

TRANSPORT AND WORKS ACT 1992
TRANSPORT AND WORKS (INQUIRIES PROCEDURES)
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**THE NETWORK RAIL (LEEDS TO MICKLEFIELD
ENHANCEMENTS) ORDER**

Level Crossing Safety Proof of Evidence

of

Andrew Cunningham

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1 QUALIFICATIONS AND EXPERIENCE

- 1.1 I am Andrew Cunningham, a Route Level Crossing Manager (**RLCM**) employed by Network Rail, within the North & East Route, which is part of the Eastern Region. I have been in my current role since July 2018, but by profession have 23 years' experience working within the railway industry. I am a permanent employee working for Network Rail to manage level crossing risk on the North and East Route. I joined Network Rail in 2006 covering various roles until I was appointed to the Level Crossing Manager's position in 2012. My roles and responsibilities during this employment were to conduct maintenance activities, risk assessments on level crossings alongside managing the enhancement and renewals work, along with other aspects relating to "Off Track" works within the railway industry.
- 1.2 My current responsibilities, so far as is relevant to this public inquiry, are to sign off and approve the LCM Assessments on level crossing risk and condition of level crossing assets, and to oversee the inspection and maintenance regime.
- 1.3 My proof of evidence will cover the following matters.
- Introduction to the 5 level crossings ("**the Crossings**");
 - Level crossing risk assessment process and the All-Level Crossing Risk Model (**ALCRM**)
 - Level crossing risk at the Crossings including incident history.
 - Response to Objections
 - Conclusions
- 1.4 My Proof of Evidence, read with those of other witnesses, addresses Matters 1 and 4c in the Statement of Matters.

2 THE LEVEL CROSSINGS

2.1 General Provisions

- 2.1.1 There are 5 Level Crossings included within the Order:
- (a) Barrowby Lane at 14 miles 04 chains
 - (b) Barrowby Foot at 13 miles 61 chains
 - (c) Garforth Moor at 13 miles 41 chains
 - (d) Peckfield at 11 miles 12 chains
 - (e) Highroyds Wood at 10 miles 29 chains
- 2.1.2 In this section I set out the main features that are common to all five of the Crossings. Level crossings present an open interface between the railway and the highway, giving rise to an increased potential for user behaviour to affect train operations. They have differing levels of protection, and are broadly split into two groups:

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- (i) Active crossings: where the road vehicle or pedestrian is warned of the approach of a train through the closure of gates or barriers and/or by warning lights and/or alarms.
 - (ii) Passive crossings: where no warning of train approach is given other than by the train driver who may use the train horn. The onus is on the road user or pedestrian to determine whether it is safe to cross the line. Instruction for proper use must be provided at each location, along with other appropriate signage.
- 2.1.3 Four of the Crossings (Barrowby Lane, Garforth Moor, Peckfield and Highroyds Wood) are passive crossings. Barrowby Lane is categorised as an active crossing, as it is fitted with Miniature Stop Lights (**MSLs**).
- 2.1.4 All of the Crossing traverses two operational railway lines running between Micklefield and Neville Hill which both have a 90mph line speed.
- 2.1.5 The direction of travel for trains towards London, is known as the 'Up' line and the direction of travel for trains away from London is known as the 'Down' line. Specific to the site, which links Leeds with York, and Leeds with Selby and Hull, the 'UP' line is the direction of travel towards Leeds and the 'Down' line is in the direction to Hull, as shown in Figure 1, below) Land located directly adjacent to the 'UP' line is known as the 'UP Side' and the land adjacent to the Down line is the 'Down Side'.

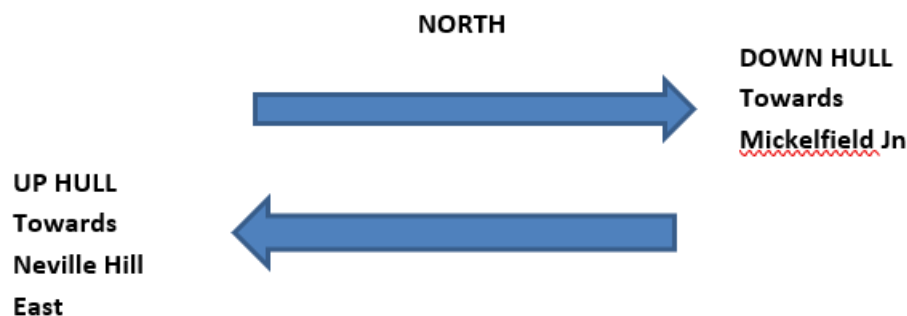


Figure 1 railway layout

- 2.1.6 **Train Operations** – The railway lines running over all 5 Level Crossing in the draft order, are operational and in 24-hour use. The train count taken for the latest risk assessments for 4 of the crossings (Barrowby Lane, Barrowby Foot, Garforth Moor and Peckfield), confirmed the current very high frequency of 233 trains daily throughout the seven days, travelling up to a maximum speed of 90 mph. There were also a further 2 Empty Coaching Stock (**ECS**) movements of trains and 5 freight trains that passed over the Crossing on average daily within the Assessment period. The other crossing (Highroyds Wood) has 63 trains per day travelling up to 90mph speed. The TRU project, which the Order is sought

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to facilitate, will increase services and will continue to increase the number of trains over subsequent years.

- 2.1.7 **Speed of trains** – the risk assessment carried out for each of the Crossings is based on the maximum permitted line speed of 90mph over the level crossing. However, it is stressed that not all trains pass over each of the Crossings at line speed. For example, at Peckfield, Garforth Moor, and Barrowby lane these crossings are within close proximity nearby Stations, those trains that stop will be either decelerating or accelerating as they approach the crossings thereby creating a wide variance in train speeds of approaching trains. Also Highroyds wood is located close to rail junction which can affect train approach speeds dependent on the ability of the train to proceed over this rail junction. This increases risk to users as each train then has a different time line in its approach to the crossing meaning that some users may think they have more time to cross the railway when first sighting a train.
- 2.1.8 **Amount of rail use** – a new train count is taken to quantify the current train service over the crossing whenever a risk assessment is carried out. The train count should be based on the actual number of trains that run over the crossing on a representative day i.e. mid-week / non-Sunday service. For the risk assessments I discuss below in relation to the Crossings in the Order, this information was obtained from Real Time Trains website.
- 2.1.9 In addition to the train service outlined above, it can also become necessary to run more trains over a crossing due to operational reasons for instance due to trains being diverted if there are problems on other lines of route. There is also a process twice a year in which the train operating companies can adjust the train timetable and include more services though this is not directly affected by the Order.
- 2.1.10 Engineering trains and track recording trains (such as the New Measurement Train (NMT)) are also known to use this line. These are short in train length, not timetabled and run at various, ad hoc times during the day. Various on-track machinery and plant can run over crossings during railway engineering works that are being carried out on the network. Network Rail's maintenance regime along this line regularly sees weekend or mid-weeknight engineering trains pass. These operate during periods where they will not affect the running of passenger trains and will therefore be unexpected to users of a crossing.
- 2.1.11 Passenger trains over 4 of the Crossings (Barrowby Lane, Barrowby Foot, Garforth Moor and Peckfield) range from two to nine carriages in length, which vary from 40 metres up to 240 metres long. The Train Operating services using the tracks over those Crossings are as follows:
- Cross Country operate Voyager trains linking Scotland and the north-east of England with the midlands and south-west of England.
 - LNER operate Azuma 9 car trains with the operator linking Scotland and the north-east of England with London Kings Cross.

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- Northern Trains operate local services across the north of England. Their fleet includes 2 car 'Sprinter' class 155 and 158 as well as 3 car class 195 trains.
- Trans Pennine Express (TPE) also link the north and east with the north-west of England. They operate 3 car class 185 (sometimes coupled together into 6 car formations) and 5 car class 802 trains.
- Freight trains also operate over the Crossings, and they are usually 300 metres in length.

2.1.12 The fifth crossing, Highroyds Wood crossing has the same services apart from no Cross Country trains are timetabled over the crossing.

2.2 LEVEL CROSSING RISK

2.2.1 Level crossings create an interface between roads, bridleways or footpaths and the operational railway. This has the potential to bring members of the public – pedestrians, cyclists, horse-riders, or vehicle drivers – into conflict with train movements. As a result, level crossing risk is one of the biggest safety risks on the railway infrastructure.

2.2.2 As part of Network Rail's strategy 'Enhancing Level Crossing Safety 2019-2039' (**CD 2.01**) and the Guidance published by our Regulator, ORR, "Principles for managing level crossing safety" dated 15 June 2021 (**CD 2.02**), Network Rail's strategy for managing level crossing risk includes:

- (i) Risk management; limiting/reducing the number of active open level crossings, continuing on-going risk reduction, risk-based prioritising of efforts, carrying out inspection and maintenance activities, on-going risk assessment regime (using tools such as the industry recognised ALCRM, support for public education and awareness of level crossing safety;
- (ii) Research and development; commitment to request and participate in research to reduce level crossing risk, also to investigate and introduce new technology;
- (iii) Co-operation with stakeholders; support the British Transport Police (BTP) and the ORR (Office of Rail and Road) to enforce adherence to level crossing and road traffic legislation, forming partnerships with other organisations such as local authorities and highway authorities.
- (iv) Learning and taking action; Network Rail will learn from others, from accidents/incidents/recommendations and take action as considered necessary.

2.2.3 Some key elements of Network Rail's policy on level crossings are reflected in the Office of Rail and Road (ORR) publication 'Principles for managing level crossing safety' dated 15th June 2021, including:

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- (i) ORR emphasises that risk should be reduced through the design of a level crossing or through an alternative way of crossing the railway where this is reasonably practicable. For an existing level crossing the risk assessment should always consider whether closure is a reasonably practicable option;
 - (ii) To ensure that the level of protection at a crossing remains adequate and appropriate, the controls should be reviewed to ensure that they are working as intended and risk assessments should be kept up to date so that any changes at the crossing are assessed and managed.
- 2.2.4 It is proposed that the TransPennine Route Upgrade Project will lead to the increased train capacity and electrification of the line from Micklefield to Neville Hill. Where an increase train capacity is proposed, Network Rail's Regulator, the ORR requires Network Rail to review the implications of the risk at existing level crossing along the route and to make any required upgrades/interventions to ensure that the risk of the level crossing is not materially increased. ORR acts on behalf of the Secretary of State in these matters and can offer guidance at an early stage as to what might be material in the particular circumstances of individual crossings. Any impact on safety will depend on the type of level crossing involved. Existing protection may no longer be adequate.
- 2.2.5 In addition, there is a requirement in planning legislation for planning authorities to consult the Secretary of State for Transport and/or the railway operator where new development materially affects traffic over any type of level crossing. The effect of new development on a level crossing similarly needs to be considered where additional risk is imported.

2.3 LEVEL CROSSING: RISK ASSESSMENT

- 2.3.1 As set out in Mr Greenwood's Proof of Evidence and in Section 5 of Network Rail's Statement of Case (**CD 5.01**) the risk assessment of level crossings involves both a quantitative and qualitative assessment of risk.
- 2.3.2 The risk assessment process firstly involves assessing the crossing and inputting sets of data into the Risk tool - All Level Crossing Risk Management (ALCRM) used by Network Rail. This data leads to the quantitative data within the risk assessment in the form of an ALCRM score and Fatalities and Weighted Injuries Index (**FWI**) score. This is recorded in the Narrative Risk Assessment (**NRA**) for the crossing produced by the Level Crossing Manager, together with commentary and observations from the RLCM, applying his or her expert judgment, highlighting key safety factors relevant to the crossing.
- 2.3.3 A qualitative risk assessment (or "structured expert judgment") is applied by the risk assessor (**the LCM**) throughout the risk assessment process. Information to support structured judgement is derived through the collation of evidence during the site visit, by applying local knowledge, using smart intelligent sources such as the internet and mapping services, through stakeholder engagement and analysis of previous assessments and accident/incident data.

