vulnerable persons are known to use the crossing, in which case an additional 50% is added to the traverse time, the final decision on adding the additional 50% is left for the LCM to use their expert judgement and knowledge of that particular crossing. Where no crossing deck exists and users are required to walk on the ballast and step over rails, a walking speed of 0.914 metres per second is used, rather than 1.18 metres per second. Where steps are within the decision point or the crossing is skewed to the tracks the LCM can adjust the traverse time as they see fit.

3.18 The LCMs are provided with a calculator within an excel spread sheet to assist and remove the possibility of errors when calculating required sighting distances.

3.19 The LCM measures sighting distances in either direction from both sides of the tracks. Whilst standing at the decision point, a measurement is taken using a range finder to a fixed structure or feature where possible. If no structures or features exist, then the LCM will walk out with a measuring wheel to the distance where the CC03 - Stop Look Listen sign is lastly visible, or where it is known that a train is visible to from the decision point. Where possible, the visibility of an approaching train is double checked with a range finder to an actual train, although this is not to be relied upon due to the speed of the approaching trains.

3.20 Weather conditions can affect visibility – especially if areas are known to be foggy / misty in the winter months. The LCM would include this information in their NRA. So even if the crossing has suitable sighting shown on the crossing by crossing section, this does not necessarily mean they have sufficient sighting throughout the year.

Usage

3.21 As part of the risk assessment data the LCM will place a covert camera at the crossing for a minimum of 9 days. This provides the LCM with an understanding of when and by whom the crossing is used. The census also highlights potential vulnerable users.

3.22 The LCM assesses the surrounding environment for potential seasonal variation to the sight lines caused by fog or vegetation growth, increased harvest usage, local attractions or tourist attractions. If the above were found, the LCM would undertake a second census at the appropriate time to record the increase/decrease in seasonal variations.

3.23 On vehicular crossings, the LCM would conduct an environmental check of up to a maximum of 700 metres in either direction and up to 20 metres either side of the railway. The following factors are used to asses any risks to a derailed train: proximity of buildings, bridges, tunnels, bodies of water, rail points/turnouts and structures. Any additional hazards would be highlighted by the LCM and added in to the narrative risk assessment.

3.24 Anything else the LCM believed relevant would be noted on his data collection form and included on the narrative risk assessment, which I refer to further below.

Risk assessment and optioneering

3.25 A defined set of observable crossing features, referred to at para 3.10 above, are recorded and then inputted into ALCRM to obtain a rating/score. A sample can be found in NR31/2 Tab 4.

3.26 ALCRM will then provide its rating score, which is divided into two parts: collective risk and individual risk of fatality.

3.27 As explained by Mark Brunnen in his proof of evidence [NR 27-1], collective risk is a measure of the total harm, or safety loss and is expressed in terms of Fatalities and Weighted Injuries (FWI) per year. This is reported in a simplified numeric form ranked from '1 to 13'. '1' represents the highest risk. '13' represents nil risk, you would only usually see a 13 where the crossing is closed or it receives no usage.

3.28 The risk to the individual crossing user is presented as individual risk of fatality per year. It is expressed as a letter, ranked from 'A to M' where 'A' represents the highest risk, and 'M' represents nil risk, you would only see a M where the crossing is closed or no usage is recorded or observed during an extended census.

3.29 However, as explained by Mark Brunnen in his Proof of Evidence, the risk assessment process, and decision making which follows the same, does not stop with the ALCRM score. It would be possible, for example, for two crossings within an LCM's area of responsibility to both score C4 (a high risk crossing) but one of those crossings might have features or characteristics which cause the LCM some concern, whereas the other does not. This would be identified on the Narrative Risk Assessment (NRA). A sample NRA can be found in my appendices at NR31/2 Tab 5 attached to my proof.

3.30 The NRA is vitally important to the management of level crossings; it gives the LCM the opportunity to describe any concerns they have with each particular crossing under their control and also allows them to differentiate between similar types of crossing with a similar risk score. For example, there may be two C4 crossings, one of which the LCM has no specific concerns about. However the other may be very prone to sea fog or have a nursing home nearby. The LCM will use the NRA to support and justify their decision making and thought process. The NRA includes evidence collected on site during the data collection along with their local knowledge gained from visiting the crossing numerous times throughout the year, and the options considered to make the crossing safer.

3.31 Following completion of the risk assessments, the LCM will carry out an 'optioneering' exercise, to consider options for eliminating, reducing, mitigating or managing the risk at an individual crossing.

3.32 Options which are considered by the LCM to eliminate the risk at a level crossing could be; closure by means of diversion, closure via an under or over bridge, and removing the rights to use the crossing. It should be noted that, installing new infrastructure is not always possible due to lack of funding and or lack of physical room to install the new equipment or structures. However, this is not a matter which would be for the LCM to determine – questions of whether such infrastructure could be installed in practice would be for a specialist engineering team, and questions of funding put forward to members of the Director of Route Safety and Asset Managers team, as explained in the Proof of Eliane Algaard NR28/1.

3.33 Options which would be considered by the LCM to reduce or mitigate the risk would usually focus on additional technologies or warnings which could be installed at the crossing. This would include for example, the installation of an active warning system, which would show a red light to instruct a user a train is approaching or a green light to instruct a user it is clear and safe to cross along with audible warnings.

3.34 Options which would be looked at by the LCM to manage the risk would be minor alterations to improve the crossing, such as delivering a gate to gate enhancement to ensure users cross the railway on the shortest safest possible route.

3.35 Other more limited options could be actioned by the LCMs themselves and this could for example include such things as arranging an education campaign at the crossing to educate the users how to use the crossing safely and in the most appropriate way, additional visits to carry out maintenance and other minor pieces of work to ensure the crossing remains to the current standard.

3.36 As I indicated above (in para 3.32), the decision on whether any particular option should be taken forward, does not rest with the LCM. The LCM will make recommendations, based on the narrative risk assessment and the optioneering process which will then be discussed and decisions made at the level crossing optioneering meeting. This meeting would be attended by a selection of senior managers and level crossing subject matter experts, who would ultimately make a decision having regard not only to the crossing under discussion but the wider network in the Anglia region.

Maintenance

4.1 The LCM is responsible for carrying out a maintenance asset inspection. This activity is carried out at least once every 6 months at an unprotected footpath or user worked crossing. If the crossing has an automatic warning system installed, it inspection frequency is increased to at least every 7 weeks.

4.2 During this inspection the LCM carries out a visual tactile inspection on the crossing, if there is a minor defect the LCM can safely rectify, they will do it there and then. Anything they cannot complete will be reported to the relevant department with a priority code that is stipulated in the maintenance standard NR/L3/TRK/4041. A copy of that standard can be found at NR31/2 Tab 6 attached to my proof.

4.3 These inspections, and works which result from the LCM reporting an issue on site, they are in addition to Maintenance Scheduled Tasks (MSTs) which are in place to maintain the sighting

lines of each footpath and user worked crossing as specified in NR/L2/TRK/5201, a copy of that standard can be found at NR31/2 Tab 1. To comply Network Rail arranges one visit to cut vegetation and one to spray vegetation to stop the regrowth every year. This frequency can be adjusted where required. It is estimated to cost £3792 per crossing visit – this is because the team carrying out the duties need to comply to track safety, this means there will be a requirement for a team of 3 to attend, this will consist of 1 person being there to solely look after the safety of the team and ensure they do not go beyond the limits of the safety zone. In general, this would cost a minimum of £7584 per year per crossing.

4.4 It is also quite difficult and costly to maintain a smooth walking route from the decision point until a user is 2 metres clear of the running line. On a typical crossing it is estimated a team has to attend once a year and every time a team attends a crossing it costs £3792. This would be completed at the same time as the vegetation team visit the crossing, if the maintenance is required at that time.

4.5 In addition, track standards dictate that every level crossing surface needs to be removed and replaced to allow inspection and maintenance of the track at set periods. This costs approximately £5000 on average each time the crossing is removed; each crossing is lifted at least once a year, however, this can be more often depending on the track quality.

4.6 I set out these figures to give an indication of the general maintenance costs associated with each level crossing on an annual basis, but these clearly do not take into account any costs which would be incurred in the event of an incident (for example, if there was a collision between a train and a motor vehicle / pedestrian) or a defect identified by an LCM on a site visit which he was not able to safely rectify himself.

The crossings contained within the draft order

5.1 I set out below the relevant risk scores, and particular characteristics, of each of the crossings contained within the Draft Order. As set out in the Proofs of Evidence of Mark Brunnen and Eliane Algaard, Network Rail is not seeking to divert users from the level crossings in the Draft Order to other crossing points because of specific safety concerns relating to each individual crossing. A number of the crossings are already closed, where such safety concerns exist – albeit this is on a temporary basis. My evidence below is therefore concerned with the current assessment of risk relating to each crossing and any particular features which have been identified by the LCM responsible for the crossing, including any past incidents recorded on the crossing, and provided to assist the inquiry in understanding the position on the ground in relation to each of the crossings.[1]

5.2 Optioneering and the associated CBA costs are based on generic costs available at the time of carrying out the risk assessment; the diversion costs shown are not based on any specific diversions linked to this Order.

1 S02 Brantham High Arch & S23 Higham Ground Frame crossings are temporarily closed under a TTRO due to safety concerns raised by the LCM, S29 Hawk End Lane is closed via a TTRO by a developer who is developing the land on the northern side of the railway.

6. S01 – Sea Wall

6.1. S01 Sea Wall footpath crossing has an ALCRM score of C5 with an FWI of 0.000638867978; it is located in Brantham Parish on the LTN1 line (London Liverpool Street to Norwich) which has a line speed of 100 MPH; it is between Ipswich and Manningtree 60 miles and 46 chains from Liverpool street station London.

6.2. There are 204 trains per day that run for 24 hours per day over this level crossing. Additionally, there are empty stock trains that pass over the crossing. There can also be various on-track machinery and plant that pass over the crossing at any point.

6.3. An aerial view of S01 Sea Wall footpath crossing can be seen below.

6.4. The track on the left is the down line from London and the track on the right is the up line to London. Trains would normally run down from London on the left hand line that is from the bottom of the picture to the top. Trains would normally run up to London on the right hand line, which is from the top of the picture to the bottom.

6.5. Below photos shows the field to field approach to the crossing.

6.6. Sea Wall level footpath crossing is a 'Passive' crossing, meaning that there is no direct method of warning people who use the crossing of approaching trains. It is not controlled, or equipped with lights, or any automatic audible warning system other than whistle boards, which I discuss further below. The location and geography of the crossing means that it is therefore necessarily reliant upon users to `stop look and listen' to check for approaching trains, ensuring they have sufficient time to cross and to protect their personal safety whilst traversing the line.

6.7. A 9 day camera census was carried out in January 2017, 7 pedestrians were recorded per day.

6.8. Given the line speed of 100 mph in this area and the distance to traverse the crossing of 9.0 metres, this crossing would require sightlines of 343 meters in order to give the user enough time to cross before the train arrives.

6.9. The Sightings recorded at last risk assessment which was completed on 18/01/17 were as follows:

All distances are recorded in metres	Minimum sighting distance required	Measured sighting distance	Is sighting compliant?
Upside looking toward up direction train approach	343	448	Yes
Upside looking toward down direction train approach	343	489	Yes
Down side looking toward up direction train approach	343	393	Yes
Down side looking toward down direction train approach	343	374	Yes

6.10. The photograph below is taken looking northward, from the up side at a train approaching in the up direction. The trains usually approach on the closest set of lines (the central line).

6.11. The photograph below is taken on the upside looking at train approaching in the down direction, looking south, the train usually approaches on the furthest (right hand side) set of lines.

6.12. The photograph below is taken on the downside at a train approaching in the up direction looking north; the train usually approaches on the furthest line of the two running (central line) set of lines.

6.13. The photograph below is taken on the down side at a train approaching in the down direction looking south; the train usually approaches on the closest (right hand side) set of lines.

6.14. As can been from the table above (6.9), S01 Sea Wall crossing does have sufficient sighting to meet industry standards in all directions, historically this was not the case and the crossing has whistle boards installed to mitigate the insufficient sighting. However, following extensive vegetation clearance the sighting was made sufficient and maintainable. The whistle boards were left in place due to the risk of fog at this particular crossing.

6.15. As set out at section 3.31 above, following the risk assessment, an optioneering exercise was carried out to consider options for eliminating, reducing, mitigating or managing risk at this crossing. These options considered were:

(i) Closure via diversion would cost in the region of £50000 – this option returned a positive CBA score of 0.87, this means the safety benefit is supporting the costs of diverting the right of way.

(ii) Installing MSL overlay has been ruled out due to an MSL overlay not being suitable for this location.

(iii) Installing an integrated MSL to the crossing at a cost of £650000 – this option has returned a CBA score of 0.03, this means the cost of this option is disproportionate to the safety benefit received.

6.16. There was a fatality on the 8th April 2016, 1P21 (GA 0830 Norwich – Liverpool St) struck person on the Up Main line at Sea Wall footpath crossing.

6.17. Sea Wall footpath crossing is positioned on a steep embankment, fog is a particular problem due to the low lying land and river nearby, this is the reason that the whistle boards are left in place. This means the crossing will potentially have insufficient sighting at certain times of the year. There is also a potential development on the old factory land to the north west of the crossing, this is planned to be turned into a train depot, and this will cause an increase to the ambient noise levels so could make it harder to hear a train approach and the use of whistle boards within the new depot, could make the whistle boards ineffective, as users will no know which train is approaching the crossing.

