#### APP - W2 - 2 - APPENDICES TO PROOF OF EVIDENCE

#### The Network Rail (Cambridge Re-Signalling) Order

Appendices to Proof of Evidence

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- JP1 ORRs publication RSP7 published on15 December 2011
- JP2 ORR's 15 June 2021 publication of Principles for Managing Level Crossing Safety
- JP3 Enhancing Level Crossing Safety 2019 2029
- JP4 NR/L2/XNG/001 Provision and risk management of level crossings
- JP5 NR/L3/XNG/308 Risk Assessing Level Crossings
- JP6 NR/L2/XNG/19608
- JP7 NR/L2/XNG/202
- JP8 Latest Narrative Risk Assessments for the relevant level crossings
- JP9 List of Incidents
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# JP1



## Level Crossings: A guide for managers, designers and operators

Railway Safety Publication 7

December 2011

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## Foreword

## What is the purpose of this guide?

1. The Office of Rail Regulation (ORR) has issued this guidance after extensive consultation. It provides general guidance on the safe management, operation, modification and use of Britain's level crossings. It also provides detailed information on the level crossing order making process which is managed by ORR. It updates earlier guidance (RSPG2E), in particular to align it with developments in industry standards and with recommendations from the Rail Accident and Investigation Branch (RAIB).

2. Please note that it is intended to be used as **guidance**. Following the guidance is not compulsory and you are free to take other action. The guidance aims to help people involved in the management and operation of level crossings to understand the associated risks and responsibilities

3. We expect level crossing risks to be controlled to the appropriate degree. If innovative or alternative ways of doing things emerge as ways of properly controlling risk, then this guidance should not hinder their introduction.

4. ORR wants its advice on level crossing safety to be accessible to everyone who has a role to play in making level crossings safer and more efficient.

## Who is this guide for?

5. This document is for people who design, install, maintain and operate level crossings. It may be of interest to others who use or are affected by the use of level crossings.

6. Interested parties may include any of the following:

- (a) railway infrastructure managers;
- (b) highway authorities;
- (c) road authorities;
- (d) planning authorities;
- (e) train and station operators;
- (f) landowners

(g) level crossing users, including groups representing motorists, cyclists, ramblers and persons with reduced mobility.

7. This guidance does **not** apply to tramways, as the characteristics of tramway crossings and the principles of tramway operation are different.

8. If in doubt, you should contact ORR for advice about how to interpret and apply this guidance to particular circumstances. The guidance will be regularly updated and the version on the ORR website shows the date of the latest update.

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Ian Prosser

Director, Railway Safety

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## Introduction

## Why is managing level crossing risk important?

1. Level crossings account for nearly half of the catastrophic train accident risk on Britain's railways. ORR believes that the safe design, management and operation of level crossings can reduce the risks, have a positive effect on user behaviour and so reduce the number of fatal and serious incidents.

## What is ORR's policy on level crossings?

2. ORR seeks to influence duty holders and others to reduce risk at Britain's level crossings. It does this through a variety of means ranging from advice to formal enforcement action. ORR checks that preventive and protective measures are implemented in accordance with the principles of prevention set out in the Management of Health and Safety at Work Regulations 1999. Risk control should, where practicable, be achieved through the elimination of level crossings in favour of bridges, underpasses or diversions. Where elimination is not possible, ORR aims to ensure that duty holders reduce risk so far as is reasonably practicable and in accordance with the principles of protection.

3. As the safety regulator for Britain's railways, ORR's role is to provide clear advice and enforce relevant legislation – including that which relates to level crossings. We also exercise the powers of the Secretary of State in making level crossing orders under the Level Crossings Act 1983. The Agency Agreement made between the Secretary of State for Transport and the Office of Rail Regulation relates to functions which ORR has agreed to perform on behalf of the Secretary of State. The Agreement is on ORR's website at <a href="http://www.rail-reg.gov.uk/upload/pdf/mou\_ORR\_DfT.pdf">http://www.rail-reg.gov.uk/upload/pdf/mou\_ORR\_DfT.pdf</a>

4. ORR believes that it is neither effective nor efficient for only rail companies to be responsible for managing safety at level crossings. Decisions about level crossings should involve rail companies, traffic authorities and other relevant organisations as early on as possible. Relevant authorities should recognise the wider benefits that safety improvements at level crossings (for example, replacing them with bridges) can bring about, particularly for road users. If wider benefits can be achieved, the appropriate funding bodies should agree on how the costs of making safety improvements will be met.

5. ORR is also committed to helping people understand the importance of the safe use of level crossings. The 'Using Level Crossings Safely' guidance is available on ORR's website.

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## 1. The legal framework

## Overview

1.1 The law relating to level crossings is not straightforward as there is a need to balance the interests of road and rail, and take account of the impact of local circumstances that affect the use of the crossing.

1.2 The law applying to level crossings has evolved over the past 160 years. No single government department controls all level crossing legislation. Currently, laws relating to the highways, railways and health and safety apply.

1.3 The Law Commission for England and Wales and the Scottish Law Commission are undertaking a joint review of the existing law governing level crossings. Check their website for the latest position at: <a href="http://www.lawcom.gov.uk/level\_crossings.htm">http://www.lawcom.gov.uk/level\_crossings.htm</a>

1.4 Duties are placed on a number of bodies and individuals including:

- (a) railway infrastructure managers;
- (b) level crossing operators;
- (c) highway, road and traffic authorities;
- (d) employers and employees;
- (e) train and freight operators;
- (f) land owners;
- (g) road users; and
- (h) other crossing users
- 1.5 ORR is the enforcing authority for railway health and safety legislation.

1.6 The key pieces of legislation that operators and users of level crossings should be familiar with are:

- Health and Safety at Work etc. Act 1974 is the primary piece of legislation covering occupational health and safety in Great Britain. It requires undertakings to manage and control risks arising from their work activities in connection with level crossings, so far as is reasonably practicable. It also gives ORR inspectors the powers to inspect and enforce safety at level crossings.
- The Management of Health and Safety at Work Regulations 1999 require employers to carry out risk assessments, make arrangements to implement necessary measures, appoint competent people and arrange for appropriate information and training.
- Level Crossings Act 1983 enables the Secretary of State for Transport to make orders that take account of both safety and convenience aspects of crossings. The order can specify the protection arrangements required at certain types of crossing. Detailed advice on the level crossing order process can be found in Chapter 3.

- Transport and Works Act 1992 enables the Secretary of State for Transport to make orders that authorise the construction of a railway in England, including allowing it to cross the highway by means of a level crossing. The authorisation of railway schemes wholly in Wales is by way of an order made by Welsh Ministers. Cross-border rail schemes are authorised by orders made by the Secretary of State subject to the agreement of Welsh Ministers. For Scotland, the Transport and Works (Scotland) Act 2007 enables Scottish Ministers to make orders that authorise the construction of a railway in Scotland, including allowing it to cross the highway by means of a level crossing. Prior to these Acts being made, crossings would have been authorised either by orders made under the Light Railways Act 1896 or under Private Acts.
- Level Crossings Regulations 1997 make it an offence for a crossing operator to fail to comply with a level crossing order.
- Railways and Other Guided Transport Systems (Safety) Regulations 2006 (ROGS), as amended by The Railways and Other Guided Transport Systems (Safety) (Amendment) Regulations 2011, require all infrastructure managers to have a safety management system that enables them to control risk – including risk arising from level crossings. ORR's published guidance on ROGS is at: <u>http://www.railreg.gov.uk/upload/pdf/rogs-guidance-may11.pdf</u>
- The Traffic Signs Regulations and General Directions 2002 contain requirements for road signs, including carriageway markings. These are supported by the Traffic Signs Manual found on DfT's website at:<u>http://www.dft.gov.uk/pgr/roads/tss/tsmanual/</u>
- The Private Crossings (Signs and Barriers) Regulations 1996 prescribe the types of signs that may be used on or near private level crossings.
- The Equality Act 2010 places duties on designers and managers to ensure that facilities at crossings do not cause an unnecessary barrier to access across the railway for those with disabilities.
- The current Railway Group Standard relating to level crossings (GK/RT0192, Level Crossing Interface Requirements, Issue 1) defines the requirements for level crossings systems at the interface between the mainline infrastructure manager and railway undertakings. GK/RT0192 can be found at:

http://www.rgsonline.co.uk/Railway Group Standards/Control%20Command%20and%20Signalling/ Railway%20Group%20Standards/GKRT0192%20Iss%201.pdf

## Highways and planning law

1.7 A process for involving affected local authorities in level crossing protection arrangements is in place.

1.8 The modifications to the Level Crossings Act 1983, introduced by the Road Safety Act 2006, formalised existing good practice in securing consultation on changes to level crossings in advance of formal circulation of a draft level crossing order. The changes also permit the order to require both the operator of the crossing and the local traffic authority to provide, operate and maintain any protective equipment (including barriers and traffic signs) specified in the order.

1.9 Local traffic authorities and level crossing operators may agree a long term strategy for each crossing. Where appropriate, consideration should be given to what action may be required by each party, to permit the crossing to be closed in the long term.

1.10 Finally, there is a requirement in planning legislation for planning authorities to consult the Secretary of State and the operator of the network where a proposed development materially affects traffic over a

level crossing. For example, a new housing development near a crossing may cause traffic levels over the crossing to increase greatly and mean that existing protection arrangements at the crossing are no longer adequate.

## 2. Managing risks at level crossings

## Introduction

2.1 This part of the guidance provides advice for those involved in the design, supply, installation and maintenance, and continued assessment of level crossing suitability. It revises and updates the advice previously given in Railway Safety Principles and Guidance, part 2, section E, 'Guidance on Level Crossings'.

#### Applying the guidance

2.2 This document does not set mandatory standards, though it does describe certain essential principles and features, such as interlocking and prescribed road signs and markings. It gives examples of established good practice which, if followed, are likely to be in accordance with the law.

2.3 ORR encourages innovative solutions to level crossing problems. In all cases a risk assessment will need to show that due consideration has been given to safety and that risks have been reduced so far as reasonably practicable. Innovative proposals may be constrained, to some extent, by the need for consistency for example for road signs.

2.4 The guidance is produced to help those who are responsible for providing and maintaining the protection arrangements at level crossings. This includes highways and road authorities, who should find the guidance helpful in so far as it deals with the roadway aspects of the protection arrangements. We hope that others, such as planning authorities, who may be consulted on proposed modifications to level crossings, will also find this document helpful.

2.5 Level crossings take many forms depending on whether they are on a public or private road, or for vehicle, horse or pedestrian use. The protection arrangements which are appropriate at level crossings will vary, depending upon the crossing location, for example proximity to road junctions, the level of usage and the nature of railway traffic.

2.6 An important factor in assuring the safety of level crossings is providing, so far as circumstances permit, a consistent appearance for road and rail users of any crossing. To help achieve this, several level crossing types have been developed over the years. Detailed protection arrangements for each type are described later.

2.7 The guidance applies when the protection arrangements at existing crossings are reviewed. It will also apply when new crossings are created. Arrangements at a level crossing on a road to which the public has access may be subject to an order, made by the Secretary of State, to provide for the protection of those using the crossing. Level crossing orders, made under the Level Crossings Act 1983, usually specify the protection arrangements at public vehicular crossings.

2.8 Where level crossings cannot be eliminated but are being renewed or altered, every effort should be made to improve the crossing and reduce risk to both crossing and railway users. Certain types of crossing design, particularly automatic types, whilst fit for purpose when road and rail traffic densities were lower, have been found to be prone to misuse with potentially high consequences when collisions occur. Given the high cost when crossings are installed and their long service life, ORR expects that the safest suitable crossing for the site-specific risks will be selected when renewing a crossing.

#### Effects on existing level crossings

2.9 This guidance sets out examples of good practice appropriate for today's world. It is relevant to existing crossings where protection arrangements require improvement. Factors affecting the continued suitability of arrangements might include increased traffic levels and speeds (road and rail), new road lay-outs, and any history of misuse or near-misses. Where protection arrangements are specified in a level crossing order, the crossing operator is required to ensure that the order is complied with. In addition to this, however, crossing operators have general duties under the Health and Safety at Work etc. Act 1974 to ensure, so far as is reasonably practicable, the safety of all those using or affected by a level crossing. In effect, this means that crossing operators need to monitor regularly the suitability of arrangements and make changes when necessary. Where the crossing is subject to a level crossing order, such changes should prompt the crossing operator to request a new or amended order to reflect these changes. The level crossing order making process is described in detail in Chapter 3.

#### **Operating conditions**

2.10 Level crossing type and design will depend on the operational requirements of the railway and road usage.

2.11 To ensure that the level of protection at the crossing remains adequate and appropriate, assess the suitability of the type of crossing when circumstances at the crossing change. This includes railway factors (for example rolling stock, signalling, electrification, speed, etc) and those of the local environment (such as housing or industrial developments, changes to road traffic conditions etc).

2.12 It is important to take into account:

- (a) normal railway operating conditions;
- (b) degraded conditions where any component or part of the railway system has failed;
- (c) foreseeable abnormal conditions to which the system may be subjected;

(d) usage, including consideration of altered or increased usage due to incident or regular occurrences and events; and

(e) emergency situations.

#### **Design and installation**

2.13 Clients, designers, suppliers, contractors and installers have responsibilities under the Construction (Design and Management) Regulations 2007 in relation to level crossings.

2.14 Similarly, equipment at level crossings may be subject to other specific regulations, for example, the Electricity at Work Regulations 1989 and the Provision and Use of Work Equipment Regulations 1998 (PUWER).

2.15 Where reference is made in this document to the Traffic Signs Regulations and General Directions 2002 or to the Private Crossings (Signs and Barriers) Regulations 1996 they will be quoted as the 2002 Regulations and the 1996 Regulations respectively. References to sign diagram numbers are to diagrams in those Regulations.

#### Structure of the guidance

2.16 This part of the guidance:

(a) suggests the crossing types appropriate to the prevailing conditions;

- (b) provides general guidance applicable to all types of crossing;
- (c) gives specific details of types of crossing; and
- (d) provides guidance on carriageway aspects and crossing equipment.

#### Terminology

2.17 Throughout the document, verbs with specific meanings are used:

should - the primary verb for statements of guidance;

may - where the guidance suggests options;

**must** - only used where there is a legal/statutory requirement for the measures described to be employed. Reference to the Act or Regulations will be provided;

**is (are) required** - having decided upon a particular option or arrangements, some consequential choices stem from that first decision. This expression is used to indicate those consequential choices and where firmer guidance is considered appropriate.

2.18 Some terms that relate specifically to level crossings have a special meaning and where these terms are first mentioned in the text they are italicised and a cross reference to the definition in Appendix A is provided.

2.19 Throughout this document speeds are given in miles per hour as this is the convention for UK highway signage and the majority of UK railway signage. Conversions to kilometres per hour should use the metric equivalent specified in relation to the relevant imperial unit in the third column of the Schedule to the Units of Measurement Regulations 1995.

Level crossing types – basic protection and warning arrangements

Figure 1

Protection from	Crossing	Warning	Full	Half barriers	No barriers	Telephone
train movements	confirmed clear	arrangements	barriers/gates			"protection"
	By signaller or		MCG			
	crossing keeper		MCB			
			MCB (CCTV)			
Protected	By obstacle		CB-OD			
	detector					
				ABCL		
	By driver				AOCL	
	By train		OMT			
	crew/other					
		Approaching		AHB		
		Train			UWC (MSL)	
					FP (MSL)	
Unprotected		Telephone				UWC (T)
					OC	
		Line of Sight			UWC	
					FP/BW	

MCG: manually controlled gated crossing

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MCB (CCTV): manually controlled barrier crossing with closed circuit CB-OD: controlled barrier crossing with obstacle detection MCB: manually controlled barrier crossing television

ABCL: automatic barrier crossing locally monitored

AOCL: automatic open crossing locally monitored

[MO: train crew (or other peripatetic railway staff) operated crossing AHB: automatic half barrier crossing

JWC (MSL): user worked crossing with miniature stop lights

FP (MSL): footpath crossing with miniature stop lights

UWC (T): user worked crossing with telephone

OC: open crossing

UWC: user worked crossing

FP/BW: footpath or bridleway crossing

authorised to pass over the crossing until the crossing is closed and Protection from train movements ensures that trains are not the crossing area has been checked to be clear.

train arrives. It is unlikely that the train can be stopped if the crossing Unprotected crossings depend on a warning being given to crossing users of an approaching train so that they can be clear before the is not clear.

achieved by contacting the signaller. For this to be effective the user must make the call and the signaller must be able to advise how purposes. At a UWC (T) the warning of an approaching train is Telephones are fitted to several crossing types for a range of close the nearest train is.

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#### Assessing suitability

2.20 Selecting the most suitable type of level crossing depends on various factors, one of which may be traffic volume. Table 1 gives guidance on the factors to be considered for any given location. In deciding which type of level crossing to install, consider likely road traffic delays. Determine the protection provided at a level crossing by undertaking a suitable and sufficient risk assessment. The following table is a general summary of the different crossing types. For further details see relevant sections in this chapter.

#### Table 1

Section	Type of crossing	Key features
4	Gated crossings operated by railway staff	The <i>traffic moment</i> (see Appendix A) and <i>actual daily road vehicle usage</i> (see Appendix A) should be low. Railway signals interlocked with the gates are required so that it is not possible to clear the signals unless the road is fully closed by the gates, nor is it possible to open the road unless the signals are at Stop and free of <i>approach locking</i> (see Appendix A).
5	Barrier crossings operated by railway staff	Generally suitable for any situation. Railway signals interlocked with the barriers are required so that it is not possible to clear the signals unless the road is fully closed by the barriers, nor is it possible to open the road unless the signals are at Stop and free of approach locking.
5A	Barrier crossings with obstacle detection	This type of crossing is protected by road traffic light signals and lifting barriers on each side of the railway. An audible warning to pedestrians is also provided. The crossing is designed to operate automatically. Railway signals, which provide full protection to the crossing, are required on all railway approaches. These signals must be interlocked with the lifting barriers so that it is not possible to clear the signals unless the road is fully closed by the barriers, nor should it be possible to raise the barriers unless the signals are set at Stop and free of approach locking, or the train has passed the signal and traversed the crossing.