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- 2.3.4 Network Rail uses both the quantitative ALCRM and the NRA, which articulates the qualitative, expert judgment of the LCM, to ensure a full and balanced approach is adopted in the risk management of the particular level crossing.
- 2.3.5 ALCRM reports two measures of risk: collective risk and individual risk of fatality. For each crossing the ALCRM score is made up of a letter (Individual Risk) and a number (Collective Risk) and also a Fatalities and Weighted Injuries (FWI) figure which informs the Collective Risk number.
- 2.3.6 Collective risk is a measure of the total harm, or safety loss and is expressed in terms of FWI per year, where FWI is a measure that accounts for fatalities and injuries. Collective risk is reported in a simplified numeric form and ranked from '1 to 13' where '1' represents the highest risk and '13' representing nil risk. This is independent of crossing type, so crossings that are relatively busy with lower degrees of protection will receive the highest rankings and conversely lightly used crossings that have high levels of protection will receive rankings towards the lower end.
- 2.3.7 As part of the NRA and following the assessment of the risk at the level crossings, LCMs are required to consider options for removing, mitigating, or further mitigating the risk at the crossing and evaluating available options to manage safety and/or the requirement to pursue closure. When reviewing options to improve safety at level crossings, Network Rail's LCM's seek to follow the principles from the Hierarchy of Risk Controls. In a level crossing context, the hierarchy of risk controls is discussed further in section 3.1 of my Proof below.
- 2.3.8 The main purpose of ALCRM is to provide a consistent method for assessing safety risks to crossing users, train passengers and train staff at level crossings on Network Rail controlled infrastructure. The risk model was developed as the result of a collaborative partnership involving the Rail Safety & Standards Board (**RSSB**), Network Rail and others.
- 2.3.9 The model has been reviewed by the RSSB with respect to pedestrian risk and was found to be robust.
- 2.3.10 The calculated levels of risk are used as one part of Network Rail's overall risk management process, informing Network Rail of the relative risks of different level crossings and guiding business decisions on crossing upgrades and closures. ALCRM is a working tool which is updated periodically to incorporate findings from latest research, the changing risk profile, and other needs of the business. The key inputs into the Risk Assessment are:
- (a) **Crossing type** – this input takes into account the safety provision from the level crossing equipment at the location. Four of the Crossings in the Order are of the type known as 'passive', meaning that level crossing users are not provided with a warning of approaching trains. Users are therefore responsible for their own safety and have to make their own judgement whether it is safe to cross or not. Only one has advanced

warning of approaching trains, being fitted with Miniature Stop Lights (Barrowby Lane), but this is not an automatic crossing, meaning that gates are not automatically locked on the approach of a train.

- (b) **Train Sighting** – Approaching trains may not be seen until it is too late (due to restrictive sighting) and quieter, more modern electric rolling stock and continuous welded rail means there is a much-reduced audible warning of approaching trains than there may have been in the past and they may not be heard.
- (c) **Warning time** – For footpath crossings, the decision point (the last point of safety before stepping onto the railway, and where the user makes the decision whether it is safe to cross) is a minimum 2 metres from the first running rail. The next point of safety after a pedestrian starts to cross is the decision point on the opposite side, 2 metres past the furthest running rail. Network Rail calculates the traverse time based on a person traveling at 1.189 metres per second, A 50% safety margin is added to the traverse time when a vulnerable use is identified. On bridleway crossings, the decision point is 3m for people on horseback.
- (d) **Amount of rail use** – a new train count is taken to quantify the current train service over the crossing. The train count should be based on the actual number of trains that run over the crossing on a representative day i.e. mid-week / non-Sunday service. This information can be sought from several sources such as Real Time Trains website, or TRUST (Train running under system TOPS). The risk assessment looks at all the different types of trains that run over the crossing, including lengths, different speeds of trains and different Train operating Companies(**TOCs**)/Freight Operating Companies(**FOCs**).
- (e) **Speed of trains** – the risk assessment is based on the maximum permitted line speed over the level crossing as shown in the Sectional Appendix.
- (f) **Amount of use by the public** – each risk assessment requires a ‘census survey’ to quantify how busy the crossing is in terms of use by the public. Methods of carrying out a census can range from a 30 minute ‘quick’ census carried out on site by the Level Crossing Manager through to a more detailed 9-day census using CCTV cameras deployed on site.

2.3.11 To get a better understanding of how a level crossing is used and by whom, the census survey results are broken down into user groups. For pedestrian and bridleway crossings the user groups are; “adults”, “accompanied children”, “unaccompanied children”, “elderly”, “rail personnel”, “mobility impaired”, “encumbered”, “wheelchairs”, “pushchairs/prams”, “mobility scooters”, “cyclists”, “dog walkers” and “horse riders”.

2.3.12 The categorisation of users is based on the application of judgement from the person undertaking the census survey using the CCTV footage and images.

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“Children” are classed as being under 18 years of age, “elderly” are classed as being over 65 years of age, “mobility impaired” are those users that are observed to use a walking aid. “Encumbered” users are classed as users who are carrying or pushing objects which might prevent free action or movement to clear the crossing quickly.

2.3.13 “Vulnerable” users (as well as “encumbered” users) are considered to be people who cannot traverse the level crossing within the normal warning time, which is why warning time is increased by 50% for “vulnerable” (and “encumbered”) users. This is supported by guidance within LCG (Level Crossing Guidance) 02 Level Crossing Guidance Document - Census Good Practice Guide (CGPG), a copy of which is appended to my Proof as **Appendix 1**.

2.3.14 The guidance defines “vulnerable” users as people who, when compared with typical users:

- Are likely to take an extended time to traverse due to disability or distraction; and/or
- Might be at greater risk of harm due to their perception of risk.

2.3.15 With regards to the vulnerability of users at level crossings, this risk assessment is exclusively for Network Rail as the expert assessor.

2.3.16 The Census Good Practice Guide (CGPG) underscores that the decision on the vulnerability of crossings users, is based on the Level Crossing Managers structured expert judgement and knowledge. The level crossing team are the competent persons responsible for the safe management and risk assessment of level crossings, and this is where the final decision lies.

2.3.17 The reasonable practicability of the application of the CGPG reinforces the flexibility in its applications to risk assessments and is to be applied in an evolutionary way, accommodating new and developing trends in human behaviour. This includes the extremely hazardous trends seen at a significant proportion of level crossings, for example the use of mobile phones and headphones.

2.3.18 The categories within the CGPG are inclusive but not exhaustive and the circumstances at which vulnerability is exemplified, is equally not exhaustive. With regard to the “elderly”, the “disabled”, “accompanied” and “unaccompanied children”, it is open to the Level Crossing Manager to apply the 50% safeguard, based on their structured expert judgement. With regard to the sample ratios of “vulnerable” use provided in the guidance, a ratio of one in five could, although not typically, be applied. A risk-based assessment, supportive of a ratio of two in five users, would also properly allow for the safeguard. The important category of users encompasses various user groups and includes those who take longer to clear the Crossing because they are mobility impaired, who experience difficulty in making an appropriate judgment, or whose judgment is impaired regarding whether it is safe to cross, such as

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unaccompanied children, people with hearing or sight difficulties or cognitive issues, and dog walkers.

2.3.19 The willingness of people to wait for trains or adhere to instructions, alarms or crossing equipment, can be influenced by such things as: distractions, time pressures, over familiarity with a crossing or timetable. Research also indicates and incidents show that human fallibility and susceptibility to distraction needs to be considered alongside deliberate misuse events and accidental human error, when considering the level of risk posed by the Crossing.

2.3.20 In terms of health and safety management, it is preferable, if possible, to 'design out' safety risks including risks associated with human behaviour.

2.3.21 The closure of the 5 Level Crossing would therefore be entirely consistent with this approach.

2.4 Optioneering, cost business Analysis and Gross disproportionality

Optioneering

2.4.1 Introducing additional train services with longer, quieter trains raise the risk at all level crossings along the route. ORR requires that where there is a change in railway operations so as to raise the risk then Network Rail must undertake a new assessment and consider all options that will mitigate the risk so far as is reasonably practical. This necessitates that the risk is reduced to at least the same level of risk prior to any railway enhancements being implemented.

2.4.2 Suitable alternative options for each site are usually considered and tested before the recommended option is identified within the NRA.

2.4.3 Each single option is subjected to robust Cost Business Analysis that also incorporates a calculated Gross Disproportionality Factor, thereby providing a structured and a consistent framework in determining whether the cost of implementing a control measure is grossly disproportionate against the reduction in risk. The Department for Transport considers the optioneering process when also taking into consideration Gross Disproportionality, to be the fairest in determining what options should be progressed, bearing in mind that the cost is weighted in favour of expenditure under gross disproportionality. As DfT confirms, the cost of implementing risk measures must not exceed the benefit that those measures might achieve.

2.4.4 The closure of a level crossing, through stopping-up, will unarguably secure the effective mitigation capable of satisfactorily controlling risk, so far as is reasonably practicable. However, risk control solutions should be appropriate for managing the hazards and risks identified. Generally, they must deliver the greatest degree of public safety for the level of expenditure. Not all solutions are appropriate for all locations and risk may increase if an inappropriate risk control is chosen. Therefore, a site-specific assessment of suitability is part of the selection process.

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2.4.5 The recommended options are then considered against the wider elements, including overall cost availability (against the full requirement of infrastructure works for the project), consideration of Network Rail's Public Sector Duty and the balance of the benefit to the public against loss and inconvenience to landowners and occupiers.

Cost Benefit Analysis (CBA) and Gross Disproportionality Factor (GDF)

2.4.6 To support the understanding of whether the risk at the level crossing is managed so far as is reasonably practicable (**SFAIRP**), the CBA is undertaken to provide a Benefit Cost Ratio (**BCR**); the principle being, if the cost of implementing a control measure is grossly disproportionate to the reduction in the risk that might be achieved, then it is reasonable not to implement that control measure.

2.4.7 Additionally, a Gross Disproportionality Factor (**GDF**) is applied to the BCR using one of the following factors:

- Medium = $BCR \times 1.5$
- High = $BCR \times 2.5$
- Exceptional = $BCR \times 6$

2.4.8 The criteria for defining the correct multiplier is determined by expert judgement by the LCM and subsequent RLCM, considering the level crossing against the following criteria using a question bank:

- Culpability – weighting deliberate misuse against genuine mistakes.
- Vulnerability – to reflect a greater responsibility towards those less able to protect themselves.
- Societal aversion – addressing the absence of public appetite for credible mass casualty train accidents.
- Uncertainty – for the degrees of confidence in our knowledge of the pattern of apply, which encompasses elements such as who/how/with/what consequences.

2.4.9 The highest level indicated across all questions determines the appropriate GDF level to use. Peckfield, Barrowby Lane, Highroyds Wood and Garforth Moor level crossings have been deemed as high rated crossings, so a 1.5 factor is applied.

2.4.10 The resultant GDF score informs and supports decision making based on the following criteria:

- (a) Benefit to cost ratio is ≥ 1 : positive safety and business benefit established (GREEN).
- (b) Benefit to cost ratio is between 0.99 and 0.5: reasonable safety and business benefit established where costs are not grossly disproportionate against the safety benefit (AMBER).

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- (c) Benefit to cost ratio is between 0.49 and 0.0: weak safety and business benefit established (RED).

2.4.11 The CBA and GDF guidance for level crossings provided to the level crossing teams is:

- GREEN: There would be a legal requirement to deliver the applicable intervention to achieve SFAIRP.
- AMBER: A record of the business decision / justification on the applicable intervention (or not where the decision is to not deliver any risk mitigation activity) is required.
- RED: No action would be proposed.

2.4.12 The optioneering selection process for the TRU upgrade project was undertaken before the guidance on Gross Disproportionate Factor was introduced. The options considered therefore did not, as far as I am aware, go through this process.

2.4.13 As part of preparing my evidence for this Inquiry, I have looked at the options in the NRAs and subsequent Optioneering. The costs for such options are generic and are not costs provided by the project. The Cost Benefit Analysis incorporating GDF analysis was undertaken. The results of that exercise are recorded under the 'Optioneering' sub-heading for each Crossing. This exercise has shown that all of the proposals included within the Order have positive CBA including with the GDF.

2.5 RISK ASSESSMENT: THE TRU PROJECT

2.5.1 In the following sections of my Proof, I have provided the ALCRM and FWI score for each of the crossings from their most recent risk assessments. For the crossings which are currently temporarily closed (Garforth Moor and Highroyds Wood) I have provided the ALCRM and FWI scores from the last risk assessment before they were closed.

