PROTECTED LEVEL CROSSING RISK ASSESSMENT

1. LEVEL CROSSING OVERVIEW AND ENVIRONMENT

1.1 LEVEL CROSSING OVERVIEW

This is a risk assessment for Dullingham MGH level crossing.

Crossing Details	
Name	Dullingham MGH
Type	MGH
Crossing status	Public Highway
Overall crossing status	Open
Route name	ANGLIA
Engineers Line Reference	CCH – 10m 56ch
OS grid reference	TL618585
Number of lines crossed	2
Line speed (mph)	60
Electrification	No electrification present
Signal box	Dullingham

Risk Assessment Details	
Name of assessor	Brendan Lister
Post	Level Crossing Manager
Date completed	14-07-2021
Next due date	12-10-2024
Email address	brendan.lister@networkrail.co.uk
Phone number	07973524610

ALCRM Risk Score	
Risk per traverse risk	K
Collective risk	7
FWI	0.000064368

1.2 INFORMATION SOURCES

The table below shows the stakeholder consultation that was undertaken as part of the risk assessment.

Consulted	Attended site
Signaller	Yes

Stakeholder consultation and attendance notes:

Talked to the signaller whilst on site

The reference sources used during the risk assessment included:

- Census Counter
- Geo-RINM
- SMIS
- Other Data Sources: TRUST for train information, Sectional Appendix, DST

1.3 ENVIRONMENT

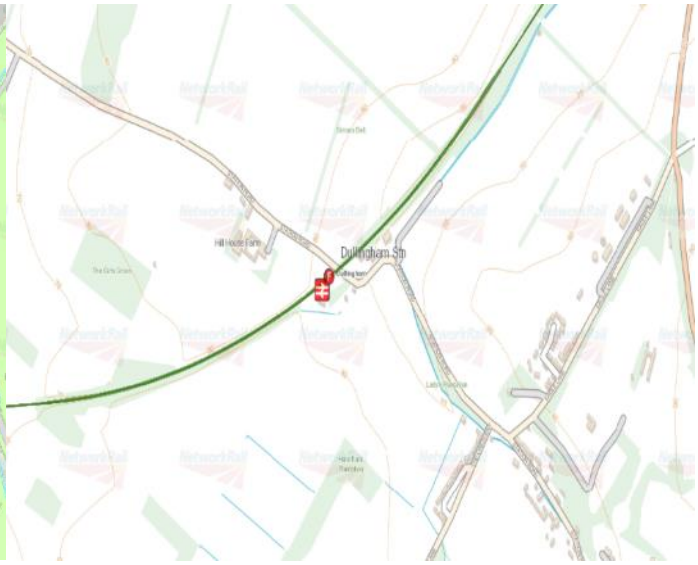
Approach Photos	
	
Up side crossing approach	Down side crossing approach

The level crossing is located on High St Dullingham. The road approach speed is estimated to be 30 to 40mph.

It is a Public Highway level crossing which is a principal access route for users travelling to a nearby station or ticket machine.

There are no planned or apparent developments near the crossing which may lead to a change or increase in use or risk.

Crossing Location



Surrounding Area

LOR	Seq.	Line of Route Description	ELR	Route	Last Updated
EA1530	002	Coldham Lane Jn to Haughley Jn	CCH	Anglia	19/11/2016

Location	Mileage M Ch	Running lines & speed restrictions	Signalling & Remarks
		U&D 60	TCB Cambridge SB (CA) RA8 GSM-R
Fulbourn LC (AHBC)	4 36		
Home Farm LC (FPS)	5 31		
Hicks LC (UWC)	5 38		
Six Mile Bottom LC (AHBC)	7 65	UP	
Brinkley Road LC (AHBC)	7 78		
Cassells LC (FPG)	8 05		
Westley Road LC (R/G) (UWC)	8 74	T DOWN	
Single line	10 07	UP SINGLE DOWN 40 60	Up platform - 94m (102 yds) Down platform - 103m (111 yds)
DULLINGHAM Dullingham (DH) SB Dullingham LC (MCG)	10 54 10 54 10 56	T	TB Dullingham SB (DH)
Single line	11 09	30 60 U&D	

Sectional Appendix

Ariel view

Site Visit General Observations:

There is a small housing development approx. 200m from the crossing on the downside approach.
At this crossing there are no road lights (Wigwags).