Section	Type of crossing	Key features
6	Automatic half barrier crossings (AHBC)	The speed of trains over the crossing should not exceed 100 mph. There should not be more than two running lines. Appropriate means to stop any train approaching the crossing in an emergency situation are required where reasonably practicable and before a train has passed the last protecting signal. Trains should not normally arrive at the crossing in less than 27 seconds after the amber lights of the road traffic light signals first show. At least 95% of trains should arrive within 75 seconds and 50% within 50 seconds. The carriageway on the approaches to the crossing should be sufficiently wide to enable vehicles to pass safely. There is no limit to the amount of road traffic, but the road layout, profile and traffic conditions should be such that road vehicles are not likely to become grounded or block back obstructing the railway. Good road profile is particularly important at this type of crossing. Not suitable where pedestrian usage is high.
7	Automatic barrier crossings, locally monitored (ABCL)	The speed of the trains over the crossings will be determined by the traffic moment but should not exceed 56 mph at any time. There should not be more than two running lines. The carriageway on the approaches to the crossing should be sufficiently wide to enable vehicles to pass safely. The road layout, profile and traffic conditions should be such that road vehicles are not likely to ground or regularly to block back obstructing the railway.
8	Automatic open crossings, locally monitored (AOCL)	The speed of the trains over the crossings will be determined by the traffic moment but should not exceed 56 mph at any time. There should not be more than two running lines. The limits on the road and rail traffic are defined in Appendix B. The carriageway on the approaches to the crossing should be sufficiently wide to enable vehicles to pass safely. The road layout, profile and traffic conditions should be such that road vehicles are not likely to ground or regularly to block back obstructing the railway.
9	Open crossings	The speed of trains over the crossing should not exceed 10 mph. There should not be more than one line over the crossing. The maximum daily traffic moment should not normally exceed 2000 or the peak hour traffic moment 30. The actual daily road vehicle usage should not exceed 200. The 85 <sup>th</sup> percentile road speed at the crossing should be less than 35 mph. The road layout, profile and traffic conditions should be such that road vehicles are not likely to ground or regularly to block back obstructing the railway.

Section	Type of crossing	Key features			
10	User worked crossings (UWCs) for vehicles	The speed of the trains over the crossing should not exceed 100 mph unless additional protection is provided. These crossings should only be used on private roads. There should not normally be more than two lines over the crossing.			
		Where no additional protection is provided, such as miniature stop lights, the warning period (i.e. arrival time of the train from the first sighting) should be greater than the time required by users to traverse the <i>crossing</i> <i>length</i> (see Appendix A) by not less than 5 seconds.			
11	Footpath and bridleway crossings	The speed of trains over the crossing should not exceed 100 mph unless additional protection is provided. There should not normally be more than two lines over the crossing.			
		The <i>warning time</i> (see Appendix A) should be greater than the time required by users to traverse the crossing surface between the <i>decision points</i> (see Appendix A) at either end of a footpath crossing on foot, or on horseback at a bridleway crossing, unless additional protection is provided.			
		Where miniature stop lights are provided, the warning period should be greater, by not less than 5 seconds, than the time required by users to traverse the crossing surface between the decision points at either end of a footpath crossing on foot, or on horseback at a bridleway crossing.			
12	Foot crossings at stations	This type of crossing should only be considered for lightly used stations where line speed does not exceed 100 mph and no alternative arrangements are available.			

## **General guidance**

2.21 This section gives general guidance on positioning and equipment at all types of crossings.

#### Positioning signalling and other railway infrastructure relative to level crossings

2.22 During normal working, no part of a stationary train should obstruct a level crossing. Where a level crossing is near a station, special arrangements may be necessary.

2.23 Determine by risk assessment where any protecting signals will be sited relative to a level crossing. Assess the likelihood and consequences of trains passing the signals without authority. If it is not possible to optimise the positions of signals, take appropriate measures to reduce the risk so far as is reasonably practicable.

2.24 Provide additional measures to protect road users where a road crosses electrified railway lines. See Section 19 for further advice.

#### Equipment at level crossings

2.25 Consider the likely impact of future uses of both the land and the railway (for example changed line speeds) on sighting and safety before land adjacent to crossings is let or sold off by railway duty holders and apply appropriate restrictive terms.

2.26 Install all crossing equipment clear of the railway structure gauge and the edge of the carriageway. Ensure that it does not obstruct sighting.

2.27 Provide an alternative power supply at all automatic crossings, including those with miniature stop lights, to allow the crossing equipment to function normally in the event of a main power supply failure.

2.28 It may be necessary, where trains run after dark, to illuminate the crossing to enable its safe operation. If the roads to a crossing are lit, the crossing should be illuminated to at least the same standard. Any lighting should not cause glare to either road users or train drivers, interfere with the visibility of railway signals or cause avoidable annoyance to local householders.

2.29 Additional lighting may be necessary at crossings which are locally monitored by the driver of the approaching train. This is to enable the train driver to see that the crossing is unobstructed from the point at which they may have to brake the train.

2.30 Any failure or damage to the equipment at a level crossing, which may lead to incorrect or unsafe operation, should be evident to the *control point*, the driver of an approaching train, or the user of the level crossing within a reasonable time of the event occurring.

## Gated crossings operated by railway staff

#### **General description**

2.31 This type of crossing is protected by gates, on both sides of the railway, which complete the fencing of the railway when closed across the road or the railway. The crossing is manually operated by railway staff who close the gates alternately across the road or the railway.

2.32 The normal position of the gates, either across the road or railway, may be specified in the legislation authorising construction of the line. Changes may be authorised by direction under the Road and Rail Traffic Act 1933. Directions may be issued by ORR on behalf of the Secretary of State. Where the gates do not completely fence in the railway when open to road traffic, cattle-cum-trespass guards may be required (described later in Section 14 'Additional measures to protect against trespass').

2.33 Road traffic light signals may be provided to assist with the safe operation of the gates. Where they are not provided, red lamps and red retro-reflective targets mounted on the gates, which show towards approaching road traffic when the gates are across the road, should be provided.

#### **Method of operation**

2.34 The gates may be operated by either:

(a) infrastructure manager staff, who are permanently stationed at a control point, sufficiently close to have a clear view to enable safe operation of the crossing; or

(b) one of the crew of an approaching train (or other peripatetic staff) at a control point adjacent to the level crossing, after the train has been stopped short of the crossing.

2.35 The person operating the gates should have a good view of the whole crossing area and, unless road traffic light signals are provided, approaching road traffic.

2.36 Road traffic light signals, where provided, should be activated before any attempt is made to close the gates to road traffic. The lights should continue to show until the gates are fully closed across the railway.

2.37 The crossing operator should have an appropriate indication of the approach of trains and clear instructions as to when the gates should be closed to road traffic.

2.38 Where the crossing is operated by a member of train crew, the train must stop short of the crossing to allow the person to close the gates to road traffic. The train may then only proceed over the crossing when the train driver receives the authority from the person operating the gates. When the train has cleared the crossing the gates should be reopened to road traffic.

#### **Railway signalling and control**

2.39 Provide railway signals which afford full protection to the crossing on all railway approaches. These signals should be interlocked with the gates so that it is not possible to clear the signals unless the road is fully closed by the gates, nor should it be possible to open the gates unless the signals are set at Stop and free of approach locking, or the train has passed the signal and cleared the crossing.

2.40 Where road traffic light signals are provided, a train passing a protecting railway signal at Stop should immediately cause the intermittent road traffic light signals to flash red, omitting the steady amber phase. Where a protecting railway signal is very close to a level crossing, this emergency warning to road users may be very short. Additional measures may be necessary, therefore, to ensure that the crossing is closed to road traffic before the train reaches the immediate vicinity of the crossing. Such additional measures may be specified in a level crossing order.

2.41 Where trains are required to stop short of the crossing, interlocking between signalling and gates is not required. Instead, provide a warning board at full service braking distance to remind the train driver to stop short of the crossing and a Stop board at the stopping point. The Stop board should not normally be less than 50 m before the crossing.

## Barrier crossings operated by railway staff

#### **General description**

2.42 This type of crossing is protected by road traffic light signals and lifting barriers on both sides of the railway. An audible warning to pedestrians is also provided. The barriers are normally kept in the raised position and, when lowered, extend across the whole width of the carriageway on each approach.

2.43 The crossing is operated by infrastructure manager staff who start the road traffic light signal sequence and then lower the barriers. The lowering and raising cycles may be initiated automatically.

2.44 Road traffic light signals may not be necessary where the barriers are normally in the lowered position and are clearly visible from an appropriate distance to approaching road traffic. Where no road traffic light signals are provided, the number of road vehicles during the peak hour should not exceed 20 and the permissible speed of the railway should not exceed 100 mph.

2.45 Telephones for public use are not normally required.

#### Method of operation

2.46 This type of crossing may be operated:

(a) by infrastructure manager staff stationed at a control point adjacent to the crossing when the line is open to rail traffic;

(b) by infrastructure manager staff stationed at a control point remote from the crossing using closedcircuit television (CCTV), whenever the line is open to rail traffic;

(c) by infrastructure manager staff at a control point adjacent to the crossing after an approaching train has been stopped short of the crossing.

2.47 For all methods of operation the person operating the crossing equipment should have a clear and full view of the crossing (including the barriers) from the control point, either directly or by CCTV.

2.48 Where the barriers are normally raised, the sequence of events to close the crossing to road traffic, once the lowering cycle has been initiated either manually or automatically, is:

(a) the amber light on each of the road traffic light signals immediately shows and the audible warning begins. The amber lights should show for approximately 3 seconds (up to 5 seconds to suit road conditions);

(b) immediately the amber lights are extinguished, the intermittent red lights should show;

(c) approximately 4 to 6 seconds later the barriers should start to descend. Where pairs of barriers are provided, the *right-hand side* (see Appendix A) barriers should not begin to descend until the *left-hand side* (see Appendix A) barriers are fully down. The time for each barrier to reach the lowered position should normally be 6 to 10 seconds. At skew crossings, where the crossing distance is greater, barrier timings may need to be lengthened accordingly. The closure sequence should be monitored by the operator, particularly if queuing vehicles or heavy usage by pedestrians is likely to increase risk;

(d) the audible warning for pedestrians should stop when all the barriers are fully lowered;

(e) the intermittent red lights should continue to show; and

(f) the crossing should be viewed carefully to ensure that there are no persons or obstructions present, before 'crossing clear' is confirmed and railway signals cleared for the passage of trains

2.49 The sequence of events to open the crossing to road traffic, once the raising cycle has been initiated either manually or automatically, is:

(a) all the barriers begin to rise simultaneously and should normally rise in 4 to 10 seconds; and

(b) the intermittent red lights should be extinguished as the barriers rise.

2.50 Where barriers lower automatically, they should not lower unless at least one red light in all the road traffic light signals is shown in each direction from which users may approach the crossing. If CCTV monitoring is provided, initiation of automatic lowering should switch on the CCTV monitor and give an audible indication at the control point.

2.51 Where automatic lowering is used, provide two barriers on each approach to avoid road users becoming trapped on the crossing.

2.52 Once the barriers have started to descend, the lowering cycle is completed in the normal sequence even if all the red road traffic light signals facing in one direction fail. The barriers may then be raised when it is safe to do so. Where, in these circumstances, the barriers have not started to descend, they should remain in the raised position.

2.53 Barriers should rise as soon as practicable after all trains for which the lower sequence has been initiated or maintained, have passed clear of the crossing.

#### **Railway signalling and control**

2.54 Provide railway signals, to fully protect the crossing, on all railway approaches. Interlock these signals with the lifting barriers so that it is not possible to clear the signals unless the road is fully closed by the barriers. It should not be possible to raise the barriers unless the signals are set at Stop and are free of approach locking, or the train has passed the signal and traversed the crossing.

2.55 Where the barriers are power operated, there should be controls at the control point to raise, stop, and lower the barriers. It should not be possible to clear any protecting signals until a further control to confirm 'crossing clear' has been operated with the barriers down.

2.56 If a train passes a protecting signal at Stop, the road traffic light signals should immediately show an intermittent red light (omitting the steady amber phase), and the audible warning should start. The barriers should not be lowered as this may strike or trap crossing users.

2.57 If the crossing is operated by one of the crew of an approaching train (or other peripatetic staff), after the train has been stopped short of the crossing, interlocking between the signalling and barriers is not required. Instead, a warning board is to be provided at full service braking distance from a stop board placed at a suitable point, not normally less than 50 m, before the crossing to remind the train driver to stop short of the crossing. The control point should be placed adjacent to the crossing.

2.58 To ensure that the crossing operates safely when the railway line is open to traffic, indicators at the control point should confirm that the equipment is powered and functioning correctly.

### Barrier crossings with obstacle detection

#### **General description**

2.59 This type of crossing is protected by road traffic light signals and lifting barriers on each side of the railway. An audible warning to pedestrians is also provided. The barriers are normally kept in the raised position, and when lowered, extend across the whole width of the carriageway on each approach. (*Obstacle detection equipment* (see Appendix A) may be appropriate to reduce risk at other types of level crossing).

2.60 The crossing normally operates automatically. The closure sequence, described below, is initiated by approaching trains. Confirmation that the crossing is clear, and that railway signals may be cleared for the passage of trains, is provided automatically following a thorough scan for any significant obstruction, by obstacle detection equipment.

2.61 Telephones for emergency public use should be provided.

2.62 Equipment provided should enable the crossing to be operated manually, for example from a remote control point using CCTV. Manual operation may be necessary when a persistent obstruction is detected, when obstacle detection equipment is not in use, and for periodic monitoring of crossing usage and suitability.

2.63 This type of crossing may be suitable at sites where road traffic flows freely, road lay-out is simple and there is no significant history of misuse. Risk assessment should, in particular, consider how the risks from blocking-back of road traffic and high or problematic pedestrian usage will be controlled.

#### **Method of operation**

2.64 The sequence of events to close the crossing to road traffic, once the lowering cycle has been initiated, is:

(a) the amber light on each of the road traffic light signals immediately shows and the audible warning begins. The amber lights show for approximately 3 seconds (up to 5 seconds to suit road conditions);

(b) immediately the amber lights are extinguished, the intermittent red lights should show;

(c) approximately 4 to 6 seconds later the left-hand barriers should start to descend. Once the left-hand side barriers are lowered, a scan of the crossing area is performed by the obstacle detector. If the crossing is clear, the right-hand barriers will begin to descend immediately. If an obstacle is detected, and in order that it may clear the crossing, there will be an interval before the right-hand side barriers may begin to descend. The time for each barrier to reach the lowered position should normally be 6 to 10 seconds. At skew crossings, where the crossing distance can be greater, barrier timings may need to be lengthened accordingly;

(d) it should not be possible to lower the barriers unless at least one red light in each road traffic light signal facing approaching road traffic is working;

(e) once the barriers have started to descend, the lowering cycle should be completed in the normal sequence even if all the red lamps in any one of the road traffic light signals facing approaching road traffic fail. The barriers may then be raised when it is safe to do so. Where, in these circumstances, the barriers have not started to descend, they should remain in the raised position;

(f) the audible warning for pedestrians should stop when all the barriers are fully lowered;

(g) the intermittent red lights should continue to show; and

(h) the crossing is again scanned by the obstacle detector. A clear scan, confirming 'crossing clear', is required before railway signals can be cleared for the passage of trains.

2.65 Barriers should rise as soon as practicable after all trains for which the lower sequence has been initiated or maintained, have passed clear of the crossing.

2.66 The sequence of events to open the crossing to road traffic, once the raising cycle has been initiated or maintained is:

(a) all the barriers begin to rise simultaneously and should normally rise in 4 to 10 seconds; and

(b) the intermittent red lights should be extinguished as the barriers rise.

#### **Railway signalling and control**

2.67 Provide railway signals, to fully protect the crossing, on all railway approaches. Interlock these signals with the lifting barriers so that it is not possible to clear the signals unless the road is fully closed by the barriers, nor should it be possible to raise the barriers unless the signals are set at Stop and free of approach locking, or the train has passed the signal and traversed the crossings.

2.68 It should not be possible to clear any protecting signals until 'crossing clear' is confirmed either automatically by obstacle detection equipment, or manually when that equipment is not being used.

2.69 Provide discrete function controls at the control point for use when obstacle detection equipment is not being used.

2.70 If a train passes a protecting signal at Stop, the road traffic light signals should immediately show an intermittent red light (omitting the steady amber phase) and the audible warning should start. The barriers should not be lowered as this may strike or trap crossing users.

2.71 To ensure that the crossing operates safely when the railway line is open to traffic, indicators at the control point should confirm that the equipment is powered and functioning correctly.

## Automatic half barrier crossings (AHBC)

#### **General description**

2.72 This type of crossing is protected by road traffic light signals and a lifting barrier on both sides of the railway. Audible warning to pedestrians is also provided. Lifting barriers are normally kept in the raised position and pivoted on the left-hand side of the road. When lowered, the barriers only extend across the entrances to the crossing leaving the exits clear.

2.73 The crossing equipment is activated automatically by an approaching train. The lowering of the barriers is preceded by the display of road traffic light signals. The period between the initial display of the road traffic light signals and the arrival of the fastest train should be sufficiently long to enable road vehicles and pedestrians to clear the crossing.

2.74 Telephones for public use, including those who are required to phone for permission to cross, are normally provided near each road traffic light signal on the right-hand side of the road. The telephones are connected to a *supervising point* (see Appendix A), which must always be open when the railway line is open.

2.75 The supervising point should have appropriate means to stop any train approaching the crossing, and means of communicating with railway staff operating the crossing equipment locally at the crossing in an emergency or abnormal situation.

#### **Method of operation**

2.76 Provide equipment to initiate crossing operation on each track and for each direction that trains may approach. The crossing equipment is activated automatically by a train as it approaches the crossing.

2.77 The time between the amber light on each of the road traffic light signals starting to show and the train arriving at the crossing should be at least 27 seconds. The train should pass as soon after 27 seconds as possible. At least 95% of trains should arrive within 75 seconds and 50% within 50 seconds, once the closing sequence has begun. Where the crossing length is longer than 15 m, the 27 seconds should be increased by 1 second for every additional 3 m of crossing length.

2.78 In certain circumstances at *predictor crossings* (see Appendix A) in abnormal circumstances an accelerating train could arrive at the crossing slightly sooner than 27 seconds after initiation of the amber road traffic light signal. This may be acceptable at crossings where it can be shown that the likelihood of an 'early arrival' is very low. No trains should arrive at a crossing in less than 22 seconds after initiation of the road traffic light signals. If 'early arrival' is foreseeable, for example for trains accelerating from a station, arrangements should be modified accordingly.

2.79 The sequence of events to close the crossing to road traffic is:

(a) the amber light on each of the road traffic light signals immediately shows and an audible warning for pedestrians begins. The lights should show for approximately 3 seconds (up to 5 seconds to suit road conditions, which will lengthen the time between amber light and train arrival);

(b) immediately the amber lights are extinguished the intermittent red lights should show; and

(c) approximately 4 to 6 seconds later the barriers should start to descend and take a further 6 to 10 seconds to reach the lowered position. At skew crossings, where the crossing distance can be increased greatly, barrier timings may need to be lengthened accordingly to enable slow-moving road users to clear the crossing.

2.80 Barriers should rise as soon as practicable after the train has passed unless another approaching train is so close that a minimum of 10 seconds *road open time* (see Appendix A) cannot be achieved. In this situation the barriers should remain lowered and the intermittent red lights should continue to flash. The audible warning should change in character after the first of the trains arrives at the crossing. The change in character should be timed so as to be detectable by pedestrians at the crossing.

2.81 Both barriers should begin to rise simultaneously. This should normally take 4 to 10 seconds to reach the raised position. The intermittent red traffic light signals should continue to show and the audible warning for pedestrians continue to sound, until the barriers begin to rise.