2.5.2 New risk assessments are required to be carried out for each level crossing on a risk-based basis. The higher risk score then the more frequent the crossing will get risk assessed. The current timescales for such are set at 1 ¼ years for high-risk crossings, 2 ¼ years and 3 ¼ years for lower risk crossings. I have identified below where a crossing is currently going through its new risk assessment.

2.5.3 In preparing my evidence for this Inquiry, I have also considered what the ALCRM scores for each Crossing would likely to be, if the TRU project upgrades which are set out in the Order have taken place. I have done this by changing to installation of Overhead line electrification (**OHLE**) and using the proposed increased capacity stated in in the Indicative Train Service Specification (**ITSS**) dated 2023. All other inputs have been kept the same as used in the risk assessment which resulted in the ALCRM scores in the sections

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below. Though, it does not take into account the change in sighting distances at each level crossing that the OHLE installation will impact.

2.5.4 This has produced the following results:

Crossing	Current ALCRM Score	Predicted ALCRM Score
Barrowby Lane	C4	C3
Barrowby Foot	C10	B10
Garforth Moor	C3	B2
Peckfield	B3	B2
Highroyds Wood	C5	C4

2.5.5 This information is an estimated impact assessment. Comprehensive risk assessments carried out in the future with the ITSS train information, new developments, changes in use and other qualitative inputs could change risk levels in the future. But these results give an indication of the likely increase in risk and thus underscores the need for the project to address the likelihood of risk if the TRU upgrade works are to be undertaken and the service capacity and electrification of the line were realised.

3 BARROWBY LANE BRIDLEWAY

3.1 Barrowby Lane - Location

3.1.1 Barrowby Lane is a Bridleway level crossing located 1352 yards to the west of Garforth Station. Cross Gates station is 2 miles and 154 yards to the east of the Crossing.

3.1.2 The Crossing, which leads from country road, is surrounded by open fields south of the railway, in the village of Garforth. It is also flanked by a few residential properties and business south of the railway, to the east and open land to the west. The bridleway traverses the crossing then connects into Nanny Goat Lane which runs parallel with the railway boundary to the North. The bridleway, which commences at Barwick Road to the east, then heads westwards towards and under the M1 motorway.

3.1.3 Garforth Stables is situated close to the crossing on the North side. There are a few residential properties, along Nanny Goat Lane, some set back from the road; but it is mostly open fields.

3.1.4 Figure 3 below provides an aerial view of the Crossing:



Figure 3 street map of Barrowby Lane

3.2 Barrowby Lane - RAIL OPERATIONS

3.2.1 The railway lines running over the Crossing are operational and in 24-hour use. The most recent train count on 10/08/2021 has confirmed a very high frequency of passenger services of approx.233 daily at varying speeds up to a maximum of 90 mph. 2 empty coaching stock movements of trains and 5 freight trains were also recorded as passing over the Crossing on average, daily. This number may increase in December 2024, under the next scheduled timetable change, which is not linked to this Order.

3.2.2 Passenger trains over the Crossing range from two to six carriages in length, which vary from 40 metres up to 240 metres long.

3.3 Barrowby Lane – PHYSICAL FEATURES OF THE CROSSING

3.3.1 The railway forms a long sweeping curve over the Crossing, and there are lineside obstructions that affect sighting of approaching trains, which means that the amount of sighting available at the Crossing is limited in both directions. The installation of OHLE and stanchions will further reduce the already limited sighting at this Crossing. To address the sighting distance available for users to cross safely, miniature stop lights (MSLs) have been provided on both sides of the crossing (see below).

3.3.2 The photographs in Figure 4 below, show the wicket gate arrangement located on Network Rail's lineside boundary fence on the North and South approaches to the Crossing. The railway is accessed by wicket gates that are 150cm wide.

3.3.3 Photographs of the gate approaches at Barrowby lane MSL level crossing:

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- 3.3.4 From the crossing gate to the crossing surface is of unmade type. The Crossing Deck is of hard rubber STRAIL construction with acme sheets between the panels.



- 3.3.5 There are no sources of lighting present at the Crossing however, due to the proximity to residential property on the Downside, depending on the time of year it is possible that a low level of ambient lighting could reach the Crossing.

3.4 Barrowby Lane – LEVEL CROSSING RISK

- 3.4.1 Network Rail has undertaken an NRA for the Crossing as part of the ongoing risk assessment regime. The up-to-date NRA for the Crossing is dated: 10/08/2021. It should be noted that a new Risk Assessment currently being undertaken.
- 3.4.2 The current ALCRM score for the Crossing is C4 (0.003986287 FWI). At present, there are 944 level crossings on the North & East Route. Out of this figure Barrowby Lane crossing is ranked number 63. However, if you compare this level crossing to other crossings of a similar type it is ranked 3 out of 35. These figures are subject to change, due to the ongoing periodic assessment of level crossings and subsequent risk changes of these level crossings.
- 3.4.3 Factors, other than the characteristics of the user group (which I discuss further below), informing this risk score include:

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- (a) High frequency of train movements: high train frequency increases risk;
- (b) Extremely high line speed: At 90mph on the Up and Down Hull lines.
- (c) Long level crossing traverse where users could be exposed to moving trains: with two running lines the crossing distance is 12.5 metres from the gate/MSL to cross the railway.
- (d) Relatively high level of public use; the Crossing has an average of 65 users per day. The risk of accident at a level crossing increases significantly with a higher level of use.
- (e) Limited sighting for trains in all directions; this is due to track curvature and lineside equipment. As a result of the limited sighting, miniature stop lights (MSLs) are provided at the Crossing to give users warning of approaching trains;
- (f) Mixed traffic; there are high speed passenger trains, lower speed passenger trains, freight services and engineering trains that use this line and they can approach the crossing at different speeds ranging from a maximum of 90mph to other slower trains. This makes it very difficult for level crossing users to judge the speed of a distant approaching train. Also note that people are not used to judging speeds of vehicles approaching them at 90mph and this can affect their perception of risk i.e. they may think they have more time to cross than they actually do have.
- (g) Another train coming; as the line is very heavily used and there is a mix of longer passenger trains, long freight trains and shorter passenger trains there is a significant risk that a level crossing user's view of an approaching train could be obscured by a second train that has just passed over the crossing.
- (h) Environmental factors; the Crossing can be prone to fog at certain times of the year which significantly affects level crossing user's sighting of approaching trains, also it reduces the ability for train drivers (of approaching trains) to see pedestrians on the crossing and sound a warning. Also, fog can reduce the audibility of approaching trains. Also, the Crossing can be affected by sun glare at certain times of the year which can reduce the ability for users to see approaching trains;
- (i) Deliberate misuse and accidental human error; significant history thereof, including near misses and incidents with youths and children.

3.4.4 It is proposed that the Transpennine Route Upgrade Project will lead to the electrification and subsequent increased capacity of the Up and Down Hull lines. Where an electrification of the line is proposed, Network Rail is required to review the implications of the risk at existing level crossings and to make any required upgrades/interventions to ensure that the risk of the level crossing is not increased. As well as the introduction of additional services there is also a future aspiration for line speed increase at the location.

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3.5 Barrowby Lane - RISK ASSESSMENT

3.5.1 The current sighting of approaching trains for users stood at the Decision Point is shown in the photographs below:

Sighting - Up side, Up train approach



Sighting - Up side, Down train approach



Sighting -Down side, Up train approach



Sighting - Down side, Down train approach



3.5.2 The images show the impact of OHLE on sighting. The yellow shaded areas show where the location of the OHLE stanchions will be once installed.

3.5.3 Currently the sighting at this location is non-compliant when stood on the Down side looking for a Down direction train. The requirement is 457m and users can only see 390m. This non-compliant sighting is mitigated by the fitment of Miniature Stop lights at site.

3.5.4 Trains are already known to pass in the vicinity of the crossing and even with the installation of MSLs the risk from users stepping out in front of a 2nd approaching train that may be hidden from the user remains high. In addition, the variance in approaching trains may lead to users running out to beat the

train which they may believe is travelling slower than it is. Users do not have the same appreciation of distance and time, when seeing a train approaching and it is only when it is practically at the level crossing, do they actually get an appreciation of its speed.

- 3.5.5 Further, Quieter, more modern electric rolling stock and continuous welded rail, means trains are significantly quieter than they used to be, so there is a much-reduced audible warning of approaching trains than what a user may expect when standing at a crossing. Instances are recorded that pedestrians may not hear a train's approach until it is less than 3 seconds from a level crossing.

3.6 Barrowby Lane – MINIATURE STOP LIGHTS

- 3.6.1 The most prominent crossing feature at MSL crossings are the red/green light indications. They provide a warning at the Crossing to the user that they are approaching a level crossing.
- 3.6.2 The MSL system operates with fixed 'treadles' located on each railway line approaching the level crossing. When a train passes over a treadle, the treadle depresses and this sends a signal to the MSL to illuminate the red light and extinguish the green light, if the red light is illuminated it is unsafe to cross. The positioning of the fixed treadles is based on the minimum required warning time for users to cross safely, and ii) the maximum permitted line speed. If the red light is still illuminated after the train has passed, then this means another train will be coming and users should continue to wait outside of the railway boundary. Users should only cross when the green light is showing.
- 3.6.3 Although the red/green lights are an integral warning system they do not actively prevent pedestrians from walking out in front of a train. They are dependent upon users paying attention to, and heeding, their warnings. With the introduction of even more services, it is inescapable that the lights will display 'red aspect' for more of the time, indicating a train approaching, and that can lead to impatience of some users. Unfortunately, It is not uncommon for users who see a train approaching to try and 'beat it' and run across the tracks – possibly unaware of a second train approaching in the opposite direction. In addition, after waiting for a train to pass they walk out, thinking the 'red aspect' is for the train just passed and do not realise that it remains red because of the approach of a second train.
- 3.6.4 The willingness of people to wait for trains or adhere to instructions, alarms or crossing equipment, can be influenced by such things as: distractions, time pressures, over familiarity with a crossing or timetable. Research also indicates and incidents show that human fallibility and susceptibility to distraction needs to be considered alongside deliberate misuse events and accidental human error, when considering the level of risk posed by the Crossing. As Mr. Greenwood confirms in his Proof of Evidence, human behaviour at level crossings shows that users do not always behave predictably when crossing the railway and people do not even always look at the signage or crossing

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warning equipment. The effectiveness of MSLs is reduced by certain user characteristics and behaviours as well as environmental factors.

3.6.5 User characteristics and non-deliberate behavioural issues that have suspected to have happened at this crossing include:

- Users with sighting impairments are less able to discern whether the red light is illuminated.
- Users with mobility issues might take excessive additional time to traverse the crossing, and they would be unaware of the MSL switching from green to red if they are on the crossing itself.
- Users with cognitive issues, such as dementia sufferers, are less able to interpret and act upon the warnings.
- Users that are distracted might have reduced situational awareness and may be less likely to observe the MSLs properly. Examples of this include; parents with children, dog walkers, groups such as ramblers, pedestrians using mobile phones, pedestrians using iPods etc. with earphones/headphones.
- Deliberate violations and behavioural issues witnessed at MSL crossings.
- Users deliberately ignoring the red warning lights - this can be more of a problem at crossings which require a longer warning time, such as at the Crossing because some people are not willing to wait for over one minute for the train to pass.
- People (more often children and youths) playing 'chicken' with approaching trains.
- People with suicidal intentions.

3.6.6 Environmental factors at MSL crossings:

- Sun glare, when the sun is directly behind the MSLs, this can make the indication more difficult to see. This is illustrated by figure 5 below. Sun glare can also be a problem when the sun is in front of the MSLs and is shining directly onto the lenses, the reflection can make the indication more difficult to discern i.e. more difficult to identify which light is illuminated

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3.6.7 Photograph showing sun behind an MSL level crossing.

3.6.8 Heavy rain, fog or snow can also affect the visibility of the MSLs.

3.6.9 In terms of health and safety management, it is preferable, if possible, to 'design out' safety risks including risks associated with human behaviour. The closure of the Crossing is entirely consistent with this approach.

3.7 Barrowby Lane – Census Details

3.7.1 A full nine-day camera census of the Crossing was carried out by Tracsis Ltd, from the 4th of December 2021 to the 12th of December 2021, and the average daily use was taken for the ALCRM risk assessment.

3.7.2 The census captured an average use of 65 users per day. Although there are days in which this figure may be exceeded, the average daily count was achieved by using the busiest weekend and five weekdays and determining the average daily count.