Sun Glare

At Dullingham MGH level crossing the orientation of the road/path from the north is 243°; the orientation of the railway from the north to the up line in the up direction is 140°.

Impact of low sun on the crossing

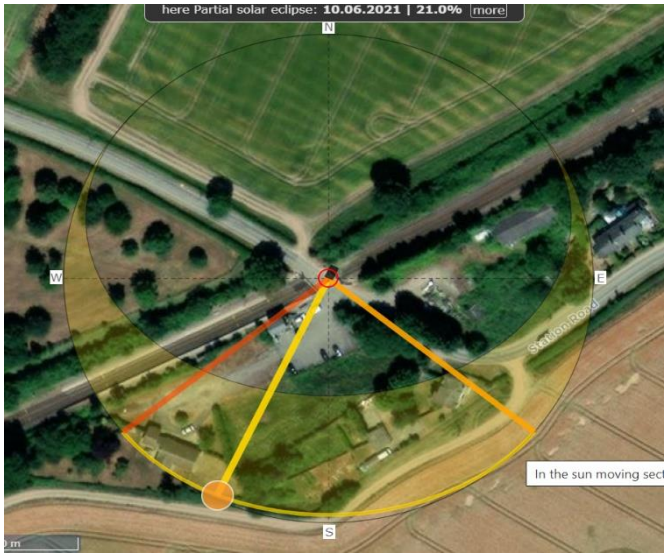
Below is the output from the SunCalc application, which shows the lines of sunrise and sunset angles at two times of year (longest day June 21st & shortest day December 21st) when low sun would align with the rail approaches and might impact on the sighting. Sun Glare is considered to be a residual risk here.

The thin orange curve is the current sun trajectory, and the yellow area around is the variation of sun trajectories during the year. The closer a point is to the centre, the higher is the sun above the horizon.

The yellow line shows the direction of sunrise; the dark orange line the direction of sunset and the mid orange line the direction at a selected time of day (shown by the orange circle above the satellite image).

There could be an issue with sun glare approaching from the south of the crossing during the summer months but this would only be for a short amount of time due to the topography of the land and vegetation around the crossing

Longest day = June 21



Shortest day = December 21

2. LEVEL CROSSING USAGE

2.1 RAIL

The train service over Dullingham MGH level crossing consists of Passenger trains. There are 34 trains per day. The highest permissible line speed of trains is 60 mph. Trains are timetabled to run for 17 hours per day.

Assessor's notes:

The train service consists of both stoppers and non-stoppers at the station.

2.2 USER CENSUS DATA

A 24-hour census was carried out on 24-04-2013 by Count on us. The census applies to 100% of the year.

The census taken on the day is as follows:

Cars / car-based vans / quad bikes	653
Large vans / small lorries / large 4x4s	90
Buses / coaches	0
HGVs	34
Tractors / large farm vehicles	5
Pedal / motor cyclists	62
Pedestrians	96
Horse riders	0
Animal herders	0

Assessor's general census notes:

the census is a weekday average of a 9-day census

Available information indicates that the crossing does not have a high proportion of vulnerable users.

Vulnerable user observations:

Even though this crossing is at a station, I would not consider a higher-than-average vulnerable use

Available information indicates that the crossing does not have a high number of irregular users.

Irregular user observations:

None recorded but cannot be discounted completely

2.3 USER CENSUS RESULTS

ALCRM calculates the usage of the crossing to be 782 road vehicles and 158 pedestrians and cyclists per day.

Notes on daily, annual, seasonal usage:

The daily use is constant and would not increase seasonally.

3. RISK OF USE

3.1 CROSSING APPROACHES

The road approach speed for vehicles on the upside of the crossing is 30 to 40mph and the approach speed on the downside of the crossing is 30 to 40mph.