2.82 If both intermittent red lights in any of the road traffic light signals fail, the barrier should remain lowered. If there is a total power failure, the barriers should fall and remain lowered. If either barrier fails to reach the lowered position, neither barrier should rise until both have been fully lowered. If either barrier fails to rise from the lowered position, the intermittent red traffic light signals should continue to show.

#### **Railway signalling and control**

2.83 Appropriate means are required to stop trains approaching the crossing in an emergency situation.

2.84 Should a train pass a signal at Stop located between a *strike-in point* (see Appendix A) and the crossing, the road traffic light signals should immediately show an intermittent red light, omitting the steady amber phase. The audible warning for pedestrians should begin and the barriers start to lower.

2.85 Where trains may be required to stop because railway signals or stations lie within or close to the strike-in points, the sequence of events to close the crossing to road traffic may be initiated:

(a) automatically by an approaching train where stopping times of trains at a station can be predicted reasonably accurately and the time taken for trains to arrive at the crossing are within those indicated in paragraph 77;

(b) by a means that is only effective when the presence of a train is detected, for example a train crewoperated plunger linked with the train detection system. (This may be used where stopping times of trains cannot be reasonably predicted); or

(c) automatically by an approaching train where a Stop signal is provided between the strike-in point and the crossing, and is interlocked with the signalling system using a 'stopping/non-stopping' control.

2.86 Provide arrangements for local operation of the crossing equipment, with effective means to prevent unauthorised use.

2.87 To ensure that the crossing operates safely when the railway line is open to traffic, indicators at the control point should confirm that the equipment is powered and functioning correctly.

## Automatic barrier crossings locally monitored (ABCL)

#### **General description**

2.88 This type of crossing appears, to the road user, to be similar to an automatic half barrier crossing. It is protected by road traffic light signals and a single lifting barrier on both sides of the railway. Audible warning to pedestrians is also provided. Lifting barriers are normally kept in the raised position and pivoted on the left-hand side of the road. When lowered, the barriers only extend across the entrances to the crossing leaving the exits clear. The period between the initial display of the road traffic light signals and the arrival of the fastest train should be sufficiently long to enable road vehicles and pedestrians to clear the crossing.

2.89 The crossing equipment is normally initiated automatically by an approaching train. The operation of the crossing equipment and the absence of obstruction on the crossing are monitored by the driver of an approaching train.

2.90 Train drivers are required to stop their trains short of the crossing unless they have received an indication that the crossing equipment is functioning correctly and have observed that the crossing is clear.

2.91 Consider providing telephones for public use. Where provided these should be connected to a supervising point which is always open when the railway line is open. Where no telephones are provided, provide signs on each side of the crossing, giving the name of the crossing and the public telephone number of a supervising point, which is always open when the railway line is open.

2.92 Staff at a supervising point should have:

- (a) control of all train movements over the crossing;
- (b) a means to communicate with railway staff operating the crossing equipment locally at the crossing:
  - (i) in an emergency; or
  - (ii) in an abnormal situation; and
- (c) a means of communicating with the train driver approaching the crossing.

#### **Method of operation**

2.93 The crossing equipment is activated automatically by a train as it approaches the crossing. The sequence of events to close the crossing to road traffic is:

(a) the amber light on each of the road traffic light signals immediately shows and an audible warning for pedestrians begins. The lights should show for approximately 3 seconds (up to 5 seconds to suit road conditions);

(b) immediately the amber lights are extinguished the intermittent red lights should show; and

(c) approximately 4 to 6 seconds later the barriers should start to descend and take a further 6 to 10 seconds to reach the lowered position.

2.94 At least 95% of trains should arrive within 75 seconds and 50% within 50 seconds, once the sequence of events to close the crossing to road traffic has begun.

2.95 Train drivers must be able to bring their train to a stand short of the crossing from the point where they can observe the crossing to be clear and observe an indication that the crossing equipment is functioning

correctly. Consider whether crossings longer than 15m might require an extended sequence to ensure that the crossing is clear before the train reaches the point where the driver has to start braking.

2.96 Barriers should rise, the road light signals should cease to show, and the audible warning should stop immediately, unless another approaching train is so close that a minimum of 10 seconds road open time cannot be achieved. In this situation the barriers should remain lowered and the intermittent red lights should continue to flash. The audible warning should change in character after the first of the trains arrives at the crossing. The change in character should be timed so as to be detectable by pedestrians at the crossing.

2.97 Both barriers should begin to rise simultaneously. This should normally take 4 to 10 seconds to reach the raised position. The intermittent red traffic light signals should continue to show and the audible warning for pedestrians continue to sound, until the barriers begin to rise.

2.98 Trains normally approach the crossing at a steady speed, known as the crossing speed, so that they can be halted short of the crossing from the point at which it clearly comes into the train driver's view. Preferably, trains should not stop before passing over a crossing unless it is not practicable to arrange otherwise, for example where a crossing lies immediately beyond a station platform.

2.99 If both intermittent red lights in any of the road traffic light signals fail, the barriers should continue to operate normally. If there is a total power failure, the barriers should remain in the raised position.

2.100 If the crossing remains closed for longer than could be caused by passing trains, it should automatically reopen to road traffic. The indication to the train driver that all the crossing equipment is functioning correctly should be extinguished at least 30 seconds before the road traffic light signals cease to flash and the barriers start to rise. An automatic reset function should be provided.

2.101 In the event of a failure of the main power supply (other than a momentary loss), the indication to the train driver that all the crossing equipment is functioning correctly should not be displayed. The road traffic light signals and the barriers should continue to operate normally.

#### **Railway signalling and control**

2.102 The indication that the crossing equipment is functioning correctly should only be displayed when the barriers have begun to descend, and at least one of the intermittent red lights of each road traffic light signal is lit, and the main power supply is functioning normally (other than a momentary loss).

2.103 The indication must be visible to approaching train drivers when they reach the decision point (marked by a special speed restriction board) where braking needs to commence, if it is necessary to stop short of the crossing.

2.104 Any railway signals which lie between the strike-in point and the crossing should not give information which conflicts with the indication given to the train driver that the crossing equipment is functioning correctly. On a double-track line, bi-directional control to initiate the crossing equipment is normally required.

2.105 Where trains are not required to stop before passing over the crossing, the sequence of events to close the crossing to road traffic should be initiated automatically by approaching trains.

2.106 A special speed restriction board is required at the point from which the crossing speed begins. This board may display different *crossing speeds* for different types of trains.

2.107 An advance warning board is required at a distance from the special speed restriction board which enables trains to slow down to the crossing speed. If the crossing speed is the same as the line speed, the advance warning board should normally be 100 m on the approach to the special speed restriction board.

2.108 Where all trains are required to stop at a station between the strike-in point and the crossing, a stop board should be located at least 50 m from the crossing and an advance warning board or fixed distant signal erected at the service braking distance from the stop board. The sequence of events to close the crossing to road traffic may be initiated either:

(a) automatically by an approaching train, where stopping times of trains at a station can be predicted reasonably accurately and the times taken for trains to arrive at the crossing are within those indicated in paragraph 2.94; or

(b) by a means that is only effective when the presence of a train is detected, for example a train crewoperated plunger linked with the train detection system.

2.109 Where not all trains are required to stop at a station between the strike-in point and the crossing, the sequence of events to close the crossing to road traffic may be initiated either:

(a) automatically by an approaching train where a Stop signal is provided between the strike-in point and the crossing, and is interlocked with the signalling system using a 'stopping/non-stopping' control; or

(b) automatically by an approaching train where stopping times of trains at a station can be predicted reasonably accurately and the times taken for trains to arrive at the crossing are within those indicated in paragraph 2.94.

2.110 Provide arrangements for local operation of the crossing equipment, with effective means to prevent unauthorised use.

## Automatic open crossings locally monitored (AOCL)

#### **General description**

2.111 This type of crossing has no barriers but is protected by road traffic light signals and an audible warning for pedestrians. The period between the initial display of the road traffic light signals and the arrival of the fastest train should be sufficiently long to enable road vehicles and pedestrians to clear the crossing.

2.112 The crossing equipment is normally initiated automatically by an approaching train. The operation of the crossing equipment and the absence of obstruction on the crossing are monitored by the driver of an approaching train.

2.113 Train drivers are required to stop their trains short of the crossing unless they have received an indication that the crossing equipment is functioning correctly and have observed that the crossing is clear.

2.114 Provide signs on each side of the crossing, giving the name of the crossing and the public telephone number of a supervising point, which is always open when the railway line is open. Telephones for public use are not normally provided.

2.115 Staff at a supervising point should have:

(a) control of all train movements over the crossing;

- (b) a means to communicate with railway staff operating the crossing equipment locally at the crossing.
  - (i) in an emergency; or
  - (ii) in an abnormal situation; and

(c) a means of communicating with the train driver approaching the crossing.

#### Method of operation

2.116 The crossing equipment is activated automatically by a train as it approaches the crossing. The sequence of events to close the crossing to road traffic is:

(a) the amber light on each of the road traffic light signals immediately shows and an audible warning for pedestrians begins. The lights should show for approximately 3 seconds (up to 5 seconds to suit road conditions ); and

(b) immediately the amber lights are extinguished the intermittent red lights should show.

2.117 At least 95% of trains should arrive within 75 seconds and 50% within 50 seconds, once the sequence of events to close the crossing to road traffic has begun.

2.118 Train drivers must be able to bring their train to a stand short of the crossing from the point where they can observe the crossing to be clear and observe an indication that the crossing equipment is functioning correctly. Consider whether crossings longer than 15m might require an extended sequence to ensure that the crossing is clear before the train reaches the point where the driver has to start braking.

2.119 The road traffic light signals should cease to show and the audible warning should stop immediately, unless another approaching train is so close that a minimum of 10 seconds road open time cannot be achieved. In this situation the intermittent red lights should continue to flash. The audible warning should change in character after the first of the trains arrives at the crossing. The change in character should be timed so as to be detectable by pedestrians at the crossing. Consider whether other means of warning such as flashing signs showing the words 'Another train coming' might also be required.

2.120 Trains normally approach the crossing at a steady speed, known as the crossing speed, so that they can be halted short of the crossing from the point at which it clearly comes into the train driver's view. Preferably, trains should not have to stop before passing over a crossing unless it is not practicable to arrange otherwise, for example if a crossing lies immediately beyond a station platform.

2.121 If the crossing remains closed for longer than could be caused by passing trains, it should automatically reopen to road traffic. The indication to the train driver that all the crossing equipment is functioning correctly should be extinguished at least 30 seconds before the road traffic light signals cease to flash. An automatic reset function should be provided.

2.122 In the event of a failure of the main power supply (other than a momentary loss), the indication to the train driver that all the crossing equipment is functioning correctly should not be displayed. The road traffic light signals should continue to operate normally.

#### **Railway signalling and control**

2.123 The indication that the crossing equipment is functioning correctly should only be displayed when at least one of the intermittent red lights of each road traffic light signal is lit and the main power supply is functioning normally (other than a momentary loss).

2.124 The indication must be visible to approaching train drivers when they reach the decision point (marked by a special speed restriction board) where braking needs to commence if it is necessary to stop short of the crossing.

2.125 Any railway signals which lie between the strike-in point and the crossing should not give information which conflicts with the indication given to the train driver that all the crossing equipment is functioning correctly. On a double-track line, bi-directional control to initiate the crossing equipment is normally required.

2.126 Where trains are not required to stop before passing over the crossing, the sequence of events to close the crossing to road traffic should be initiated automatically by approaching trains. A special speed restriction board is required at the point from which the crossing speed begins. This board may display different crossing speeds for different types of trains.

2.127 An advance warning board is required at a distance from the special speed restriction board which enables trains to slow down to the crossing speed. If the crossing speed is the same as the line speed, the advance warning board should normally be 100 m on the approach to the special speed restriction board.

2.128 Where all trains are required to stop at a station between the strike-in point and the crossing, a stop board should be located at least 50 m from the crossing and an advance warning board or fixed distant signal erected at service braking distance from the stop board. The sequence of events to close the crossing to road traffic may be initiated either:

(a) automatically by an approaching train where stopping times of trains at a station can be predicted reasonably accurately and the time taken for trains to arrive at the crossing is within those indicated in paragraph 117; or

(b) by a means that is only effective when the presence of a train is detected, for example a train crewoperated plunger linked with the train detection system.

2.129 Where not all trains are required to stop at a station between the strike-in point and the crossing, the sequence of events to close the crossing to road traffic may be initiated either:

(a) automatically by an approaching train where a Stop signal is provided between the strike-in point and the crossing, and is interlocked with the signalling system using a 'stopping/non-stopping' control; or

(b) automatically by an approaching train, where stopping times of trains at a station can be predicted reasonably accurately and the time taken for trains to arrive at the crossing are within those indicated in paragraph 2.117.

2.130 Additionally, where the station is between the strike-in point and the crossing, and a Stop signal is not provided between the station and the crossing, the sequence of events to close the crossing to road traffic may be initiated automatically by an approaching train if:

- (a) the railway is a single line;
- (b) the actual daily road vehicle usage is less than about 2000;
- (c) not more than 10% of trains stop at the station; and
- (d) station stops are of short duration.

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2.131 Provide arrangements for local operation of the crossing equipment, with effective means to prevent unauthorised use.

## **Open crossings**

#### **General description**

2.132 This type of crossing does not have barriers or road traffic light signals. Only road traffic signs are provided. **Road users must give way to trains at the crossing.** Road users can see approaching trains in sufficient time for them to be able to cross the railway or stop safely. Train drivers are required to stop trains short of the crossing unless they have observed that the crossing is clear. Train drivers are also required to sound the train's horn as appropriate.

2.133 Telephones for public use are not necessary. Provide signs on each side of the crossing, giving the name of the crossing and the public telephone number of a supervising point, which is always open when the railway line is open.

#### **Method of operation**

2.134 Trains normally approach the crossing at a steady speed, known as the crossing speed, so that trains can be halted short of the crossing from the point at which it clearly comes into the train driver's view. Preferably, trains should not have to stop before passing over a crossing unless it is not practicable to arrange otherwise.

2.135 Trains are required to stop before proceeding over the crossing where:

(a) road users cannot see approaching trains across the viewing zones (defined in Appendix C); or

(b) the train driver cannot see the crossing from the point at which the brake should be applied to stop short of the crossing.

2.136 Trains are not required to stop again before proceeding over the crossing where:

(a) the train has stopped at a station platform on the approach to the crossing; or

(b) the train has already stopped for other reasons at a point from which the train driver can see the crossing.

#### **Railway signalling and control**

2.137 Where trains are not required to stop before passing over the crossing, a combined speed restriction and whistle board should be provided at a point from which the crossing speed begins. This board displays the crossing speed of 10 mph for all types of trains.

2.138 An advance warning board is required at the distance from the combined speed restriction and whistle board which enables trains to reduce their speed to the crossing speed. If the crossing speed is the same as the line speed, the advance warning board should normally be placed 100 m on the approach to the special speed restriction board.

2.139 Where all trains are required to stop before passing over the crossing, a stop board should be located at least 25 m from the crossing and an advance warning board or fixed distant signs erected at the service braking distance from the stop board.

## User worked crossings (UWCs) for vehicles

#### **General description**

2.140 This type of crossing is normally protected by gates, or lifting barriers on both sides of the railway. The gates, normally closed across the road and hung so as to open away from the railway, are operated by the users. Barriers are normally closed across the road. Signs explaining how to use the crossing safely, including when to use any telephones, are displayed to road users on each side of the crossing.

2.141 When designing and operating any type of user worked crossing it is essential that the actual use of the crossing, the type of vehicles, equipment and activities and the frequency are properly understood. This will normally require effective dialogue with the crossing users during design and at appropriate intervals to ensure that the crossing remains suitable. Joint risk assessment with users may be appropriate.

2.142 Users should have sufficient time from first seeing an approaching train, or otherwise being made aware of the approach of a train with the aid of additional protective equipment, to cross safely. The decision point should be at least 3 m from the nearest running rail.

2.143 Additional protective equipment may not be required if the minimum warning time is available. The minimum warning period should be determined by risk assessment of crossing usage and be at least 5 seconds longer than the time required to cross. Assessments should involve the crossing users and be recorded.

2.144 In assessing the time required to cross, consider:

(a) the type and characteristics of vehicles, equipment or animals likely to go over the crossing;

(b) the surface of the crossing and its immediate approaches; and

(c) the position at which a vehicle, after going over the crossing, would be clear of the railway or gate on the far side.

'Example:

Crossing distance (from decision point to decision point) 12 m

Longest/slowest vehicle likely to use the crossing 18 m at 1.5 m per second

Total distance = crossing distance + vehicle length (to ensure vehicle clear of crossing) In this case the total distance is 30 m

Crossing time at 1.5 m/s = 20 seconds

Add to this the 5 second safety margin and the minimum warning period for the crossing in this example is 25 seconds

2.145 Additional protective equipment that may be provided includes:

(a) miniature stop lights, as described in Section 18, on both sides of the crossing, especially where:

(i) the minimum warning time of trains cannot be obtained and the actual daily road vehicle usage exceeds 100; or

(ii) the provision of a telephone is impractical because it is difficult to provide reliable information concerning the whereabouts of trains, or the information supplied would be so restrictive that it would be likely to cause the user to become unduly impatient and to cross without permission; or

(iii) use of a telephone would cause excessive workload for the crossing operator; or

(iv) the line speed exceeds 100 mph.

(b) subject to the limitations noted above, telephones, on both sides of the crossing and connected to a supervising point, which is always open when the railway line is open, where:

(i) the minimum warning time of trains cannot be obtained;

(ii) there is known regular use by animals on the hoof;

(iii) fog is prevalent.

(c) audible warnings of the trains (preferably generated at the crossing itself). Where train speeds are low and the service infrequent, whistle boards positioned not more than 400 m from the crossing may help give warning of a train's approach.

2.146 To achieve the required warning time, it may be necessary to reduce the train speed over the crossing.

2.147 Telephones are not a preferred option. Where telephones are provided, vehicle drivers must follow instructions given. In some circumstances, it may also be necessary for other types of user, for example pedestrians, to telephone before crossing. Signs should make this clear.

2.148 Where miniature stop lights are provided, clear instructions should be provided for users. If lights are defective, users should be instructed to telephone the crossing operator and a contact number should be provided if there is no crossing telephone.

### Footpath and bridleway crossings

#### **General description**

2.149 This type of crossing is found where the railway crosses a footpath or bridleway. Footpaths and bridleways are those which:

(a) are shown on definitive maps and statements maintained under Part III of the Wildlife and Countryside Act 1981; or

(b) have come into being following public path creation agreements or public path creation orders under Part III of the Highways Act 1980; or

(c) otherwise exist as either public or private rights of way.

2.150 Users are expected to use reasonable vigilance to satisfy themselves that no trains are approaching before they start to cross the line. They should cross quickly and remain alert whilst crossing. Users should have sufficient time from first seeing, or being warned of, an approaching train to cross safely.