3.7.3 The Table below shows the combined usage figures from the nine-day census

Direction : Combined											
Adults	Accompanied Children	Accompanied Children in Pram/Pushchair	Unaccompanied Children	Elderly	Impaired	Wheelchair	Mobility Scooter	Pedestrian Utilising Bicycles	Railway Personnel	Equestrians	Total
35	0	2	0	0	0	0	0	1	0	1	39
84	4	2	0	1	0	0	0	2	0	0	93
35	0	0	0	0	0	0	0	4	0	0	39
37	0	0	0	0	0	0	0	4	0	0	41
38	1	1	0	0	0	0	0	1	0	0	41
69	0	1	0	0	0	0	0	7	0	0	77
68	1	0	0	0	0	0	0	5	0	0	74
66	2	3	0	1	0	0	0	4	0	0	76
96	6	0	0	3	0	0	0	6	0	0	111
528	14	9	0	5	0	0	0	34	0	1	591

3.7.4 The table is taken from the 9 days census survey carried out by Tracsis Ltd which recorded use of the Crossing by the following user groups:

- Cyclists-4
- Horse Riders-1

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- Pedestrians 60
- Animal Herders-0

3.7.5 It is expected that levels of use reflect the census being conducted during the winter, darker months and that usage might be slightly higher during the summer period.

3.7.6 From the 9-day camera census the following “vulnerable” and “encumbered” use was captured:

- 23 accompanied children/ 0 unaccompanied children - children have been shown to be vulnerable to distraction (or distracted by virtue of a mobile phone, headphones, or headgear) and unintentional errors when using level crossings. They can also be prone to misusing level crossings, often without realising the danger they place themselves in playing games such as “chicken”. There are recorded examples of children/youths misusing the Crossing.
- 5 “elderly” people - older members of the population have been shown to be more likely to suffer mobility, eyesight and hearing difficulties which reduces the effectiveness of warnings provided at the Crossing and hearing approaching trains.
- 9 people with pushchairs/buggies - a pushchair/buggy would increase a person’s ‘footprint’ on the Crossing, the person pushing the pushchair/buggy is more likely to focus on where they are directing themselves, and will have reduced ability to increase speed to exit the Crossing.
- 34 adults utilising bicycles - these users are more likely to focus on their bikes/scooter rather than looking out for trains. For those riding over the crossing there is the additional risk of them falling off their bicycles where there is a right for users to cycle on the public right of way, users should always dismount and then push their bicycles for safety purposes.

3.8 Barrowby Lane – Previous Incidents

3.8.1 In recent years user vigilance for their own safety and adherence to safe protocols has been considerably reduced by the vast increased use of mobile communications and other personal devices.

3.8.2 The likelihood of users being distracted by mobile communications has increased and, additionally, the likelihood of people wearing earphones or headphones has also considerably increased which reduces the effectiveness of audible warnings.

3.8.3 Moreover, mobile phones have camera and video functions which has greatly increased the temptation for some people to take photographs or video footage in dangerous locations, such as level crossings. The use of headphones/earphones has been identified as a concern within a number of risk assessments and has been noted by the RAIB in their reporting as being a

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contributing factor in fatalities at other pedestrian crossings similar to the Crossing.

3.8.4 The incident history of the Crossing includes the failure of the MSLs on 11/02/2021. This incident resulted in users having to call the signaller for permission to cross using the telephones provided. This was witnessed not to be the case as many users either failed to read the signage or failed to adhere to it crossing without permission.

3.8.5 Bridleway users of this crossing are instructed to use the telephones provided to gain permission to cross at all times.

3.8.6 Barrowby Lane Level Crossing, in its existing arrangement, has had 19 instances of telephone failure between 2008-2018. The closure of the level crossing increases the reliability and resilience of the railway.

3.9 Barrowby Lane – Optioneering

3.9.1 The table below shows the CBA and GDF on previous NRA options considered.

Option	Term	ALCR M risk score	ALCRM FWI	Cost	Benefit Cost Ratio	Status	Comments
Closure via extinguishment / Diversion	Long Term	M13	0	60K	CBA 7.461 CBA+GD 18.903	REJECTED	This option provides a positive CBA and removes all unacceptable risk at the Crossing but there is no suitable diversionary route
Closure by stepped footbridge	Long Term	M13	0	2.5M	CBA 0.1794 CBA+GD 0.4486	REJECTED	This option does not pass a CBA.
Closure by ramped Bridleway bridge	Long Term	M13	0	2.5M	CBA 0.1794 CBA+GD 0.4486	RECOMMENDED	This option's costs have been estimated at 2.5M along with Barrowby Lane been 1.5M total cost of bridge 4M. CBAs combined together produce a positive CBA $0.4486+0.5232=0.9718$
Implementing low-cost improvements to the Level Crossing.	Short Term	C4	0.002930531	15K	CBA 0.3183 CBA+GD 0.7959	REJECTED	Implementing all feasible low-cost options will not reduce risk SFAIRP.
Installation of Integrated MSL	Long Term	C4	0.002930531	0	CBA 0 CBA+GD 0	REJECTED	This option is already installed.

3.10 Barrowby Lane - CONCLUSIONS

3.10.1 With the addition of additional longer and potentially faster trains above the current 223, closure of the Crossing is the only effective way to remove the increased risk associated with this Crossing. As well as the addition of quieter and longer services, the installation of electrification of the line imposes further risk: impacts on sighting of approaching trains and increase the likelihood of the lights been red at the crossing for much longer due to more train capacity. The

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user's willingness to wait increases and imposes more risk that Network Rail will need to address.

3.10.2 Although there is presently a miniature stop light system in place to mitigate insufficient sighting, historic evidence confirms that extremely dangerous incidents still occur by virtue of pedestrian use of the Crossing, and people disregarding the red-light warning or being distracted and failing to observe the red light.

3.10.3 The crossing has a busy train service of 233 trains per day, The Crossing experiences a relatively high level of pedestrian use (of approx. 65 users per day). There is also a known high level of use by "vulnerable" users, particularly mothers with prams/pushchairs and cyclists.

3.10.4 The Crossing has exhibited a high volume of misuse especially during times when the stop lights are not working and crossing users are instructed by the crossing signage to use the crossing telephones to contact the signaller to ask permission to cross.

3.10.5 There is a clear safety case for closing this level crossing and replacing it with a grade separated means of crossing the railway. This is supported by both our regulator, the ORR, and DfT in legislation.

4 BARROWBY FOOT LEVEL CROSSING

4.1 Barrowby Foot – Location

4.1.1 Barrowby Footpath Crossing is located 3 mile and 660 yards to the East of Crossgates station and 836 yards to the west of Garforth Station. Consequently, approaching trains that stop at the station will be accelerating or decelerating when traversing the Crossing. Non-stop Intercity Trains will be travelling at linespeed (90mph).

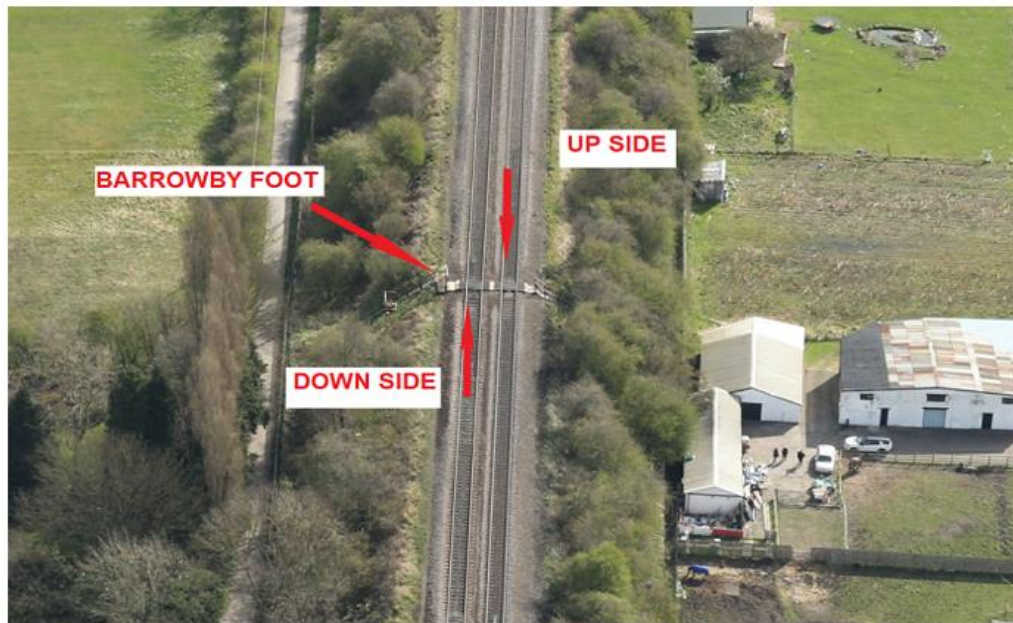
4.1.2 The Crossing is a Footpath level crossing which leads from Barrowby Lane in the Garforth area to the south (Up Side), and connects into Nanny Goat Lane over the railway to the North(Down Side). Nanny Goat Lane runs parallel with the railway boundary, leading from Barwick Road.

4.1.3 The Down Side has open fields surrounding with a couple of residential properties that are set back from Nanny Goat Lane. The Upside is flanked by tree line that runs adjacent to the railway. There is also a property on this side.

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4.1.4 Figure 6 aerial view of Barrowby footpath level crossing



4.2 Barrowby Foot – Rail Operations

4.2.1 The railway lines running over the Crossing are operational and in 24-hour use. The train count taken for the latest risk assessment confirmed the current very high frequency of 233 trains daily throughout the seven days, travelling up to a maximum speed of 90 mph. There were also a further 2 empty coaching stock (ECS) movements of trains and 5 freight trains that passed over the Crossing on average daily within the seven days of the Assessment.

4.3 Barrowby Foot - Physical Features of The Crossing

4.3.1 Barrowby Foot Crossing is a 'passive' crossing, meaning that level crossing users are not provided with a warning of approaching trains. It provides access from Barrowby Lane to the south to Nanny Goat Lane to the north. It is very lightly used.

4.3.2 The audibility to hear approaching trains against ambient background noise is reduced due to the introduction of the quieter, more modern electric rolling stock and continuous welded rail. This means there is a much-reduced audible warning of approaching trains than there may have been in the past. There are no sources of lighting present at the Crossing the signage would only be seen via an independent light source such as a torch.

4.3.3 The photographs in Figure 7 below show the wicket gate arrangement located on Network Rail's lineside boundary fence on the North and South approaches to the Crossing. The railway is accessed by gates at the bottom of the banking on each side and via a set of steps on either side which lead up to the Crossing.

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4.3.4 Photographs of the gate approaches to Barrowby Footpath level crossing



4.3.5 The crossing deck is accessed by climbing unmarked steps and a steep approach up to rail level from the decision points on either side. This effectively lowers the traverse speed of a pedestrian, thereby increases the time taken to cross. The Crossing has hard rubber Strail decking with tarmac/concrete infills between the panels.



4.4 Barrowby Foot – Level Crossing Risk

- 4.4.1 The proposed enhancements will allow train capacity to increase. This in turn increases the likelihood of trains passing each other in close proximity to the crossing, thereby raising the risk of a second train being hidden to a pedestrian, approaching from the opposite direction and obscured from sight by the first. It is also not heard, as the pedestrian is fooled into thinking the sound of the 2nd train approaching is the sound of the train that has just passed. This risk is heightened with increased services.
- 4.4.2 Sighting at the Crossing is compliant though limited at this location, as can be seen in the photographs below:

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Sighting - Up side, Up train approach



Sighting - Up side, Down train approach



Sighting - Down side, Up train approach



Sighting - Down side, Down train approach



4.4.3 The yellow shaded images show the impact of the OHLE stanchions at this location when installed, this will significantly impact on current sighting of approaching trains.

4.4.4 The increase in train numbers will additionally contribute to the risk.

4.5 Barrowby Foot – Risk Assessment

4.5.1 Network Rail has undertaken an NRA for the Crossing as part of the ongoing risk assessment regime. The up-to-date NRA for the Crossing is dated 22/02/2023.