One of the approach roads to Dullingham MGH level crossing is assessed as being long and straight. There are prominent features on the approach to the level crossing that could distract drivers.

Site visit observations:

The upside approach has a sharp bend in the road, followed by the access to the station car park. There is a field access on the downside approach approx. 10m from the crossing

The road surface, including gradient if present, is unlikely to impact on the ability of a vehicle to stop behind the stop line.

There are known issues with ice, mud, loose material or flood water. In addition, there are known issues with foliage or fog.

Assessor's notes:

Fog at certain times of year. Due to the profile of the road and surrounding area soil and stones are washed onto the crossing surface when it rains heavily.

At the estimated road speed, the visibility of level crossing signage and equipment on the upside is easily sufficient - a vehicle would have surplus time to react if the crossing is activated

At the estimated road speed, the visibility of level crossing signage and equipment on the downside is easily sufficient - a vehicle would have surplus time to react if the crossing is activated

3.2 AT THE CROSSING – GROUNDING RISK

The visual evaluation of the vertical profile of the road indicates that it does create a risk of vehicles grounding on the crossing.

Risk of grounding signs have been provided at the crossing.

Assessor's notes:

The crossing is on a slope, with the crossing being a flat area and slopes either side

3.3 AT THE CROSSING – BLOCKING BACK

Assessor's notes:

The upside approach has a sharp bend in the road, followed by the access to the station car park. There is a field access on the downside approach approx. 10m from the crossing.

Blocking back is never known to occur at this crossing

3.4 AT THE CROSSING – ANOTHER TRAIN COMING RISK

Trains rarely pass each other at this crossing.

Assessor's another train coming notes:

It is possible at this crossing as occasionally trains pass at the station due to the down loop.

3.5 INCIDENT HISTORY

A level crossing safety event has been known to occur at Dullingham MGH level crossing in the last twelve months.

Assessor's incident history notes:

22/11/2020 09:14 LC Misuse - Youth jumped the LC gates at Dullingham LC after a platform alteration announcement

Red light violations / barrier weaving

The chance of a vehicle user deliberately misusing the crossing is estimated as Significantly lower than average.

Measures have been taken to mitigate deliberate misuse.

Assessor's incorrect use notes:

At this crossing there are no road lights (Wigwags).

