Strategic Risk Chapters

Level Crossings

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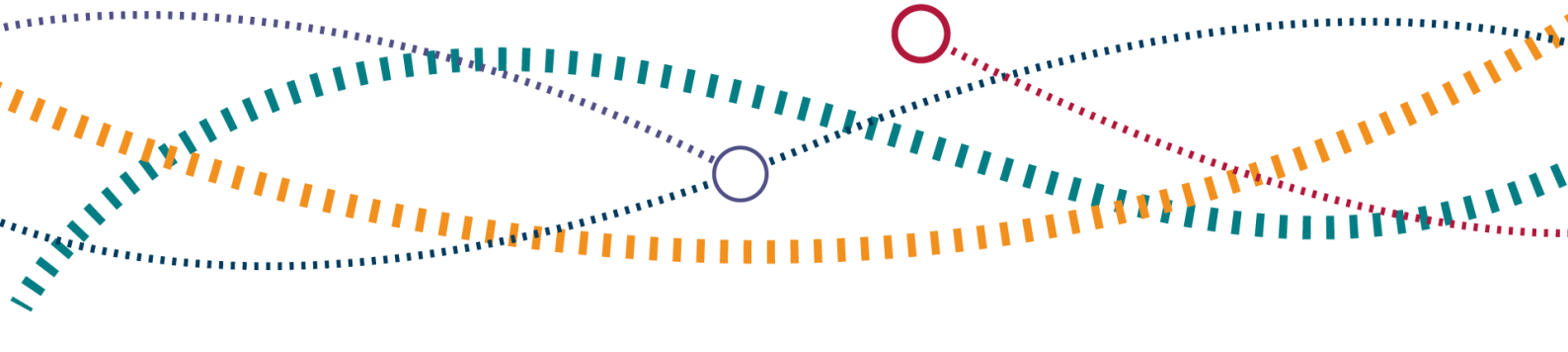

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SRC Level Crossings

ORR's strategy for regulating level crossing safety is informed by analysis of the current situation and our judgment of what we think needs to be achieved. In particular, we want to:

- ensure continued improvement in risk management by embedding the use of our guidance for all stakeholders who produce level crossing risk assessments. This will aid the design and management of level crossings;
- work with all sectors to promote the benefits of good risk assessment to underpin decision-making. Assessments should be drawn up by competent people who have a proper knowledge of the risks and of the application of controls associated with crossings, as well as a good understanding of the behaviour of users and their perception of risk;
- encourage research, innovation and new technologies to improve risk control at level crossings;
- target ORR interventions on the highest risk areas. For the mainline railway (which has the majority of crossings), this means passive footpath and user-worked crossings and automatic half-barrier crossings;
- drive the consistent application of Network Rail's level crossing strategy 2019-2029, so improvements are targeted in accordance with risk;
- ensure that the closure of level crossings is the first option considered in a risk-control strategy by the duty holder, in line with the principles of prevention. We recognise the need to balance the risk of alternative routes against the safety benefits to the railway of closing crossings, and that others are best placed to make these judgments;
- encourage alternatives to crossings to be fully explored and delivered where reasonably practicable. In principle, we do not support the creation of new level crossings where there is a reasonably practicable alternative.

1. Introduction

Level crossing safety is a priority topic for us. It is the area where many members of the public interact with the railway and level crossing use gives rise to significant potential for injury and harm.

Network Rail, operators of heritage and light railways and those who control rail depots, have an explicit legal duty under the Health and Safety at Work etc. Act 1974 (HSWA) to minimise risks arising on their networks, so far as is reasonably practicable.

There are just under 5,500 level crossings on the mainline rail network in Great Britain and an estimated 1,500 on heritage and minor railways. There are also a very small number of crossings in rail depots. Britain's mainline railway is amongst the safest in Europe, and level crossing incidents in the UK were well below the European average in the five-year period from 2017 to 2021. This could change with just one major incident, however, and every incident has the potential for significant human and economic loss. Level crossings remain one of the greatest risks to public and passenger safety on the rail network.

Many level crossings connect communities, and people in those communities often want their crossings to remain open, even when a case for closure on railway safety grounds has been made.

Trains are generally now more frequent, quieter and travel at higher speeds than before; the population has increased; there is more road traffic using crossings and bigger farm machinery with better soundproofing for their operators; and more pedestrians are using electronic equipment that can distract them. Level crossings operate within a system that goes beyond the railway and they have an economic as well as safety impact. For example, barrier down time on public road crossings can have a significant influence on traffic flow.