4.5.2 The ALCRM score of the current risk assessment is C10 (0.000001483 FWI).

4.5.3 The known factors and the characteristic of the user group, informing the risk and risk score at this crossing include:

- High frequency of train movements: high train frequency increases risk;
- Extremely high line speed: At 90mph on the Up and Down Hull lines.

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- Inclined steep approaches then a nine-metre traverse where users could be exposed to moving trains:
- Limited but compliant sighting for trains in up direction; this is due to track curvature.
- Mixed traffic: there are high speed passenger trains, lower speed passenger trains, freight services and engineering trains that use this line and they can approach the crossing at different speeds ranging to a maximum of 90mph. This makes it very difficult for level crossing users to judge the speed and distant of approaching train. Also note that people are not used to judging speeds of vehicles approaching them at 90mph and this can affect their perception of risk i.e. they may think they have more time to cross than they actually do;
- Another train coming; as the line is very heavily used and there is a mix of longer passenger and freight trains with shorter passenger trains there is a significant risk that a crossing user's view of an approaching train could be obscured by a second train that has just passed over the crossing. This risk increases due to electrification and as train capacity is increased.
- Environmental factors; the Crossings can be prone to fog at certain times of the year which significantly affects level crossing user's sighting of approaching trains, also it reduces the ability for train drivers (of approaching trains) to see pedestrians on the crossing and sound a warning. Also, fog can reduce the audibility of approaching trains. Also, the Crossing can be affected by sun glare at certain times of the year which can reduce the ability for users to see approaching trains.

4.6 Barrowby Foot – Census Details

- 4.6.1 A full 9-day camera census of the Crossing was carried out by the LCM on 21/02/2023 and an estimate was taken for the ALCRM risk assessment because the census recorded no users of the Crossing. The level crossing manager reviewed the video footage from the 9-day census and from local knowledge, previous site visits and a previous camera 9-day census the LCM (Level Crossing Manager) estimated the crossing is used a few times in the year . So an estimated use was entered.
- 4.6.2 The TRU project also undertook a 9-day census in 2016 which also showed no evidence of use in the nine days.If no users were entered into ALCRM it would produce an M13 (no risk) score. This is obviously not the case (it being the LCM's assessment that the crossing is used although infrequently used) and so an estimated user count is used.
- 4.6.3 The estimated use which the used in the risk assessment by reference to the following user groups was as follows:
- Cyclists-No evidence of Use

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- Horse riders-No evidence of use
- Pedestrians-Few times a year
- Animal Herders-No evidence of use

4.6.4 From the 9-day camera census, as there were no recorded users there were no “vulnerable” or “encumbered” use captured.

4.7 Barrowby Foot – Previous Incidents

4.7.1 Since 2015 there have only been 2 reported incidents, though when investigated these were seen to take place at Barrowby lane crossing not Barrowby foot crossing.

4.7.2 In recent years user vigilance for their own safety and adherence to safe protocols has been considerably reduced by the vast increased use of mobile communications and other personal devices. The likelihood of users being distracted by mobile communications has increased and, additionally, the likelihood of people wearing earphones or headphones has also considerably increased which reduces the effectiveness of audible warnings. Moreover, mobile phones have camera and video functions which has greatly increased the temptation for some people to take photographs or video footage in dangerous locations, such as level crossings. The use of headphones/earphones has been identified as a concern within a number of risk assessments and has been noted by the RAIB in their reporting as being a contributing factor in fatalities at other pedestrian crossings similar to the Crossing.

4.8 Barrowby Foot – Optioneering

4.8.1 The table below shows the CBA and GDF on previous NRA options considered.

Option	Term	ALCRM risk score	ALCRM FWI	Cost	Benefit Cost Ratio	Status	Comments
Closure via extinguishment / Diversion	Long Term	M13	0	60K	CBA 5.2319 CBA+GD 13.0796	REJECTED	This option provides a positive CBA and removes all unacceptable risk at the Crossing No suitable diversionary route available.
Closure by stepped footbridge	Long Term	M13	0	2.5M	CBA 0.1256 CBA+GS 0.3139	REJECTED	This option does not pass a CBA.
Closure by ramped footbridge	Long Term	M13	0	1.5M	CBA 0.2093 CBA+GD 0.5232	RECOMMENDED	This option does pass a CBA. The cost has been split with Barrowby Lane and so combined scores to provide one bridge and close both crossings. CBA+GD 0.532+0.506=1.238
Installation of Overlay MSL	Long Term	C12	0.00000435	150K	CBA 0.1840	REJECTED	This option does not pass a CBA. Does not

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Option	Term	ALCRM risk score	ALCRM FWI	Cost	Benefit Cost Ratio	Status	Comments
					CBA+GD 0.4600		provide adequate mitigation (residual risk).
Installation of Integrated MSL	Long Term	C12	0.00000 435	2M	CBA 0.0213 CBA+GD 0.0533	REJECTED	This option does not pass a CBA. Does not provide adequate mitigation (residual risk).

4.9 Barrowby Foot – Conclusions

- 4.9.1 Closure of the Crossing is the only effective way to remove the risk associated with the Crossing.
- 4.9.2 Although there is presently compliant sighting in place to mitigate risk of use, dangerous incidents can still occur by virtue of pedestrian use of the Crossing, and people disregarding the approach of trains or being distracted and failing to observe approaching trains. The crossing has a busy train service of 233 trains per day, this number is set to increase upon the electrification of the line, the increase in rail traffic also increases the risk of trains passing close or near to each other.
- 4.9.3 There is a clear safety case for closing this level crossing. The risks imposed as part of the TRU electrification project and subsequent increase in trains and future aspiration to increase line speed mean that the crossing risk is increased.

5 GARFORTH MOOR

5.1 Garforth Moor – Location

- 5.1.1 Garforth Moor FPW Crossing is located only 396 yards to the west of Garforth Station and 2-mile 1100 yards to the east of Crossgates station, so trains that stop at Garforth will be at much slower speeds and are accelerating or decelerating when approaching the Crossing. InterCity express trains will be travelling at line speed.
- 5.1.2 The crossing provides private pedestrian access from Garforth Moor to the south, and to allotments just north of the crossing. It also carries a public footpath which is currently closed under a TTRO since 22 December 2017 on safety grounds. The Upside path commences from Dale Croft in a residential area of Garforth. To the north of the crossing, it continues for approximately 60m before it forks off to the East and North, the footpath runs along open fields before joining onto public highways.
- 5.1.3 The bridge on Barwick Rd is currently used as the alternative route whilst the crossing is temporarily closed. The proposed option is to make this closure permanent (subject to supporting works) however, the Bridge is Grade II listed, which constrains the potential to widen the bridge to provide for better pedestrian access.
- 5.1.4 Figure 8 below provides an aerial view of the Crossing:



5.2 Garforth Moor – Rail Operations

- 5.2.1 The railway lines running over the Crossing are operational and in 24-hour use. The train count has confirmed a very high frequency of passenger services of approx.233 daily at varying speeds up to a maximum of 90 mph. 2 empty coaching stock (ECS) movements of trains and 5 freight trains were also recorded as passing over the Crossing on average, daily. This number may increase with the additional services that may be introduced in December 2024, under the next scheduled timetable change (not linked to the Order).
- 5.2.2 Passenger trains over the Crossing range from two to six carriages in length, which vary from 40 metres up to 240 metres long.

5.3 Garforth Moor - Physical Features of The Crossing

- 5.3.1 The Crossing is a 'passive' crossing, meaning that level crossing users are not provided with a warning of approaching trains and need to ascertain themselves whether it is safe to cross when standing at the Decision Point.
- 5.3.2 The approaches to the crossing are tarmac surfaced. There are palisade corralled approaches to the crossing. Under the temporary closure the crossing has been fenced off along the Network Rail boundary to as to prevent unauthorised pedestrian access.
- 5.3.3 The photographs in Figure 9 below show the fencing that prevents pedestrian access to the crossing.

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- 5.3.4 The aerial view shows that the former timber deck has also been lifted which would be replaced (along with the gates) if the Crossing was to be reopened.



5.4 Garforth Moor – Level Crossing Risk

- 5.4.1 This level crossing is currently closed and out of use under a TTRO on safety grounds (deficient sighting of approaching trains). This TTRO has been in place since December 2017.
- 5.4.2 The warning time (of approaching trains) with trains travelling at 90mph users required 462 metres of sighting of an approaching train to cross safely. The traverse distance over the crossing is 9.1 metres. At an average walking speed of 1.189m/s the time needed to cross in safety was 7.65 seconds (11.48 seconds for a vulnerable user) and the deficient sight lines gave only 5.27 seconds of warning.
- 5.4.3 The sighting deficiency of approaching trains is demonstrated in the photographs below, the photos are taken at the decision points. Currently the sighting is non-compliant when stood in the Up cess looking for an up-direction

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train and when stood in the Down cess looking for an up direction train with a required distance of 462m, the achievable is 240m.

Sighting - Up side, Up train approach



Sighting - Up side, Down train approach



Sighting - Down side, Up train approach



Sighting - Down side, Down train approach



- 5.4.4 The erection of the OHLE Stanchions will further restrict sighting of approaching trains should it reopen; the above images shaded in yellow show the impact of OHLE stanchions on the crossing sighting when installed.
- 5.4.5 Prior to its temporary closure Network Rail had undertaken an NRA for the Crossing as part of the ongoing risk assessment regime. The most recent NRA for the Crossing was dated 21/08/2017. As the crossing is currently closed, the score of the current risk assessment is M13 (0.0 FWI).
- 5.4.6 At the time of the previous risk assessment in 2017 before the crossing was closed, the risk score was C3 (0.00669795) There are 944 level crossings on the North & East Route and the Garforth Moor crossing is ranked number 29. However, if you compare this level crossing to other crossings of a similar type it was ranked 6 out of 288.

Reason for temporary closure

- 5.4.7 The footpath over the level crossing was predominantly used by dog walkers to access a larger footpath network and occupiers of the allotments to the north east of the level crossing. When the last census was undertaken prior to its

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temporary closure in April 2017 the crossing showed an average of 46 users per day with up to 65% of those considered 'vulnerable users' including the elderly, dog walkers and those encumbered. Specifically, there were several users clearly going to the allotments carrying equipment which could potential impede their visibility and/or be a distraction.

- 5.4.8 The crossing has limited sighting looking towards Garforth station. There is vegetation on either side of the crossing as the footpath approaches the operational railway corridor, but the curvature of the line is such that cutting it back further than what it is already would not alter the limited sighting.
- 5.4.9 The crossing is protected by whistle boards sited at 281m and 434m (for stopping and non-stopping trains) in the up direction and 371m for trains travelling in the down direction. Trains are instructed to sound horns on approach to the crossing to warn pedestrians. However, there is insufficient sighting for vulnerable users and the existing whistle boards are not positioned to provide enough warning for this use.
- 5.4.10 The whistle boards cannot be moved nearer to the crossing – they are situated at a distance designed to provide the optimum warning time to crossing users, which must be greater than the sighting distance, but not too far away for the sound to be lost. Relocation of the whistle boards will take them beyond the 400m maximum permitted distance under the whistle board guidance and ORR recommendation instruction.
- 5.4.11 The maximum line speed is 90mph in both directions. The crossing is passed by approximately 269 trains per day. 259 are passenger trains and are normally 80 metres in length and 10 are freight trains being approximately 300 metres in length (note this train count is pre-covid levels the current train count has not yet reached the pre-covid levels and stands at 233 trains). It is believed that the majority of these trains are scheduled during the hours of 06.00 and 23.59 although delays to trains means this is not guaranteed. This also doesn't account for other trains connected with maintenance and repairs of the railway which often run during the night. With the Transpennine Route Upgrade project it is inevitable that the crossing will be impacted by the following - increased number of trains, quieter trains.
- 5.4.12 As well as the limited sighting, the factors and the characteristic of the user group, informing this risk score at this crossing include:
 - (a) High frequency of train movements: high train frequency increases risk;
 - (b) Extremely high variation of train speeds approaching the crossing: Non-stop InterCity express trains travel at 90mph on the Up and Down Hull lines, trains stopping at Garforth Station will be significantly slower and will be accelerating or decreasing as they approach the crossing. This makes it very difficult for level crossing users to judge the speed and distant of approaching train. RSSB advise that people are not used to judging speeds of vehicles approaching them at 90mph and this can

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affect their perception of risk i.e. they may think they have more time to cross than they actually do;

- (c) Undulations and different track levels over a 9.1m traverse where users could be exposed to moving trains.