7. S02 – Brantham High Bridge

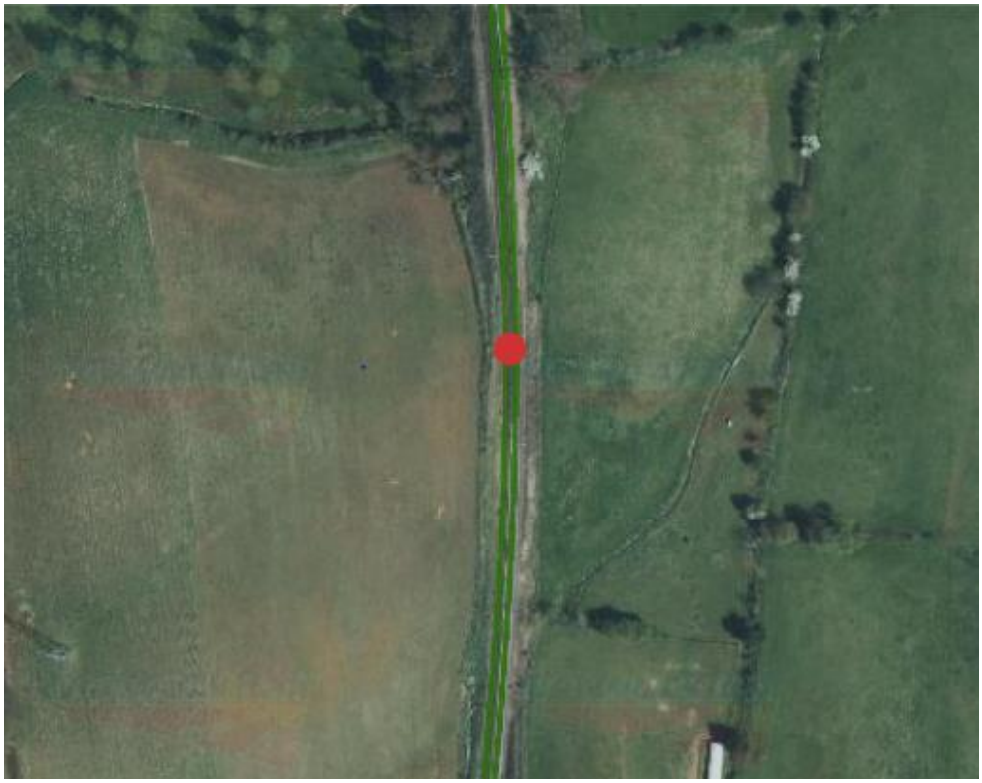
7.1. S02 Brantham High Bridge footpath crossing has an ALCRM score of M13, prior to the crossing being temporarily closed under TTRO in September 2016, the ALCRM score was C6 with a FWI of 0.000110097148. It is located in Brantham Parish on the LTN1 line (London Liverpool Street to Norwich) which has a line speed of 100 MPH; it is between Ipswich and Manningtree 61 miles and 74 chains from Liverpool street station London.

7.2. There are 204 trains per day that run for 24 hours per day over this level crossing. Additionally, there are empty stock trains that pass over the crossing. There can also be various on-track machinery and plant that pass over the crossing at any point.

7.3. An aerial view of S02 Brantham High Bridge crossing can be seen below.

7.4. The track on the left is the down line from London and the track on the right is the up line to London. Trains would normally run down from London on the left hand line that is from the bottom of the picture to the top. Trains would normally run up to London on the right hand line, which is from the top of the picture to the bottom.

7.5. Below photos shows the field to field approach to the crossing.



7.6. S02 Brantham High Bridge level crossing is a 'Passive' crossing, meaning that there is no direct method of warning people who use the crossing of approaching trains. It is not controlled, or equipped with lights, or any automatic audible warning systems, other than whistle boards which I discuss further below. The location and geography of the crossing means that it is therefore necessarily reliant upon users to `stop look and listen' to check for approaching trains, ensuring they have sufficient time to cross and to protect their personal safety whilst traversing the line.

7.7. A 9 day camera census was carried out between 25th June and 03rd July 2016. 2 users were recorded using the crossing and both were adults.

7.8. Given the line speed of 100 mph in this area and the distance to traverse the crossing of 9.0 metres, this crossing would require sightlines of 343 metres in order to give the user enough time to cross before the train arrives.

7.9. The Sightings recorded at last risk assessment which was completed on 11/11/15 were as follows:

All distances are recorded in metres	Minimum sighting distance required	Measured sighting distance	Is sighting compliant?
Upside looking toward up direction train approach	343	632	Yes
Upside looking toward down direction train approach	343	330	No
Down side looking toward up direction train approach	343	430	Yes
Down side looking toward down direction train approach	343	170	No

7.10. The photograph below is taken looking northward, from the up side at a train approaching in the up direction. The trains usually approach on the closest set of lines (the central line).

7.11. The photograph below is taken on the upside looking at train approaching in the down direction, looking south, the train usually approaches on the furthest (right hand side) set of lines.

7.12. The photograph below is taken on the downside at a train approaching in the up direction looking north; the train usually approaches on the furthest line of the two running (central line) set of lines.

7.13. The photograph below is taken on the down side at a train approaching in the down direction looking south; the train usually approaches on the closest (right hand side) set of lines.

7.14 As can been from the table above (7.9), S02 Brantham High Bridge crossing does not have sufficient sighting to meet industry standards in all directions, Whistle boards are installed as mitigation. Trains regularly pass each other at this location. While on site the LCM has witnessed a train passing on the up line, while a train is approaching on the down line. The up line train completely blocks out the sound of the whistle board, when the whistle board warns a train is approaching on the down line. This is a prime example where whistle boards are not a reliable mitigation to insufficient sighting, it was for this reason it was decided this crossing had to be closed.

7.15 As set out at section 3.31, following the risk assessment, an optioneering exercise was carried out to consider options for eliminating, reducing, mitigating or managing risk at this crossing. These options considered were:

(i) Closure via diversion would cost in the region of £50000 – this option returned a positive CBA score of 0.74, this means the safety benefit is supporting the costs of diverting the right of way.

(ii) Installing MSL overlay has been ruled out, an MSL overlay is not suitable for this location.

(iii) Installing an integrated MSL to the crossing at a cost of £650000 – this option has returned a CBA score of 0.03, this means the cost of this option is disproportionate to the safety benefit received

7.16 There have been no reported incidents at this location.

8. S03 Buxton Wood

8.1. S03 Buxton Wood footpath crossing has an ALCRM score of C7 with an FWI of 0.000091322: it is located in Bentley Parish on the LTN1 line (London Liverpool Street to Norwich) which has a line speed of 100 MPH; it is between Ipswich and Manningtree 63 miles and 24 chains from Liverpool street station London.

8.2. There are 204 trains per day that run for 24 hours per day over this level crossing. Additionally, there are empty stock trains that pass over the crossing. There can also be various on-track machinery and plant that pass over the crossing at any point.

8.3. An aerial view of S03 Buxton Wood crossing can be seen below.

8.4. The track on the left is the down line from London and the track on the right is the up line to London. Trains would normally run down from London on the left hand line that is from the bottom of the picture to the top. Trains would normally run up to London on the right hand line, which is from the top of the picture to the bottom.

8.5. Below photos shows the field to field approach to the crossing.

8.6. S03 Buxton Wood level crossing is a 'Passive' crossing, meaning that there is no direct method of warning people who use the crossing of approaching trains. It is not controlled, or equipped with lights, or any automatic audible warning systems. The location and geography of the crossing means that it is therefore necessarily reliant upon users to `stop look and listen' to check for approaching trains, ensuring they have sufficient time to cross and to protect their personal safety whilst traversing the line.

8.7. A 9 day camera census was carried out between 24th September and 02nd October 2016. 11 adults were recorded, none of which were identified as vulnerable users.

8.8. Given the line speed of 100 mph in this area and the distance to traverse the crossing of 9.0 metres, this crossing would require sightlines of 339 metres in order to give the user enough time to cross before the train arrives.

8.9. The Sightings recorded at last risk assessment which was completed on 15/03/16 were as follows:

All distances are recorded in metres	Minimum sighting distance required	Measured sighting distance	Is sighting compliant?
Upside looking toward up direction train approach	339	554	Yes
Upside looking toward down direction train approach	339	362	Yes
Down side looking toward up direction train approach	339	481	Yes
Down side looking toward down direction train approach	339	410	Yes

8.10. The photograph below is taken looking northward, from the up side at a train approaching in the up direction. The trains usually approach on the closest set of lines (the central line).

8.11. The photograph below is taken on the upside looking at train approaching in the down direction, looking south, the train usually approaches on the furthest (right hand side) set of lines.

8.12. The photograph below is taken on the downside at a train approaching in the up direction looking north; the train usually approaches on the furthest line of the two running (central line) set of lines.

8.13. The photograph below is taken on the down side at a train approaching in the down direction looking south; the train usually approaches on the closest (right hand side) set of lines.

8.14. As can be seen from the table above, S03 Buxton wood crossing does have sufficient sighting to meet industry standards in all directions, if vulnerable users were to be identified the crossing would have insufficient sighting and a temporary speed restriction would be required. The OHL (overhead line cables) stations and the track curvature can make seeing a train approaching more difficult than a usual crossing.

8.15. As set out at section 3.31, following the risk assessment, an optioneering exercise was carried out to consider options for eliminating, reducing, mitigating or managing risk at this crossing. The following options considered were;

(i) Closure via diversion would cost in the region of £50000 – this option returned a positive CBA score of 1.57, this means the safety benefit is supporting the costs of diverting the right of way.

(ii) Installing MSL overlay has been ruled out, due to an MSL overlay not being suitable for this location.

(iii) Installing an integrated MSL to the crossing at a cost of £650000 – this option has returned a CBA score of 0.03, this means the cost of this option is disproportionate to the safety benefit received

8.16 There have been no recorded incidents at this crossing.

9. S04 Island

9.1. S04 Island footpath crossing has an ALCRM score of C6 with an FWI of 0.000189461: it is located in Bentley Parish on the LTN1 line (London Liverpool Street to Norwich) which has a line speed of 100 MPH; it is between Ipswich and Manningtree 64 miles and 04 chains from Liverpool street station London.

9.2. There are 204 trains per day that run for 24 hours per day over this level crossing. Additionally, there are empty stock trains that pass over the crossing. There can also be various on-track machinery and plant that pass over the crossing at any point.

9.3. An aerial view of S04 Island crossing can be seen below.

9.4. The track on the left is the down line from London and the track on the right is the up line to London. Trains would normally run down from London on the left hand line that is from the bottom of the picture to the top. Trains would normally run up to London on the right hand line, which is from the top of the picture to the bottom.

9.5. Below photos shows the field to field approach to the crossing.

9.6. S04 Island level crossing is a 'Passive' crossing, meaning that there is no direct method of warning people who use the crossing of approaching trains. It is not controlled, or equipped with lights, or any automatic audible warning systems other than Covtec the whistle board repeater system. The location and geography of the crossing means that it is therefore necessarily reliant upon users to `stop look and listen' to check for approaching trains, ensuring they have sufficient time to cross and to protect their personal safety whilst traversing the line.

9.7. A 9 day camera census was carried out between 25th June and 03rd July 2016. 37 adults were recorded.

9.8. Given the line speed of 100 mph in this area and the distance to traverse the crossing of 9.1 metres, this crossing would require sightlines of 343 metres in order to give the user enough time to cross before the train arrives.

9.9. The Sightings recorded at last risk assessment which was completed on 14/06/17 were as follows:

All distances are recorded in metres	Minimum sighting distance required	Measured sighting distance	Is sighting compliant?
Upside looking toward up direction train approach	343	263	No
Upside looking toward down direction train approach	343	492	Yes
Down side looking toward up direction train approach	343	355	Yes
Down side looking toward down direction train approach	343	418	Yes

9.10. The photograph below is taken looking northward, from the up side at a train approaching in the up direction. The trains usually approach on the closest set of lines.

9.11. The photograph below is taken on the upside looking at train approaching in the down direction, looking south, the train usually approaches on the furthest (right hand side) set of lines.

9.12. The photograph below is taken on the downside at a train approaching in the up direction looking north; the train usually approaches on the furthest line of the two running (central line) set of lines.

9.13. The photograph below is taken on the down side at a train approaching in the down direction looking south; the train usually approaches on the closest (right hand side) set of lines.

9.14. As can been from the table above (9.9), S04 Islands crossing does not have sufficient sighting to meet industry standards in all directions, Islands crossing has insufficient sighting on one out of the four approaches and the crossing is situated in a cutting, as you can see from the pictures the view of an approaching train is incredibly limited. Whistle boards are in place and COVTEC is also installed. The crossing is situated in the centre of a 'S' bend in an area where other crossings also

have whistle boards, this means a user has the potential to become confused about which crossing the train is approaching.

9.15. As set out at sections 9 below, following the risk assessment, an optioneering exercise was carried out to consider options for eliminating, reducing, mitigating or managing risk at this crossing. These options considered were:

(i) Closure via diversion would cost in the region of £50000 – this option returned a positive CBA score of 0.74, this means the safety benefit is supporting the costs of diverting the right of way.

(ii) Installing MSL overlay has been ruled out, due to an MSL overlay not being suitable for this location.

(iii) Installing an integrated MSL to the crossing at a cost of £650000 – this option has returned a CBA score of 0.03, this means the cost of this option is disproportionate to the safety benefit received

9.16. There have been no reported incidents at this crossing.

10. S07 – Broomfield

10.1. S07 Broomfield footpath crossing has an ALCRM score of C4 with an FWI of 0.001250089; it is located in Barham on the LTN1 line (London Liverpool Street to Norwich) which has a line speed of 100 MPH; it is between Ipswich and Stowmarket 74 miles and 14 chains from Liverpool street station London.

10.2. There are 207 trains per day that run for 24 hours per day over this level crossing. Additionally, there are empty stock trains that pass over the crossing. There can also be various on-track machinery and plant that pass over the crossing at any point.