2. ORR's role and approach to level crossings

The law requires railway businesses to manage level crossing risk effectively using their own safety management systems. ORR's role is to provide assurance that they are doing so. Our primary interest is to promote and, where necessary, enforce the safe design, management, and operation of level crossings to reduce the likelihood of people being harmed and to reduce the number of 'close calls'.

We will ensure continued improvement in risk management with our guidance, 'Principles for Managing Level Crossing Safety', for all stakeholders who produce risk assessments, which aids the design and management of level crossings.

We will work with all sectors to promote the benefits of good risk assessment and the identification of reasonably practicable controls, to underpin decision making. Assessments should be drawn up by competent people who have a proper knowledge of the risks and of the application of controls associated with crossings, as well as a good understanding of the behaviour of users and their perception of risk. We encourage research, innovation, and the use of new technologies to widen the options for risk control at level crossings.

We support the closure of level crossings, and this should be the first option considered in a risk-control strategy by the duty holder, in line with the principles of prevention set out in the Management of Health and Safety at Work Regulations 1999. The closure of level crossings requires attention to many factors, including:

- the practicalities of replacing them with bridges or underpasses;
- the legal arrangements for closing rights of way;
- the need to minimise the possible transfer of risk to other crossings; and
- the possibility of importing new dangers, such as increasing the likelihood of trespass.

We recognise the need to balance the risk of alternative routes against the safety benefits to the railway of closing crossings, and that others are best placed to make these judgments.

ORR does not approve or grant permission for new or reinstated level crossings but may submit an opinion on a proposal for a new level crossing as part of the Transport and Works Act 1992 (TWA) or Transport and Works (Scotland) Act 2007 (TWAS) Order process. Early engagement with proposers of new level crossings is important, so that we can work with the proposer and encourage alternatives to crossings to be fully explored and delivered where reasonably practicable. In principle, we do not support the creation of new level crossings where there is a reasonably practicable alternative, because they introduce new risks to the railway and those using the crossing.

ORR makes Level Crossing Orders (on behalf of the Secretary of State for Transport), and then inspects level crossings to ensure that the measures set out in the Order are in place and being complied with. ORR usually makes Orders for public vehicular road crossings. ORR updated its Level Crossing Order process in April 2022, to streamline and simplify the process where possible, to reduce bureaucracy and allow for developments in technology.

3. Safety risks

Responsibility for controlling level crossing risk is primarily with the railway infrastructure manager (such as Network Rail) working with the train operating companies, local authorities, highways agencies and users of the crossing. Effective co-operation and collaboration between these parties is critical and each has a role to play, although the contribution of each party to risk control will vary.

At level crossings, users are assisted to cross safely by the layout of the crossing and equipment such as gates, barriers, warning lights, alarms, and signs. These arrangements must be kept under review, through a regular reassessment of risks by the crossing operator, and they may need to be changed if the risk profile at the crossing alters. For example, if there are changed traffic levels (either of road vehicles, pedestrians and/or trains), a different mix of users, a new school or housing development is built nearby, or if different user behaviours are observed - such as motorists weaving around barriers.

Regular reassessment of risks should also revisit consideration of closing the crossing, or its replacement with an alternative method of crossing the railway. Options for installing new protection arrangements that reduce risk should also be considered, particularly given that technological developments are increasing the range and affordability of options available.

In the following pages we consider the mainline railway in detail because it is where the majority of level crossings are found. We also describe our objectives for the Heritage sector, reflecting the different challenges to be found on these railways. These two sectors are the focus for ORR's targeted proactive activity. Work with other parts of the industry will primarily be reactive.

Mainline railway

The Railway Safety and Standards Board (RSSB) estimates that 6% of the total mainline system risk is from level crossings. The majority of this risk is borne by members of the public using the crossings, with most casualties being pedestrians and road vehicle occupants.

There are several types of level crossing in use on the mainline network. The table below shows level crossing numbers by type:

Table 3.1

Crossing type				Number
Passive		UWC-T	User-worked crossing with telephone	1518
		UWC	User-worked crossing	350
		OC	Open crossing	40
		FP	Footpath crossing	1877
Active	Manual	MCG	Manually controlled gate	109
		MCB	Manually controlled barrier	162
		MCB-OD	Manually controlled barrier with obstacle detection	117
		MCB-CCTV	MCB monitored by closed-circuit television	434
	Automatic	AHB	Automatic half-barrier	394
		AFBCL	Automatic full barrier crossing locally monitored	3
		ABCL	Automatic half barrier crossing locally monitored	61
		AOCL+B	Automatic open crossing locally monitored with barrier	61
		AOCL/R	Automatic open crossing locally or remotely monitored	23
		UWC-MSL	User-worked crossing with miniature stop lights	218
		FP-MSL	Footpath crossing with miniature stop lights	125
Total				**5,492**
Source: Network Rail (ALCRM), April 2023				

The level of protection afforded to users of the level crossing varies with the type of crossing. Those that provide a higher level of protection do not rely on the user to assess whether it is safe to cross, such as by looking for an approaching train. Instead warning(s) of an approaching train and/ or barriers are provided. Other factors such as the number of crossing barriers and whether the crossing has railway signals protecting it are also important.