2.151 Footpath crossings should be protected by a stile or self-closing wicket gate on both sides of the railway. They should not have a gate on one side and a stile on the other, nor different widths or types of gates. Stiles and kissing gates may not be appropriate at crossings where the use of bicycles, pushchairs, wheelchairs, etc. is foreseeable.

2.152 Bridleway crossings should be protected by a self-closing wicket gate on both sides of the railway. Unless required to dismount, it should be possible for a mounted horse rider to open the gates without dismounting.

2.153 Riders may be required to dismount because of the presence of overhead live conductors. Otherwise, assume that horse riders will remain mounted while crossing. Make allowances for young or inexperienced riders to lead their mounts. Consider whether cyclists use the crossing. Where appropriate, take measures to encourage cyclists to dismount.

2.154 At bridleway crossings, the gate should be at the decision point . Where this is not practicable, there should be sufficient space to allow a person on horseback to make a decision from a place of safety.

2.155 A sign explaining how to cross safely should be displayed at the decision point on each side of the crossing. For footpath crossings this should be not less than 2 m from the nearest running rails or 3 m where the line speeds are higher than 100 mph. For bridleway crossings this should not be less than 3m from the nearest running rail.

2.156 Where this type of crossing passes over multiple tracks and space between tracks exists so that a fenced, safe waiting place can be created for users, the crossing on each side of the safe waiting place should be treated as a separate crossing. A chicane may be provided on the crossing to make the position of the safe waiting place clear. Appropriate instructions to the users must be provided at appropriate points.

2.157 The minimum width between fences guiding users to the decision point or safe waiting area should be 1 m for footpath crossings. For bridleway crossings the minimum width should be 3m. These widths may need to be increased depending on user requirements.

2.158 Care should be taken not to provide misleading displays to crossing users. Where, for instance, miniature stop lights are provided on one part of a multiple track crossing, they should be provided on all parts of the crossing.

2.159 At a user worked crossing which is subject to additional footpath or bridleway crossing rights, stiles or separate gates for use by the pedestrians or riders should be provided. Vehicular gates may be locked shut and restricted to authorised private usage.

#### Method of operation

2.160 The warning time should be greater than the time required by users to cross between the decision points at either end of a crossing. In assessing how quickly users will cross, take account of the mobility of likely users and the type of crossing surface.

2.161 As a guide, a walking speed of 1.2 metres per second (m/s) may be used where the surface is level and close to rail level. In other cases 1 m/s may be more appropriate. Increase the calculated time to cross to take account of foreseeable circumstances such as impaired mobility of users, numbers of pushchairs and bicycles or where there is a slope or step up from the decision point.

2.162 Where the warning time is insufficient, additional protective equipment should be provided and may include:

(a) miniature stop lights as described in Section 18;

(b) telephones provided on both sides of the crossing and connected to a supervising point, which is always open when the railway line is open; or

(c) audible warnings of trains (preferably generated at the crossing itself). Where train speeds are low and the service infrequent, whistle boards positioned not more than 400 m from the crossing may help give warning of a train's approach.

- 2.163 Where whistle boards are considered, take account of:
  - (a) the speed of sound (330 m/s) and the speed of the train;
  - (b) the possibility that train drivers will not sound the horn, especially at certain times of the day or night;
  - (c) the possibility that train horns may be inaudible at the crossing because of background noise; and
  - (d) the possible impact of train horn noise on nearby residents.

2.164 Where whistle boards are provided, they are normally required on all railway approaches. The time between first hearing a horn and arrival of a train should be the same for trains travelling in either direction.

## Foot crossings at stations

#### **General description**

2.165 This type of crossing is found between platforms at stations and may be the only route between platforms or the only practicable route for people who cannot use steps.

2.166 Only consider this type of crossing for lightly used stations where line speed does not exceed 100 mph and no alternative arrangements are available.

#### Method of operation

2.167 Where passengers are always escorted by railway staff, an established form of protection is a white light, extinguished 40 seconds before the arrival of trains. A sign reading "Caution – Cross only when light shows" is placed adjacent to the white light.

2.168 Where unescorted passengers may cross, miniature stop lights are the preferred protection method. The red light should show 40 seconds before the arrival of any train. An audible warning should be provided. Where the warning is for two or more trains approaching, the character or tone of the warning sound should change distinctively after the first train arrives at the crossing. Appropriate instructions should be provided.

### Provision for pedestrians at public vehicular crossings

2.169 Appropriate provision should be made for pedestrians, taking account of the number and frequency of pedestrians and trains, at all public vehicular level crossings.

2.170 Where the approach roads are provided with a footway on either or both sides of the road, a footway or footways of adequate width should continue over the crossing. There should be sufficient space, taking into account the volume and nature of the users, for pedestrians to pass each other without the need to use part of the carriageway reserved for road vehicles. Allowance should be made for the needs of those with pushchairs and in wheelchairs.

2.171 Any footway should be made up to the level of the carriageway and maintained in a good and even condition.

#### **Road markings**

2.172 Provide longitudinal road markings along each edge of any footway, to delineate the required width and define the safe route for pedestrians walking over the crossing.

2.173 Clearly mark out a safe place for pedestrians to stand when crossings are closed to road traffic on any footways approaching an automatic or open crossing.

#### Audible warnings

2.174 Provide audible warning devices at all automatic crossings and barrier crossings operated by railway staff, so that pedestrians on or approaching the crossing are given adequate warning of the closure of the crossing. Devices should be capable of volume adjustment to suit local requirements.

2.175 Where road traffic light signals are provided, the warning sound should begin when the amber lights first show. At all automatic open or half barrier crossings, the warning sound continues until the intermittent red lights are extinguished. At barrier crossings operated by railway staff, the warning sound stops when the barriers are fully lowered.

2.176 At automatic open or half barrier crossings where two trains can arrive at the crossing without providing the minimum road open time, the character of the warning sound should change distinctively after the first of the trains arrives at the crossing.

2.177 At simple, un-automated, open crossings, the audible warning may be provided by horns from approaching trains.

#### **Pedestrian signals**

2.178 Traffic signals for pedestrians (Diagram 4006 in the 2002 Regulations) may be provided at crossings, particularly where the volume of pedestrians is high or vulnerable groups use the crossing regularly. The pedestrian traffic signal may be especially helpful at skewed automatic half barrier crossings, at full barrier crossings on one way streets and at auto-lower full barrier crossings.

2.179 Pedestrian signals should face outwards from the crossing towards approaching pedestrians. Pedestrian signals are not normally considered necessary at gated crossings operated by railway staff.

#### **Tactile thresholds**

2.180 Provide a suitable *tactile threshold* (see Appendix A) across each footway approaching a level crossing. Tactile thresholds are not required on roads where there is no footway.

2.181 Tactile thresholds should be placed before pedestrian stop markings across the footway on approach to the crossing. The purpose of the tactile threshold is to provide blind and partially-sighted people with an indication of the direction of the footway as well as the line behind which they should wait while the crossing is closed. See the Department for Transport's guidance on use of tactile paving surfaces.

#### Means to control the flow of pedestrians

2.182 Where vulnerable or large numbers of pedestrians regularly use a crossing, consider appropriate means to deter them from walking on the carriageway such as guard rails on approach. Guard rails should be provided only where the footway is sufficiently wide and does not create a bottleneck.

2.183 Where pedestrians in significantly large numbers cross from one side of the road to the other while the road is closed to allow a train to pass over the crossing, consider providing a double row of non-reflecting road studs to indicate the safe place to cross.

2.184 Where a crossing lies adjacent to a railway station and the entrance or exit to the station is via the platform ramp, pedestrians should be directed from the platform to the road and vice versa so that they are protected by the crossing after leaving or before joining the train.

#### **Pedestrian categories**

2.185 The volume of pedestrian and train flow may be determined by the train pedestrian value (TPV) which in turn defines the pedestrian categories. The TPV is the product of the maximum number of pedestrians and the number of trains passing over the crossing within a period of 15 minutes. A detailed method of calculation can be found in Appendix D. Pedestrian categories are given in Table 2.

Table 2 Pedestrian categories				
Pedestrian category	Train pedestrian value (TPV)			
Α	more than 450			
В	151-450			
C	150 or less			

#### **Pedestrian provisions**

2.186 As with all aspects of level crossing risk, the precautions for pedestrians should be determined by risk assessment. To guide that process, Table 3 suggests precautions which may be appropriate for these pedestrian categories.

Table 3 Pedestrian provisions						
Pedestrian category	Width of footway (metres)	Road markings	Audible warnings*	Pedestrian signals	Tactile threshold*	Guard rails
A	2 or more	YES	YES	YES	YES	ŧŧ
В	1.8 or more	YES	YES	ŧŧ	YES	ŧŧ
С	1.5 or more ŧ	YES	YES	ŧŧ	ŧŧ	ŧŧ
#### **Table 3 Pedestrian provisions**

\* Not required at gated crossings operated by railway staff

t A reduced width of 1 m or lack of approach funnel is normally restricted to those crossings with a daily pedestrian usage of less than about 25

tt Yes if necessary

2.187 At any crossing where the number of pedestrians or the size of the vulnerable group is exceptionally large, automatic crossings may not be suitable and a barrier crossing operated by railway staff may have to be provided.

## Additional measures to protect against trespass

2.188 Cattle-cum-trespass guards and fencing protection will normally be required to discourage trespass by pedestrians and, where relevant, animals straying onto the railway.

#### **Cattle-cum-trespass guards**

2.189 Guards should be provided where there is movement of animals over the crossing, or where there is a significant risk of trespass by pedestrians.

2.190 Guards should be provided at all types of crossings on third rail electrified railways, except at a gated crossing operated by railway staff, where the gates when across the railway completely fence off the road and any footway from the railway.

2.191 The guards should be adjacent to the footway at the edge of, and level with, the surface of the carriageway. They should extend the full length of the crossing between the boundary fences for a distance of at least 2.6 m in any direction from the edge of the carriageway.

2.192 The guards may consist of arris rails running parallel with the running rails or some other similarly effective system. Arris rails which are triangular in section with the vertical sides approximately 115 mm high, at approximately 150 mm pitch, and with a clear space between them not exceeding 35 mm are considered to be effective.

#### Fencing

2.193 Provide fencing:

- (a) around barrier mechanisms unless protected in other ways; and
- (b) to ensure the effectiveness of any cattle-cum-trespass guards.

2.194 At footpath crossings and bridleway crossings, consider whether additional fencing may be required between the boundary fence and the decision point. Where the gate or stile is at the decision point rather than in the boundary fence, provide additional fencing to connect the boundary fence to the decision point.

2.195 Where the road is unfenced and the adjacent land is used for grazing, and crossing gates are not provided, provide a standard highway-type cattle-grid in the roadway.

# The crossing

#### **Vertical profile**

2.196 The profile over any vehicular crossing should have no sudden changes of vertical curvature. The profile over an automatic half barrier or user worked crossing is critical to safety. At other types of crossing it is less critical because these crossings are either manually operated by railway staff, or locally monitored by the drivers of trains travelling at restricted speeds such that they can stop short of the crossing.

2.197 The profile over automatic half barrier or user worked crossings should not cause a vehicle, such as a low-loader or a tractor and trailer, to become grounded and obstruct the railway. The likelihood of grounding depends on the characteristics of the road surface at the crossing and any potentially low-clearance vehicles that might use the crossing.

#### Measurement of safe profiles

2.198 Safe profile is determined by considering the wheelbase and ground clearance of road vehicles which might foreseeably use the crossing. The maximum permitted profile hump anywhere on the road surface, over the longest foreseeable wheelbase length, is 75mm.

2.199 At automatic half barrier (AHB) crossings, the safe profile may be defined by the vehicle category, which is in turn determined by the road and rail traffic density. It is defined in Table 4 below.

2.200 Traffic data should be established by census. Take into account the likely increase in road usage following automation of a crossing, as well as other factors, such as the proximity of heavy plant operator premises, which may necessitate a flatter profile. It is important to note that Table 4 below sets minimum requirements. Local information on actual usage may well mean that the profile at a particular crossing needs to be flatter than traffic data alone would suggest.

	Table 4 Measuring safe vertical profiles				
Actual daily road vehicle usage	or	Daily traffic moment	Vehicle category	Theoretical wheelbase length	
				(metres)	(feet)
More than 2000		More than 80000	1	15.3	50
2000 or less		80000 or less	2	9.75	32
600 or less		25000 or less	3	8.5	28

2.201 Provide "risk of grounding" signs as described in Section 19 for crossings with vehicle categories 2 and 3, where the profile does not meet the category 1 standard.

2.202 The profile should be maintained across the full width of the carriageway and the approaches. The approaches extend for a minimum of 20 m from the nearest rail for vehicle category 2 and 3 crossings, and up to 30 m for vehicle category 1 crossings.

2.203 Road approaches to crossings should be regularly inspected by the crossing operator (as well as the traffic authority or private road owners). The profile should be checked when road defects are noted or when track alterations are undertaken. Remedial works on approach roads should be undertaken as required.

2.204 At user worked crossings, determine with the users the types of vehicle or equipment likely to go over the crossing before designing the vertical profile. Once this is determined, use the maximum wheelbase length to design the safe profile based on the same maximum permitted hump of 75 mm. Determine the gradient of the approaches to the crossing in conjunction with the vertical profile required for the type of traffic using it.

2.205 Providing telephones at a user worked crossing does not reduce the need to maintain appropriate profile conditions.

#### **Crossing surface**

2.206 The surface of the carriageway over a crossing and on its immediate approaches should be properly maintained and have a skid resistance comparable to that of the road approaches. Consider a higher degree of skid resistance where road speeds are high, the visibility of a crossing is limited or the road slopes downhill towards the crossing. Appropriate measures should be discussed with the traffic authority. The surface should be free from pot-holes, running rails proud of the surface, depressed areas or major undulations. Any timbers or panels used in the surface should be firmly fixed. Flangeway gaps should be kept to a minimum, particularly at skew crossings, to reduce the risk of small or narrow wheels becoming trapped.

2.207 At vehicular crossings with gates which completely fence in the railway when closed to the road or where there is no footway adjacent to the carriageway, the ground at the edges of the carriageway over the crossing should be made up to the same level as the carriageway for at least 1 m.

2.208 At user worked crossings, a satisfactory road surface, appropriate for the type of traffic using them, and adequate approaches should be provided and maintained. Where timbers are used for the crossing surface, they should be securely fixed in position and provide a clear flangeway. Where the surface is predominantly made up of ballast, it should be contained to ensure that the surface is at, or almost at, rail level and the flangeway is maintained.

2.209 At footpath crossings and bridleway crossings, the surface provided between the decision points should be unobstructed. An appropriate level crossing surface should be provided in all but remote rural locations. There should be no movable signalling or track equipment (such as sets of points) on the surface or close by, that might create a hazard. The surface should be maintained in a good and even condition at rail level with suitable non-slip properties.

2.210 The type of surface should be in keeping with, but not necessarily the same as, the surface provided on the approaches to the crossing immediately outside the railway boundary.

2.211 Where the track ballast shoulder is high, either steps or ramps for footpath crossings and ramps for bridleway crossings should be maintained to give access to the surface. Ramps are preferable but where it

is not reasonably practicable, provide steps. On steep slopes, consider whether hand-rails may be needed in addition to steps or ramps.

2.212 Where the surface is other than ballast or stone chippings, provide a non-slip surface. Where the surface is made up to rail level and stone is used as in-fill, provide a means to retain the stone.

2.213 At bridleway crossings, make the surface up to rail level.

2.214 At footpath crossings, make the surface up to rail level, where:

(a) the crossing is in a location where housing, factories, shops etc adjoin or are close to the railway, and the crossing provides an attractive or convenient link between them;

(b) any of the approaches on the path are metalled; or

(c) there is heavy regular use.

#### **Crossing width**

2.215 At all crossings, the width of the carriageway over the crossing and on the approaches should, where practicable, be constant. It should be possible for traffic to pass safely on the approaches and the crossing itself should not form an isolated passing place.

2.216 At automatic crossings, the carriageway width over the crossing should be maintained on each approach for the distances shown in Table 5. It may be necessary to increase these distances depending on the types of vehicle using the crossing.

Table 5 Crossing width				
Actual daily road vehicle usage	or	Daily traffic moment	Distances measured from the stop line (metres)	
			AHBC and ABCL	AOCL
More than 2000		More than 80000	21	21
2000 or less		80000 or less	14	14
600 or less		25000 or less	14	7

2.217 The carriageway width over an automatic half barrier crossing should normally be at least 6.1 m. A narrower carriageway, to a minimum of 5 m, may be acceptable on less busy roads. As a guide in this instance, a less busy road may be considered to be one with a daily road vehicle usage of less than 4000.

2.218 The carriageway width over a locally-monitored automatic barrier crossing (ABCL) should not normally be less than 5 m. Existing level crossings being upgraded to ABCL may be less than 5 m in width.

2.219 The carriageway width over a locally-monitored automatic open crossing should not be less than 5 m where the actual daily road vehicle usage is greater than 600 or the peak hour traffic moment is greater than 120.

2.220 At user worked crossings, the road surface should be at least as wide as the distance between the gate posts. The width of the crossing should not exceed 5 m to allow the use of single-leaf gates.

2.221 At footpath crossings, the width of the surface should not be less than 1 m, and at bridleway crossings, the width of the surface should not be less than 3 m.

#### **Provision of lay-bys**

2.222 Consider whether lay-bys may be required at automatic half barrier crossings so that vehicles, whose drivers are required to telephone before using the crossing, can be parked clear of the carriageway.

#### **Crossing alignment**

2.223 At user worked crossings, the alignment of the crossing over the tracks should enable the time required to cross to be kept to a minimum.

2.224 Footpath crossings and bridleway crossings should, where possible, be at right angles to the railway line. Where necessary seek clarification from Rights of Way Officers when determining exact routes and opportunities for diversion. Where it is proposed to divert a public footpath or bridleway crossing, consult closely with the local Rights of Way Officer.

#### **Crossing approaches**

2.225 At user worked crossings, the alignment of the immediate approaches to the crossing should be in line with the alignment of the crossing itself. Light sources from road vehicles or equipment should not be allowed to cause confusion with railway signals.

## Gates, wicket gates and barrier equipment

#### Gates

2.226 The gateway should be the full width of the carriageway plus at least 450 mm clearance on each side and the clearance between gate posts should be of equal width at both sides of the railway. Means should be provided to retain the gates in both open and closed positions.

2.227 When closed, the gates should extend over the full width of the carriageway. Unless legally specified otherwise, the normal position of the gates is across the road.

2.228 Consider installing power operated gates at user worked crossings . These avoid the need for multiple crossings in order to open and close gates.

2.229 At crossings on public roads, the gates should be painted white and carry red retro-reflective targets to face outwards when the gates are across the road. Additionally, consider mounting red lamps on the gates which show towards approaching road traffic when the gates are across the road.

2.230 At gated crossings operated by railway staff, the gates should be lockable when closed across the road or railway and should be conspicuous to the drivers of approaching trains when closed across the railway.