10.3. An aerial view of S07 Broomfield footpath crossing can be seen below.

10.4. The track on the left is the down line from London and the track on the right is the up line to London. Trains would normally run down from London on the left hand line that is from the bottom of the picture to the top. Trains would normally run up to London on the right hand line, which is from the top of the picture to the bottom.

10.5. Below photos shows the field to field approach to the crossing.

10.6. S07 Broomfield footpath level crossing is a 'Passive' crossing, meaning that there is no direct method of warning people who use the crossing of approaching trains. It is not controlled, or equipped with lights, or any automatic audible warning systems. The location and geography of the crossing means that it is therefore necessarily reliant upon users to `stop look and listen' to check for approaching trains, ensuring they have sufficient time to cross and to protect their personal safety whilst traversing the line.

10.7. A 9 day camera census was carried out between 25th June 2016 and 3rd July 2016, 141 pedestrians were recorded over the 9 days, 11 were unaccompanied children & 8 were accompanied children, and all remaining users were adults and believed to be able bodied. The 11 unaccompanied children were not considered a high number so the 50% extra traverse time was not added. This is also consistent with previous camera census that have been carried out which have not identified any vulnerable users.

10.8. Given the line speed of 100 mph in this area and the distance to traverse the crossing of 9.5 metres, this crossing would require sightlines of 358 meters in order to give the user enough time to cross before the train arrives.

10.9. The Sightings recorded at last risk assessment which was completed on 19/10/2016 were as follows:

All distances are recorded in metres	Minimum sighting distance required	Measured sighting distance	Is sighting compliant?
Upside looking toward up direction train approach	358	839	Yes
Upside looking toward down direction train approach	358	461	Yes
Down side looking toward up direction train approach	358	839	Yes
Down side looking toward down direction train approach	358	436	Yes

10.10. The photograph below is taken looking northward, from the up side at a train approaching in the up direction. The trains usually approach on the closest set of lines (the central line).

10.11. The photograph below is taken on the upside looking at train approaching in the down direction, looking south, the train usually approaches on the furthest (right hand side) set of lines.

10.12. The photograph below is taken on the downside at a train approaching in the up direction looking north; the train usually approaches on the furthest line of the two running (central line) set of lines.

10.13. The photograph below is taken on the down side at a train approaching in the down direction looking south; the train usually approaches on the closest (right hand side) set of lines.

10.14. As can been from the table above (10.9), S07 Broomfield crossing does have sufficient sighting to meet industry standards in all directions

10.15. As set out at section 3.31 above, following the risk assessment, an optioneering exercise was carried out to consider options for eliminating, reducing, mitigating or managing risk at this crossing. These options considered were:

(i) Closure via diversion would cost in the region of £50000 – this option returned a positive CBA score of 0.74, this means the safety benefit is supporting the costs of diverting the right of way.

(ii) Installing MSL overlay has been ruled out, due to an MSL overlay not being suitable for this location.

(iii) Installing an integrated MSL to the crossing at a cost of £650000 – this option has returned a CBA score of 0.03, this means the cost of this option is disproportionate to the safety benefit received

10.16. There have been no reported incidents at this crossing.

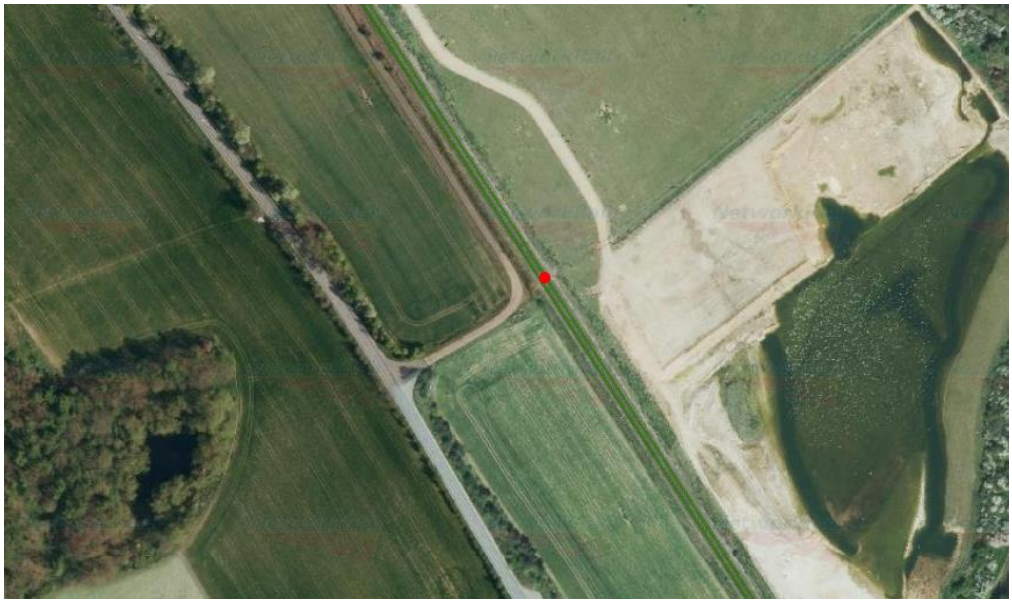
10.17. Broomfield footpath crossing crosses three lines of rails. The third line is a shunt neck for the freight yard, this has been temporarily taken out of use and a temporary buffer stop installed to protect the footpath. This has had to be done due the crossing not having sufficient sighting to traverse all three lines and give users enough sighting to make an informed decision whether they had time to cross. If the shunt line ever had to be extended back to full length a speed restriction or technology would be required to ensure the crossing remained compliant to industry standards.

11. S08 – Stacpools

11.1. S08 Stacpools footpath crossing has an ALCRM score of C5 with an FWI of 0.000713093; it is located in Needham Market on the LTN1 line (London Liverpool Street to Norwich) which has a line speed of 100 MPH; it is between Ipswich and Stowmarket 75 miles and 70 chains from Liverpool street station London.

11.2. There are 207 trains per day that run for 24 hours per day over this level crossing. Additionally, there are empty stock trains that pass over the crossing. There can also be various on-track machinery and plant that pass over the crossing at any point.

11.3. An aerial view of S08 Stacpools footpath crossing can be seen below.



11.4. The track on the left is the down line from London and the track on the right is the up line to London. Trains would normally run down from London on the left hand line that is from the bottom of the picture to the top. Trains would normally run up

to London on the right hand side, which is from the top of the picture to the bottom.

11.5. Below photos shows the field to field approach to the crossing.

11.6. S08 – Stacpools footpath level crossing is a 'Passive' crossing, meaning that there is no direct method of warning people who use the crossing of approaching trains. It is not controlled, or equipped with lights, or any automatic audible warning systems. The location and geography of the crossing means that it is therefore necessarily reliant upon users to `stop look and listen' to check for approaching trains, ensuring they have sufficient time to cross and to protect their personal safety whilst traversing the line.

11.7. A 9 day camera census was carried out between 25th June 2016 and 3rd July 2016, 39 adult pedestrians were recorded using the crossing throughout this period.

11.8. Given the line speed of 100 mph in this area and the distance to traverse the crossing of 9 metres, this crossing would require sightlines of 339 metres in order to give the user enough time to cross before the train arrives.

11.9. The Sightings recorded at last risk assessment which was completed on 19/10/2016 were as follows:

All distances are recorded in metres	Minimum sighting distance required	Measured sighting distance	Is sighting compliant?
Upside looking toward up direction train approach	339	610	Yes
Upside looking toward down direction train approach	339	916	Yes
Down side looking toward up direction train approach	339	584	Yes
Down side looking toward down direction train approach	339	871	Yes

11.10. The photograph below is taken looking northward, from the up side at a train approaching in the up direction. The trains usually approach on the closest set of lines (right hand side).

11.11. The photograph below is taken on the upside looking at train approaching in the down direction, looking south, the train usually approaches on the furthest (right hand side) set of lines.

11.12. The photograph below is taken on the downside at a train approaching in the up direction looking north; the train usually approaches on the furthest line (right hand side) set of lines.

11.13. The photograph below is taken on the down side at a train approaching in the down direction looking south; the train usually approaches on the closest (right hand side) set of lines.

11.14. As can been from the table above (11.9), S08 Stacpools crossing does have sufficient sighting to meet industry standards in all directions

11.15. As set out at section 3.31above, following the risk assessment, an optioneering exercise was carried out to consider options for eliminating, reducing, mitigating or managing risk at this crossing. These options considered were:

(i) Closure via diversion would cost in the region of £50000 – this option returned a positive CBA score of 0.87, this means the safety benefit is supporting the costs of diverting the right of way.

(ii) Installing MSL overlay to the crossing at a cost of £250000 – this option has returned a 0.03 CBA score, this means the cost of this option is disproportionate to the safety benefit received.

11.16. There have been no recorded incidents at this crossing.

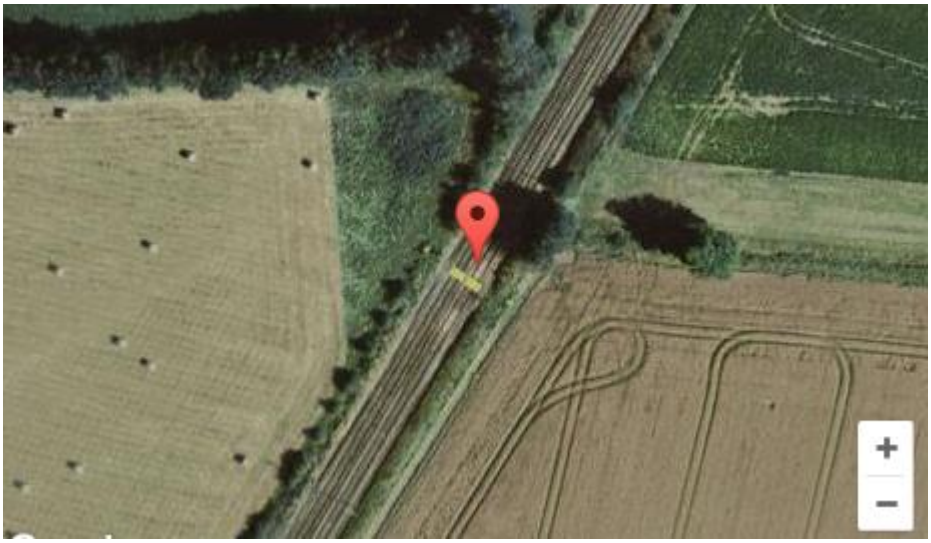
11.17. Stacpools footpath crossing has a relatively busy 'B' road around 100 metres from the crossing, it also has an aggregates quarry on the upside of the crossing, both of these mean the ambient sound levels are higher than normal, this means it may be more difficult to hear a train approaching in this location.

12. S11 – Leggetts footpath crossing

12.1. S11 Leggetts footpath crossing has an ALCRM score of C7 with an FWI of 0.000083053; it is located in Old Newton with Dagworth on the LTN1 line (London Liverpool Street to Norwich) which has a line speed of 100 MPH; it is between Diss and Stowmarket 84 miles and 29 chains from Liverpool street station London.

12.2. There are 92 trains per day that run for 20 hours per day over this level crossing. Additionally, there are empty stock trains that pass over the crossing. There can also be various on-track machinery and plant that pass over the crossing at any point.

12.3. An aerial view of S11 Leggetts crossing can be seen below.



12.4. The track on the left is the down line from London and the track on the right is the up line to London. Trains would normally run down from London on the left hand line that is from the bottom of the picture to the top. Trains would normally run up to London on the right hand side, which is from the top of the picture to the bottom.

12.5. Below photos shows the field to field approach to the crossing.

12.6. S11 Leggetts level crossing is a 'Passive' crossing, meaning that there is no direct method of warning people who use the crossing of approaching trains. It is not controlled, or equipped with lights, or any automatic audible warning systems. The location and geography of the crossing means that it is therefore necessarily reliant upon users to `stop look and listen' to check for approaching trains, ensuring they have sufficient time to cross and to protect their personal safety whilst traversing the line.

12.7. An estimated census was carried on the 19th of October 2015, it was estimated that 2 people used the crossing per day; a 9 day census was also carried out on the 25th June 2016 for 9 days this census showed no users.

12.8. Given the line speed of 100 mph in this area and the distance to traverse the crossing of 9.3 metres, this crossing would require sightlines of 346 metres in order to give the user enough time to cross before the train arrives.

12.9. The Sightings recorded at last risk assessment which was completed on 19/10/2016 were as follows:

All distances are recorded in metres	Minimum sighting distance required	Measured sighting distance	Sighting distance measured to	Is sighting compliant?
Upside looking toward up direction train approach	346	1200	Stanchion	Yes
Upside looking toward down direction train approach	346	420	Vegetation	Yes
Down side looking toward up direction train approach	346	1200	Stanchion	Yes
Down side looking toward down direction train approach	346	517	Stanchion	Yes

12.10. The photograph below is taken looking northward, from the up side at a train approaching in the up direction. The trains usually approach on the closest set of lines (right hand side).

12.11. The photograph below is taken on the upside, looking south, the train usually approaches on the furthest (right hand side) set of lines.

12.12. The photograph below is taken on the downside looking north; the train usually approaches on the closest line (right hand side) set of lines.

12.13. The photograph below is taken on the downside looking south; the train usually approaches on the furthest line (right hand side) set of lines.

12.14. As can been from the table above (12.9), S11 Leggetts crossing does have sufficient sighting to meet industry standards in all directions

12.15. As set out at section 3.31above, following the risk assessment, an optioneering exercise was carried out to consider options for eliminating, reducing, mitigating or managing risk at this crossing. These options considered were:

(i) Closure via diversion would cost in the region of £50000 – this option has returned a 1.32 CBA score – this means which means the safety benefit is supporting the costs of diverting the right of way

(ii) Fenced approach walkway would ensure the users cross exactly on the quickest safest route available, this would include tactile edges to ensure users stop and make their decision to cross at the most appropriate position.