5.4.13 A 50% safety margin is added to the traverse time as the crossing was used by vulnerable users, identified at the time of the last risk assessment.

5.4.14 Another train coming; as the line is very heavily used and there is a mix of longer passenger trains, long freight trains and shorter passenger trains it is known that trains pass in the vicinity of the crossing. There is a significant risk that a crossing user's view of an approaching train can be obscured by a second train that has just passed over the crossing. This risk is increased due to the implementation of additional train services.

5.4.15 Environmental factors; the Crossings can be prone to fog at certain times of the year which significantly affects level crossing user's sighting of approaching trains, also it reduces the ability for train drivers (of approaching trains) to see pedestrians on the crossing and sound a warning. Also, fog can reduce the audibility of approaching trains.

5.4.16 Also, the Crossing can be affected by sun glare at certain times of the year which can reduce the ability for users to see approaching trains;

5.5 Garforth Moor - Census Details

5.5.1 A full camera census of the Crossing was carried out by the Level Crossing Manager upon the last risk assessment undertaken in 2017 and an estimated census count was inputted in the ALCRM risk assessment. The LCM reviewed the video footage from the 9-day census and verified the crossing was used infrequently and so an estimated census use was entered based on the adjoining activities (allotment and PRow).

5.5.2 The figure used was for 46 users per day, based on a previous ten-day census undertaken by surveillance Group Ltd between 14/04/17-23/04/2017.

5.5.3 The table below shows a daily average use taken from the census survey as carried out by Surveillance Group Ltd, which evidence use of the Crossing by the following user groups:

- Cyclists-0
- Horse riders 0
- Pedestrians-46
- Animal Herders-0

5.5.4 From the 2017 ten-day camera census some "vulnerable" or "encumbered" use was captured, as I have broadly described above.

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5.5.5 It is expected that levels of use reflect the census being conducted during the winter months and that usage might have been slightly higher, during the summer period.

5.6 Garforth Moor - Previous Incidents

5.6.1 Prior to its closure there had been 2 incidents in the previous five years, in 2006/7.

5.6.2 In recent years, user vigilance for their own safety and adherence to safe protocols has been considerably reduced by the vast increased use of mobile communications and other personal devices. The likelihood of users being distracted by mobile communications increased and, additionally, more people wearing earphones or headphones had also considerably increased, which reduced the effectiveness of audible warnings and distracts users from looking for approaching trains.

5.6.3 Moreover, mobile phones have camera and video functions which has greatly increased the temptation for some people to stop on the crossing deck and take photographs or video footage, seemingly oblivious to the obvious danger to their lives that these raises.

5.6.4 The use of headphones/earphones had also been identified as a concern. This has been noted by the RAIB in their reporting as being a contributing factor in fatalities at other pedestrian crossings which are similar to this Crossing.

5.7 Garforth Moor – OPTIONEERING

5.7.1 The table below shows the CBA and GDF on previous NRA options considered.

Option	Term	ALCRM risk score	ALCRM FWI	Cost	Benefit Cost Ratio	Status	Comments
Closure via extinguishment / Diversion	Long Term	M13	0	60K	CBA 10.3760 CBA+GD 25.94	RECOMMENDED	This option provides an intensively positive CBA and removes all unacceptable risk at the Crossing
Closure by stepped footbridge	Long Term	M13	0	2.5M	CBA 0.2490 CBA+GD 0.6226	REJECTED	This option does not pass a CBA. There is also insufficient room within NR's land holdings to allow for the construction of a bridge. Land and Planning constraints.
Closure by ramped footbridge	Long Term	M13	0	3.5M	CBA 0.1779 CBA+GD 0.447	REJECTED	This option does not pass a CBA. There is also insufficient room within NR's land holdings to allow for the construction of a bridge. Land and Planning constraints.
Implementing low-cost improvement	Short Term	C3	0.00669795	15K	CBA 0.3183 CBA+GD 0.7959	REJECTED	Implementing all feasible low-cost

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Option	Term	ALCRM risk score	ALCRM FWI	Cost	Benefit Cost Ratio	Status	Comments
s to the Level Crossing.							options will not reduce risk SFAIRP.
Installation of Supplementary Audible Warning Device (SAWD)	Short Term	C3	0.00669795	25K	CBA 0 CBA+GD 0	REJECTED	Does not pass CBA. Does not provide adequate mitigation. The whistle boards are not compliant and so cannot install Supplementary audible Warning Device (SAWD)
Installation of Overlay MSL	Long Term	C4	0.003641453	150K	CBA 0.5048 CBA+GD 1.2619	REJECTED	This option does not pass a CBA. Does not provide adequate mitigation (residual risk). Unable to install due to the proximity of the station
Installation of Integrated MSL	Long Term	C4	0.003641453	1.2M	CBA 0.0953 CBA+GD 0.2382	REJECTED	This option does not pass a CBA. Does not provide adequate mitigation (residual risk). Unable to install due to the proximity of station.

5.8 Garforth Moor - Conclusions

- 5.8.1 Closure of the Crossing is the only effective way to remove the already very high risk to public safety associated with this Crossing. The sighting is deficient and the installation of OHLE will make this even worse. The increase in the number of trains further adds to this risk.
- 5.8.2 As there is presently non-compliant sighting, dangerous incidents would be likely to occur by virtue of pedestrian use of the Crossing should it reopen. In addition to the risk from varying speeds of approaching trains, the increase in rail traffic also increases the risk of trains passing each other in the vicinity of the crossing. It is known that this already occurs here.
- 5.8.3 In my view, there is a clear safety case for its permanent closure. The risks imposed as part of the TRU electrification project and subsequent increase in trains and future aspiration to increase line speed mean that the crossing risk is increased to an unacceptable level. The Order will allow for this, as well as making provision for those who used it to access the allotments.
- 5.8.4 The increase in risk I have identified is due to the increase of train services by the TRU project, it does not take into account the additional risk imposed by sighting limitations that electrification imposes which would potentially raise the

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ALCRM scoring and FWI higher. The risk at Garfield Moor will increase and Network Rail has a statutory duty to mitigate this risk SFAIRP. Closure of the Crossing is the only effective way to remove the risk.

6 PECKFIELD BRIDLEWAY

6.1 Peckfield – Location

- 6.1.1 Peckfield Bridleway Level Crossing is located between East Garforth station (1 mile and 968 yards to the West) and Micklefield Station (550 yards to the East).
- 6.1.2 The Bridleway over the Crossing leads from an industrial area of Micklefield (Pit Lane) to the south and crosses the railway onto the Northerly Pit Lane, which gives access to open land and a sports field, continuing northwards where it links into Barwick Road.
- 6.1.3 Pit Lane to the North of the Crossing is flanked by residential properties, which border on to the railway boundary. A further extension of Pit Lane runs parallel with the southern boundary of the railway, leading from Great North Road to the East, passing the Crossing with the North/South section of Pit Lane and continues westward, leading towards the A63 to the west.
- 6.1.4 The figure 1 below, provides an aerial view of the Crossing. North is to the left of the picture



6.2 Peckfield – Physical Features of The Crossing

- 6.2.1 To the north of the Crossing the railway forms a long sweeping curve, and there are lineside obstructions that affect sighting of approaching trains, which means that the amount of sighting available at the Crossing is reduced in both directions.
- 6.2.2 As there is insufficient sighting distance available for Bridleway users to cross safely, telephones have been provided on both sides of the level crossing which are connected to the controlling Signal Box and equestrian users are instructed to contact the signaller for permission to cross. Permission would be refused if

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any train was approaching the crossing. The Crossing is equipped with hard rubber Strail decking with concrete infills between the panels.

- 6.2.3 The photographs below show the wicket gate arrangement located on Network Rail's lineside boundary fence on the North and South approaches to the Crossing.



- 6.2.4 There are no sources of lighting present at the Crossing however, due to the proximity to residential properties on the Downside, and street lighting on Pit Lane on the Upside, depending on the time of year and the amount of tree/vegetation coverage, it is possible that a low level of ambient lighting could reach the Crossing.

6.3 PECKFIELD - RISK ASSESSMENT

- 6.3.1 Sighting of approaching trains from the Decision Point is restricted at this crossing, as is shown in the photographs below:

Sighting - Up side, Up train approach



Sighting - Up side, Down train approach



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Sighting -Down side, Up train approach



Sighting - Down side, Down train approach



- 6.3.2 The above images shows the impact of OHLE on sighting, the yellow shaded area shows the position of OHLE stanchions once they have been installed.
- 6.3.3 The sighting distance is compliant for pedestrian users stood at the decision point of 2m. the sighting for Equestrian users at 3m is deficient and so telephones are installed for these users.
- 6.3.4 Peckfield Level Crossing, in its existing arrangement, has had 8 instances of telephone failures between 2008-2018.
- 6.3.5 The close proximity to Micklefield Station means that trains stopping at the Station will be approaching the Crossing either accelerating or decelerating. Other express trains that do not stop will be travelling at line speed. This introduces the risk from variation in speed of approaching trains.

6.4 Peckfield – Level Crossing Risk

- 6.4.1 Network Rail has undertaken an NRA for the Crossing as part of the ongoing risk assessment regime. The up-to-date NRA for the Crossings is dated 30/03/22
- 6.4.2 A new risk assessment was undertaken on 13/06/22 and this assessment is in the process of having the NRA produced and going to the optioneering panel.
- 6.4.3 The ALCRM score of the current risk assessment is B3 (0.009342638 FWI). At present, there are 944 level crossings on the North & East Route. Out of this figure Peckfield crossing is ranked number 24. However, if you compare this level crossing to other crossings of a similar type it is ranked 5 out of 288. Putting the crossing in high risk category. These figures are subject to change, as I have explained above.
- 6.4.4 Factors, other than the characteristic of the user group, informing this risk score that has been assessed at this Crossing include:
 - High frequency of train movements: high train frequency increases risk.
 - Extremely high line speed: At 90mph on the Up and Down Hull lines.
 - Long level crossing traverse where users could be exposed to moving trains: with two running lines the crossing distance is 10.4 metres from

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the decision point to 2m past the furthest running rail (position of safety) to cross the railway. For equestrian users of the crossing decision points are based on 3m decision point to 2m past furthest running rail and so would have to traverse a distance of 11.4m. Though these users are required to telephone for permission to cross.

- Relatively high level of public use; the Crossing has an average of 51 users per day. The risk of accident at a level crossing increases significantly with a higher level of use.
- Limited sighting for trains travelling in the up direction.; this is due to track curvature.
- Mixed traffic: there are high speed passenger trains, lower speed passenger trains, freight services and engineering trains that use this line and they can approach the crossing at different speeds ranging from a maximum of 90mph down to much lower speed for stopping trains that are either stopping for or departing Micklefield station. This makes it very difficult for level crossing users to judge the speed and distant of approaching train. Also note that people are not used to judging speeds of vehicles approaching them at 90mph and this can affect their perception of risk i.e., they may think they have more time to cross than they actually do.
- Another train coming; as the line is very heavily used and there is a mix of longer passenger trains, long freight trains and shorter passenger trains there is a significant risk that a level crossing user's view of an approaching train could be obscured by a second train that has just passed over the crossing. With the TRU project increasing the capacity of the line, this is more likely to occur.
- Environmental factors: the Crossing can be prone to fog at certain times of the year which significantly affects level crossing user's sighting of approaching trains, also it reduces the ability for train drivers (of approaching trains) to see pedestrians on the crossing and sound a warning. Also, fog can reduce the audibility of approaching trains. Also, the Crossing can be affected by sun glare at certain times of the year which can reduce the ability for users to see approaching trains.
- Deliberate misuse and accidental human error; significant history thereof, including near misses and incidents with youths and children.

6.5 Peckfield – Census Details

6.5.1 The most recent census at the Crossing was carried out by MHC Traffic between 28th February 2023 and 6th March 2023.

6.5.2 A full camera census of the Crossing was carried out MHC Traffic and the average was taken for the ALCRM risk assessment. The North and East Route

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level crossing team reviewed the video footage from the 7-day census and verified the categorisations made by.

6.5.3 The census captured an average use of 50 users per day. Although there are days in which this figure is exceeded, for example Wednesday 1st March and Sunday 5th March 5th when there were 56 and 81 users respectively.