The different types of level crossings can be classified in various ways. The previous table used ‘Active, Automatic, Manual and Passive’.

Looking at data for the last 10 years (April 2013 to March 2023) there were 61 fatalities to level crossing users (excluding suicides). The table below shows the types of crossing where they occurred.

Table 3.2

Crossing type	Number of fatalities	Percentage
Footpath	34	56
AHB	11	18
UWC-T	7	11
MCB-CCTV	4	7
Footpath-MSL	3	5
UWC-MSL	1	2
MCB	1	2

Source: RSSB, February 2024.

The data illustrates that the greatest proportion of fatalities occurred at passive footpath crossings, followed by automatic half-barrier (AHB) and user-worked crossings with a telephone. Footpath crossings account for 34% of the level crossing estate.

The last level crossing incident resulting in train occupant fatalities (as of February 2024) occurred at Ufton Nervet in 2004, when a passenger train derailed after striking a car that had been deliberately parked on the crossing by its driver, as a suicidal act. The train driver and five passengers were killed, in addition to the car driver.

Data for the last 10 years (April 2013-March 2023) shows there were 67 vehicular collisions. As the table below shows, AHB crossings were the greatest contributor but account for just 7% of Network Rail's level crossing estate. AHB crossings are very convenient for the user due to their short barrier down time. However, we provide guidance on situations where we consider their application is inappropriate and Network Rail are trialling the use of additional equipment to deter unsafe use (such as weaving around the barriers) of these crossings.

Table 3.3

Crossing type	Number of strikes	Percentage
AHB	23	34
UWC-T	18	27
OC	9	13
UWC-MSL	5	7
MCB-CCTV	4	6
AOCL	4	6
UWC	3	4
Footpath-MSL	1	1

Source: RSSB, February 2024.

As the graphs below illustrate there was a decline in the number of collisions between road vehicles and trains at level crossings between 2019/2020 and 2020/2021, followed by a slight increase. As mentioned above, passive crossings are the greatest contributor followed by active-automatic crossings. We are encouraging industry to explore new technologies to improve risk control at these crossings.

Each crossing type has a different risk profile. The RSSB Safety Risk Model models this risk by considering factors such as: level crossing protection; road and rail traffic over the crossing; and train speed. The results show that:

(a) the risk of collisions between trains and road vehicles is greatest at AHB crossings and variations of UWCs, user-worked crossings with telephone (UWC-T) and user-worked crossings with miniature stop lights (UWC-MSL);

(b) (b)the greatest proportion of the risk to pedestrians is at footpath crossings rather than from pedestrian use of any other type of crossing.

Given the relative risks to users at different types of level crossings on the mainline railway, ORR will target our efforts on promoting improved risk control at footpath crossings, user-worked crossings and AHB crossings.

Heritage railways

The majority of heritage railways have level crossings as part of their operation; around half have level crossings that cross public carriageways. Our 2014 survey of level crossing types in the heritage sector found that around 16% of these public carriageway crossings were public open level crossings; half being automatic with lights (Automatic Open Crossings Locally Monitored) (AOCL) and half being crossings with signage only, where the train driver is required to observe that the crossing is clear (Open Crossings) (OC).

RIDDOR reportable incidents for the heritage sector show that there have been 9 collisions between trains and vehicles between April 2013 to March 2023. None of these resulted in reported injuries to the vehicle or train occupants.

4. Industry Activity

Network Rail

Network Rail has achieved considerable success in reducing risk at level crossings during Control Period 4 (CP4) and Control Period 5 (CP5). This was largely attributable to dedicated risk-reduction funds, which was strongly managed and directed from their Head Office.

In Control Period 6 (CP6), Network Rail does not have additional ring-fenced funds to improve level crossing safety, and decision making was devolved to the routes and regions. In line with statutory requirements, it will adopt reasonably practicable improvements in risk control. Network Rail will focus on using better techniques and digital technologies to improve the way they maintain and manage their infrastructure and will take steps to further reduce risk to the public at their level crossings.

At CP5 exit, level crossing risk, as modelled by Network Rail's All Level Crossing Risk Model (ALCRM), was at 11.5 Fatalities and Weighted Injuries (FWI). FWI was at 11.6 over the first two years of CP6, then declined to 8.6 by 2022-23. This decline was in part due to the launch of a new version of the algorithm used in ALCRM in April 2021.