#### Wicket gates

2.231 Where wicket gates for pedestrians are provided, they should be on the same side of the carriageway and open away from the railway. Wicket gates for footpath crossings and gated crossings operated by railway staff should not be less than 1 m wide. Wider gates may be required in accordance with local user needs. Wicket gates for bridleway crossings should not be less than 1.5 m wide.

2.232 All wicket gates should be easy to open from either side and be self-closing. Latches are not normally provided on gates. Where it is appropriate to provide latches, however, they should be easy to operate and not prevent easy egress from the railway. Where wicket gates are provided across the footway at gated crossings operated by railway staff, they should be lockable.

#### **Barriers**

2.233 The tops of the barriers when lowered should be at least 900 mm above the road surface at the centre of the carriageway. The clearance between the bottom edge of the lowered barrier and the road surface at the centre of the carriageway should not exceed 1000 mm unless a skirt is fitted. Barriers that are designed to fall under gravity as part of their method of operation should be inclined towards the carriageway at an angle of between 5° and 10° from the vertical.

2.234 When raised no part of the barrier below 5 m should be within 450mm of the edge of the carriageway. Where the barriers cover a footway, no part of the raised barrier less than 2 m above the footway, should be within 150 mm horizontally from the outer edge of the footway.

2.235 The barriers should be as close as convenient to the railway, but no part of the equipment should be within the standard structure gauge.

2.236 Barriers should be at least 125 mm deep at their mid-points and at least 75 mm deep at their tips. Each barrier should display on both sides red and white bands about 600 mm long to the full depth of the barrier. A strip of retro-reflective material not less than 50 mm deep should be provided along the full length of each band.

2.237 Dangerous moving parts of the barrier mechanism, excluding the boom and any skirt, should be guarded effectively.

2.238 Two electric lamps (three on barriers longer than 6 m) of adequate luminous intensity should be fitted to each barrier which, when illuminated, show a red light in each direction along the carriageway. The lamps should be evenly spaced along the barriers with one lamp within 150 mm of the barrier tip. The lamps should show except when the barriers are fully raised. It may be appropriate at some user worked crossings to omit these lamps.

2.239 At barrier crossings operated by railway staff, each road approach should be protected by barriers which, when lowered, extend across the full width of the carriageway and any footway.

2.240 At barrier crossings operated by railway staff and user worked crossings, skirts should be fitted to the barriers where there is a significant risk of pedestrians deliberately passing under the lowered barriers. Where cattle or sheep are regularly walked over the crossing, skirts should be fitted. The skirts should be of a light colour, light construction and fence in the space between the lowered barriers and the road surface. Skirts are not required at automatic crossings with half barriers.

2.241 At user worked crossings, the barriers may be hand-operated and counter-weighted to fall when released. Such barriers should be linked so that they can be raised or lowered together from either side of the crossing.

#### **Single barriers**

2.242 Where single barriers are provided they should preferably be pivoted on the left-hand side of the road. On one-way roads or on two-way roads with central reservations where special provision can be made for pedestrians, barriers may be provided on the approach to the crossing only.

#### Half barriers

2.243 At automatic crossings with half barriers, the barriers should be pivoted on the left-hand side of the road on each approach.

2.244 On skew crossings with half barriers where the tip of the barrier points towards the railway, the point of intersection of the line extended through the barriers and the outer edge of the road, including any footway, should not be within 1000 mm of the nearest rail.

2.245 When lowered, the half barriers should extend to between 150 mm and 450 mm of the centre of the carriageway, but not over the centre line. On carriageways between 5 m and 5.7 m wide, the barriers should extend to within 800 mm of the centre line so as to leave a clear exit of at least 3 m in width. On carriageways narrower than 5 m, shorter barriers may be necessary in order to provide off-side clearance of at least 3 m.

#### Barriers on lines electrified on the overhead system

2.246 If the railway is electrified with overhead conductors and a barrier, if displaced, could come closer than 150 mm to the conductors, the barrier should either be made of metal or be provided with a continuous conducting strip. The metal barrier or conducting strip should be connected to earth in such a manner as to ensure that inadvertent contact with the overhead conductors causes any controlling circuit-breaker to interrupt the electric traction supply. Consider whether it may be appropriate to sheath the return conductor at any crossing.

## **Telephones and telephone signs**

2.247 Telephones are not normally necessary at barrier crossings operated by railway staff, locallymonitored automatic open crossings or open crossings. At locally-monitored automatic barrier crossings consider providing telephones for public use so that equipment malfunctions can be reported.

2.248 At barrier crossings operated by a member of the train crew, or other railway staff, signs to Diagram 785 giving the telephone number of a supervising point which is always open when the railway line is open should be displayed at each side of the crossing. The name of the crossing should also be shown immediately below each sign.

2.249 Where telephones are provided as part of the safety arrangements, calls should always be routed to a suitable staffed railway location and a definite message as to whether or not it is safe to cross given.

#### At automatic crossings with half barriers

2.250 Telephones for public use at automatic crossings with half barriers should be suitably weatherproof or housed in cabinets and connected directly to the supervising point. A two-way calling facility should be provided.

2.251 The power supply to the telephones should be suitably backed up so that they remain available if the main power supply fails. Faults on individual telephones or the failure of a user to replace a handset should not prevent the correct operation of the remaining telephones.

2.252 The telephone symbol to Diagram 787 (2002 Regulations) should be displayed on or adjacent to each telephone/cabinet and on two other faces. The telephones should be clearly visible from the crossing. If the telephones are not clearly visible to a person at the location of the sign to Diagram 784.1, signs to Diagram 788 are required directing potential users to the telephones.

2.253 Clear and simple instructions, which are also legible at night, should be provided for users needing to contact the supervising point. The user should not have to dial a telephone number.

2.254 In case the telephone at the crossing is out of order, the name of the crossing, its grid reference and the public telephone number of a continuously staffed supervising point should be clearly displayed.

2.255 When calls are received in the supervising point, a distinctive warning should be sounded, accompanied by a visual indication. These calls should take priority over any other calls on the telephone system and the warning should sound even if the system is currently in use.

2.256 If the railway is not open for 24 hours a day, a means to notify users of the times between which trains do not travel over the crossing should be provided. This may be in the form of a notice which is legible at night or a recorded announcement. It is essential that information given is correct and fully up to date.

2.257 The telephone system should have a facility which records that calls have been made from the crossing during periods when the railway and supervising point are closed. When the supervising point reopens, a visual and audible indication should be given that calls from the crossing have been made during the period of closure.

#### At user worked crossings and bridleway crossings

2.258 Telephones, where provided, should be positioned adjacent to the gates or barriers on each side of the crossing, mounted in a suitable place, at heights appropriate to the users of the crossing. The telephones should be suitably weatherproof or housed in cabinets and connected directly to a supervising point. A two-way calling facility should be provided.

2.259 The telephone symbol to Diagram 787 should be displayed on or adjacent to the cabinet/telephone. Telephones should be seen readily from the crossing or signs to Diagram 788 provided.

2.260 Clear and simple instructions to direct users to contact the supervising point should be provided. These should also legible at night. The telephone user should not have to dial a telephone number.

2.261 The name of the crossing and its grid reference should be displayed followed by the telephone number of a continuously staffed supervising point in case the telephone at the crossing is out of order.

2.262 Evidence shows that many users fail to use telephones. Telephones create potential for human error during communications, and may distract the signaller from other tasks. Even where telephones are fitted, maintaining adequate *sighting distances* (see Appendix A) at the crossing can still reduce risk to users and the railway.

# Miniature stop lights (MSL)

#### **General description**

2.263 Miniature stop lights (previously known as miniature warning lights) consist of red and green lights. They can be used at user worked crossings, footpath crossings and bridleway crossings. In some instances it may be appropriate for the warning system to be activated by the user on arrival before using the crossing. The green light normally shows, but an approaching train automatically changes the lights to red. Signs to Diagram 107 in the 1996 Regulations (see Figure 8) instructing users to cross only when the green light shows should be provided.

2.264 MSL alone may not be suitable where livestock or large or slow moving vehicles or equipment cross the railway. Additional arrangements may need to be made as determined in the risk assessment process.

#### **Positioning of MSL**

2.265 The MSL should be located so that they face towards an approaching user. They should be clearly visible to the crossing users when operating the gates or barriers. MSL may be mounted in the sign to Diagram 107 (1996 Regulations). At crossings not provided with a telephone, the public telephone number of a continuously staffed supervising point should be displayed, so that users may enquire about crossing safely (and report MSL failure). Use of signs to Diagram 108 should be avoided.

2.266 MSL should normally be placed on the near side of the railway, facing users approaching the crossing unless siting them at the far side is more effective at conveying the message.

#### **MSL** equipment

2.267 The red and green lights should be sufficiently bright to be clearly seen by users at the decision point. Light emitting diodes (LED) lamps are brighter and more reliable than traditional filament lamps. Low energy solutions such as flashing or on-call displays might be appropriate in certain locations. Lamps should be fitted with hoods (to aid viewing in bright sunlight) where necessary. Care should be taken to ensure that hoods do not restrict the visibility of MSL for users, including pedestrians operating gates or barriers.

#### Associated signs

2.268 Traffic signs associated with the use of MSL are shown in Figure 8 of Section 19. These signs are in addition to those required at user worked crossings, footpath crossings and bridleway crossings. These signs are in accordance with the 1996 Regulations.

2.269 At user worked crossings the signs to Diagrams 109 or 110 should be mounted with the MSL on the near side of the crossing facing approaching users.

2.270 At footpath or bridleway crossings the signs to Diagram 114 should be mounted with the MSL on the near side of the crossing facing approaching users. Where a footpath or bridleway is routed over a user worked crossing, care should be taken in the placement of signs (to Diagrams 109/110 and 114) so that instructions to drivers and instructions to pedestrians/riders are not confused.

#### Railway signalling and control equipment

2.271 MSL should be operated automatically by approaching trains, in accordance with the warning period required for the particular crossing.

2.272 The minimum warning period should be determined by risk assessment of crossing usage and be at least 5 seconds longer than the time required to cross.

2.273 The green light should show until the red light appears. As soon as the train is clear of the crossing, the red light should be extinguished and the green light should appear unless the red light is required to show for another train.

2.274 Bi-directional controls should be provided.

2.275 Consider whether special controls might be required, for example where signals or station platforms lie between the strike-in point and the crossing.

## Traffic signals, traffic signs and road markings

2.276 The requirements for road signs, including carriageway markings, are contained in the 2002 Regulations. These are supported by guidance in the Traffic Signs Manual (chapters 4 and 5) and information available via the Department for Transport website. Signs for use at private crossings are described in the 1996 Regulations.

#### **Road traffic light signals**

2.277 The construction and specification of road traffic light signals used at level crossings are required to comply with Diagram 3014. The reverse of the backing board should be coloured grey. Lamps to the current European standard should be used.

2.278 A primary road traffic light signal should be located on the left-hand side of the carriageway, on each road approach, as close as possible to the crossing. At crossings where there are barriers, it should be located not more than 1 m before the barrier and adjacent to the barrier machine where this is on the left-hand side.

2.279 A duplicate primary road traffic light signal should be located on the right-hand side of the carriageway on each approach. Consider providing one or more additional road traffic light signals where neither the primary nor the duplicate primary signal can be seen from a side approach. Secondary road traffic light signals, located on the far side, should not be used at crossings.

2.280 No road traffic light signal should be located on the approach side of the vehicular stop line or an extension from it. Drivers stopped at the crossing need to see the road traffic light signals.

2.281 At *acute skew crossings* (see Appendix A and figure 9(b)), the duplicate primary signal may be placed in line with the vehicular stop line to shorten the length of the crossing.

2.282 At *obtuse skew automatic crossings* (see Appendix A), the duplicate primary signal may be placed closer to the railway than normal, provided that a vehicle stopped in line with the signal is not foul of the railway structure gauge. In the risk assessment consider whether special arrangements for pedestrians may be necessary (see Section 13 and Figure 9 (a) at the end of this section).

2.283 Where the normal post mounting of a road traffic light signal is impracticable, it may be mounted over the carriageway provided that no part of the horizontal structure or the signal is less than 5.5 m above the road surface.

2.284 Where a road traffic light signal is mounted over the carriageway and the railway is electrified with overhead conductors and the structure and signal, if displaced, could come closer than 150 mm to the overhead conductors, the structure and the signal should either be made of metal or be provided with a continuous conducting strip. The metal structure and signal or the conducting strip should be connected to

earth in such a manner as to ensure that inadvertent contact with the overhead conductors causes controlling circuit-breaker(s) to interrupt the electric traction supply.

2.285 In exceptional cases, for example where the central reservation is narrow or where, at very acute skew crossings, the duplicate primary road traffic light signal would encroach on the overhang clearance above the carriageway, a special design of the restricted width signal in accordance with the relevant Department for Transport's drawing may be used. Using this restricted width signal requires special authorisation from the Department.

2.286 Where mounted at the side of the road, no part of the road traffic light signal below 5 m should be within 450mm of the edge of the carriageway. This is to minimise the likelihood of damage to the sign from passing vehicles, especially vehicles with large mirrors or overhanging loads. Where the road has a steep camber, the clearance may need to be increased to 600 mm. Offset traffic signal head mounting brackets (or cranked poles) may be needed to ensure that the horizontal clearance is maintained. The centre of the road traffic light signal lens nearest the carriageway should at least 810 mm, but not more than 1500 mm, measured horizontally from the carriageway edge.

2.287 Where the signals are above a footway, a minimum headroom from the lower edge of the signal backing board of 2100 mm should be maintained.

2.288 The distance from which it is desirable that the intermittent red lights and amber lights can be seen varies according to the speed value of the road. The speed is taken as the 85<sup>th</sup> percentile of the observed speeds of approaching vehicles. Recommended minimum visibility distances are shown in Table 6. If these minimum visibility distances cannot be achieved, consider further measures for example the provision of additional advance warning signs, countdown markers etc.

Table 6: Recommended minimum visibility distances		
85 <sup>th</sup> percentile speed of road vehicles		Minimum visibility distance (metres)
kilometres per hour (km/h)	miles per hour (mph)	
50	30	70
65	40	90
80	50	150
95	60	220
115	70	300

2.289 Where a crossing is close to a road junction controlled by traffic light signals, consider linking the two sets of road traffic light signals. The results of this consideration should be documented in the risk

assessment. Where they are linked, seek special authorisation from the local traffic authority for the connection between them.

#### **Pedestrian signals**

2.290 Pedestrian light signals used at level crossings must comply with Diagram 4006 (2006 Regulations), appropriately positioned to maximise visibility.

2.291 The red figure on the pedestrian signal should be illuminated on commencement of the crossing closure sequence and should flash while the intermittent red lights of the road traffic light signals are lit. The rate of flashing should be the same as that of the intermittent red lights in the road traffic light signal.

#### **Traffic signs**

2.292 Appropriate traffic signs should be provided on each road approach. Examples of the layouts are given in Figures 2 to 7 and 9. Details of the signs for use with MSL are shown in Figure 8.

2.293 At automatic crossings with half barriers, signs to Diagram 784.1 should be appropriately positioned on approach to the crossing to suit the road speed (see Figure 4). A sign to Diagram 786 should be provided in association with 784.1 and on the nearside, facing vehicles leaving the crossing.

2.294 Where lay-bys are provided and a Traffic Regulation Order is in force limiting the parking at lay-bys to 'Large or slow vehicles only', the permitted variant to the sign to Diagram 660 should be provided and the road marked in accordance with Diagram 1028.3.

2.295 At automatic crossings and open crossings, signs to Diagram 775 reading 'Keep crossing clear' should be provided on each primary and duplicate primary road traffic light signal post to face traffic approaching the crossing. At open crossings they should be mounted on both sides of the road on or near the posts carrying the St Andrew's Cross signs (Diagram 774).

2.296 Signs to Diagram 775 may be provided at gated and barrier crossings operated by railway staff where standing traffic is a problem.

2.297 At automatic crossings on double-track lines, where two trains can arrive at the crossing without providing the minimum road open time, signs to Diagram 777 reading 'Another train coming if lights continue to show' should be provided on or near each duplicate primary road traffic light signal facing outwards from the crossing.

2.298 At locally-monitored automatic open crossings on double-track lines, where two trains can arrive at the crossing without providing the minimum road open time, signs to Diagram 776 reading 'Another train coming' should be provided on the left-hand side of the road, normally 2 m on the railway side of each primary road traffic light signal and directed towards drivers of vehicles halted at the stop lines. These signs should flash at the same rate as the road traffic light signals.

2.299 Where the width of the road is less than 4 m and the number of vehicles going over the crossing during the peak hour exceeds 120, a Priority Order should be considered and signs to Diagram 615 and 811 provided accordingly.

2.300 At automatic crossings and open crossings, where the road crosses the railway at a skew angle or there are bends on one or both approaches, bend and chevron signs and count-down markers may be required. Consider also whether additional reflecting road studs along the edges of the carriageway may be required to direct drivers along the road.

2.301 Wherever the form of protection at a crossing has been altered, a new educational sign to Diagram 790 reading 'New level crossing control ahead' is required to be displayed for a period of not more than 3 months (see Direction 37.1 in the 2002 Regulations).

2.302 At user worked crossings, footpath crossings and bridleway crossings, a sign explaining to the user how to cross safely for example 'Stop, Look, Listen' or 'Cross only if green light shows' or 'Stop, always telephone before crossing', should be provided facing the user at the decision point or at the telephone if provided. It is important that appropriately worded signs are provided whether or not they appear in the 1996 Regulations.

2.303 Information including the name of the crossing, location reference and contact number should also be provided at level crossings. A contact number for the railway operator should also be provided.

2.304 Signs specified in the 1996 Regulations may be placed by a crossing operator on or near a private road or path. It is an offence for a user to fail to comply with any requirement, restriction or prohibition conveyed by a crossing sign lawfully placed on or near a private road or path' (Transport and Works Act 1992 and Transport and Works (Scotland) Act 2007). A public footpath or bridleway is clearly not a 'private road or path', but, where they convey an appropriate message, signs from the 1996 Regulations are commonly used. At footpath, bridleway and private crossings, other suitable signs may be used to inform users, clearly and simply, how to use the crossing safely.

#### **Related to electrified lines**

2.305 Where the railway is electrified with overhead conductors, signs to Diagram 779 should be provided with an appropriate plate (Diagram 780A). At user worked crossings, suitable signs warning of the danger from bare electrical conductors such as 'Danger, overhead live wires' should be provided and face towards the user approaching the decision point.

2.306 Overhead conductors at level crossings should be at the greatest height practicable. Signs to Diagram 780A should show a safe height which allows for suitable safe clearance under the overhead conductors.

2.307 Where currently overhead conductors at level crossings are not at maximum practicable height, steps should be taken to remedy this situation, so far as is reasonably practicable. In the interim, signs to Diagrams 779 and 780A should be provided at the last available alternative route before the crossing.

2.308 At any crossing where, currently, overhead conductors are not at the maximum practicable height, a height gauge to Diagram 781 should be erected at the 'safe height'. Signs to Diagram 780.2A should show a safe height which allows for suitable safe clearance under the overhead conductors. At user worked crossings suitable warning signs should be displayed.