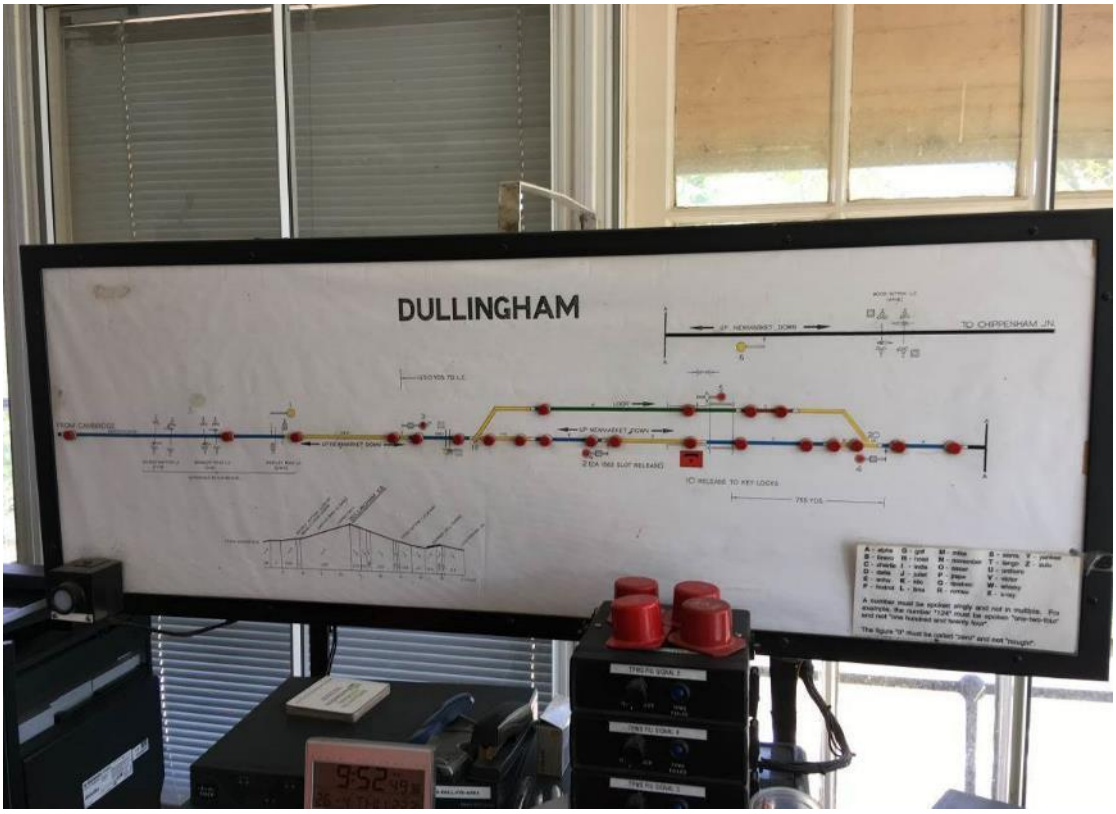
3.6 THE CROSSING – STRIKE IN TIMES

Strike in times

	Designed strike in time	Does the observed strike in time conform to the designed strike in time?	Is the observed barrier down time excessive?
Up line	120	Yes	No
Down line	120	Yes	No

Assessor's notes and observations on strike in times:

There are gates operated by the signaller at this crossing and they will close the gates to allow smooth passage of trains



Dullingham signal box panel

4. ALCRM CALCULATED RISK

Dullingham MGH level crossing ALCRM results.

Key risk drivers: ALCRM calculates that the following key risk drivers influence the risk at this crossing:

- Climbs over barrier
- Railway cause: train unexpected
- Late braking
- Incorrect use (eg. non-adherence with level crossing road traffic light signals)
- Fails to observe level crossing
- Road traffic accident
- Sunlight obscures crossing/lights or view up / down track
- Poor crossing visibility
- Railway cause: SPAD at signal protecting the LC
- Railway cause: signaller or other workforce

The calculated safety risk for this crossing is:	**Risk per Traverse (Letter)**	**Collective Risk (Number)**
	K	**7**
	Risk per Traverse (FWI)	**Collective Risk (FWI)**
Cars / car-based vans / quad bikes	0	0.000039043
Large vans / small lorries / large 4x4s		0.000005381
Buses / Coaches	0	0
HGVs		0.000000424
Tractors / large farm vehicles		0.000000062
Pedal / motor cyclists	0	0.000006784
Pedestrians		0.000010505
Horse Riders		0
Animal Herders		0
Vehicles user in pedestrian mode		0
Train Passengers	0	0.000000171
Train Staff	0	0.000001065
Derailment Risk		0.000000932
Weighted Average (Users)	**0**	
Total Risk		**0.000064368**
	Average Consequence	0.484803329
	Collision Frequency	0.000132771

5. OPTION ASSESSMENT AND CONCLUSIONS

5.1 OPTIONS EVALUATED

The options evaluated to mitigate the risks at Dullingham MGH crossing include:

Option	Term	Risk per Traverse	Collective Risk	FWI	FWI Difference	Cost	Benefit Cost Ratio	Status	Comments
Install VAS	Traffic Change Option	K	7	0.000063099	0.000001269	12,000	0.05	Accepted 13.10.21 S+T RAM to discuss with Cambridge Project	Vas should be considered due to the road sloping on the northern approach and due to this there is a chance of vehicles skidding, this option does not have a positive CBA.
Safety Campaign	Short Term	K	7	0.000063733	0.000000635	500	N/A	Accepted 13.10.21	The LCM would complete this as and when they are at the crossing, with the help from the BTP if required
Closure by Overbridge	Long Term	M	13	0	0.000064368	10,000,000	0.04	Rejected 13.10.21 Cost Disproportionate to Safety Benefit	Due to the location and the topography of the area this option would not be a viable option, also the option does not have a positive CBA.
Upgrade to MCB-OD/CCTV	Long Term	J	6	0.000112124	-0.000047756	3,500,000	0.03	Accepted 13.10.21	This option has been considered as part of the Cambridge