As of January 2024, Network Rail level crossing risk reduction safety benefits stood at 1.130 FWI. The scorecard target for CP6 is 1.490 FWI, which Network Rail aims to achieve with its planned risk reduction activity.

Network Rail produced a level crossings strategy for 2019-2029, which was adopted soon after the start of CP6. It sets out Network Rail's strategy to manage the safety and reliability of level crossings for the next 10 years.

We will continue to monitor Network Rail's progress against its targets and encourage Network Rail to continue implementing its level crossing strategy for 2019-2029 to reduce risk across the whole crossing population.

Heritage railways

Heritage railways generally operate at lower speeds not exceeding 25mph (40kmph). When compared to the mainline sector, the lower speed profile changes the level of risk associated with level crossings. However, the risk remains significant and our level crossing strategy remains relevant to the heritage sector. The same legislation applies, and we expect the sector to achieve the same legal standard as the mainline sector.

Risk at level crossings should be reduced as far as is reasonably practicable. It is therefore important that heritage operators understand the risk profile of all of their level crossings through the production of a suitable and sufficient risk assessment; identifying control measures and ensuring that these control measures are implemented effectively.

Risk assessments should be drawn up, and reviewed by suitably competent persons who have knowledge of the risks and controls associated with crossings, taking account of ORR and sector guidance.

Level crossings need to be regularly inspected by competent persons to ensure the control measures remain effective. Risk assessments also need to be regularly reviewed and the risks reassessed, and after an incident or when significant change in use is likely or has occurred. Such changes include:

- changes in train type or operation;
- user profile;
- local developments; or
- infrastructure enhancement/renewal.

Reviews may indicate that changes are justified, such as closure, an alternative crossing method, or different type of level crossing.

This regular reassessment of risks may indicate that changes to control measures are now justified, such as closure of the crossing, or its replacement with some other method of crossing the railway. When crossing risks are reassessed, new innovative controls may have become available or existing ones may have become more practical or cheaper to install.

As the heritage sector expands and realises ambitions to extend or reinstate old railway lines, the level of interest in opening new, or reinstating level crossings is increasing. In line with the general principles of prevention, we expect operators to demonstrate that there is no reasonably practicable alternative to the provision of a new or reinstated level crossing; with the analysis based upon a proportionate, but suitable and sufficient, risk assessment. Whilst ORR does not approve or grant permission for new or reinstated level crossings, we will may submit an opinion on the level crossing proposal as part of the Transport and Works Act 1992 (TWA) or Transport and Works (Scotland) Act 2007 (TWAS) Order process.

Tramways

It is unusual to treat the crossing of roads by tramways as level crossings in the same manner that rail and road crossings are treated. Whilst some examples do exist, conflict points such as intersections between tramways, roadways and footpaths are generally designed and operated along highway principles.

Junctions where roads cross tramways are therefore different from level crossings in that they are designed as road crossings, with the usual highway traffic controls, rather than the specialised flashing lights, audible warnings and barriers seen on mainline railways. The crossings and traffic lights are the responsibility of highway authorities, and the police are responsible for investigating incidents.

ORR's 'Strategy for Regulation of Health and Safety Risks – Chapter 14: Tramways' provides further information.

5. ORR Activity

Level crossings on both the mainline and heritage railways remain a high priority for ORR. We have been active for many years, using relevant legal mechanisms to pursue our strategy and so improve the risk profile of level crossings. Our key activities and the outcomes we seek from them are in the table that follows:

Table 5.1

ORR activity	The outcome we seek from this activity
Targeting inspection activity for Network Rail on particular aspects of risk management. In CP7 we will prioritise scrutinising arrangements for safer management of crossings that rely on users to decide for themselves when it is safe to cross or where the only information to aid decision-making is from telephoning a signaller. We expect the adoption of new technology to make a significant difference in controlling these risks.	Duty holders demonstrate targeted, risk-based improvements to protect the safety of level crossing users. Increased adoption of technology to inform crossing users when it is safe to cross.
Monitoring Network Rail's delivery of its new level crossing strategy. We will be ensuring that routes and regions of Network Rail exercise devolved decision-making powers to introduce reasonably practicable improvements.	Evidence of consistent and effective application of the Network Rail level crossing strategy and increasing use of technical solutions leading to improved risk control.
We will support and encourage duty holders to take a structured approach to level crossing risk assessment, in line with our guidance on level crossings to ensure it encourages a sound risk-based approach.	Improvements in level crossing risk assessment supported by appropriate guidance.
Encouraging Network Rail to be innovative in developing new technologies that will reduce risks at crossings with restricted sighting and AHB crossings.	Improved safety for users and train occupants at crossings that rely presently on the users' vigilance alone, or warning from drivers sounding the train horn, by adding a layer of engineered protection from new technologies. Preserving the convenience of AHB crossings but improving risk control by additional measures.