12.16. There have been no reported incidents at this crossing.

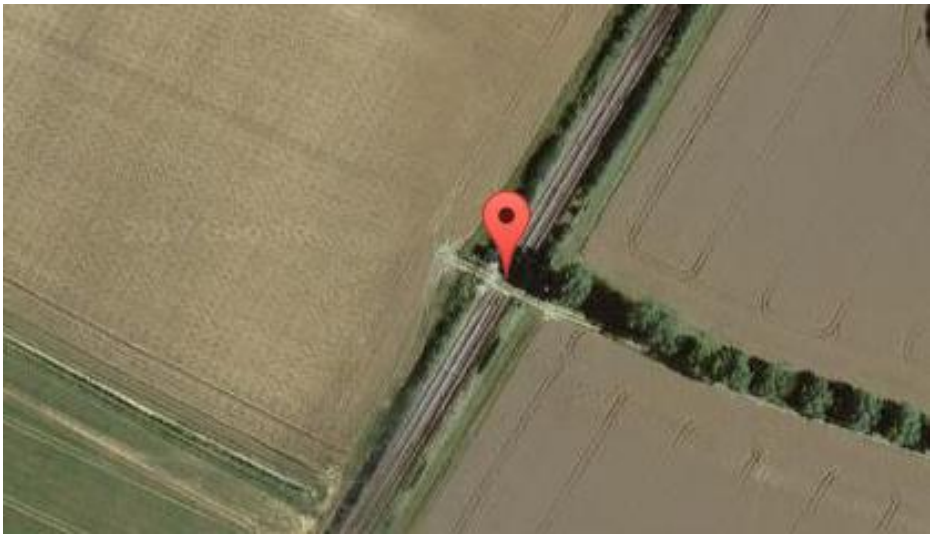
12.17. S11 Leggetts crossing has sufficient sighting to meet industry standards, however if vulnerable users were to be identified the sighting would be insufficient.
Vegetation needs to be maintained more regularly to ensure the sighting levels are maintained, this would typically be an additional planned visit to cut the vegetation, this would mean this crossing would be visited once to spray and twice to cut the vegetation throughout the year.

13. S12 – Gooderhams

13.1. S12 Gooderhams footpath crossing has an ALCRM score of C7 with an FWI of 0.00007975; it is located in Bacton on the LTN1 line (London Liverpool Street to Norwich) which has a line speed of 100 MPH; it is between Diss and Stowmarket 84 miles and 77 chains from Liverpool street station London.

13.2. There are 92 trains per day that run for 20 hours per day over this level crossing. Additionally, there are empty stock trains that pass over the crossing. There can also be various on-track machinery and plant that pass over the crossing at any point.

13.3. An aerial view of S12 Gooderhams crossing can be seen below.



13.4. The track on the left is the down line from London and the track on the right is the up line to London. Trains would normally run down from London on the left hand line that is from the bottom of the picture to the top. Trains would normally run up to London on the right hand side, which is from the top of the picture to the bottom.

13.5. Below photo shows the field to field approach to the crossing.

13.6. S12 – Gooderhams foot crossing is a 'Passive' crossing, meaning that there is no direct method of warning people who use the crossing of approaching trains. It is not controlled, or equipped with lights, or any automatic audible warning systems.

The location and geography of the crossing means that it is therefore necessarily reliant upon users to `stop look and listen' to check for approaching trains, ensuring they have sufficient time to cross and to protect their personal safety whilst traversing the line.

13.7. A census was carried on the 5th of May 2016, this census showed 2 pedestrians using the crossing per day.

13.8. Given the line speed of 100 mph in this area and the distance to traverse the crossing of 9 metres, this crossing would require sightlines of 358 metres in order to give the user enough time to cross before the train arrives.

13.9. The Sightings recorded at last risk assessment which was completed on 04/05/2016 were as follows:

All distances are recorded in metres	Minimum sighting distance required	Measured sighting distance	Sighting distance measured to	Is sighting compliant?
Up side looking toward up direction train approach	358	716	Vegetation	Yes
Up side looking toward down direction train approach	358	658	Vegetation	Yes
Down side looking toward up direction train approach	358	647	Vegetation	Yes
Down side looking toward down direction train approach	358	672	Vegetation	Yes

13.10. The photograph below is taken looking northward, from the up side at a train approaching in the up direction. The trains usually approach on the closest set of lines (right hand side).

13.11. The photograph below is taken on the upside, looking south, the train usually approaches on the furthest (right hand side) set of lines.

13.12. The photograph below is taken on the downside looking north; the train usually approaches on the closest line (right hand side) set of lines.

13.13. The photograph below is taken on the downside looking south; the train usually approaches on the furthest line (right hand side) set of lines.

13.14. As can been from the table above (13.9), S12 Gooderhams crossing does have sufficient sighting to meet industry standards in all directions

13.15. As set out at section 3.31above, following the risk assessment, an optioneering exercise was carried out to consider options for eliminating, reducing, mitigating or managing risk at this crossing. These options considered were:

(i) Closure via diversion would cost in the region of £50,000 – this option has returned a 1.87 CBA score which means the safety benefit is supporting the costs of diverting the right of way.

(ii) Installation of an MSL overlay has been ruled out, due to an MSL overlay not being suitable for this location.

(iii) Installation of a miniature warning light system (MSL) to give user a clear indication of approaching trains would cost in the region of £650,000 - this option has returned a 0.02 CBA score which means the cost of this option is disproportionate to the safety benefit received.

13.16. There have been no recorded incidents at this crossing

13.17. Sighting is very good S12 Gooderhams crossing, for a train approaching in the up direction towards London it is possible to see the train over 1000 meters away at certain times of the year. This could potentially lead to users misjudging how long the train takes to reach the crossing.

14. S13 – Fords Green

14.1. S13 Fords Green footpath crossing has an ALCRM score of C9 with an FWI of 0.000005954; it is located in Bacton on the LTN1 line (London Liverpool Street to Norwich) which has a line speed of 100 MPH; it is between Diss and Stowmarket 85 miles and 51 chains from Liverpool street station London.

14.2. There are 92 trains per day that run for 20 hours per day over this level crossing. Additionally, there are empty stock trains that pass over the crossing. There can also be various on-track machinery and plant that pass over the crossing at any point.

14.3. An aerial view of S13 Fords Green crossing can be seen below.

14.4. The track on the left is the down line from London and the track on the right is the up line to London. Trains would normally run down from London on the left hand line that is from the bottom of the picture to the top. Trains would normally run up to London on the right hand side, which is from the top of the picture to the bottom.

14.5. Below photo shows the field to field approach to the crossing.

14.6. S13 Fords Green footpath crossing is a 'Passive' crossing, meaning that there is no direct method of warning people who use the crossing of approaching trains. It is not controlled, or equipped with lights, or any automatic audible warning systems. The location and geography of the crossing means that it is therefore necessarily reliant upon users to `stop look and listen' to check for approaching trains, ensuring they have sufficient time to cross and to protect their personal safety whilst traversing the line.

14.7. A 9 day census was undertaken starting on the 25th June 2016, 6 adult pedestrians were recorded over the 9 days.[2]

14.8. Given the line speed of 100 mph in this area and the distance to traverse the crossing of 9.2 metres, this crossing would require sightlines of 346 metres in order to give the user enough time to cross before the train arrives.

14.9. The Sightings recorded at last risk assessment which was completed on 13/02/2017 were as follows:

All distances are recorded in metres	Minimum sighting distance required	Measured sighting distance	Is sighting compliant?
Upside looking toward up direction train approach	346	794	Yes
Upside looking toward down direction train approach	346	454	Yes
Down side looking toward up direction train approach	346	836	Yes
Down side looking toward down direction train approach	346	567	Yes

14.10. The photograph below is taken looking northward, from the up side at a train approaching in the up direction. The trains usually approach on the closest set of lines (right hand side).

2 A Second quick census was undertaken on 13 Feb 2017, this census returned zero users. A quick census is explained in more detail above in 25.7.

14.11. The photograph below is taken on the upside, looking south, the train usually approaches on the furthest (right hand side) set of lines.

14.12. The photograph below is taken on the downside looking north; the train usually approaches on the closest line (right hand side) set of lines.

14.13. The photograph below is taken on the downside looking south; the train usually approaches on the furthest line (right hand side) set of lines.

14.14. As can been from the table above (14.9), S13 Fords Green crossing does have sufficient sighting to meet industry standards in all directions

14.15. As set out at section 3.31above, following the risk assessment, an optioneering exercise was carried out to consider options for eliminating, reducing, mitigating or managing risk at this crossing. The options considered were:

(i) Closure via diversion would cost in the region of £50,000 – this option has returned a 0.78 CBA score which means the safety benefit is supporting the costs of diverting the right of way.

(ii) Installation of a miniature warning light system (MSL) to give user a clear indication of approaching trains would cost in the region of £250,000 - this option has returned a 0.02 CBA score which means the cost of this option is disproportionate to the safety benefit received.

14.16. No incidents have been identified at this location

14.17. S13 Fords green has sufficient sighting to meet industry standards, however if vulnerable users were to be identified the sighting would be insufficient, for a train approaching in the up direction towards London it is possible to see the train over 1000 meters away at certain times of the year. This could potentially lead to users misjudging how long the train takes to reach the crossing.

15. S16 – Gislingham

15.1. S16 Gislingham bridleway crossing has an ALCRM score of C8 with an FWI of 0.000041527; it is located in Bacton on the LTN1 line (London Liverpool Street to Norwich) which has a line speed of 100 MPH; it is between Diss and Stowmarket 85 miles and 51 chains from Liverpool street station London.

15.2. There are 92 trains per day that run for 20 hours per day over this level crossing. Additionally, there are empty stock trains that pass over the crossing. There can also be various on-track machinery and plant that pass over the crossing at any point.

15.3. An aerial view of S16 Gislingham crossing can be seen below.

15.4. The track on the left is the down line from London and the track on the right is the up line to London. Trains would normally run down from London on the left hand line that is from the bottom of the picture to the top. Trains would normally run up to London on the right hand side, which is from the top of the picture to the bottom.

15.5. The picture below shows the crossing.

15.6. S16 – Gislingham level crossing is a 'Passive' crossing, meaning that there is no direct method of warning people who use the crossing of approaching trains. It is not controlled, or equipped with lights, or any automatic audible warning systems. Telephones are present that all horse riders and users with animals must call to gain permission to cross as instructed by the signs on the approaches. The location and geography of the crossing means that it is therefore necessarily reliant upon all other users to `stop look and listen' to check for approaching trains, ensuring they have sufficient time to cross and to protect their personal safety whilst traversing the line.

15.7. A seven day census was carried out on the 6th of September 2016. The average figure calculated from this census was 1 pedestrian using the crossing per day.

15.8. Given the line speed of 100 mph in this area and the distance to traverse the crossing of 9 metres, this crossing would require sightlines of 508 metres in order to give the user enough time to cross before the train arrives.

15.9. The Sightings recorded at last risk assessment which was completed on 13/02/2017 were as follows:

All distances are recorded in metres	Minimum sighting distance required	Measured sighting distance	Is sighting compliant?
Upside looking toward up direction train approach	508	961	Yes
Upside looking toward down direction train approach	508	708	Yes
Down side looking toward up direction train approach	508	924	Yes
Down side looking toward down direction train approach	508	724	Yes

15.10. The photograph below is taken looking northward, from the up side at a train approaching in the up direction. The trains usually approach on the closest set of lines (right hand side).

15.11. The photograph below is taken on the upside, looking south, the train usually approaches on the furthest (right hand side) set of lines.

15.12. The photograph below is taken on the downside looking north; the train usually approaches on the closest line (right hand side) set of lines.

15.13. The photograph below is taken on the downside looking south; the train usually approaches on the furthest line (right hand side) set of lines.

15.14. As can been from the table above (15.9), S16 Gislingham crossing does have sufficient sighting to meet industry standards in all directions for pedestrians.

Telephones have been installed to mitigate sighting deficiency for horse riders. The decision point for equestrian users is 3 meters away from the nearest line, instead of 2 meters for pedestrian users. The OHL stantions obscure sighting from the 3 meter decision point.

15.15. As set out at section 3.31 above, following the risk assessment, an optioneering exercise was carried out to consider options for eliminating, reducing, mitigating or managing risk at this crossing. These options considered were:

(i) Closure via diversion would cost in the region of £50,000 – this option has returned a 0.74 CBA score which means the safety benefit is supporting the costs of diverting the right of way.

(ii) Installation of an overlay miniature warning light system (MSL) to give user a clear indication of approaching trains would cost in the region of £250,000 - this option has returned a 0.02 CBA score which means the cost of this option is disproportionate to the safety benefit received.

15.16. There have been no reported incidents at this crossing.

15.17. S16 Gislingham has sufficient sighting to meet industry standards. A train approaching in the up direction towards London it is possible to see the train over 1000 meters away at certain times of the year. This could potentially lead to users misjudging how long the train takes to reach the crossing. This crossing is a bridleway crossing; however we have never known horses to use the crossing and if they did use the crossing they would have to use the telephone provided.

16. S17 Paynes footpath crossing

16.1. S17 Paynes footpath crossing has an ALCRM score of C8 with an FWI of 0.00004163964, it is located in Gislingham on the LTN1 line (Norwich to London) which has a line speed of 100 MPH; it is between Diss and Stowmarket 88 miles and 72 chains from Liverpool street station London.

16.2. There are 92 trains per day that run for 20 hours per day over this level crossing. Additionally, there are empty stock trains that pass over the crossing. There can also be various on-track machinery and plant that pass over the crossing at any point.

16.3. An aerial view of S17 Paynes crossing can be seen below.

16.4. The track on the left is the down line from London and the track on the right is the up line to London. Trains would normally run down from London on the left hand line that is from the bottom of the picture to the top. Trains would normally run up to London on the right hand side, which is from the top of the picture to the bottom.