								Cambridge Project	outer and re-signalling project that would close the signal box and therefore the crossing would need to be modernised.
Drainage to crossing	Short Term	K	7	0.000063733	0.000000635	25,000	0	Accepted 13.10.21 Being completed by Cambridge Project	This option should be considered with the MCB-OD due to the amount of debris that comes off the neighbouring fields when it rains heavily, which the signaller regularly cleans.
Renew deck to Strail	Short Term	K	7	0.000063733	0.000000635	50,000	0.28	Rejected 13.10.21 Suitable for current use	The crossing surface at present is a Polysafe and is subject to dynamic loading when road traffic approaches from the northern direction, this option does not have a positive CBA.

NOTES

Network Rail always evaluates the need for short and long-term risk control solutions. An example of level crossing risk management might be a short-term risk control of a temporary speed restriction, with the long-term solution being closure of the level crossing and its replacement with a bridge.

5.2 CONCLUSIONS

The crossing is located on a B road on the outskirts of Dullingham village. The railway is the Cambridge (Coldhams Lane Junction to Haughley Junction) with a line speed of 60mph in each direction. The station car park is small so most of the railway users are dropped off or walk from the village which is south of the crossing.

Currently a manually closed gate operated by the signaller at the station, located at the ends of the station platform on a rural lane. The station car park exits onto the road immediately next to the crossing, the road slopes downhill from the north to the crossing, creating a possible skid and grounding risk.

As part of the Cambridge Interlocking project this crossing is planned to upgrade to an MCB-OD or CCTV and to close the signal box, moving the control to Cambridge Signal box. The risk to signal box staff is not considered in ALCRM but is considered as a qualitative element and is considered to be high by the LCM given the volume of traffic and layout of this crossing with no Road Traffic Light Signals

Provision of vehicle activated signs on crossing approaches would help alleviate the skid and grounding risk.

Options

Optioneering panel reviewed the Narrative Risk Assessment on the 13th October 2021

Closure by Overbridge

Due to the location and the topography of the area this option would not be a viable option, also the option does not have a positive CBA.

Drainage to crossing

This option should be considered with the MCB-OD due to the amount of debris that comes off the neighbouring fields when it rains heavily, which the signaller regularly cleans.

Install VAS

Vas should be considered due to the road sloping on the northern approach and due to this there is a chance of vehicles skidding, this option does not have a positive CBA.

Upgrade to MCB-OD/CCTV

This option has been considered as part of the Cambridge outer and re-signalling project that would close the signal box and therefore the crossing would need to be modernised.

Renew deck to Strail

The crossing surface at present is a Polysafe and is subject to dynamic loading when road traffic approaches from the northern direction, this option does not have a positive CBA.

Safety Campaign

The LCM would complete this as and when they are at the crossing, with the help from the BTP if required

New Census

Due to an old census this option was accepted, with RLCM and Sponsor to find funding to complete

ANNEX A – ADDITIONAL PHOTOGRAPHS

Additional Photographs
 Up side crossing approach
 Up side looking across crossing

Up side looking at trains travelling in the up direction

Up side looking at trains travelling in the down direction

Down side crossing approach

Down side looking across crossing:

Down side looking at trains travelling in the up direction

Down side looking at trains travelling in the down direction

Signs/lights/crossing equipment on both up and down sides:

ANNEX B – HAZARD IDENTIFICATION AND RISK CONTROLS

The table below is intended for use by risk assessors when identifying hazards and risk control solutions. It is not an exhaustive list or presented in a hierarchical order.