ORR activity	The outcome we seek from this activity
ORR will encourage early engagement with proposers of new level crossings, so that we can work with the proposer and encourage alternatives to crossings to be fully explored and delivered where reasonably practicable.	ORR will comment as necessary on proposals for a new level crossing as part of the Transport and Works Act 1992 (TWA) or Transport and Works (Scotland) Act 2007 (TWAS) Order process. ORR will not support the introduction of new level crossings where there are reasonably practicable alternatives.
Working with heritage operators to improve their Safety Management System by applying Heritage Railway Association guidance.	Improved consistency and maturity in safety management, resulting in improved risk control.
Promoting, within the heritage sector, the installation of LED road traffic light signals where appropriate to control risk, in accordance with duty holders' risk assessment of crossing use and consideration of the current conspicuity of the crossing lights.	More widespread adoption of LED lights and other enhancements to conspicuity of warnings, making it easier to see the lights in a variety of environmental conditions.
Encouraging within the heritage sector, the conversion of open crossings and AOCLs to barrier or gated types where appropriate.	Improved risk control by increase in numbers of crossings protected by barriers or gates.
Encouraging the heritage sector to adopt the innovative technological solutions being brought into operation in the mainline sector, where this is appropriate, to better control risk. For example, through the use of 'overlay' miniature stop light systems in the conversion of passive crossings to active.	Improved risk control arising from increased adoption of innovative active warning techniques at passive crossings.

We have investigated level crossings incidents and taken enforcement action as a result of our findings, including prosecution. Our enforcement notices are published on our website.

6. Abbreviations and acronyms

- ALCRM: All Level Crossing Risk Model
- CP: Control Period
- FWI: Fatalities and Weighted Injuries
- HSWA: Health and Safety at Work etc Act 1974
- LED: Light Emitting Diode
- ORR: Office of Rail and Road
- ORV: Occupants of Road Vehicle
- RAIB: Rail Accident Investigation Branch
- RIDDOR: Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 2013
- RSSB: Rail Safety and Standards Board
- TWA: Transport and Works Act 1992
- TWAS: Transport and Works (Scotland) Act 2007

Glossary of terms

Accidental mainline risk	Risk arising from railway operations or maintenance activities, excluding suicides.
Active crossings	Where the level crossing user is warned of the approach of the train through closure of gates or barriers and/or by warning lights and/or alarms.
Automatic crossings	The approaching train activates the closure sequence for the level crossing automatically. There are no protecting signals and the crossing area is not checked to ensure it is clear prior to the arrival of the train (see also manual crossing).
Control Periods	These are the five-year timespans to which Network Rail works for financial and other planning purposes. Each Control Period begins on the 1st April and ends on 31st March to coincide with the financial year. Control Period 4: 2009-14 Control Period 5: 2014-19 Control Period 6: 2019-24 Control period 7: 2024-29

Accidental mainline risk	Risk arising from railway operations or maintenance activities, excluding suicides.
Fatalities and Weighted Injuries	The aggregate amount of safety harm. One FWI is equivalent to: one fatality, or 10 major injuries, or 200 Class 1 minor injuries, or 200 Class 1 shock/trauma events, or 1,000 Class 2 minor injuries, or 1,000 Class 2 shock/trauma events.
Manual crossing	These crossings can also be termed railway-controlled. The crossing area is checked by a signaller/crossing keeper to ensure it is free of people/vehicles etc. before the protecting signals are cleared to allow the train through. This can also be done using technology, which scans the crossing, mimicking the action of the signaller/crossing keeper.
Passive crossings	The onus is on the level crossing user to determine if it is safe to cross. This can be based on sighting alone, or the sound of a train horn in some circumstances or, where a phone is provided, by telephoning the signaller.
Precursor Indicator Model	An RSSB-devised model that measures the underlying risk from train accidents by tracking changes in the occurrence of accident precursors.
Principles of prevention	The Management of Health and Safety at Work Regulations 1999, Schedule 1 sets out the general principles of prevention. Where an employer implements preventative and protective measures he shall do so on the basis of these principles.
Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 2013	These Regulations require employers, the self-employed and those in control of premises to report specified workplace incidents.
Safety Risk Model	A quantitative representation of the safety risk that can result from the operation and maintenance of the GB rail network.

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