16.5. An second aerial picture below is showing Paynes crossing from the Routeview helicopter and clearly shows the defined footpath approaches to the crossing.

16.6. S17 Paynes level crossing is a 'Passive' crossing, meaning that there is no direct method of warning people who use the crossing of approaching trains. It is not controlled, or equipped with lights, or any automatic audible warning systems. The location and geography of the crossing means that it is therefore necessarily reliant upon users to `stop look and listen' to check for approaching trains, ensuring they have sufficient time to cross to and protect their personal safety whilst traversing the line.

16.7. A census was carried out starting on the 13th June 2016 for 14 days with an average taken. This census showed 1 pedestrian using the crossing per day.

16.8. Given the line speed of 100 mph in this area and the distance to traverse the crossing of 9.0 metres, this crossing would require sightlines of 339 metres in order to give the user enough time to cross before the train arrives.

16.9. The Sightings recorded at last risk assessment which was completed on 27/04/2016 were as follows:

All distances are recorded in metres	Minimum sighting distance required	Measured sighting distance	Is sighting compliant?
Upside looking toward up direction train approach	339	974	Yes
Upside looking toward down direction train approach	339	974	Yes
Downside looking toward up direction train approach	339	974	Yes
Downside looking toward down direction train approach	339	974	Yes

16.10. The photograph below is taken looking north, from the up side at a train approaching in the up direction. The trains usually approach on the closest set of lines (right hand side).

16.11. The photograph below is taken on the upside, looking South, the train usually approaches on the furthest (right hand side) set of lines.

16.12. The photograph below is taken on the downside looking north; the train usually approaches on the closest line (right hand side) set of lines.

16.13. The photograph below is taken on the downside looking south; the train usually approaches on the furthest line (right hand side) set of lines.

16.14. As can been from the table above (16.9), S17 Paynes crossing does have sufficient sighting to meet industry standards in all directions

16.15. As set out at section 3.31 above, following the risk assessment, an optioneering exercise was carried out to consider options for eliminating, reducing, mitigating or managing risk at this crossing. These options considered were:

(i) Closure via diversion would cost in the region of £50,000 – this option has returned a 0.77 CBA score which means the safety benefit is supporting the costs of diverting the right of way.

(ii) Installation of a miniature warning light system (MSL) to give user a clear indication of approaching trains would cost in the region of £250,000 - this option has returned a 0.02 CBA score which means the cost of this option is disproportionate to the safety benefit received.

16.16. There have been no incidents reported at this crossing.

16.17. It is possible to see the train over 1000 metres away at certain times of the year. This could potentially lead to users misjudging how long the train takes to reach the crossing.

17. S18 Cow Pasture Lane

17.1. S18 Cow Pasture Lane bridleway crossing has an ALCRM score of C6 with a FWI of 4.56793367E-4, it is located in Mellis on the LTN1 line (Norwich to London) which has a line speed of 100 MPH; it is between Diss and Stowmarket 90 miles and 60 chains from Liverpool street station London.

17.2. There are 92 trains per day that run for 20 hours per day over this level crossing. Additionally, there are empty stock trains that pass over the crossing. There can also be various on-track machinery and plant that pass over the crossing at any point.

17.3. An aerial view of S18 Cow Pasture Lane crossing can be seen below.

17.4. The track on the left is the down line from London and the track on the right is the up line to London. Trains would normally run down from London on the left hand line that is from the bottom of the picture to the top. Trains would normally run up to London on the right hand side, which is from the top of the picture to the bottom.

17.5. An second aerial picture below is showing Cow Pastures Lane crossing.

17.6. S18 Cow Pasture Lane level crossing is a 'Passive' crossing, meaning that there is no direct method of warning people who use the crossing of approaching trains. It is not controlled, or equipped with lights, or any automatic audible warning systems. The location and geography of the crossing means that it is therefore necessarily reliant upon users to `stop look and listen' to check for approaching trains, ensuring they have sufficient time to cross to and protect their personal safety whilst traversing the line.

17.7. A census was carried out starting on the 11th January 2017 for 8 days with an average taken. This census showed 2 pedestrians and 2 cyclists using the crossing per day. Another census was also undertaken on the 25th June 2016 for 9 days, 67 users were recorded all of which were adult pedestrians. Six cyclists were recorded walking there cycles over the crossing and no equestrians.

17.8. Given the line speed of 100 mph in this area and the distance to traverse the crossing of 10.3 metres, this crossing would require sightlines of 388 metres in order to give the user enough time to cross before the train arrives.

17.9. The Sightings recorded at last risk assessment which was completed on 12/01/2017 were as follows:

All distances are recorded in metres	Minimum sighting distance required	Measured sighting distance	Is sighting compliant?
Upside looking toward up direction train approach	388	805	Yes
Upside looking toward down direction train approach	388	618	Yes
Downside looking toward up direction train approach	388	1104	Yes
Downside looking toward down direction train approach	388	579	Yes

17.10. The photograph below is taken looking north, from the up side at a train approaching in the up direction. The trains usually approach on the closest set of lines (right hand side).

17.11. The photograph below is taken on the upside, looking South, the train usually approaches on the furthest (right hand side) set of lines.

17.12. The photograph below is taken on the downside looking north; the train usually approaches on the closest line (right hand side) set of lines.

17.13. The photograph below is taken on the downside looking south; the train usually approaches on the furthest line (right hand side) set of lines.

17.14. As can been from the table above (17.9), S18 Cow Pasture Lane crossing does have sufficient sighting to meet industry standards in all directions

17.15. As set out at section 3.31 above, following the risk assessment, an optioneering exercise was carried out to consider options for eliminating, reducing, mitigating or managing risk at this crossing. These options considered were:

(i) Closure via diversion would cost in the region of £50,000 – this option has returned a 0.71 CBA score which means the safety benefit is supporting the costs of diverting the right of way.

(ii) Installation of a miniature warning light system (MSL) to give user a clear indication of approaching trains. Installation would cost around £120,000. This option has returned a 0.03 CBA score which means the cost of this option is disproportionate to the safety benefit received.

(iii) Gate to gate Improvements – Straighten the traverse and provide defined decision points. The cost of this is expected to be £20,000. This option has returned a 0.03 CBA score which means the cost of this option is disproportionate to the safety benefit received.

17.16. On February 3rd 2017 train 1P42 fatally struck a person at the crossing. There has been no other incident reported at this location.

17.17. S18 Cow Pasture Lane crossing is the equivalent to a public bridleway, there are long straight approaches and it is possible to see a train over 1000 meters away at certain times of the year. This could potentially lead to users misjudging how long the train takes to reach the crossing.

18. S21 Abbotts

18.1. S21 Abbotts footpath crossing has an ALCRM score of C6 with an FWI of 0.000159499128, it is located in Mellis on the LTN1 line (Norwich to London) which has a line speed of 100 MPH; it is between Diss and Stowmarket 88 miles and 72 chains from Liverpool street station London.

18.2. There are 92 trains per day that run for 20 hours per day over this level crossing. Additionally, there are empty stock trains that pass over the crossing. There can also be various on-track machinery and plant that pass over the crossing at any point.

18.3. An aerial view of S21 Abbotts crossing can be seen below.

18.4. The track on the left is the down line from London and the track on the right is the up line to London. Trains would normally run down from London on the left hand line that is from the bottom of the picture to the top. Trains would normally run up to London on the right hand side, which is from the top of the picture to the bottom.

18.5. An second aerial picture below is showing Abbotts crossing from the Routeview helicopter.

18.6. S21 Abbotts level crossing is a 'Passive' crossing, meaning that there is no direct method of warning people who use the crossing of approaching trains. It is not controlled, or equipped with lights, or any automatic audible warning systems. The location and geography of the crossing means that it is therefore necessarily reliant upon users to `stop look and listen' to check for approaching trains, ensuring they have sufficient time to cross to and protect their personal safety whilst traversing the line.

18.7. A 9 day census was carried out on 25th June 2016, 22 pedestrians used the crossing, of which 2 were accompanied children and the remainder were adults.

18.8. Given the line speed of 100 mph in this area and the distance to traverse the crossing of 9.0 metres, this crossing would require sightlines of 339 metres in order to give the user enough time to cross before the train arrives.

18.9. The Sightings recorded at last risk assessment which was completed on 27/04/2016 were as follows:

All distances are recorded in metres	Minimum sighting distance required	Measured sighting distance	Is sighting compliant?
Upside looking toward up direction train approach	339	663	Yes
Upside looking toward down direction train approach	339	805	Yes
Downside looking toward up direction train approach	339	712	Yes
Downside looking toward down direction train approach	339	804	Yes

18.10. The photograph below is taken looking north, from the up side at a train approaching in the up direction. The trains usually approach on the closest set of lines (right hand side).

18.11. The photograph below is taken on the upside, looking South, the train usually approaches on the furthest (right hand side) set of lines.

18.12. The photograph below is taken on the downside looking north; the train usually approaches on the closest line (right hand side) set of lines.

18.13. The photograph below is taken on the downside looking south; the train usually approaches on the furthest line (right hand side) set of lines.

18.14. As can been from the table above (18.9), S21 Abbotts crossing does have sufficient sighting to meet industry standards in all directions

18.15. As set out at section 3.31 above, following the risk assessment, an optioneering exercise was carried out to consider options for eliminating, reducing, mitigating or managing risk at this crossing. These options considered were:

(i) Closure via diversion would cost in the region of £50,000 – this option has returned a 0.51 CBA score which means the safety benefit is supporting the costs of diverting the right of way.

(ii) Installation of a miniature warning light system (MSL) to give user a clear indication of approaching trains. This option has returned a

0.02 CBA score which means the cost of this option is disproportionate to the safety benefit received.

(iii) Gate to gate improvements – Straighten the traverse and provide defined decision points. The cost of this is expected to be £20,000. this option has returned a 0.03 CBA score which means the cost of this option is disproportionate to the safety benefit received.

18.16. There have been no incidents reported at this location.

18.17. S21 is situated on a long straight section of track; it is possible to see the train over 1000 meters away at certain times of the year. This could potentially lead to users misjudging how long the train takes to reach the crossing.

19. S22 Weatherby

19.1. S22 Weatherby footpath crossing has an ALCRM score of D2 with an FWI of 0.012806907. It is located in Newmarket Parish on the CCH line (Coldham Lane Junction to Haughley Junction) which has a line speed of 40mph on the up side and also 40mph on the down side. It is between Newmarket and Kennett at 14 miles and 5 chains.

19.2. There are 34 trains per day that run for 17 hours per day over this level crossing. Additionally, there are empty stock trains that pass over the crossing. There can also be various on-track machinery and plant that pass over the crossing at any point.

19.3. Aerial view of S22 Weatherby footpath crossing can be seen below.

19.4. The crossing is situated on a single line and if a user is looking towards Newmarket Station from either side of the crossing then they would be looking in the up direction. If a user is looking away from Newmarket station from either side of the crossing, then they would be looking in the down direction.

19.5. A second aerial picture below is showing S22 Weatherby footpath crossing and its approaches.

19.6. S22 Weatherby footpath crossing is a 'Passive' crossing, meaning that there is no direct method of warning people who use the crossing of approaching trains. It is not controlled, or equipped with lights, or any automatic audible warning systems. The location and geography of the crossing means that it is therefore necessarily reliant upon users to `stop look and listen' to check for approaching trains, ensuring they have sufficient time to cross to protect their personal safety whilst traversing the line.

19.7. The last census was carried out starting on the 25th June 2016 until the 3rd July 2016 by TRACSIS/Mott McDonald. This census showed an average of 412 pedestrian users (including unaccompanied children, pushchair users and mobility scooter users) and 55 cyclists using the crossing per day.

19.8. Given the line speed of 40mph on both the up and down sides in this area and the distance to traverse the crossing of 5.7 metres, this crossing requires sightlines of 129 metres in both directions in order to give the user enough time to cross before the train arrives. This traverse distance has been increased by 50% to take into account vulnerable usage.

19.9. The Sightings recorded at last risk assessment which was completed on 20/07/2015 were as follows:

All distances are recorded in metres	Minimum sighting distance required	Measured sighting distance	Is sighting compliant?
Upside looking toward up direction train approach	129m	253m	Yes
Upside looking toward down direction train approach	129m	238m	Yes
Downside looking toward up direction train approach	129m	235m	Yes
Downside looking toward down direction train approach	129m	246m	Yes

19.10. The photograph below is showing sighting for up direction up trains approaching

19.11. The Photograph below is showing sighting for up direction down trains approaching

19.12. The photograph below is showing sighting for down direction up trains approaching

19.13. The photograph below is showing sighting for down direction down trains approaching

19.14. As can been from the table above (19.9), S22 Weatherby footpath crossing does have sufficient sighting to meet industry standards in all directions. This means the sighting for a user to see an approaching train is good when weather conditions are favourable. Sighting distances however, will be severely reduced when the weather is poor e.g. raining or foggy.

19.15. As set out at section 3.31 above, following the risk assessment, an optioneering exercise was carried out to consider options for eliminating, reducing, mitigating or managing risk at this crossing. The options considered were:

(i) Closure via diversion would cost in the region of £50000 – this option has returned a 10.93 CBA score which means the safety benefit is supporting the costs of diverting the right of way.

(ii) Upgrade to Overlay or Integrated MSL this would cost in the region of £250000 - this option has returned a 0.10 CBA score which means the cost of this option is disproportionate to the safety benefit received at this location.

(i) Installation of overbridge would cost in the region of £2m - this gave a CBA of 0.27 score which means the cost of this option is disproportionate to the safety benefit received.

(ii) Gate to gate enhancement would cost in the region £15,000 - this option has returned a 0.02 score which means the cost of this option is disproportionate to the safety benefit received.