6.5.4 The table below is taken from the 7 days census survey carried out by MHC Traffic which recorded use of the Crossing by the following user groups:

- Pedestrians
- Cyclists

6.5.5 As part of the census an origin/destination survey was undertaken. The pedestrian usage was seen to be dog walkers, walkers, pedestrians visiting shops, pedestrians visiting work, pedestrians. No equestrian use was recorded.

6.5.6 In the MHC Traffic report, the users were seen to be regular users of the crossing local to the area, and some long-distance walkers.

Day of Week	Pedestrians	Cyclists	Equestrians	Other	All
Monday	42	0	0	0	42
Tuesday	49	0	0	0	49
Wednesday	54	2	0	0	56
Thursday	38	0	0	0	38
Friday	44	1	0	0	45
Saturday	39	0	0	0	39

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Day of Week	Pedestrians	Cyclists	Equestrians	Other	All
Sunday	79	2	0	0	81
Total Days	345	5	0	0	350

6.5.7 Previously a 9-day census was undertaken by Tracsis from 04/12/2021 to 12/12/2021. This census was a more in-depth census. It is expected that levels of use reflect the census being conducted during the winter months and that usage might be slightly summer period.

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6.5.8 The figures from this census are below: -

Direction: Combined											
Adults	Accompanied Children	Accompanied Children in Pram/Pushchair	Unaccompanied Children	Elderly	Impaired	Wheelchair	Mobility Scooter	Pedestrian Utilising Bicycles	Railway Personnel	Equestrians	Total
16	0	0	0	0	0	0	0	0	0	0	16
36	8	0	1	0	0	0	0	2	4	0	51
14	0	0	0	0	0	0	0	0	2	0	16
13	0	0	0	0	0	0	0	1	4	0	18
21	0	0	0	3	0	0	0	0	15	0	39
30	0	0	0	1	0	0	0	0	0	0	31
25	1	0	0	0	0	0	0	0	2	0	28
55	1	0	0	3	0	0	0	2	4	0	65
50	1	0	0	4	0	0	0	2	6	0	63
260	11	0	1	11	0	0	0	7	37	0	327

6.5.9 From the 9-day camera census the following “vulnerable” and “encumbered” use was captured:

- 11 accompanied children/ 0 unaccompanied children – Although none were recorded during this census, unaccompanied children have been shown to be vulnerable and susceptible to distraction (or distracted by virtue of a mobile phone, headphones, or headgear) and unintentional errors when using level crossings. They can also be prone to misusing level crossings, often without realising the danger they place themselves in playing games such as “chicken”.
- 11 “elderly” people – older members of the population have been shown to be more likely to suffer mobility, eyesight and hearing difficulties which reduces the effectiveness of warnings provided at the Crossing and hearing approaching trains and are therefore categorised as vulnerable.
- 7 adults pushing bikes - these users are more likely to focus on their bikes/scooter rather than looking out for trains. For those riding over the crossing there is the additional risk of them falling off their bicycles. As this is a footpath level crossing, people are not permitted to cycle over the Crossing or to push bicycles over it. Even at crossings where there is a right for users to cycle on the public right of way, users should always dismount and then push their bicycles for safety purposes.

6.6 Peckfield – Previous Incidents

6.6.1 A review of the incident data files from April 2014 to the date of this assessment shows that there have been seven reports of near miss incidents with pedestrian users at the crossing recorded in Network Rail’s files.

6.6.2 The latest incident reported was on 20/11/2021 12:40 which was a driver reporting a near miss at Peckfield with three adults, smartly dressed, approx. 50yrs old. When the driver whistled, they looked up but showed no urgency to leave the crossing, so the emergency brake was applied.

6.6.3 Telephone misuse has also been reported by the signallers who report that children make nuisance calls from the crossing.

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6.6.4 In recent years user vigilance for their own safety and adherence to safe protocols has been considerably reduced by the vast increased use of mobile communications and other personal devices. The likelihood of users being distracted by mobile communications has increased and, additionally, the likelihood of people wearing earphones or headphones has also considerably increased which reduces the effectiveness of audible warnings. Moreover, mobile phones have camera and video functions which has greatly increased the temptation for some people to take photographs or video footage in dangerous locations, such as level crossings. The use of headphones/earphones has been identified as a concern within a number of risk assessments and has been noted by the RAIB in their reporting as being a contributing factor in fatalities at other pedestrian crossings similar to the Crossing.

6.7 Peckfield – OPTIONEERING

6.7.1 The table below shows the CBA and GDF on previous NRA options considered.

Option	Term	ALCRM risk score	ALCRM FWI	Cost	Benefit Cost Ratio	Status	Comments
Closure via extinguishment / Diversion	Long Term	M13	0	60k	CBA 11.6189 CBA+GD 29.042	RECOMMENDED	This option provides an intensively positive CBA and removes all unacceptable risk at the Crossing
Closure by stepped footbridge	Long Term	M13	0	2.5M	CBA 0.2789 CBA+GD 0.6971	REJECTED	This option does not pass a CBA. There is also insufficient room within NR's land holdings to allow for the construction of a bridge. Land and Planning constraints.
Closure by ramped footbridge	Long Term	M13	0	6M	CBA 0.1162 CBA+GD 0.2905	REJECTED	This option does not pass a CBA. There is also insufficient room within NR's land holdings to allow for the construction of a bridge. Land and Planning constraints.
Implementing low-cost improvements to the Level Crossing.	Short Term	B3	0.008144742	15K	CBA 0.4007 CBA+GD 1.0019	REJECTED	Implementing all feasible low-cost options will not reduce risk SFAIRP.
Installation of Overlay MSL	Long Term	C4	0.002078772	150K	CBA 1.0583 CBA+GD 2.6457	REJECTED	This option does not pass a CBA. Does not provide adequate mitigation (residual risk). Unable to install due to proximity of rail junctions and station nearby.

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Option	Term	ALCRM risk score	ALCRM FWI	Cost	Benefit Cost Ratio	Status	Comments
Installation of Integrated MSL	Long Term	C4	0.002078772	1.2M	CBA 0.1582 CBA+GD 0.3957	REJECTED	This option does not pass a CBA. Does not provide adequate mitigation (residual risk). Unable to install due to proximity of rail junctions and station nearby.

6.8 Peckfield – Conclusions

- 6.8.1 Although there is presently compliant sighting for pedestrian users and telephones in place to mitigate risk (due to non-compliant sighting) for equestrian users, dangerous incidents still occur by virtue of pedestrian use of the Crossing, and people disregarding the approach of trains or being distracted and failing to observe approaching trains.
- 6.8.2 The crossing already has a busy train service of 233 trains per day, this will increase in the upcoming years with scheduled timetable changes and the introduction of additional services as part of the TRU project which this Order is intended to facilitate. The Crossing experiences a relatively high level of pedestrian use (of approx.50 users per day). There is also a high level of use by “vulnerable” users, particularly dog walkers.
- 6.8.3 Another train coming risk is heightened due to the increase in services; the electrification of the line will significantly impact on the sighting of approaching trains, as well as introducing electric trains onto the network which are significantly quieter than other trains and may not be heard.
- 6.8.4 The Crossing has exhibited an incident of misuse and there have been a high number of historic near misses (by example only) where a train driver has had to apply their emergency brakes to avoid striking a pedestrian on the crossing.
- 6.8.5 In my opinion given the proposed TRU increase in train services and subsequent electrification, that there is a clear safety case for closing this level crossing. The risk at Peckfield will increase and Network Rail has a statutory duty to mitigate this risk SFAIRP. Closure of the Crossing is the only effective way to remove it.

6.9 Peckfield - Objections

- 6.9.1 I have addressed the objections below which relate to Level Crossing Safety.
- 6.9.2 **OBJ 10 (D Brown):** Developments have occurred in and around Micklefield village in the recent past. The impact of such developments is recognised. Developments such as this need to be considered as they can impact significantly on the surrounding PROW and level crossings. It is recognised that the PROW are used frequently and recognition on impacts on the users are considered and the need for alternative route when required so as to not

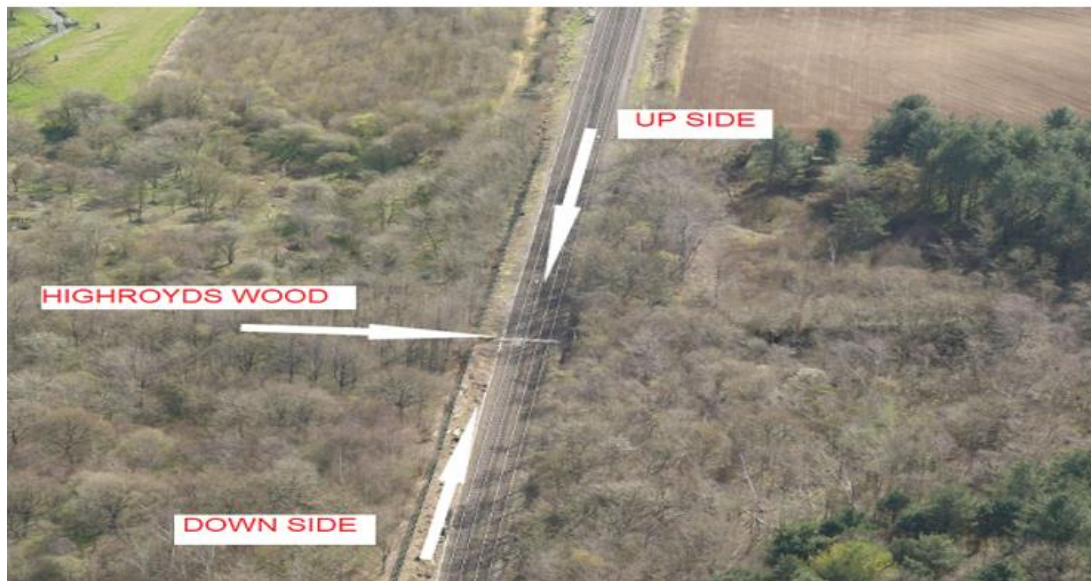
prevent access restriction. There are 2 alternative options suggested to ensure that access is still maintained.

- 6.9.3 **OBJ 12 (Todd):** The crossing would/will be subject to an increase in use as part of the developments close to the crossing. This impact is considered and the risks that this imposes on the crossing become greater, obviously due to the increase in vulnerable users as mentioned (Children, Dog walkers, irregular users etc.) that heightened risk needs to be managed sufficiently to ensure the safety of the public. Given the options available, the closure of the crossing eliminates all this risk and the need for an alternative route to cross the railway is preferred.
- 6.9.4 **OBJ 18 (Galley):** Suggestion there isn't a safety case for closing the crossing due to e.g. train speeds – The safety case for closing the crossing / justification for closing the crossing on safety grounds is set out in paras 6.4-6.6 and 6.8 of my proof.
- 6.9.5 **OBJ 10,12,13,14,16:** Reliance is placed on new houses being built / having been built / likely to be built reference to.
- 6.9.6 Picking up on the point as discussed in paragraph 2.2 of this proof, Network Rail should be consulted on all future developments and assess such developments impact on the use of level crossing and consequently the further risks imposed by such developments. There is a cause for concern as more houses results in more crossing users/most users likely to increase the vulnerability of crossing users whether that be by children/elderly/mobility impaired or even the unfamiliarity of the railway and safe level crossing use. The risk factors are increased and is something Network Rail would have to mitigate to ensure risk is managed SFAIRP at the location. The increase in users and factors that this brings, are drivers for further closings of the Level crossing and finding a different way for users to cross the railway.