2.309 In calculating the 'safe height', allowance should be made for the effect of the vertical profile of the carriageway on a road vehicle and its load.

2.310 At crossings where the gradient of the approaches is such that vehicles with large overhangs or conveying a large overhanging load could touch or come dangerously close to the overhead line equipment, even though they are lower than the 'safe height' shown on the sign to Diagram 780A or 780.2A, an additional sign depicting the hazard, such as 'Danger, overhanging load may foul live wires' should also be provided.

2.311 At crossings where the railway is electrified with a conductor rail, warning notices depicting the hazard, such as 'Do not touch the live rail' should be provided.

#### Related to risk of grounding

2.312 Where there is a risk that vehicles may become grounded on the crossing, signs to Diagram 782 should be erected on the immediate approaches. Advance warning signs to Diagram 782 with distance information to Diagram 573 should be provided at the last available alternative route before the crossing.

2.313 Where telephones are provided at the crossing, signs to Diagram 783 should be mounted beneath signs to Diagram 782 on the approaches. Where telephones are not provided at the crossing, signs to Diagram 785.1 (large) should be provided on the approaches and signs to Diagram 785.1 (small) at the crossing itself.

#### **Road markings**

2.314 Road markings should be provided at level crossings in accordance with the 2002 Regulations taking into account guidance in the Traffic Signs Manual.

2.315 Road markings are not normally provided at gated crossings operated only by railway staff, unless the crossing is also signalled.

#### Transverse and associated road markings

2.316 Transverse road markings should extend across the left-hand half of each two-way carriageway, or across the full width of a carriageway which is either one-way or has no centre line marking.

2.317 Where road traffic light signals are installed, transverse Stop lines to Diagram 1001 should be provided at right angles to the carriageway on each approach approximately 1 m before the primary road traffic light signal. At locally-monitored automatic open crossings (AOCLs) increase this to 2 m. The 300 mm size variant is recommended.

2.318 At open crossings, Give Way lines to diagram 1003 should be provided at right angles to the carriageway on each approach to the crossing, but not less than 2 m from the running edge of the nearest rail. Give Way signs to diagram 602 should also be provided. The triangular road marking to diagram 1023 should be provided in advance of the Give Way lines.

2.319 At user worked crossings on private roads, carriageway markings are not normally used. However, where a STOP sign to diagram 601.1 is provided, a transverse Stop line to diagram 1002.1 and the word STOP to diagram 1022 should also be provided unless the road surface is unsuitable. If the private road is one to which the public has access, these markings must be used, utilising a short length of road surfacing if necessary.

2.320 At automatic crossings and open crossings, a pedestrian Give Way line to diagram 1003.2 should be provided across any footway. It should also be extended across the right-hand side of a carriageway marked with a centre line, unless there are guard rails between the carriageway and the footway. Do not use it at crossings where the full width is controlled by barriers.

2.321 The pedestrian Give Way line should be at right angles to the carriageway. It should be located approximately 1 m on the approach side of any road traffic light signal, except at open crossings where it should be in line with the Give Way markings on the left-hand side of the carriageway. No part of the line should be less than 2 m from the running edge of the nearest running rail.

2.322 At obtuse skew crossings, the pedestrian Give Way line should be provided in conjunction with a pedestrian signal. The end of this pedestrian line at the edge of the carriageway should be located not less than 2 m from the nearest running rail. In these cases the pedestrian Give Way line on the approach side of the road traffic light signal may then be omitted (see Figure 9).

#### Longitudinal road markings

2.323 The type of longitudinal road marking to use generally depends on the width of the carriageway.

2.324 Where the road passes over the crossing a continuous line to diagram 1012.1 should be provided along each edge of the carriageway. Line widths are detailed in table 4-5 in Chapter 5 of the Traffic Signs Manual. A 100 mm wide line should also be provided along the back edge of each footway and, if separated from the main carriageway, along the front edge. The markings should be continued as necessary on each approach to clearly define the footway.

2.325 Where the width of the carriageway over the crossing is less than 5 m, centre line markings will not normally be provided.

2.326 Where the width of the carriageway over the crossing is between 5 and 5.5 m, the centre of the carriageway between the Stop or Give Way lines should be marked with the appropriate longitudinal warning line to diagram 1004, 1004.1, 1008 or 1008.1. The warning line should extend back from each Stop line for at least the minimum number of marks indicated in table 4-3 of the Traffic Signs Manual Chapter 5, or for at least 6 m if beyond that distance the carriageway is less than 5 m wide.

2.327 Where the width of the carriageway on the immediate approaches is 5.5 m or more, the centre of the carriageway over the crossing should be marked with a double continuous white line to diagram 1013.1A. The lines should be continued along the approaches where justified by the normal visibility criteria for double white lines. At automatic half barrier crossings extend the double continuous white lines for at least 12 m back from the Stop line. Unless the double continuous line extends further back from each Stop line than the distance indicated in table 7, precede it by a double white line to diagram 1013.1D, with the continuous line nearer to drivers approaching the crossing.

2.328 The minimum length of double white lines depends on the 85<sup>th</sup> percentile speed of cars using the road, and on the general width of the carriageway, excluding any part of the crossing or approaches which may have been specially widened. Recommended overall lengths of the marking to diagram 1013.1A, or a combination of that marking and diagram 1013.1D, are shown in table 7. Where the carriageway is wider than 7.3 m the lengths in table 7 may be increased by up to 50%, but the double lines should not extend beyond the position of the sign to diagram 784.1, where this is used, unless a lay-by is provided.

	Table 7: Lengths of double white lines
85 <sup>th</sup> percentile speed	Recommended length of double lines measured from the Stop line
Miles per hour (mph)	metres
up to 30	up to 30
31 to 40	30 to 45

	Table 7: Lengths of double white lines	
over 40	45 to 60	

2.329 At least one deflection arrow to Diagram 1014 must be provided on each approach to the double centre carriageway markings at crossings. It is normal for two such arrows to be used on each approach. Where a driver's forward view is limited, as at a crest, a third arrow may be necessary to give adequate forewarning. Arrows should be positioned in accordance with part 5 of the Traffic Signs Manual Chapter 5, summarised in Table 8 below.

Table 8: Location of deflection arrows					
Speed limit (mph)	Length of arrow	Distance of tip of arrow from the start of the unbroken line			
	(m)	First arrow	Second arrow	Third arrow	
30	4.5	13.75	43.75	79.75	
40	4.5	19.75	55.75	109.75	
50	6	21	66	138	
60	6	30	84	165	

#### **Road studs**

2.330 Double continuous white lines must be supplemented by a single row of white road studs. The studs should be white bi-directional reflecting and laid at intervals of between 3 and 4.5m. Any stud within 2 m of a running rail should be made of plastic.

#### Yellow box markings

2.331 Yellow box markings to diagram 1045 should be provided at automatic half barrier crossings where road traffic flow in any one direction exceeds the guideline figures in table 9 below. A yellow box marking might be appropriate at any type of crossing where blocking by queuing road traffic is foreseeable, regardless of the table 9 figures.

Table 9: Yellow box markings		
Overall width of carriageway (metres)	Yellow box to be provided if vehicle numbers in any one hour in either direction exceed	
5.0 to 5.9	500	
6.0 to 7.4	600	

Table 9: Yellow box markings			
7.5 and over	750		

2.332 Where a long yellow box is required the marking should be extended using additional diamond shaped units on the approach side and additional diagonal crosses on the trailing side of the crossing. The maximum permitted length of a yellow box is 30 m.





Figure 3: Typical layout of automatic half barrier crossing or automatic barrier crossing (locally monitored)



# Figure 4: Typical layout of automatic half barrier crossing or automatic barrier crossing (locally monitored) (with additional risks)











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Figure 8: Special signs for use with MSL



Diagram 107

Preferred – provide telephone number if necessary



Figure 9: typical layout of an obtuse skew crossing (a) and an acute skew crossing (b) indicating the arrangement of the transverse road markings and road traffic light signals (not to scale)



#### **Notes to Figure 9**

A pedestrian stop line is to be provided across the footway whenever a pedestrian signal is provided. The pedestrian stop line shall be approximately 1 m in advance of the pedestrian signal. This pedestrian stop line shall be positioned in such a manner that the end of the line at the edge of the carriageway is not less than 2 m from the nearest running rail.

The provision of a pedestrian signal may be appropriate at skew crossings with significant pedestrian usage.

In the case of an extremely obtuse skew crossing, like the one in Figure 9, the following arrangement may be considered as an alternative:

- (a) the omission of the pedestrian stop line and the pedestrian signal on the right-hand side footway; and
- (b) the duplicate primary road traffic light signal and the pedestrian stop line across the footway and across the right-hand side of the carriageway may be positioned closer than the minimum 2 m from the nearest running rail.

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# 3. Level crossing order submissions

# **Overview and introduction**

3.1 When the construction of railways was authorised, mainly in the 19th century, the individual enabling Act of Parliament specified how the railway was to cross other ways (for example roads and footpaths), either by bridge or on the level. Where the crossing was on the level, the arrangements for protecting the users, both railway and highway, were specified.

3.2 Since initial construction, use of the roads and railway has changed considerably, as has the cost of and delay caused by level crossings, and from the 1950s level crossings have been modernised to permit remote or automatic operation with lifting barriers and/or road traffic signals.

3.3 In order to permit the railway operator to change the protective arrangement specified in the original Act, a legal process was introduced which empowered the Secretary of State for Transport to make statutory orders specifying the new or updated arrangements at individual crossings to which the public has access. This process is currently authorised through provisions in the Level Crossings Act 1983.

3.4 This order making process is managed by ORR on behalf of the Secretary of State for Transport. The process is normally initiated by the operator of a level crossing, and requires consultation with the local traffic authority. An order provides for the protection of those using a level crossing and may place duties on both the crossing operator and local traffic authority. An order may make such provision as the Secretary of State considers necessary for the safety or convenience of crossing users.

3.5 This guide is intended to be an *aide-memoire* to assist railway level crossing operators in making level crossing order submissions to ORR for consideration. It also provides information for statutory consultees on the process, together with other background information. It takes account of the changes introduced in the Level Crossings Act 1983 by the Road Safety Act 2006.

#### The order making process in outline

3.6 The process is normally initiated by the crossing operator proposing a new or amended order. The local traffic authority and the ORR must be consulted. A request and draft order is then submitted and there is a statutory consultation period for the local traffic authority to make representations. On behalf of the Secretary of State, ORR considers any representations, and then decides whether to make the order, with or without amendments. The order is made to come into force when the relevant work is completed.

3.7 This Chapter includes advice on managing of level crossings, what an order should contain, and on the process for requesting, considering and making an order. It also includes contact details (Appendix E) and the wording of the Level Crossings Act 1983, as amended (Appendix F).

# Background and other information on level crossing management

#### Modernisation of existing level crossings

3.8 The primary objective should be to close level crossings permanently, following the closure or diversion of a highway, road or by the provision of a bridge or under-pass. As a secondary objective, it may be practicable to reduce the status of the crossing, for example from vehicular to footpath or bridleway only. Simple renewal and retention of existing crossings should be seen as a last resort. Crossing renewals

should not introduce new risks to the railway or users. In determining whether reasonably practicable solutions exist, other than renewing an existing crossing, the operator should take into account the whole-life costs of installing and maintaining level crossings.

#### Authorisation of level crossings

3.9 Level crossings on public highways normally need to be <u>authorised</u> by statutory means to establish the rights and obligations of road and rail users. An order under the Level Crossings Act 1983 does not authorise a crossing, but does provide the means for any changed protective arrangements at that crossing to be effectively placed, recorded and enforced.

#### **New level crossings**

3.10 Except in exceptional circumstances, ORR does not support the creation of any new level crossings, of any type. A new public highway level crossing in England and Wales may require a Transport and Works Act Order<sup>11</sup> or other appropriate statutory authorisation to create 'the right to cross the railway on the level'. In Scotland an order under the Transport and Works (Scotland) Act 2007 may be required. ORR is consulted on such proposals and may object during any relevant consultation exercise. Normally, any new road required to cross a railway should do so by a bridge or underpass.

3.11 Where a new level crossing is authorised under the Transport and Works Act 1992 or similar legislation, a level crossing order (obtained by the processes outlined in this document) may be needed to specify the necessary protective arrangements.

#### Temporary vehicular level crossings and temporary increased use

3.12 Bringing into use temporary level crossings, (excepting those for sole use by employees of the relevant transport undertaking) for instance to enable construction works to take place, must comply with the Railways and Other Guided Transport Systems (Safety) Regulations 2006 as amended. This also applies in the case of temporary increased use of private level crossings.

3.13 If the crossing is one to which the public has access, and the protection arrangements need to be altered from those specified in the authorising Act (for example manual gates to remotely operated full barrier CCTV), a level crossing order is the most appropriate mechanism for sanctioning the relevant changes.

#### Change in line speeds

3.14 Any project involving a change to line speeds over a length of route will require reassessment of risk and operational requirements at all crossings. Closure, where possible, should be pursued. Where a private user worked crossing is one to which the public has access, any significant changes may make it appropriate for all protection arrangements to be recorded in a level crossing order.

## Level crossing orders: scope, content and format

3.15 A level crossing order details the protective arrangements at a level crossing. A new or amended order may bring about changes to those protective arrangements. Orders can revoke earlier orders, disapply requirements under other legislation (for example the authorising Act, a Light Railway Order or an order made under the Transport and Works Act 1992) and enable road traffic signs (including signals and road markings) to be placed (and have legal effect) upon a highway or other road to which the public has

<sup>&</sup>lt;sup>1</sup> See Section 1 & Schedule 1 of the Transport and Works Act 1992. Transport and Works Act Orders are dealt with by the Transport and Works Act Unit, Dept for Transport, Great Minster House, 76 Marsham Street, London, SW1P 4DR

access. It may place duties on both the level crossing operator and the local traffic authority, in relation to the safety or convenience of users of the crossing.

3.16 In England and Wales any level crossing on a "highway<sup>2</sup> or other road to which the public has access" may be subject to a level crossing order made under the Level Crossings Act 1983, though in many cases this will not be necessary. "Access" includes pedestrian, vehicular or on horseback, and is not restricted to a public right of way. It is a matter of fact, rather than right. Thus an order may be made for a "private" crossing if the public has access to it, even though there are no public rights of way over it or over the road up to the crossing. In Scotland the law, and in particular the definition of a 'road', is a little different. The effect is that in Scotland a level crossing order can only be made for a crossing if it is on a road to which the public has a *right* of access.

3.17 Level crossing orders may normally only be requested by the operator of the crossing (defined in relation to a level crossing as the person carrying on an undertaking which includes maintaining the permanent way at the crossing<sup>3</sup>). However, the Secretary of State may make an order without the request of an operator, and ORR may, by serving notice on an operator, require the operator to request an order.

3.18 The level crossing order specifies how the crossing shall be operated and the protective equipment (which includes barriers, traffic signs, signals and road markings) to be provided at the crossing by both the operator and local traffic authority.<sup>4</sup> The type of level crossing should normally conform with one of the types described in this guidance document. The level crossing order consideration process takes account of the safety and convenience of users, road and rail, and the status of the crossing. Where necessary and appropriate to particular circumstances at individual crossings, protective arrangements may be varied from the standard guidance.

3.19 Orders normally contain several parts. The order itself contains the citation, principal duties, revocation of earlier orders and other details. It records who applied for the order in its title, though this does not affect the validity of the order if the operator subsequently changes. It may also explicitly or implicitly disapply parts of earlier legislation applying to the crossing.

3.20 There are three supporting Schedules, which contain details of:

- The location of the crossing (in both road and railway terms), together with a record of the local traffic authority and, if appropriate, the status of the crossing for which the protection is provided (Schedule 1);
- What equipment the operator must provide (Schedule 2 part 1);
- How the operator must operate the crossing (Schedule 2 part 2);
- What the local traffic authority must provide (Schedule 3 part 1); and
- How the local traffic authority shall conduct its undertaking in relation to the level crossing (Schedule 3 Part 2).

<sup>&</sup>lt;sup>2</sup> See definition in the Level Crossings Act 1983, inserted by the Level Crossing Regulations 1997 and the Highways Act 1980

<sup>&</sup>lt;sup>3</sup> See section 1(11) Level Crossings Act 1983

<sup>&</sup>lt;sup>4</sup> See the amendments made to section 1(20(a) of the Level Crossings Act 1983 by section 50(2) of the Road Safety Act 2006

3.21 Orders for each type of crossing are made to a standard format, for which templates are available from ORR on application. However, where particular features, requirements or equipment need to be included, any proposed additional wording should be discussed with ORR at an early stage. Templates normally contain a number of options or alternative paragraphs (dealing with yellow box markings or centre of carriageway markings, for instance).

3.22 Any change that affects, or alters, the content of a level crossing order (including variation, amendment and revocation orders) requires statutory consultation (see timescales below). There is no mechanism for exemption from statutory consultation, nor can the minimum consultation and two-month period for representations be reduced. Level crossing orders can amend or vary earlier orders, and can revoke an earlier order completely.

3.23 Amendment or variation orders can be used to amend or vary individual words or paragraphs. Variation and amendment orders that affect an earlier order must explicitly provide for the earlier order to remain in force. ORR will not normally progress a variation or amendment order, and will require the submission of a new, complete draft order:

- where there are significant changes to any existing order;
- where a change of level crossing type is proposed;
- where there are already three or more existing amendments or variations to an original order;
- where the traffic sign numbering within an existing order relates to other than the current edition of the 2002 Regulations; or
- where significant time (more than two years) has elapsed since consultation, commissioning has been delayed, or circumstances have changed significantly since the original consultation.

3.24 New orders other than variation and amendment orders should explicitly revoke all earlier orders together with any amendment or variation orders that have not previously been revoked. Where an earlier order is revoked, the correct, full citation as quoted (This order may be cited as...) in the earlier order itself must be used.

## Level crossing order request and consideration process

3.25 A "flow chart" outlining the order making process can be found at Figure 10. It is intended to be illustrative rather than prescriptive. In general, the earlier matters are discussed and resolved, the less scope there is for unforeseen timescale and resource problems to affect implementation of the proposed works.

#### **Initial proposals**

3.26 Level crossing modernisation project teams should make ORR aware of their proposals 12-24 months or more in advance of the proposed commissioning date so as to allow time to discuss the engineering aspects and the draft level crossing order with ORR. At this stage it is important to resolve issues of principle, such as the risk assessment to inform to what extent the crossing should meet current standards, or whether renewal as a different type of crossing will be appropriate. The proposed use of any novel equipment may require special consideration and should be discussed with ORR at this stage.

3.27 Consider whether a public consultation meeting will be needed (see public meetings below). Either at this stage or as part of the initial consultation with ORR and the local traffic authority, a site visit by interested parties should normally be arranged.