19.16. Weatherby footpath crossing is situated south of Newmarket town. It serves as a short cut from the town centre to housing, allotments and Newmarket football club. It is a high use crossing with all types of vulnerable users using this crossing including children, due to the children's play areas situated nearby. It is also used by users coming home from pubs/clubs late at night. Local Authority street lighting is provided on both approaches but is switched off at 00.01hrs leaving the crossing in darkness. There have been 4 near misses since 1st May 2017, one of which was a child who was pulled back by their parent. Between 2006 and January 2017 there has been 9 near misses and 1 fatality, the fatality happened in August 2015. This crossing is also within sight of Newmarket station, this means a user could confuse a stopping and non-stopping train and believe they have enough time to cross when they actually do not.

20. S23 Higham footpath crossing

20.1. S23 Higham footpath crossing has an ALCRM score of M13 as it has been temporarily closed under a TTRO Order since June 2016 with an FWI of 0.00. Prior to closure the crossing was a C9 with an FWI of 0.000006708. It is located in Higham Parish on the CCH line (Coldham Lane Junction to Haughley Junction) which has a line speed of 75mph on the up side and also 75mph on the down side. It is between Kennett and Bury St Edmunds at 21 miles and 56 chains.

20.2. There are 104 trains per day that run for 24 hours per day over this level crossing. Additionally, there are empty stock trains that pass over the crossing. There can also be various on-track machinery and plant that pass over the crossing at any point.

20.3. Aerial views of S23 Higham Footpath crossing can be seen below.

20.4. The track on the left is the down line from Kennett and the track on the right is the up line from Bury St Edmunds. Trains would normally run down from Kennett on the left hand line that is from the left of the picture to the right. Trains would normally run up to Bury St Edmunds on the right hand side, which is from the right of the picture to the left.

20.5. S23 Higham level crossing is a 'Passive' crossing, meaning that there is no direct method of warning people who use the crossing of approaching trains. It is not controlled, or equipped with lights, or any automatic audible warning systems. The location and geography of the crossing means that it is therefore necessarily reliant upon users to `stop look and listen' to check for approaching trains, ensuring they have sufficient time to cross to protect their personal safety whilst traversing the line.

20.6. There has been no recent census at this crossing as it has been temporarily closed since June 2016. The crossing is closed under a TTRO, this is due to the very steep embankments and unsafe approaches.

20.7. Given the line speed of 75mph on both the up and down sides in this area and the distance to traverse the crossing of 8.1 metres, this crossing requires sightlines of 270 metres in all directions in order to give the user enough time to cross before the train arrives.

20.8. The Sightings recorded at last risk assessment which was completed on 24/10/2016 were as follows:

All distances are recorded in metres	Minimum sighting distance required	Measured sighting distance	Is sighting compliant?
Upside looking toward up direction train approach	270m	824m	Yes
Upside looking toward down direction train approach	270m	365m	Yes
Downside looking toward up direction train approach	270m	824m	Yes
Downside looking toward down direction train approach	270m	290m	Yes

20.9. The photograph below is showing sighting for up side up direction trains approaching

20.10. The photograph below is showing sighting for up side down direction trains approaching

20.11. The photograph below is showing sighting for down side up direction trains approaching

20.12. The photograph below is showing sighting for down side down direction trains approaching

20.13. As can been from the table above (20.8), S23 Higham crossing does have sufficient sighting to meet industry standards in all directions. This means the sighting for a user to see an approaching train is adequate when weather conditions are favourable, but can be affected by vegetation growth and the user's visibility when approaching from down a steep embankment. Sighting distances will also be severely reduced when the weather is poor e.g. raining or foggy. If vulnerable users were identified the sighting would be insufficient.

20.14. As set out at section 3.31 above, following the risk assessment, an optioneering exercise was carried out to consider options for eliminating, reducing, mitigating or managing risk at this crossing. The options considered were:

(i) Closure via diversion would cost in the region of £50000 – this option has returned a 1.26 CBA score which means the cost of the safety benefit received is supporting this closure.

(ii) Upgrade to Overlay or Integrated MSL this would cost in the region of £250000 - this option has returned a 0.10 CBA score which means the cost of this option is disproportionate to the safety benefit received at this location.

(iii) Installation of overbridge would cost in the region of £2m - this gave a CBA of 0.01 score which means the cost of this option is disproportionate to the safety benefit received.

(iv) Gate to gate enhancement would cost in the region £15,000 - this option has returned a 0.02 score which means the cost of this option is disproportionate to the safety benefit received.

20.15. Higham Crossing has dangerous steep embankments creating dangerous underfoot conditions for potential users and minimum sighting is only just being achieved due to track curvature and location of a bridge nearby which also restricts sighting for users. The crossing is currently closed under a TTRO and major improvements would be required before the crossing would be able to reopen safely.

20.16. The crossing has had no recorded incidents before being temporarily closed.

21. S24 Higham Ground Frame

21.1. S24 Higham Ground Frame footpath crossing has an ALCRM score of C6 with an FWI of 0.000106982. It is located in Barrow Parish on the CCH line (Coldham Lane Junction to Haughley Junction) which has a line speed of 75mph on the Up Side and

also 75mph on the Down Side. It is between Kennett and Bury St Edmunds at 22 miles and 49 chains.

21.2. There are 124 trains per day that run for 24 hours per day over this level crossing. Additionally, there are empty stock trains that pass over the crossing. There can also be various on-track machinery and plant that pass over the crossing at any point.

21.3. Aerial views of S24 Higham ground Frame Footpath crossing can be seen below.

21.4. The track on the top is the down line from Kennett and the track on the bottom is the up line from Bury St Edmunds. Trains would normally run down from Kennett on the top line that is from the left of the picture to the right. Trains would normally run up from Bury St Edmunds on the bottom line, which is from the right of the picture to the left.

21.5. A second aerial view is shown below.

21.6. S24 Higham Ground Frame level crossing is a 'Passive' crossing, meaning that there is no direct method of warning people who use the crossing of approaching trains. It is not controlled, or equipped with lights, or any automatic audible warning systems. The location and geography of the crossing means that it is therefore necessarily reliant upon users to `stop look and listen' to check for approaching trains, ensuring they have sufficient time to cross to protect their personal safety whilst traversing the line.

21.7. The last census was carried out starting on the 10th October 2016 until the 13th October 2016 by the Level Crossing Manager. This census showed no usage at the crossing however, some day time pedestrian usage was allowed for in the Risk Assessment. A previous 9 day survey in June 2016 showed usage on only one of the 9 days in question by pedestrian users.

21.8. Given the line speed of 75mph on both the Up and Down Sides in this area and the distance to traverse the crossing of 9.0 metres, this crossing requires sightlines of 254 metres in both directions in order to give the user enough time to cross before the train arrives.

21.9. The Sightings recorded at last risk assessment which was completed on 13/10/2016 were as follows:

All distances are recorded in metres	Minimum sighting distance required	Measured sighting distance	Is sighting compliant?
Upside looking toward up direction train approach	254m	1,125m	Yes
Upside looking toward down direction train approach	254m	804m	Yes
Downside looking toward up direction train approach	254m	1,125m	Yes
Downside looking toward down direction train approach	254m	804m	Yes

21.10. The photograph below is showing sighting for up side up direction trains approaching on the nearest running line

21.11. The photograph below is showing sighting for up side down direction trains approaching on the nearest running line

21.12. The photograph below is showing sighting for down side up direction trains approaching on the nearest running line

21.13. The photograph below is showing sighting for down side down direction trains approaching on the nearest running line

21.14. As can been from the table above (21.9), S24 Higham Ground Frame crossing does have sufficient sighting to meet industry standards in all directions. This means the sighting for a user to see an approaching train is good when weather conditions are favourable. Sighting distances however, will be severely reduced when the weather is poor e.g. raining or foggy.

21.15. As set out at section 3.31 above, following the risk assessment, an optioneering exercise was carried out to consider options for eliminating, reducing, mitigating or managing risk at this crossing. The options considered were:

(i) Closure via diversion would cost in the region of £50,000 – this option has returned a 1.33 CBA score which means the safety benefit is supporting the costs of diverting the right of way.

(ii) Installation of overbridge would cost in the region of £2m - this gave a CBA of 0.01 score which means the cost of this option is disproportionate to the safety benefit received.

(iii) Gate to gate enhancement would cost in the region £15,000 - this option has returned a 0.02 score which means the cost of this option is disproportionate to the safety benefit received.

21.16. Higham grounframe footpath is in the middle of two fields and is hardly used, one side of the crossing leads straight into a farm yard and the yard is closed down and buildings are derilict. The other side of the crossing leads through a field up to the A14 hence this crossing is not being used that often. It has a wooden deck with anti slip and has good sighting due to the track orientation being fairly straight. Vegetation can become a problem here but is generally cut back on a regular basis.

22. S25 Cattishall

22.1. S25 Cattishall footpath crossing has an ALCRM score of C6 with an FWI of 0.00042802. It is located in Great Barton Parish on the CCH line (Coldham Lane Junction to Haughley Junction) which has a line speed of 75mph on the Up Side and also 75mph on the Down Side. It is between Thurston and Bury St Edmunds at 30 miles and 49 chains.

22.2. There are 110 trains per day that run for 24 hours per day over this level crossing. Additionally, there are empty stock trains that pass over the crossing. There can also be various on-track machinery and plant that pass over the crossing at any point.

22.3. Aerial views of S25 Cattishall Footpath crossing can be seen below.

22.4. The track on the bottom is the up line from Thurston and the track on the top is the down line from Bury St Edmunds. Trains would normally run up from Thurston on the bottom line that is from the right of the picture to the left. Trains would normally run down from Bury St Edmunds on the top line, which is from the left of the picture to the right.

22.5. A second aerial view can be seen below.

22.6. S25 Cattishall level crossing is a 'Passive' crossing, meaning that there is no direct method of warning people who use the crossing of approaching trains. It is not controlled, or equipped with lights, or any automatic audible warning systems. The location and geography of the crossing means that it is therefore necessarily reliant upon users to `stop look and listen' to check for approaching trains, ensuring they have sufficient time to cross to protect their personal safety whilst traversing the line.

22.7. The last census was carried out starting on the 25th June 2016 until the 3rd July 2016. This census showed average daily pedestrian usage at the crossing of 25 pedestrians and 20 bicycles and this includes vulnerable users.

22.8. Given the line speed of 75mph on both the Up and Down Sides in this area and the distance to traverse the crossing of 9.3 metres, this crossing requires sightlines of 394 metres in both directions in order to give the user enough time to cross before the train arrives. The traverse distance time has been increased by 50% to allow for vulnerable users.

22.9. The Sightings recorded at last risk assessment which was completed on 29/07/2016 were as follows:

All distances are recorded in metres	Minimum sighting distance required	Measured sighting distance	Is sighting compliant?
Upside looking toward up direction train approach	394m	615m	Yes
Upside looking toward down direction train approach	394m	1,529m	Yes
Downside looking toward up direction train approach	394m	615m	Yes
Downside looking toward down direction train approach	394m	1,529m	Yes

22.10. The photograph below is showing sighting for up side up direction trains approaching on the nearest running line

22.11. The photograph below is showing sighting for up side down direction trains approaching on the nearest running line

22.12. The photograph below is showing sighting for down side up direction trains approaching on the nearest running line

22.13. The photograph below is showing sighting for down side down direction trains approaching on the nearest running line

22.14. As can been from the table above (22.9), S25 Cattishall crossing does have sufficient sighting to meet industry standards in all directions. This means the sighting for a user to see an approaching train is good when weather conditions are favourable. Sighting distances however, will be severely reduced when the weather is poor e.g. raining or foggy.

22.15. As set out at section 3.31 above, following the risk assessment, an optioneering exercise was carried out to consider options for eliminating, reducing, mitigating or managing risk at this crossing. The options considered were:

(i) Closure via diversion would cost in the region of £50,000 – this option has returned a 1.58 CBA score which means the safety benefit is supporting the costs of diverting the right of way.

(ii) Installation of overbridge would cost approximately £2m, this gave a CBA of 0.01 score which means the cost of this option is disproportionate to the safety benefit received.

22.16. Cattishall footpath is a well used footpath and has been redesigned following a previous fatality on 24th March 2014. In reality, the only two remaining options to improve safety at the crossing are to impliment new technology or to seek closure.

23. S27 Barrells footpath crossing

23.1. S27 Barrells footpath crossing has an ALCRM score of C6 with an FWI 0.000223206, it is located in Thurston on the CCH line (Coldham lane jcn. to Haughley) which has a line speed of 75 MPH; it is between Thurston and Elmswell at 33miles and 72 chains.

23.2. There are 124 trains per day that run for 24 hours per day over this level crossing. Additionally, there are empty stock trains that pass over the crossing. There can also be various on-track machinery and plant that pass over the crossing at any point.

23.3. An aerial view of S27 Barrells crossing can be seen below.

23.4. The track on the left is the up line to Cambridge and the track on the right is the down line to Haughley. Trains would normally run down from Cambridge on the right hand line that is from the top of the picture to the bottom. Trains would normally run up to Cambridge on the left hand side, which is from the bottom of the picture to the top.

23.5. An second aerial picture below is showing S27 Barrells crossing from the Routeview helicopter and clearly shows the footpath approaches to the crossing.

23.6. S27 Barrells level crossing is a 'Passive' crossing, meaning that there is no direct method of warning people who use the crossing of approaching trains. It is not controlled, or equipped with lights, or any automatic audible warning systems. The location and geography of the crossing means that it is therefore necessarily reliant upon users to `stop look and listen' to check for approaching trains, ensuring they have sufficient time to cross to and protect their personal safety whilst traversing the line.

23.7. A 9 day census was carried out on the 25th June 2016 23 pedestrians users were recorded at the crossing, one of whom was recorded as elderly and the remainder were recorded as adults.