7 HIGHROYDS WOOD

7.1 Highroyds Wood – Location

- 7.1.1 The Crossing, which carries a public footpath, is located in the middle of Highroyds Wood. The crossing provides an access from one side of Highroyds Wood to the other. It is located to the east of Micklefield in West Yorkshire. The environment surrounding the footpath has dense vegetation.
- 7.1.2 Micklefield Station is 880 yards to the West of the crossing. South Milford station is 2 miles 1144 yards to the East of the Crossing. The footpath connects several other footpaths in the local PRoW network, both to the North and South of the railway.
- 7.1.3 Figure 2 railway layout at Highroyds wood Footpath



7.2 Highroyds Wood – Rail Operations

- 7.2.1 The railway lines running over the Crossing are operational and in 24-hour use. A train count has been taken for the latest risk assessment. A very high frequency of passenger services approx.60 daily will operate throughout the day travelling up to a maximum speed of 90 mph. There were also 3 freight trains that passed over the Crossing on average daily. This train count will be increased by the TRU project.
- 7.2.2 In addition to the train service outlined above, it can also become necessary to run more trains over the Crossing due to operational reasons for instance due to trains being diverted if there are problems on other lines of route.
- 7.2.3 Engineering trains and track recording trains (such as the New Measurement Train (NMT)) are also known to use this line. These are short in train length, not timetabled and run at various, ad hoc times during the day. Various on-track machinery and plant can run over the Crossing during railway engineering works that are being carried out on the network. Network Rail's maintenance regime along this line regularly sees weekend or mid-weeknight engineering trains pass. These operate during periods where they will not affect the running of passenger trains and will therefore be unexpected to users of the Crossing.
- 7.2.4 Passenger trains over the Crossing range from two to six carriages in length, which vary from 40 metres up to 240 metres long.

7.3 Highroyds Wood - Physical Features of The Crossing

- 7.3.1 The level crossing is a passive crossing and had no means of warning a user of an approaching train other than the standard 'stop, look, listen' signs that were positioned at the decision points. The approaches to the crossing are unmade and previously lead to wicket gates positioned within the railway boundary. These were removed and replaced with palisade fencing when it was temporarily closed under a TTRO on safety grounds in December 2021. The

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photographs in Figure 10 below, show the crossing closed out of use to prevent unauthorised access.

7.3.2 Photographs of the fencing to Footpath level crossing



7.3.3 The Crossing decking is of wooden ACME panel type.



7.4 Highroyds Wood - LEVEL CROSSING RISK

The crossing was closed under Health & Safety reasons in December 2021 after it was observed that longer trains stopped at a nearby signal meant the train stood over the level crossing or stood very near to the level crossing. It is currently fenced out of use to prevent public access. A further extension of the TTRO has been requested.

7.5 Highroyds Wood - RISK ASSESSMENT

7.5.1 Network Rail has undertaken an NRA for the Crossing as part of the ongoing risk assessment regime. The most recent NRA for the Crossing is dated 27/07/2021. The ALCRM score of the current risk assessment is M13 (0.0 FWI), this is because the crossing is temporarily closed.

7.5.2 At the time of the risk assessment in 2021 (prior to the Crossing's closure) the risk score was C5 (FWI 0.000810001)

Reasons for temporary closure

- 7.5.3 A covert camera was set up for 17 days between (24th September and 11 October 2021) and identified a large number of trains standing on the crossing itself or severely blocking sighting by standing a few metres from the crossing itself.
- 7.5.4 This is because this line gives way to trains travelling on the CFM (Church Fenton to Micklefield) line going into Micklefield Station, and trains can be stopped at a signal on the HUL3 line (South Milford to Micklefield) until they are given permission to join the CFM line. The frequency of this event varies daily due to the different types of trains and the number of units – for example, Northern Trains run two/three and four-unit trains and TransPennine Express run three- and six-unit trains. In addition, freight trains also run on this line which at circa 350m have a much greater length than passenger trains. It is often the case that trains will stop on the crossing, obstructing the right of way when waiting for signals to change and gaining permission to proceed.
- 7.5.5 On some occasions trains have been captured stopping just before or just after the crossing blocking the view of trains. Because of varying train lengths and the uncertainty surrounding the point at which different train drivers decide to apply the brake for stopping at a signal, it is difficult to predict whether trains will stop on the crossing and prevent use or whether they will stop just before it or just after it.
- 7.5.6 Information from the signaller indicates that for the Up line (towards Micklefield Station) if a train were to be travelling at maximum line speed (90 mph) it should take approximately 8.3 seconds for the train to pass over the points either side of the crossing. Obviously for trains travelling at lower speeds this time will increase, but for 94% of trains, records show travelling this distance is actually taking 260 seconds. The longest occupation between points (where the crossing is) is 12 minutes. On the Down side (towards South Milford) it should take approximately 27 seconds for a train to travel past the points either side of the crossing (allowing for some acceleration out of Micklefield Station), but for 94% of trains this takes 48 seconds, with the longest occupation between the points (where the crossing is) being 3 minutes. This means trains in both directions are spending significant amounts of time stood at, or on the crossing, blocking the crossing or restricting sighting either completely or partially.
- 7.5.7 With trains either blocking the crossing or the sighting in a particular direction, a person could be hit by a train. Human behaviour factors similar to a car blocking a pedestrian crossing on a road may encourage users to walk onto the track, around the train and then back down the track to the crossing. The likelihood of a train stopping over or in the vicinity of the crossing and blocking the view is considerably higher than most other crossings on the network and in turn, this increases the likelihood that a pedestrian may choose to walk around the train.

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- 7.5.8 The level crossing carries a public footpath and were it not for the misuse and trains stopping on the crossing, it would be considered by Network Rail to be compliant. The covert camera referenced above captured a large number of motorbikes and bicycles using the woods as a motor cross type trail and using the crossing (both on and off bikes) as a means of access between the two sections of woodland on a daily basis: with an increase in this type of usage over the weekend.
- 7.5.9 This misuse pose serious safety concerns namely the mitigation of risk is not set up for higher rights- as the status is recorded as a public footpath only.
- 7.5.10 Restricted sighting of approaching trains at the crossing when stood at the Decision point on the up side is demonstrated in the photographs below. The images and yellow shaded areas also demonstrate the impact of OHLE stanchions when installed.
- 7.5.11 Sighting is non-compliant when stood in the up cess looking for Down direction trains. The sighting is obstructed further when trains are stood close to the crossing.

Sighting - Up side, Up train approach



Sighting - Up side, Down train approach



- 7.5.12 There are no sources of lighting present at the Crossing the 'Stop, Look, Listen' signage would only be seen via an independent light source such as a torch.
- 7.5.13 Additional factors and the characteristic of the user group, informing the risk score for the Crossing included:
- (a) High frequency of train movements: high train frequency increases risk;
 - (b) Extremely high line speed: At 90mph on the Up and Down Hull lines.
- 7.5.14 Undulations and different track levels over a 9m traverse where users could be exposed to moving trains:
- (a) Limited sighting for trains in Down direction; this is due to track curvature.
 - (b) Installation of OHLE with further reduce sighting.
 - (c) Freight trains straddling the level crossing for extended periods.
 - (d) Shorter passenger trains obscuring sighting of oncoming trains in the other direction.
 - (e) Mixed traffic at varying speeds: there are both high and low speed passenger trains, freight services and engineering trains that use this

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line and they can approach the crossing at different speeds up to a maximum of the Station will also be accelerating or decelerating when traversing the Crossing. This collectively makes it very difficult for level crossing users to judge the speed and distance of approaching trains.

7.5.15 Further, with the close proximity of the junction for the York Line and the Hull Line. this can also effect train movements. As I have set out above, at regular instances the train must stop in the westerly direction (up direction) at a protecting signal due to rail traffic entering onto the HUL4 line via the CFM line. When held at this signal this means that the longer (freight) trains will stand over the public footpath crossing. The straddling of trains over the crossing increases risk of pedestrians:

- (a) walking down the railway for over 500m to pass around the stationary train, which is criminal trespass that could result in a fatal incident by stepping out into the path of a train approaching on the opposite line.
- (b) attempting to climb through the carriages whilst the train is stationary, raising the risk of a fatal incident should the train start to move off
- (c) attempting to climb over the carriages, again raising the risk of a fatal incident should the train start to move off.

7.5.16 Another train coming; as the line is very heavily used and there is a mix of longer passenger trains, long freight trains and shorter passenger trains there is a significant risk that a level crossing user's view of an approaching train could be obscured by a second train that has just passed over the crossing. This risk is increased due to the electrification project as train capacity is increased.

7.5.17 Environmental factors; the Crossings can be prone to fog at certain times of the year which significantly affects level crossing user's sighting of approaching trains, also it reduces the ability for train drivers (of approaching trains) to see pedestrians on the crossing and sound a warning. Also, fog can reduce the audibility of approaching trains. Also, the Crossing can be affected by sun glare at certain times of the year which can reduce the ability for users to see approaching trains.

7.6 Highroyds Wood - Census Details

7.6.1 A full 9-day camera census of the Crossing was carried out by the Level Crossing Manager using a wildlife camera positioned at the crossing for census purposes on 02/10/2021-11/10/2021.

7.6.2 The Level Crossing Manager reviewed the video footage from the camera and verified the crossing was infrequently used, and so and an average 24hr crossing usage of 23 users was taken from the results. The results of the average day were used for this assessment as it provided a truer picture of the crossings use than a quick census would.

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7.6.3 The table below shows a daily average use taken from the ten-day census survey carried out by the LCM which evidence use of the Crossing by the following user groups:

- Cyclists-7
- Horse riders 0
- Pedestrians-16
- Animal Herders-0

7.6.4 It is expected that levels of use reflect the census being conducted during the winter months and that usage might have been slightly higher during the summer period.

7.7 Highroyds Wood – Previous Incidents

7.7.1 Prior to its closure there had been 2 near miss incidents within five weeks, in the previous 12 months.

7.8 Highroyds Wood – Optioneering

7.8.1 The table below shows the CBA and GDF on previous NRA options considered.

Option	Term	ALCRM risk score	ALCRM FWI	Cost	Benefit Cost Ratio	Status	Comments
Closure via extinguishment / Diversion	Long Term	M13	0	60K	CBA 5.8736 CBA+GD 14.6840	RECOMMENDED	This option provides an intensively positive CBA and removes all unacceptable risk at the Crossing
Closure by stepped footbridge	Long Term	M13	0	2.5M	CBA 0.1410 CBA+GD 0.3524	REJECTED	This option does not pass a CBA. There is also insufficient room within NR's land holdings to allow for the construction of a bridge. Land and Planning constraints.
Closure by ramped footbridge	Long Term	M13	0	3.5M	CBA 0.1007 CBA+GD 0.2517	REJECTED	This option does not pass a CBA. There is also insufficient room within NR's land holdings to allow for the construction of a bridge. Land and Planning constraints.
Implementing low-cost improvements to the Level Crossing.	Short Term	C5	0.000804929	15K	CBA 0.5937 CBA+GD 1.4842	REJECTED	Implementing all feasible low-cost options will not reduce risk SFAIRP.

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Option	Term	ALCRM risk score	ALCRM FWI	Cost	Benefit Cost Ratio	Status	Comments
Installation of SAWD	Short Term	C5	0.000784641	25K	CBA 0 CBA+GD 0	REJECTED	Does not pass CBA. Does not provide adequate mitigation (residual risk).
Installation of Overlay MSL	Long Term	D5	0.000580573	150K	CBA 0.2082 CBA+GD 0.5205	REJECTED	This option does not pass a CBA. Does not provide adequate mitigation (residual risk). Unable to install due to rail junctions within the strike in
Installation of Integrated MSL	Long Term	D5	0.000580573	1.2M	CBA 0.0391 CBA+GD 0.0978	REJECTED	This option does not pass a CBA. Does not provide adequate mitigation (residual risk). Unable to install due to rail junctions within strike in.

7.9 Highroyds Wood – Conclusions

- 7.9.1 With the risk of trains standing over the crossing the risk becomes unacceptable and needs to be managed to SFAIRP for Network Rail to comply with its statutory duties under s3 of the Health and Safety at Work etc Act 1974.
- 7.9.2 The cost of relocating the signal would be unacceptably high (so cannot be justified) and there may not be another suitable site to relocate the signal that would give the necessary sighting to see the signal and safely stop before it when travelling at 90mph, should it be displaying a red aspect. Similarly, the cost of a pedestrian bridge at the location is not justified.
- 7.9.3 The evidence shows there is a clear safety case for permanently closing this level crossing, being the only effective way to remove the risk.

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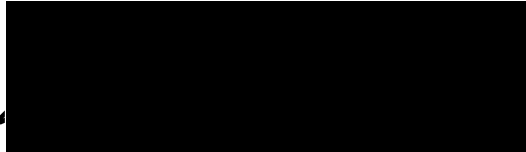
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Witness Declaration

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 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.

Signed:

A black rectangular box redacting the signature of Andrew Cunningham.

Andrew Cunningham
Route Level Crossing Manager, Network Rail
2 February 2024