#### Consultation with local traffic authority and ORR

3.28 New consultation provisions were introduced by the Road Safety Act 2006<sup>5</sup>. Before submitting a request for an order to the Secretary of State, an operator must consult both ORR and the local traffic authority about the draft order he intends to submit to the Secretary of State, and must allow a reasonable period for them to make representations. The purpose is to permit any matters of concern to be raised and resolved in advance of the Secretary of State's formal consideration of the order. The 2006 Act also amended the Level Crossings Act 1983 to permit level crossing orders to place requirements on local traffic authorities<sup>6</sup>.

3.29 Clearly, the proposed content of an order, in particular the schedules placing duties on the local traffic authority, needs to be discussed at as early a stage as possible, and particular attention should be given to the first consultation under the new arrangements with each local traffic authority. Attention should also be given at this stage to establishing an agreed status of the crossing, particularly where private vehicular rights are involved. Ideally, all matters should be resolved at this time, and the statutory consultation process should not raise any further issues or matters of comment.

3.30 As a minimum, the crossing operator must consult with the local traffic authority in the area the crossing is situated, and ORR. There is no longer a statutory duty to consult with the planning authority, but ORR considers that it is good practice to continue to do so. The crossing operator should consider consulting on as wide a basis as is felt necessary, for instance with planning authorities, parish and community councils. In the case of crossings with private rights, consider consulting the authorised users and the owner of the private road. Consider also consulting the authorised users, if the crossing is an accommodation or occupation crossing with public footpath or bridleway rights. Where operation of the crossings initiated by station staff, the relevant train and station operators should be consulted. Responses to this consultation should be directed to and be considered by the crossing operator.

3.31 There is no statutory guidance on the process required or how far in advance of the draft order circulation date this consultation should be carried out. However, it will need to include a written summary of the proposal, a preliminary draft of the proposed order and an outline layout, and may, where appropriate and practicable, include a site visit. A record should be kept of issues raised and the considerations and decisions arising from them.

3.32 Evidence that consultation has been carried out, how it was done, what responses were received and what action has been taken should accompany the later draft order submission.

#### Public meetings

3.33 Although not a statutory requirement, "public" consultation meetings should also be considered and held with relevant local authorities and other relevant bodies as part of this consultation process where there are significant changes to the method of operation planned (for example conversion of manual gates to automatically controlled barriers). Such meetings within the local community, to describe the railway operator's proposals, will give advance warning of local concerns and allow time to consider any objections raised by the communities concerned.

<sup>&</sup>lt;sup>5</sup> See the new sections 1(8) and 1(8A) to the Level Crossings Act 1983 introduced by section 50(7) of the Road Safety Act 2006

<sup>&</sup>lt;sup>6</sup> See the new section 1(2)(a) to the Level Crossings Act 1983 introduced by section 50(2) of the Road Safety Act 2006

3.34 The organisation and cost of such meetings are the railway operator's responsibility. ORR has, in the past, chaired such meetings in an independent capacity, and is prepared to continue doing so when requested, provided sufficient advance warning is given. Minutes should be kept and distributed to the communities concerned and ORR. Such meetings should be held as early as possible (12-24 months in advance). Local representatives such as the highway and planning authorities, town, parish and community councils, police (local as well as British Transport Police), other emergency services, National Farmers Union and any other significant local users should be invited as appropriate.

3.35 The railway operator should be prepared to give a brief presentation explaining the operation of the proposed level crossing and should be able to answer technical and any other questions. ORR will be pleased to explain the legislation and order making process to those present. A record should be kept of items raised at these meetings.

3.36 Any undertakings made to local communities should be carefully considered before being given, as failure to honour undertakings can lead to such issues being raised again during the formal consideration of the order, thus possibly delaying the making of the order.

#### Draft order submission and supporting information required

3.37 A list of supporting documents and information required to accompany order requests is provided in Appendix G. Here you will also find guidance on making and recording the results of a 'suitable and sufficient' risk assessment. Which documents need to be provided will depend on the particular circumstances of each level crossing; the list is for guidance and is neither exhaustive nor prescriptive. Where there are deviations from established guidance or practice, these should be justified. Evidence of the legal status of the crossing should be provided, if necessary.

3.38 If you have any doubts on what information is required, please contact ORR before making your submission. The information provided should come from one single point of contact in the relevant part of the organisation.

3.39 After consulting ORR and the local traffic authority about the draft order, the crossing operator must give them written notice of his intention to make a request for an order to the Secretary of State. That notice must specify a period (of at least two months) within which ORR and the local traffic authority can make representations to the Secretary of State, and must be accompanied by a copy of the draft order that is being requested.

3.40 The consultation letter to the local traffic authority and ORR should include an end date for consultation (at least two months), and a proposed or likely commissioning date for the new arrangements. Responses or objections from consultees at this stage should be directed to the Secretary of State for Transport c/o Level Crossing Team, ORR, One Kemble Street, London, WC2B 4AN.

3.41 The crossing operator should ensure that it can demonstrate delivery of these notification documents to the consultees. Copies of such letters should accompany the request to the Secretary of State. Details of any responses to the initial consultation process, and any action taken should also be included.

#### Draft order consideration and order making

3.42 Correspondence to the Secretary of State for Transport and the Office of Rail Regulation should be addressed to: The Secretary of State for Transport, c/o, Level Crossing Team, ORR, One Kemble Street, London, WC2B 4AN.

3.43 The draft order will be considered, taking into account guidance, relevant standards and the particular circumstances at the crossing. The primary considerations are whether the proposal is adequately safe and represents an appropriate balance between safety and convenience for all crossing users, road and rail.

3.44 Where relevant issues are raised concerning matters other than the safety or convenience of users, such as rights of way over a crossing, or the convenience of road users other than those using a crossing, these will be taken into account in ORR's assessment of the draft order. However, the draft order may in these circumstances need to be referred to the Secretary of State for a decision.

3.45 It is at this stage that minor amendments to the proposed order, such as correcting dimensions in the original draft, are incorporated. More significant additions may be made, for instance where the assessment process has identified the need to better address particular risks at the crossing.

3.46 Consultation responses are also considered, and if appropriate the order may be modified to take account of these matters.

3.47 If there are public rights of way/convenience issues raised by the consultation, ORR may seek guidance from the Department for Transport. In some cases ORR is not empowered to make an order on behalf of the Secretary of State, and in such cases the draft order will be referred to the Secretary of State with a recommendation. ORR will inform the railway operator as soon as it becomes aware of any issues likely to delay the making of an order that might affect a proposed commissioning date.

#### Inspection of level crossings subject to orders

3.48 Implementing the arrangements specified in an order remains the responsibility of the crossing operator and local traffic authority. All level crossing works are subject to inspection at ORR's discretion. Variation or amendment orders, detailing minor changes only, may not necessitate inspection.

3.49 The inspection should normally be arranged shortly after the revised arrangements have been brought into use. Consultees, including a representative of the relevant traffic authority, should be invited by the railway operator to join the inspection. Any deficiencies identified should be corrected and the action taken confirmed in writing.

3.50 Failure to implement properly the arrangements specified in an order will be considered using ORR's established enforcement decision making process. Formal enforcement, including notices and prosecution, may be used.

#### **Traffic Signs Authorisations**

3.51 Traffic Signs Authorisations are required if the railway operator wishes to place a sign on a public highway that is not shown within the 2002 Regulations, or wishes to place a sign from the 1996 Regulations on a public highway (including a public footpath) or road or other highway to which the public has access. Such requests should be made to ORR along with details of the size of the sign/signal, colour, size of lettering/numerals, etc. A detailed explanation of why the sign is required and copies of any supporting correspondence from local authorities (such as Police, Traffic authority) should be provided. Two copies of a map (minimum scale 1:2500) should be supplied, one showing the position of the proposed sign(s) marked with a cross, the other unmarked. ORR will progress the request on behalf of the railway operator.

#### **Timescales**

3.52 Where order requests are incomplete or inaccurate, the timescales indicated below will be extended. Where assessment of an application reveals that it is incomplete, then further assessment may be delayed

until the relevant information is provided. Where a request is grossly deficient ORR may recommend the Secretary of State declines to make an order, and the consultation cycle will need to be restarted from the initial consultation phase. To avoid wasted effort by operators, local authorities and ORR's inspectors, the crossing operator should liaise with ORR at an early stage to ensure all necessary information will be available when required.

#### Consultation

3.53 Before submitting a request for an order, the crossing operator must formally advise and consult ORR and the local traffic authority of his intention to do so (section 1(8A) of the Level Crossings Act 1983). Consulting the local planning authority is also good practice, even though there is no longer a statutory requirement to do so. The timescales are not set down, but this should be undertaken at the earliest opportunity. Sufficient time should be allowed for a public meeting if necessary and, once the consultation is started, sufficient reasonable time should be allowed for responses to be made and considered. Two months may be considered as an absolute minimum for this to be done effectively. If adequate time is not allowed, or the consultation is otherwise ineffective, it may result in comments being made and needing to be considered after the statutory consultation. If consultation is not effectively carried out, the subsequent draft order submission might be legally challenged.

#### Circulation of draft order

3.54 The last date for comments should be included in the letter accompanying the draft order. Note that new level crossing orders, and variations or amendments to existing orders, however minor the changes, all have to go through a statutory consultation process in full. There is no power in the Level Crossings Act to shorten or waive the minimum consideration period.

#### Consideration of draft order together with any consultation responses

3.55 Considering draft orders and making a recommendation for signature cannot take place until the consultation period has ended. The recommendation can be that the order is made as submitted, that an order is not made, or that an amended order is made. In practice the majority of orders made fall into the last category.

3.56 Crossing operators are therefore advised to allow a minimum of four months between circulation of the draft order and the proposed commissioning date. The level crossing is required to comply with the level crossing order at all times and, therefore, the crossing operator must ensure that the new order is dated to 'come into force' on the commissioning date.

3.57 The earlier a crossing operator makes the application for an order, the less likely there will be timescale problems. While ORR will make every attempt to meet reasonable project timescales, it cannot deal with last-minute applications unless there are exceptional circumstances. Poor planning will not be considered as an exceptional circumstance.

3.58 The required "coming into force" date should normally be confirmed to ORR. Cancellation or postponement of a planned commissioning should be advised to ORR at the earliest opportunity. Once made, an order cannot easily be revoked.

# Information for local traffic and planning authorities

3.59 A process for making orders in relation to level crossing protection has been in place since the late 1950s, and local authorities have, since that time, been part of that process. Even before level crossing modernisation began, local highway authorities had responsibility for traffic signs on the road approaches to level crossings, and this responsibility has not changed.

3.60 The modifications to the Level Crossings Act 1983 introduced by the Road Safety Act 2006 formalised good practice in consulting on changes to level crossings in advance of formal circulation of a draft order. The changes also permit the order to record and clarify the local traffic authority's responsibility for the approaches to the crossing. Where new traffic control measures are required (such as a centre-carriageway "median strip" to prevent "zig-zagging" around half barriers) the responsibility for provision and maintenance should be agreed through consultation and incorporated in the draft order. The final division of responsibilities will be made clear in the level crossing order. As a general principle, it may be considered appropriate for the party introducing any increased risk to bear the responsibility for controlling it. Where there is any failure to provide or maintain any traffic signs required by the order, ORR will consider whether formal enforcement is appropriate.

3.61 Where traffic signs on the approach to a crossing need to be changed, for example if a local traffic authority wishes to introduce one way traffic flow, proposals must be discussed and agreed with the railway operator in ample time for any necessary revision to the level crossing order to be made. This will determine when revised arrangements may be brought into force.

3.62 New orders may record the need for local traffic authorities and level crossing operators to agree a long term strategy for each crossing. Where appropriate, consideration should be given to what measures may be required, by each party, to permit the crossing to be closed in the long term.

3.63 New orders may also specifically require the local traffic authority and the crossing operator to cooperate in the joint management of risk at the crossing. This will require the local traffic authority to make the crossing operator aware of any significant temporary or permanent changes affecting the nature and characteristics of road traffic approaching the crossing. Such changes might include a revised road layout, traffic calming measures or a change in permissible road speed.

#### Planning decisions affecting level crossings

3.64 There is a requirement in planning legislation<sup>7</sup> for planning authorities to consult the Secretary of State for Transport and /or the railway operator where development materially affects traffic over any type of level crossing. In Scotland, the requirement is for the planning authority to consult Network Rail Infrastructure Limited or any other railway undertakers likely to be affected where the development is likely to result in a material increase in the volume or material change in the character of traffic using a level crossing over a railway. 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.

3.65 Planning authorities should take careful note of comments from crossing operators. Consideration should be given to opportunities for closure of the level crossing concerned in favour of bridge underpass or diversionary routes. If a planning decision necessitates a change in level crossing protection, consideration should be given to the funding of the changes and to the timescales for implementation consistent with the requirements of the level crossing order making process. Changes in level crossing protection may well incur additional costs for local traffic authorities as well as the crossing operator.

<sup>&</sup>lt;sup>7</sup> Town and Country Planning (General Development Procedure) Order 1995 SI 1995 No 419; Regulation 25 and Schedule 5 of the Town and Country Planning (Development Management Procedure) (Scotland) Regulations 2008 as amended

# Requiring a request for a level crossing order

3.66 The Level Crossings Act 1983 section 1(6A) gives ORR, where it is of the opinion that an order is required, the power to issue a written notice to the operator of a crossing to require the operator to request a level crossing order. The notice will contain details of the reasons for the opinion, and places a statutory duty on the operator to request an order.

3.67 The subsequent request for an order will be considered by ORR as normal, but making the order is not delegated to ORR in these circumstances. In such cases the order is made by the Secretary of State, taking into account any recommendation from ORR.

3.68 If the operator declines to make a request for an order, the Secretary of State can be advised to make an order without a request. Alternatively, ORR may serve an improvement notice, under the Health and Safety at Work etc Act 1974, requiring an operator to request an order. Failure to comply with such a notice can lead to prosecution.

# **Relevant legislation and publications**

3.69 The most relevant legislation is the Level Crossings Act 1983 (as amended by the Level Crossings Regulations 1997 and the Road Safety Act 2006). Operators should also be familiar with the Health and Safety at Work etc Act 1974, the Railways and Other Guided Transport Systems (Safety) Regulations 2006 as amended and the Traffic Signs Regulations and General Directions 2002. See Appendix H.
#### Figure 10: Level crossing order process



### **Appendix A - Common terms**

Where possible the document has been written in plain English and the use of technical expressions or jargon has been avoided.

The following explains what is meant by certain terms used within the document that relate specifically to level crossings:

'Actual daily road vehicle usage' means the number of road vehicles passing between 06.00 and 24.00 averaged over a 9-day period.

*'Acute (skew) crossing'* is a crossing at which the angle measured in an anticlockwise direction from the road to the running rail is less than a right angle.

**'Approach locking'** is a feature of the signalling interlocking. In the context of a level crossing it should prevent the crossing opening to road traffic after protecting signals have been placed to danger if there is a risk of an approaching train not having received a complete warning sequence of signals.

'Control point' is a location from which the equipment at a crossing is controlled.

**'Crossing length'** applies to any vehicular crossing. At a crossing equipped with gates or full barriers it is the distance between the gates or barriers measured across the railway. At an open crossing or one equipped with half barriers it is the distance measured from the give way or stop line to a point at which a road vehicle would be clear of the railway or crossing equipment on the far side.

**'Crossing speed'** applies to locally-monitored crossings and open crossings. It is the maximum speed at which trains are allowed to travel from a point (indicated by the position of a special speed restriction board) on the approach to a crossing until the front of the train arrives at the crossing.

**'Decision point'** applies to user worked crossings, footpath crossings and bridleway crossings. It is a point where guidance on crossing safely is visible and at which a decision to cross or wait can be made in safety.

**'Left-hand side'** means the left-hand side of the road or carriageway as it would appear to a person approaching the crossing along that road or carriageway.

**'Obstacle detection':** An obstacle detector is a device or system for proving a level crossing is clear, as part of the closure sequence. An obstacle detector may comprise one detector or a system of obstacle detectors, for example a primary high-integrity obstacle detector to detect any obstruction capable of derailing a train, together with a lower-integrity Complementary obstacle detector to detect possibly low-lying, obstructions not capable of derailing a train.

**'Obtuse (skew) crossing'** is a crossing at which the angle measured in an anticlockwise direction between the road and the running rail is greater than a right angle.

**'Predictor crossing'** is a crossing at which the likely arrival time of trains is calculated automatically by the equipment at crossing. The timing of closure sequence is thus set according to the approach speed of trains

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*'Right-hand side'* means the right-hand side of the road or carriageway as it would appear to a person approaching the crossing along that road or carriageway.

**'Road open time'** is the time after the road traffic light signals have ceased to show and any barriers are clear of the road, before the road traffic light show again for another train.

**'Sighting distance'** is the distance measured along the railway from a decision point to the point at which an approaching train becomes visible in any direction from which a train may approach.

**'Strike-in point'** is the position on the track at which the presence of a train is detected and the operating sequence of the crossing is initiated.

**'Supervising point'** is the location from where the crossing is supervised. Most commonly this is either a local or remote signal-box but can be another location.

*'Tactile threshold'* is an area of tactile paving slabs laid in a specific pattern for the guidance of visually-impaired pedestrians.

*'Traffic moment'* is the number of road vehicles using the crossing multiplied by the number of trains passing in a given period.

**'Warning time'** is the shortest possible time for trains to travel the sighting distance or, where whistle boards are provided, the shortest time between the sound being heard at the crossing and the train arriving at the crossing. In calculations of warning time the highest attainable train speed should be used.

## Appendix B - Limitation on road and rail traffic at AOCL

1 Actual daily road vehicle usage is converted to effective daily road vehicle usage using Table 10 because the relationship between the accident probability and the actual road traffic volume is not linear. Converting the actual road traffic volume to the effective figure will give the same accident probability if the probability:traffic flow relationship is a straight line. (For a detailed explanation, see the report 'Automatic open level crossings - A review of safety' by Professor P F Stott, published in 1987 by HMSO, ISBN 0 11 5508317).

2 The effective daily road vehicle usage is then multiplied by the daily number of trains to give the effective traffic moment and hence the maximum permitted crossing speed which can be derived from Table 11.

Table 10			
Actual daily road vehicle usage	Effective daily road vehicle usage		
250	230		
500	425		
750	580		
1000	705		
1250	810		
1500	890		
1750	955		
2000	1010		
2500	1080		
3000	1115		
3500	1115		
4000	1080		
4500	1040		

Table 10			
5000	990		
6000	885		
7000	765		
8000	650		
9000	540		
10000	475		

Table 11		
Effective traffic moment	Maximum permitted crossing speed	
	miles per hour (mph)	
4000	55	
4600	50	
5400	45	
6500	40	
8200	35	
10130	30	
13100	25	
15000	less than 25	

## Appendix C - Definition of viewing zone at open crossings

The viewing zone (the shaded region as shown in Figure 11) is defined by lines connecting points 'X' and 'Y' given in Table 12.