23.8. Given the line speed of 75 mph in this area and the distance to traverse the crossing of 9.3 metres, this crossing would require sightlines of 263 metres in order to give the user enough time to cross before the train arrives.

23.9. The Sightings recorded at last risk assessment which was completed on 9/06/2016 were as follows:

All distances are recorded in metres	Minimum sighting distance required	Measured sighting distance	Is sighting compliant?
Upside looking toward up direction train approach	263	670	Yes
Upside looking toward down direction train approach	263	354	Yes
Downside looking toward up direction train approach	263	680	Yes
Downside looking toward down direction train approach	263	361	Yes

23.10. The photograph below is taken from the up side at a train approaching in the up direction. The trains usually approach on the closest set of lines (right hand side).

23.11. The photograph below is taken on the upside, the train usually approaches on the furthest (right hand side) set of lines.

23.12. The photograph below is taken on the downside; the train usually approaches on the furthest line (right hand side) set of lines.

23.13. The photograph below is taken on the downside looking south; the train usually approaches on the closest line (right hand side) set of lines.

23.14. As can been from the table above (23.9), S27 Barrells crossing does have sufficient sighting to meet industry standards in all directions

23.15. As set out at section 3.31above, following the risk assessment, an optioneering exercise was carried out to consider options for eliminating, reducing, mitigating or managing risk at this crossing. These options considered were:

(i) Closure via diversion would cost in the region of £50,000 – this option has returned a 1.42 CBA score which means the safety benefit is supporting the costs of diverting the right of way.

(ii) Installation of overbridge. Cost: £2.5m this gave a CBA of 0.01 score which means the cost of this option is disproportionate to the safety benefit received.

23.16. There has been no recorded incident at this location.

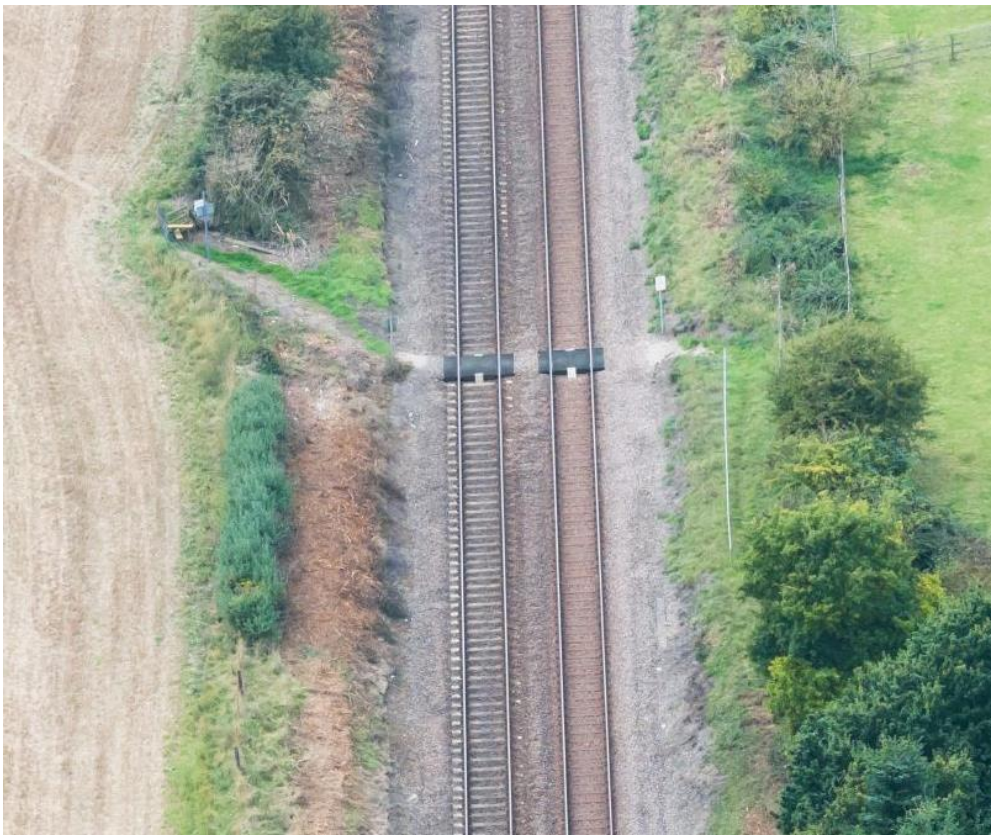
23.17. This crossing is located in quite a steep cutting meaning any user has to approach the crossing using a set of steps with limited space at the bottom, those who are carrying objects (for example, heavy bags or equipment) and those with dogs, either on or off the lead could be in the danger zone before they are able to easily make their decision whether to cross or not. The crossing has sufficient sighting to meet industry standards, however if vulnerable users were to be identified the sighting would be insufficient.

24. S28 Grove Farm

24.1. S28 Grove Farm footpath crossing has an ALCRM score of C6 with an FWI of 0.000214300, it is located in Thurston on the CCH line (Coldham lane jcn. to Haughley) which has a line speed of 75 MPH; it is between Thurston and Elmswell 33miles and 71 chains.

24.2. There are 124 trains per day that run for 24 hours per day over this level crossing. Additionally, there are empty stock trains that pass over the crossing. There can also be various on-track machinery and plant that pass over the crossing at any point.

24.3. An aerial view of S28 Grove Farm crossing can be seen below.



24.4. The track on the left is the up line to Cambridge and the track on the right is the down line from Cambridge. Trains would normally run down from Cambridge on the right hand line that is from the top of the picture to the bottom. Trains would normally run up to Cambridge on the left hand side, which is from the bottom of the picture to the top.

24.5. An second aerial picture below is showing S28 Grove Farm crossing from the Routeview helicopter and clearly shows the footpath approaches to the crossing.

24.6. S28 Grove Farm level crossing is a 'Passive' crossing, meaning that there is no direct method of warning people who use the crossing of approaching trains. It is not controlled, or equipped with lights, or any automatic audible warning systems. The location and geography of the crossing means that it is therefore necessarily reliant upon users to `stop look and listen' to check for approaching trains, ensuring they have sufficient time to cross to and protect their personal safety whilst traversing the line.

24.7. A 9 day census was carried out on the 25th June 2016, 13 pedestrians users were recorded at the crossing, all of whom were adult pedestrians.

24.8. Given the line speed of 75 mph in this area and the distance to traverse the crossing of 9.6 meters, this crossing would require sightlines of 271 meters in order to give the user enough time to cross before the train arrives.

24.9. The Sightings recorded at last risk assessment which was completed on 12/10/2016 were as follows:

All distances are recorded in metres	Minimum sighting distance required	Measured sighting distance	Is sighting compliant?
Upside looking toward up direction train approach	271	595	Yes
Upside looking toward down direction train approach	271	576	Yes
Downside looking toward up direction train approach	271	571	Yes
Downside looking toward down direction train approach	271	583	Yes

24.10. The photograph below is taken from the up side at a train approaching in the up direction. The trains usually approach on the closest set of lines (right hand side).

24.11. The photograph below is taken on the upside, the train usually approaches on the furthest (right hand side) set of lines.

24.12. The photograph below is taken on the downside; the train usually approaches on the furthest line (right hand side) set of lines.

24.13. The photograph below is taken on the downside; the train usually approaches on the closest line (right hand side) set of lines.

24.14. As can been from the table above (24.9), S28 Grove farm crossing does have sufficient sighting to meet industry standards in all directions

24.15. As set out at section 3.31 above, following the risk assessment, an optioneering exercise was carried out to consider options for eliminating, reducing, mitigating or managing risk at this crossing. These options considered were:

(i) Closure via diversion would cost in the region of £50,000 – this option has returned a 1.41 CBA score which means the safety benefit is supporting the costs of diverting the right of way.

(i) Installation of overbridge Cost: £2m this gave a CBA of 0.01 score which means the cost of this option is disproportionate to the safety benefit received.

(ii) Gate to gate enhancement would cost in the region £15,000 - this option has returned a 0.02 score which means the cost of this option is disproportionate to the safety benefit received.

24.16. There have been no recorded incidents at this crossing.

24.17. S28 Grove Farm crossing is a slightly skewed crossing; this means a user with limited mobility could potentially approach the crossing and not be able to turn sufficiently to see an approaching train. Following a fatality at Grimston Lane crossing on the Felixstowe line, RAIB carried out an investigation and as part of their findings they stated a factor Network Rail needs to consider is the ability of a person with less mobility being able to turn their body sufficiently to see a train approaching when it is approaching from slightly behind them (RAIB report 23/2016 John Prest NR31/2 Tab 7).

25. S29 Hawk End Lane

25.1. S29 Hawk End Lane Footpath crossing has an ALCRM score of C6 with an FWI of 0.000111603, it is located in Elmswell on the CCH line (Coldham lane jcn. to Haughley), which has a line speed of 75 MPH; it is between Thurston and Elmswell at 37miles and 0 chains. This crossing is currently closed and has been for at least 2 years, the crossing was closed by the developer who is building houses on the old disused factory on the northern side of the crossing.

25.2. There are 124 trains per day that run for 24 hours per day over this level crossing. Additionally, there are empty stock trains that pass over the crossing. There can also be various on-track machinery and plant that pass over the crossing at any point.

25.3. An aerial view of S29 Hawk End Lane crossing can be seen below.

25.4. The track on the left is the up line to Cambridge and the track on the right is the down line from Cambridge. Trains would normally run down from Cambridge on the right hand line that is from the top of the picture to the bottom. Trains would normally run up to Cambridge on the left hand side, which is from the bottom of the picture to the top.

25.5. An second aerial picture below is showing S29 Hawk End Lane crossing from the Routeview helicopter and clearly shows the footpath approaches to the crossing.

25.6. S29 Hawk end lane level crossing is a 'Passive' crossing, meaning that there is no direct method of warning people who use the crossing of approaching trains. It is not controlled, or equipped with lights, or any automatic audible warning systems. The location and geography of the crossing means that it is therefore necessarily reliant upon users to `stop look and listen' to check for approaching trains, ensuring they have sufficient time to cross to and protect their personal safety whilst traversing the line.

25.7. An estimated census was carried out on the 3rd November 2015. This census estimated 2 daily pedestrians using the crossing per day. The crossing has been temporarily closed for some time so a more up to date census has not been available. An estimated census is when the LCM turns up at the crossing to complete a risk assessment, and they will carry out a quick census while they are on site. This has to be for a minimum of 30 minutes. The LCM will usually be on site for anywhere between 60 minutes and 180 minutes, the quick census will be undertaken over the same amount of time. If there have been no users during this period the LCM will estimate the amount of usage using their knowledge of local people and the local environment.

25.8. Given the line speed of 75 mph in this area and the distance to traverse the crossing of 9.3 metres, this crossing would require sightlines of 266 metres in order to give the user enough time to cross before the train arrives.

25.9. The Sightings recorded at last risk assessment which was completed on 3/11/2015 were as follows:

All distances are recorded in metres	Minimum sighting distance required	Measured sighting distance	Is sighting compliant?
Upside looking toward up direction train approach	266	419	Yes
Upside looking toward down direction train approach	266	419	Yes
Downside looking toward up direction train approach	266	391	Yes
Downside looking toward down direction train approach	266	523	Yes

25.10. The photograph below is taken from the up side at a train approaching in the up direction. The trains usually approach on the closest set of lines (right hand side).

25.11. The photograph below is taken on the upside, the train usually approaches on the furthest (right hand side) set of lines.

25.12. The photograph below is taken on the downside; the train usually approaches on the furthest line (right hand side) set of lines.

25.13. The photograph below is taken on the downside; the train usually approaches on the closest line (right hand side) set of lines.

25.14. As can been from the table above (25.9), S29 Hawk end lane crossing does have sufficient sighting to meet industry standards in all directions

25.15. As set out at section 3.31above, following the risk assessment, an optioneering exercise was carried out to consider options for eliminating, reducing, mitigating or managing risk at this crossing. These options considered were:

(i) Closure via diversion would cost in the region of £50,000 – this option has returned a 1.34 CBA score which means the safety benefit is supporting the costs of diverting the right of way.

(ii) Installation of overbridge. Cost: £2m this gave a CBA of 0.01 score which means the cost of this option is disproportionate to the safety benefit received.

(iii) Installing a MSL overlay system would cost approximately £250,000 – this option has returned a CBA of 0.02 which means the cost of this option is disproportionate to the safety benefit received

(iv) Gate to gate enhancement would cost in the region £15,000- this option has returned a 0.01 score which means the cost of this option is disproportionate to the safety benefit received.

25.16. There have been no reported incidents at the crossing.

25.17. Hawk End Lane crossing is temporarily closed under a TTRO this was put in place in 2016. FP12 passes around the edge of the Taylor Wimpey construction site, and so it felt necessary to close the footpath in the interests of public safety.

Elmswell Parish Council brought planning application 0846/13 for the Grampian Harris site to Network Rail's attention in 2013. Network Rail raised concerns about the increase in risk at the level crossing that would result from the proposed

development. After several meetings, a strategy was devised to deliver closure of the crossing. Condition 17 of the planning permission, dated 17/03/2015, states:

> ***PRIOR TO DEVELOPMENT: MITIGATION OF RISK AT HAWK END LANE (sic.) CROSSING***
>
> *No development, with the exception of demolition and remediation, shall take place on the site until a strategy for mitigating risk at Hawk End Lane crossing has been agreed in writing by the planning authority. The strategy shall have been the subject of consultation by the developer with Network Rail and the Parish Council and shall demonstrate the steps taken to address advice given. The strategy shall include a clear timetable for delivery of mitigation of risk relative to the construction and occupation of the development. The development and any risk mitigation measures shall thereafter be delivered in accordance with the agreed strategy and timetable.*
>
> *Reason: To provide a strategy to mitigate the risk to pedestrians from the development from crossing the railway at Hawk End Lane.*

Elmswell station is within site of the crossing, this means it can be difficult for crossing users to differentiate between a stopped train and through train which could, lead to an error in the user's decision making.