	Hazard	Control
Road vehicle and train collision risk	Examples at the crossing include: • insufficient sighting and / or train warning for all vehicle types; known to be exacerbated by the driving position, e.g. tractor • level crossing equipment and signage is not conspicuous or optimally positioned • instructions for safe use might be misunderstood e.g. signage clutter detracts from key messages, conflicting information given • high volume of unfamiliar users, e.g. irregular visitors, migrant workers • known user complacency leading to high levels of indiscipline, e.g. failure to use telephone, gates left open • type of vehicle unsuitable for crossing; - large, low, slow making access or egress difficult and / or vehicle is too heavy for crossing surface - risk of grounding and / or the severity of the gradient adversely affects ability to traverse • poor decking panel alignment / position on skewed crossing • where telephones are provided, users experience a long waiting time due to:	Controls can include: • optimising the position of equipment and / or signs • removing redundant and / conflicting signs • engaging with signalling engineers to optimise strike in times • upgrading of asset to a higher form of protection • downgrading of crossing by removing vehicle access rights • optimising sighting lines and / or providing enhanced user-based warning system, e.g. MSL • re-profiling of crossing surface • engaging with stakeholders / authorised users to reinforce safe crossing protocol, legal responsibilities and promote collaborative working • widening access gates and / or improving the crossing surface construction material • realigning or installing additional decking panels to accommodate all vehicle types • implementing train speed restriction or providing crossing attendant

	Hazard	Control
	- long signal section (Signaller unaware of exact train location) - high train frequency • insufficient or excessive strike in times at MSL crossings • high chance of a second train coming • high line speed and / or high frequency of trains • unsuitable crossing type for location, train service, line speed and vehicle types	
Pedestrian and train collision risk	Examples include: • insufficient sighting and / or train warning • ineffective whistle boards; warning inaudible, insufficient warning time provided, known high usage between 23:00 and 07:00 • high chance of a second train coming • high line speed and / or high frequency of trains • level crossing equipment and signage is not conspicuous or optimally positioned • location and position of level crossing gates mean that users have their backs to approaching trains when they access the level crossing, i.e. users are initially unsighted to trains approaching from their side of the crossing • instructions for safe use might be misunderstood e.g. signage clutter detracts from key messages, conflicting information given • surface condition or lack of decking contribute to slip trip risk	Controls can include: • optimising the position of equipment and / or signs • removing redundant and / conflicting signs • upgrading of asset to a higher form of protection • optimising sighting lines, e.g. de-vegetation programme, repositioning of equipment or removal of redundant railway assets • implementing train speed restriction or providing crossing attendant • providing enhanced user-based warning system, e.g. MSL • engaging with stakeholders / authorised users to reinforce safe crossing protocol, legal responsibilities and promote collaborative working • installing guide fencing and / or handrails to encourage users to look for approaching trains, read signage or cross at the designed decision point

	Hazard	Control
	• known high level of use during darkness • increased likelihood of misuse, e.g. crossing is at station • free wicket gates might result in user error • high volume of unfamiliar users, e.g. irregular visitors / ramblers, equestrians • complacency leading to high levels of indiscipline, e.g. users are known to rely on knowledge of timetable • high level of use by vulnerable people • where telephones are provided i.e. bridleways, users experience a long waiting time due to: - long signal section (Signaller unaware of exact train location) - high train frequency • insufficient or excessive strike in times at MSL crossings • unsuitable crossing type for location, train service, line speed and user groups • high usage by cyclists • degree of skew over crossing increases traverse time and users' exposure to trains • crossing layout encourages users not to cross at the designed decision point; egress route unclear especially during darkness schools, local amenities or other attractions are known to contribute towards user error	• re-design of crossing approach so that users arrive at the crossing as close to a 90° angle as possible • installing lighting sources • engaging with signalling engineers to optimise strike in times • providing decking or improving crossing surface, e.g. holdfast, strail, non-slip surface • providing cyclist dismount signs and / or chicanes • straightening of crossing deck