26. S30 Lords No.29

26.1. S30 Lords No.29 footpath crossing has an ALCRM score of C6 with an FWI of 0.000481605, it is located in Elmswell on the CCH line (Coldham lane jcn. to Haughley) which has a line speed of 75 MPH; this crossing is between Haughley and Elmswell at 37miles and 58 chains.

26.2. There are 124 trains per day that run for 24 hours per day over this level crossing. Additionally, there are empty stock trains that pass over the crossing. There can also be various on-track machinery and plant that pass over the crossing at any point.

26.3. An aerial view of S30 Lords No.29 crossing can be seen below.

26.4. The track on the left of the above picture is the up line to Cambridge and the track on the right is the down line to Haughley. Trains would normally run down from Cambridge on the right hand line that is from the top side of the picture to the bottom. Trains would normally run up to Cambridge on the left hand line, which is from the bottom of the picture to the top.

26.5. A second aerial picture below is showing S30 Lords No.29 crossing from the Routeview helicopter and clearly shows the footpath approaches to the crossing.

26.6. S30 Lords No.29 level crossing is a 'Passive' crossing, meaning that there is no direct method of warning people who use the crossing of approaching trains. It is not controlled, or equipped with lights, or any automatic audible warning systems. The location and geography of the crossing means that it is therefore necessarily reliant upon users to `stop look and listen' to check for approaching trains, ensuring they

have sufficient time to cross to and protect their personal safety whilst traversing the line.

26.7. A 24hr census was carried out on the 8th March 2017. This census shows 9 pedestrians using the crossing per day. Another census was carried out on the 25th June 2016 for 9 days, this showed 44 pedestrian users, of whom 4 were accompanied children, 1 was an unaccompanied child and the remainder were adults.

26.8. Given the line speed of 75 mph in this area and the distance to traverse the crossing of 9.3 metres, this crossing would require sightlines of 263 metres in order to give the user enough time to cross before the train arrives.

26.9. The Sightings recorded at last risk assessment which was completed on 16/03/2017 were as follows:

All distances are recorded in metres	Minimum sighting distance required	Measured sighting distance	Is sighting compliant?
Upside looking toward up direction train approach	263	799	Yes
Upside looking toward down direction train approach	263	562	Yes
Downside looking toward up direction train approach	263	816	Yes
Downside looking toward down direction train approach	263	465	Yes

26.10. The photograph below is taken from the up side at a train approaching in the up direction. The trains usually approach on the closest set of lines (right hand side).

26.11. The photograph below is taken on the upside at a train approaching in the down direction. The train usually approaches on the furthest (right hand side) set of lines.

26.12. The photograph below is taken on the downside at a train approaching in the up direction. The train usually approaches on the furthest line (right hand side) set of lines.

26.13. The photograph below is taken on the downside looking at a train approaching in the Down direction. The train usually approaches on the closest line (right hand side) set of lines.

26.14. As can been from the table above (26.9), S30 Lords no.29 crossing does have sufficient sighting to meet industry standards in all directions

26.15. As set out in section 3.31, following the risk assessment, an optioneering exercise was carried out to consider options for eliminating, reducing, mitigating or managing risk at this crossing. These options considered were:

(i) Closure via diversion would cost in the region of £50,000 – this option has returned a 1.62 CBA score which means the safety benefit is supporting the costs of diverting the right of way.

(ii) Installing a MSL overlay system would cost approximately £250000 – this option has returned a CBA of 0.02 which means the cost of this option is disproportionate to the safety benefit received

26.16. There have been no reported incidents at this crossing.

26.17. This crossing is located in quite a steep cutting meaning any user has to approach the crossing using a set of steps; this means there is only a small safe standing area at the bottom to make a decision whether it is safe to cross.

27. S31 Mutton Hall

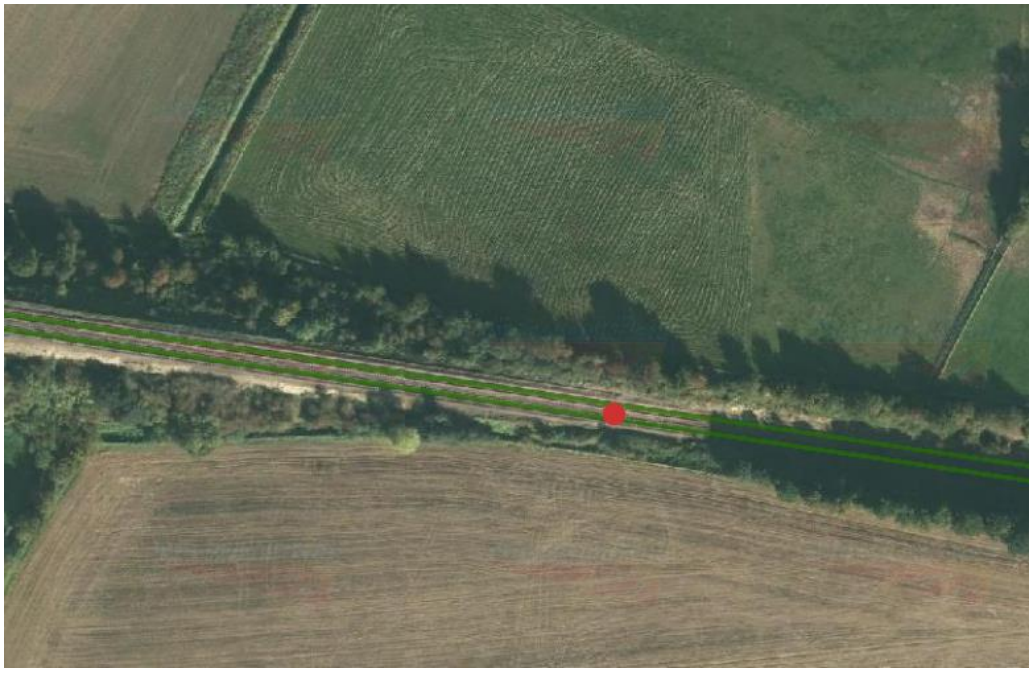
27.1. S31 Mutton Hall footpath crossing has an ALCRM score of C6 with an FWI of 0.000101705, it is located in Thurston on the CCH line (Coldham lane jcn. to Haughley) which has a line speed of 75 MPH; it is between Haughley and Elmswell at 38miles and 38 chains.

27.2. There are 124 trains per day that run for 24 hours per day over this level crossing. Additionally, there are empty stock trains that pass over the crossing. There can also be various on-track machinery and plant that pass over the crossing at any point.

27.3. An aerial view of S31 Mutton Hall crossing can be seen below.

27.4. The track on the left hand side of the picture is the up line to Cambridge and the track on the right is the down line to Haughley. Trains would normally run down from Cambridge on the right hand line that is from the top of the picture to the bottom. Trains would normally run up to Cambridge on the left hand line, which is from the bottom of the picture to the top.

27.5. A second aerial picture below is showing S31 Mutton Hall crossing.



27.6. S31 Mutton Hall level crossing is a 'Passive' crossing, meaning that there is no direct method of warning people who use the crossing of approaching trains. It is not controlled, or equipped with lights, or any automatic audible warning systems. The location and geography of the crossing means that it is therefore necessarily reliant upon users to `stop look and listen' to check for approaching trains, ensuring they have sufficient time to cross to and protect their personal safety whilst traversing the line.

27.7. A 9 day camera census was undertaken between 25 June 2016 and 03 July 2016 with survey hours 00:00 to 24:00. 34 pedestrian users were recorded, of whom two were accompanied children, two were impaired and the remainder were unimpaired.

27.8. Given the line speed of 75 mph in this area and the distance to traverse the crossing of 9.0 metres, this crossing would require sightlines of 254 metres in order to give the user enough time to cross before the train arrives.

27.9. The Sightings recorded at last risk assessment which was completed on 16/03/2017 were as follows:

All distances are recorded in metres	Minimum sighting distance required	Measured sighting distance	Is sighting compliant?
Upside looking toward up direction train approach	254	576	Yes
Upside looking toward down direction train approach	254	1495	Yes
Downside looking toward up direction train approach	254	589	Yes
Downside looking toward down direction train approach	254	1498	Yes

27.10. The photograph below is taken from the up side at a train approaching in the up direction. The trains usually approach on the closest set of lines (right hand side).

27.11. The photograph below is taken on the upside at a train approaching in the down direction. The train usually approaches on the furthest (right hand side) set of lines.

27.12. The photograph below is taken on the downside at a train approaching in the up direction. The train usually approaches on the furthest line (right hand side) set of lines.

27.13. The photograph below is taken on the downside looking south at a train approaching in the Down direction. The train usually approaches on the closest line (right hand side) set of lines.

27.14. As can been from the table above (27.9), S31 Mutton Hall crossing does have sufficient sighting to meet industry standards in all directions

27.15. As set out in section 3.31, following the risk assessment, an optioneering exercise was carried out to consider options for eliminating, reducing, mitigating or managing risk at this crossing. These options considered were:

(i) Closure via diversion would cost in the region of £50,000 – this option has returned a 1.33 CBA score which means the safety benefit is supporting the costs of diverting the right of way.

(ii) Installation of overbridge. Cost: £2m this gave a CBA of 0.01 score which means the cost of this option is disproportionate to the safety benefit received.

(iii) Installing a MSL overlay system would cost approximately £250000 – this option has returned a CBA of 0.02 which means the cost of this option is disproportionate to the safety benefit received

27.16. There have been no incidents reported at this location.

27.17. The sighting is very good at S31 Mutton Hall crossing; it is possible to see the train over 1000 meters away when travelling in the down direction at certain times of the year. This could potentially lead to users misjudging how long the train takes to reach the crossing. The crossing approach on the upside of the track is very wet and slippery, this causes issues when crossing the track.

28. S69 – Bacton

28.1. S69 Bacton footpath crossing has an ALCRM score of C8 with an FWI of 3.9875E-5; it is located in Bacton on the LTN1 line (London Liverpool Street to Norwich) which has a line speed of 100 MPH; it is between Diss and Stowmarket 86 miles and 06 chains from Liverpool street station London.

28.2. There are 92 trains per day that run for 20 hours per day over this level crossing. Additionally, there are empty stock trains that pass over the crossing. There can also be various on-track machinery and plant that pass over the crossing at any point.

28.3. An aerial view of S69 Bacton footpath crossing can be seen below.

28.4. The track on the right is the down line from London and the track on the left is the up line to London. Trains would normally run down from London on the right hand line that is from the top of the picture to the bottom. Trains would normally run up to London on the left hand side, which is from the bottom of the picture to the top.

28.5. A second aerial picture of Bacton foot crossing.

28.6. S69 – Bacton level crossing is a 'Passive' crossing, meaning that there is no direct method of warning people who use the crossing of approaching trains. It is not controlled, or equipped with lights, or any automatic audible warning systems. The location and geography of the crossing means that it is therefore necessarily reliant upon users to `stop look and listen' to check for approaching trains, ensuring they have sufficient time to cross and to protect their personal safety whilst traversing the line.

28.7. A 9 day camera census was undertaken on 25 June 2016 27 pedestrians were recorded, of whom 22 were unaccompanied children and five were adults.

28.8. Given the line speed of 100 mph in this area and the distance to traverse the crossing of 9.0 metres, this crossing would require sightlines of 508 metres in order to give the user enough time to cross before the train arrives.

28.9. The Sightings recorded at last risk assessment which was completed on 21/09/2016 were as follows:

All distances are recorded in metres	Minimum sighting distance required	Measured sighting distance	Is sighting compliant?
Upside looking toward up direction train approach	508	950	Yes
Upside looking toward down direction train approach	508	1100	Yes
Downside looking toward up direction train approach	508	950	Yes
Downside looking toward down direction train approach	508	1100	Yes

28.10. The photograph below is taken looking northward, from the up side at a train approaching in the up direction. The trains usually approach on the closest set of lines (right hand side).

28.11. The photograph below is taken on the upside, looking south, the train usually approaches on the furthest (right hand side)

28.12. The photograph below is taken on the downside looking north; the train usually approaches on the closest line (right hand side) set of lines.

28.13. The photograph below is taken on the downside looking south; the train usually approaches on the furthest line (right hand side) set of lines.

28.14. As can be seen from the table above (28.9), S69 Bacton footpath crossing does have sufficient sighting to meet industry standards in all directions

28.15. As set out in the section 3.31, following the risk assessment, an optioneering exercise was carried out to consider options for eliminating, reducing, mitigating or managing risk at this crossing. These options considered were:

(i) Closure via diversion would cost in the region of £50,000 – this option has returned a 1.28 CBA score which means the safety benefit is supporting the costs of diverting the right of way.

(ii) Installation of overbridge. Cost: £2m this gave a CBA of 0.01 score which means the cost of this option is disproportionate to the safety benefit received.

(iii) Installing a MSL overlay system would cost approximately £250000 – this option has returned a CBA of 0.02 which means the cost of this option is disproportionate to the safety benefit received

(iv) Gate to gate enhancement would cost in the region £15,000- this option has returned a 0.02 score which means the cost of this option is disproportionate to the safety benefit received.

28.16. There have been no reported incidents at this crossing.

28.17. S69 Bacton crossing is situated next to a local football club, this can cause an increase in usage at certain times of the year when activities are on at the football

ground. The sighting is very good at S69 Mutton Hall crossing; it is possible to see the train approaching from over 1000 meters away at certain times of the year. This could potentially lead to users misjudging how long the train takes to reach the crossing

Witness declaration

I hereby declare as follows:

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

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

(iii) I understand my duty to the Inquiry to help it with matters within my expertise and I have complied with that duty