	Hazard	Control
Pedestrian and road vehicle collision risk	Examples include: • a single gate is provided for pedestrian and vehicle users where there is a high likelihood that both user groups will traverse at the same time • the position of pedestrian gate forces / encourages pedestrian users to traverse diagonally across the roadway • road / footpath inadequately separated; footpath not clearly defined • condition of footpath surface increases the likelihood of users slipping / tripping into the path of vehicles	Controls can include: • providing separate pedestrian gates • clearly defining the footpath; renew markings • positioning pedestrian gates on the same side of the crossing • improving footpath crossing surface so it is devoid of potholes, excessive flangeway gaps and is evenly laid • improving crossing surface, e.g. holdfast, strail, non-slip surface
Personal injury	Examples include: • skewed crossing with large flangeway gaps results in cyclist, mobility scooter, pushchair or wheelchair user being unseated • condition of footpath surface increases the likelihood of users slipping / tripping • degraded gate mechanism or level crossing equipment • barrier mechanism unguarded / inadequately protected	Controls can include: • improving fence lines • reducing flangeway gaps and straightening where possible • providing decking or improving crossing surface, e.g. holdfast, strail, non-slip surface • straighten / realign gate posts • fully guarding barrier mechanisms

ANNEX C – ALCRM RISK SCORE EXPLANATION

ALCRM calculates the level of risk to individual users (per traverse) and the combined risks for all users, train staff and passengers at level crossings. It provides a consistent and robust quantitative methodology that is supplemented by the local knowledge and professional judgement of risk assessors.

Risk is expressed in fatalities and weighted injuries (FWI). The following values help to explain what this means:

- 1 = 1 fatality per year or 10 major injuries or 200 minor RIDDOR events or 1000 minor non-RIDDOR events
- 0.1 = 20 minor RIDDOR events or 100 minor non-RIDDOR events
- 0.005 = 5 minor non-RIDDOR events

RISK PER TRAVERSE

This is the level of calculated risk to an individual crossing user. It applies to a single traverse of the level crossing or each time the crossing is used by an individual.

Risk per traverse:

- Can be calculated for crossing users, train staff and passengers. Ranking is based on the risk to users only.
- Does not increase with the number of users.
- Is presented as a simplified ranking A to M. A is highest, L is lowest, and M is 'zero risk' e.g. temporary closed, dormant or crossings on mothballed lines.
- Allows risks to individuals on a per traverse basis to be assessed even if usage and Collective Risk is low.
- Can help in the prioritisation of risk mitigation and investment in safety.

Risk Per Traverse Ranking	Probability		FWI/traverse	
	Upper	Lower	Upper	Lower
A	1 in 1	1 in 500000	1	0.000002
B	1 in 500000	1 in 2500000	0.000002	0.0000004
C	1 in 2500000	1 in 12500000	0.0000004	0.00000008
D	1 in 12500000	1 in 62500000	0.00000008	0.000000016
E	1 in 62500000	1 in 125000000	0.000000016	0.000000008
F	1 in 125000000	1 in 250000000	0.000000008	0.000000004
G	1 in 250000000	1 in 500000000	0.000000004	0.000000002
H	1 in 500000000	1 in 1000000000	0.000000002	0.000000001
I	1 in 1000000000	1 in 2000000000	0.000000001	0.0000000005
J	1 in 2000000000	1 in 5000000000	0.0000000005	0.0000000002
K	1 in 5000000000	1 in 10000000000	0.0000000002	0.0000000001
L	1 in 10000000000	Greater than 0	0.0000000001	Greater than 0
M	0	0	0	0

COLLECTIVE RISK

This is the total calculated risk for the crossing and includes the risk to users (pedestrian and vehicle), train staff and passengers.

Collective risk:

- Is presented as a simplified ranking 1 to 13. 1 is highest, 12 is lowest, and 13 is 'zero risk' e.g. temporary closed, dormant or crossings on mothballed lines.
- Can help in the prioritisation of risk mitigation and investment in safety.

Collective Risk Ranking	Upper Value (FWI)	Lower Value (FW)
1	Theoretically infinite	Greater than 5.00E-02
2	0.050000000	0.010000000
3	0.010000000	0.005000000
4	0.005000000	0.001000000
5	0.001000000	0.000500000
6	0.000500000	0.000100000
7	0.000100000	0.000050000
8	0.000050000	0.000010000
9	0.000010000	0.000005000
10	0.000005000	0.000001000
11	0.000001000	0.000000500
12	0.0000005	0
13	0.00E+00	0.00E+00