#### Figure 11: Definition of viewing zone at open crossings



Table 12: Viewing zones					
Distances 'x' (metres)	Distances 'y' (metres) for crossing lengths of:				
	7 m	14 m	21 m		
2	140	170	200		
10	40	45	55		
20	25	30	35		
40	20	25	30		

Distance 'X' is the distance of road vehicle users from the 'give way' line on the approach. Distance 'Y' is the distance of an approaching train from the crossing. A crossing which crosses the railway at right angles over a single line is normally considered to be 7 m long, but at longer crossings it should be possible to see trains earlier. Where road gradients are steep, distances 'X' should be varied accordingly. Where the 85th percentile road speed is less than 15 mph (25 km/h), the maximum value of 'X' may be 20 m.

### **Appendix D - Train pedestrian value (TPV)** calculation

1 TPVs are calculated by multiplying the number of pedestrians who pass over the railway by any route at the crossing within any period of 15 minutes by the number of trains passing over the crossing in the same period.

2 Normally a census should be taken over a nine day period, between the hours 06.00 and 24.00, particularly where high volumes or vulnerable groups of pedestrians are involved. Where the number of pedestrians is low, the actual number may be determined by an estimate. Where there are regular events which boost pedestrian usage, these should be included in the census.

3 Where the data are obtained from a census, only the maximum number of pedestrians in any period of 15 minutes in the day needs to be established. Where an estimate is accepted, the number of pedestrians used in calculating TPV should be deemed to be 75% of the largest hourly value to obtain an equivalent maximum figure for a period of 15 minutes to cater for the non-uniform distribution of pedestrian flow.

4 The number of trains should be deemed to be 25% of those passing over the crossing in a period of one hour. This hour should be either:

- (a) the same hour used to give the estimated hourly value of numbers of pedestrians; or
- (b) the hour which includes the 15 minutes when the pedestrian number is established by census.

5 The number of trains should be rounded up to the next integer and should not normally be less than one

## Appendix E - ORR level crossings team – Contact details

The ORR Level Crossings Team can be contacted at the Office of Rail Regulation, 3rd Floor, One Kemble Street, London, WC2B 4AN Telephone: 0207 282 2000.

All submissions (both consultation and requests for orders) should be made to this address rather than direct to any out-based office or inspector. Core operating times are Monday to Friday, 09:00-17:00, though some staff may be available both before and after these times via ORR switchboard telephone number 020 7282 2000.

In addition, a number of local inspectors, working in the Network Rail routes or the heritage sector, take a significant role in the assessment of schemes. These inspectors may be used as the first point of contact for day-to-day enquiries.

### **Appendix F - Level Crossings Act 1983**

Level Crossings Act 1983, as amended by the Transport and Works Act 1992, Level Crossings Regulations 1997, Railways Act 2005 and Road Safety Act 2006

1 -(1) Subject to the following provisions of this section, the Secretary of State may, in relation to any place where a railway crosses a road on a level (in this section referred to as a "level crossing"), by order provide for the protection of those using the level crossing.

(1A) Subsection (1) above applies whether or not the crossing is in use when the order is made; and if it is not in use when the order is made the order shall be made so as to come into force when it is in use.

(2) An order under this section may make such provision as the Secretary of State considers necessary or expedient for the safety or convenience of those using the crossing; and, in particular –

(a) may require the operator of the crossing or the local traffic authority (or both) to provide at or near the crossing any protective equipment specified in the order and to maintain and operate that equipment in accordance with the order; and

(b) may impose on the operator requirements as to the operation of the railway at or near that crossing.

(3) While an order is in force under this section in relation to a level crossing -

(a) (repealed)

(b) subject to any exceptions specified in the order, any provision made by or under any enactment as to the crossing (or level crossings including that crossing) and imposing requirements as to protective equipment at or near the crossing, the supervision of the crossing (including the provision of buildings for the purposes of supervision) or the operation of the railway at or near the crossing shall not apply in relation to the crossing.

(4) Nothing in subsection (3)(b) above affects any provision as to traffic signs made under the Road Traffic Regulation Act 1967; but a traffic sign placed on or near a road in pursuance of an order under this section shall be treated for the purposes of section 54(4) of that Act as having been placed as provided by that Act.

(4A) Nothing in subsection (3)(b) above affects any provision made by or under Part 1 of the Health and Safety at Work etc. Act 1974.

(5) An order under this section –

(a) may be varied or revoked by a subsequent order under this section; and

(b) may impose requirements as to protective equipment provided before the making of the order.

(6) The Secretary of State may make an order under this section in respect of a level crossing on being requested to do so by the operator of the crossing or without a request by the operator.

(6ZA) The Secretary of State may not make an order without a request by the operator unless:

(a) he has consulted the Office of Rail Regulation and the local traffic authority about the order he proposes to make; and

(b) having done so, he has sent to the operator, the Office of Rail Regulation, and the local traffic authority a copy of a draft order he proposes to make and a notice specifying the period (not being less than two months) within which they may make representations to him in respect of his proposal to make the order.

(6A) Where the Office of Rail Regulation gives written notice to an operator of a crossing that in its opinion a request should be made to the Secretary of State to make an order under this section in respect of that crossing and the notice states the reasons for that opinion, the operator shall be under a duty to make such a request.

(7) Where the operator of a crossing requests the Secretary of State to make an order under this section, the request shall be accompanied by a draft of the order which the operator is requesting the Secretary of State to make.

(8) Before making a request the operator-

(a) must consult the Office of Rail Regulation and the local traffic authority about the draft order he intends to submit to the Secretary of State; and

(b) having done so, must give written notice to the Office of Rail Regulation and the local traffic authority of his intention to make a request.

(8A) A notice given under subsection (8)-

(a) must be accompanied by a copy of the draft order which the operator intends to submit to the Secretary of State; and

(b) must specify the period (not being less than two months) within which the Office of Rail Regulation and the local traffic authority may make representations to the Secretary of State in respect of the request.

(9) The Secretary of State shall consider any representations made to him pursuant to subsection 6ZA or 8A above if they have been made within the period specified in the notice referred to in the subsection concerned and may then, if he decides to make the order, make it in accordance with the draft sent to persons pursuant to the subsection concerned or with such modifications as he thinks fit.

(10) This section applies where a Government department is operating a railway at a level crossing as it applies in other cases.

(10A) Any order made under section 124 of the Transport Act 1968 or section 66 of the British Transport Commission Act 1957 and in force immediately before 1st April 1997, including any requirements or conditions laid down under the order, shall have effect as if it had been made under this section.

(10B) In performing his functions under this Act the Secretary of State shall take account of any advice given to him with respect thereto by or on behalf of the Office of Rail Regulation.

#### (11) In this section -

"barrier" includes gate;

"local traffic authority", in relation to a crossing, means the authority which for the purposes of the Road Traffic Regulation Act 1984 is the local traffic authority for the road crossed by the railway at the crossing;

"operator", in relation to a crossing, means any person carrying on an undertaking which includes maintaining the permanent way;

"protective equipment" includes barriers, lights, traffic signs, manual, mechanical, automatic, electrical, telephonic or television equipment or other devices;

"road" means any highway or other road to which the public has access; and

"traffic sign" has the same meaning as in the Road Traffic Regulation Act 1984.

2.- (1)This Act may be cited as the Level Crossings Act 1983.

(2) This Act shall come into force at the end of the period of three months beginning with the day on which it was passed.

(3) This Act does not extend to Northern Ireland.

### Appendix G - Supporting documentation level crossing order assessment checklist

Items on this list will normally be required, but you will need to consider the particular circumstances at each individual level crossing to determine whether all the items listed are required, or whether additional documentation may be needed to support your assessment.

### Major works at existing level crossings, including change in protection method, complete renewal or major modernisation

1) An outline project description and risk assessment, together with justification that the type of protection proposed is suitable for current or foreseeable road and rail traffic levels. As a minimum, to be suitable and sufficient, the risk assessment process will need to:

• Identify all the hazards at the crossing for each type of user. Consider all possibilities including foreseeable misuse, seasonal variations and abnormal working. Design should eliminate risk where reasonably practicable.

• Evaluate the risks posed to all users, road and rail, by the identified hazards. Consider the likelihood of an accident and the probable results. Level crossing accidents are usually serious, and have the potential to be catastrophic.

• Consider how risks might arise or change over the expected life of the crossing.

• Identify how, and to what extent, the chosen measures control risk. Taking into account the important issue of road-user convenience, all reasonably practicable steps to reduce risk should be taken. Explain how the chosen risk control measures will maintain or, preferably, improve on previous safety arrangements.

• Identify any residual risks and be able to justify why no further action is warranted.

• Be recorded and clearly reflected in the design and installation of the Crossing.

#### Practical guidance on recording assessment findings

Regulation 3 of the Management of Health and Safety at Work Regulations 1999 requires the making of a 'suitable and sufficient' health and safety risk assessment for the purpose of identifying the measures that need to be taken to comply with the relevant law. The *significant findings* of the assessment should be recorded.

- i. The simple purpose of all this is to help dutyholders make good decisions in compliance with the law. The record of assessment will set out the reasoning behind those decisions. A written record will also be a convenient means for showing others that a proper process has been followed. The selection of protection arrangements should be based on the findings of the risk assessment.
- ii. In making decisions about risk reduction, regard must be given to the 'general principles of prevention' set out in schedule 1 of the above Regulations, whereby avoidance of risk is the first choice and issuing instructions is the last. A reference to the approved code of practice and guidance to the Management of Health and Safety at Work Regulations 1999 can be found in Appendix H Publications.
- iii. There is no single 'right way' of setting out assessment findings. There is no set style or length, though railway infrastructure managers may find it helpful to develop their own standardised formats. In most cases it should be possible to present the significant findings of assessment in a concise manner. There is much up to date information freely available on the topic of safety at level crossings. Railway infrastructure managers should be quite capable of undertaking, in-house, risk assessments and presenting their findings to a good standard. They will, of course, need to take into account the advice, and responsibilities, of other stakeholders, such as local traffic authorities.
- iv. The record of assessment should be presented as a single, identifiable, document or bundle of information. Where necessary, and to avoid duplication, reference should be made to other documents such as ground plans, census results, published safety statistics, etc. In many cases a quantitative risk modelling process is used in support of the assessment. This is good, though care needs to be taken to ensure that the workings, sensitivities and limitations of any such process are understood by all concerned.
- v. The record of assessment should:
  - Describe when and how the assessment was undertaken and who was involved, i.e. the users of user worked crossings;
  - Make clear what input data was used and confirm steps taken to ensure its accuracy;
  - Explain how assessment findings have been interpreted and 'sense checked' by competent persons;
  - Record the arrangements put in place to control risk, providing the reasoning for their selection or, in the case of measures not used, rejection. In determining the cost-effectiveness of new safety measures, pricing should be in line with the competitive market;
  - Give proper consideration to the needs of crossing users whether in vehicles or not and whether at public or private.

2) Ground plans showing the level crossing at a scale of 1:50 or 1:100.

3) A plan, at a suitable scale, showing the highway approaches and positions of all proposed signs and road markings and a sketch showing the position of road traffic signals and barriers.

4) For all automatic crossings, half barrier crossings (not locally monitored) and relevant vehicular user worked crossings, a scale drawing detailing the category of road profile proposed, and showing the vertical road profile across the full width of carriageway over the crossing and on all approaches along the length of

the carriageway for a distance of 30 m from the nearest rail. The drawing should demonstrate that the claimed profile is achieved. (Items 3, 4 and 5 can be presented on one drawing).

5) As appropriate to the submission, signalling scheme plans (or relevant parts) showing:

#### a) for Automatic Half Barrier Crossings (AHBC)

'Strike-in points', control tables for protecting signals if there are station controls or similar within the scheme, distance of protecting signals from the crossing and line speeds and calculations relating to the acceleration of trains, where required.

### b) for Automatic Half Barriers Locally Monitored (ABCL) and Automatic Open Crossings Locally Monitored (AOCL)

The position of stop boards, special speed restriction boards (SSRB), advance warning boards (AWB), 'strike-in points', details of the calculations and standards used to position the boards and strike-in points, gradients and line speeds (please contact ORR in advance of making any AOCL or ABCL submission if other signalling alterations are proposed in the vicinity of the level crossing).

#### c) for Automatic Open Crossings Locally Monitored (AOCL)

A robust, comprehensive, risk assessed justification for the continued provision of AOCL type crossing equipment (or Manually Operated Crossings Locally Monitored) rather than any form of barrier crossing will be required in all cases. Orders for new AOCL crossings will not normally be considered.

#### d) for Open Crossings (OC)

The position of stop boards, special speed restriction boards (SSRB), advance warning boards (AWB), calculations and standards used to position the boards, gradients, line speeds and details of the viewing zone proposed.

### e) for Manually Controlled Barriers with CCTV (MCB CCTV) and for Manually Controlled Barriers (MCB)

The position of protecting signals and control tables, the position of 'strike-in points', if authority for autolowering is sought, gradients and line speeds.

#### f) for Miniature Stop Light crossings (MSL)

'Strike-in points', control tables for protecting signals if there are station controls or similar within the scheme, distance of protecting signals from the crossing, line speeds and details of authorised usage of the crossing.

6) A detailed road traffic census (covering all user types) covering a minimum of a representative 9-day period between 0600-2400 hours to accompany all automatic crossing submissions, particularly AOCL, and at MCB CCTV crossings, if authority for auto-lowering is sought. Seasonal variation in traffic levels should be addressed in any supporting census analysis. Permitted and normal road traffic approach speeds should be included. Rail traffic census details should also be supplied. Recent (less than 18 months old) traffic census information should be available if requested for other submissions. (A project may be delayed

if this information has not been taken into account.) Anticipated barrier down-time should be considered if significant changes are proposed, for example conversion from AHB to MCB.

7) Photographs of the existing level crossing from all road and rail approaches.

8) For new MCB CCTV level crossings or where the signaller's control arrangements are changed, an ergonomics/human factors report on the proposed signaller control functions, workload and furniture layout is required.

9) A statement of the status of the crossing, for example 'private road with public bridleway and footpath' and, if a public vehicular crossing, reference to the authority under which the railway is permitted to cross the road on the level - the original railway Act.

10) A draft level crossing order (or draft variation order) and a request addressed to the Secretary of State for Transport for consideration of the draft, along with copies of the covering letters sent to the statutory consultees.

11) Confirmation of the consultation with local authorities and ORR, with details of any matters raised and resultant changes.

#### Minor works at existing level crossings

12) A statement of compliance with standards and regulations signed by a competent person within the crossing operator's organisation.

13) An outline description and risk assessment of the proposed work.

14) A draft level crossing order (or draft variation order) and a request addressed to the Secretary of State for Transport for consideration of the draft, along with copies of the covering letters sent to the statutory consultees.

15) Confirmation of the consultation with local authorities and ORR, with details of any matters raised and resultant changes.

16) Items 3-9 above, as appropriate.

### **Appendix H - Legislation and publications**

#### Legislation

The Railway Clauses Consolidation Act 1845 and the Railways Clauses Consolidation (Scotland) Act 1845

Road and Rail Traffic Act 1933

The Electricity at Work Regulations 1989 (Statutory Instrument No 1989/635)

New Roads and Street Works Act 1991

Transport and Works Act 1992

The Town and Country Planning and General Development Procedure Order 1995 (Statutory Instrument No. 1995/419)

The Private Crossings (Signs and Barriers) Regulations 1996 (Statutory Instrument No1996/1786)

Railway Safety (Miscellaneous Provisions) Regulations 1997 (ISBN 0-7176- 1262-7)

The Provision and Use of Work Equipment Regulations (PUWER) 1998 (Statutory Instrument No 1998/2306)

Railway Safety Regulations 1999 (ISBN 0-7176-2442-0)

The Management of Health and Safety at Work Regulations 1999 (Statutory Instrument No 1999 3242)

Level Crossings Act 1983 (as amended by the Level Crossings Regulations 1997 and the Road Safety Act 2006)

The Railways and Other Guided Transport Systems (Safety) Regulations (ROGS) 2006 (Statutory Instrument No. 2006/599) as amended by The Railways and Other Guided Transport Systems (Safety) (Amendment) Regulations 2011

The Construction (Design and Management) Regulations 2007 (Statutory Instrument No 2007/320)

The Traffic Signs Regulations and General Directions 2002 (as amended by the Traffic Signs (Amendment) Regulations and General Directions 2008 -Statutory Instrument No 2008/2177)

The Equality Act 2010

#### **Publications**

A guide to the Level Crossing Regulations 1997 L97 (ISBN 0 7176 1261 9)

Approved Code of Practice: Safe use of work equipment. Provision and use of work equipment regulations 1998 L22 HSE Books 2008 ISBN: 9780717662951

The Traffic Signs Manual, Chapters 4/5, (ISBN 978 0 11 552411 0 and ISBN 0 11 5524797), found on DfT's website at: <u>http://www.dft.gov.uk/pgr/roads/tss/tsmanual/</u>

Installation of Traffic Signals and Associated Equipment (ISBN 0 11 552008 2)

Safety at Street Works and Road Works, Code of Practice (ISBN 0 11 551958 0)

Railway Group Standards and Network Rail Line Standards and Codes of Practice

Guidance on the use of Tactile Paving Surfaces (rev June 2007) found on DfT's website at: <u>http://www.dft.gov.uk/transportforyou/access/peti/guidanceontheuseoftactilepav6167</u>

Prevention of Trespass and Vandalism on Railways - a good practice guide (ISBN 0 7176 1661 4)

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ORR\_s 15 June 2021 publication of principles for Managing Level Crossing Safety



# Principles for managing level crossing safety

15 June 2021



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### **Foreword**

Level crossings provide access routes across our railways for the public and for private landowners, but they present a particular safety challenge which has increased as our railways and highways have become busier. Level crossings are a priority topic for the Office of Rail and Road (ORR) because of the potential for harm and injury to members of the public.

There are currently just under 5,800 level crossings on the mainline railway with another estimated 1,500 on heritage and minor railways. They range from rural footpath crossings where the user checks for themselves that it is safe to cross, to high-tech public road crossings with obstacle detection systems and automatic barriers. This guidance is for all types of level crossing and is aimed at a wide audience including level crossing operators and managers, users, landowners and local traffic authorities.

This guidance marks a change from our level crossing guidance published in 2011 - Level Crossings: Guidance for Managers, Designers and Operators, and known as RSP7. While RSP7 does not set mandatory standards, it does describe particular layouts and methods of operation, and as such is perceived as setting requirements for level crossing design. Principles for Managing Level Crossing Safety takes a risk based approach, in line with other ORR health and safety guidance, and sets out principles and factors which should be considered in a level crossing risk assessment. It 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, and the importance of considering how level crossings are actually used. Overall, this guidance supports our strategy for regulating level crossings, which is focussed on continued improvement in risk management.

This guidance has been developed with the help of a stakeholder steering group who were invited by ORR to engage from early in the project. We would like to thank the members of the stakeholder steering group: Association of Directors of Environment, Economy, Planning and Transport (ADEPT), British Transport Police, Department for Transport, Heritage Railway Association, Hertfordshire County Council, Institute of Public Rights of Way, Network Rail, Rail Delivery Group and RSSB.

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#### Ian Prosser CBE - Director, railway safety

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### 1. Introduction

- This guidance is intended to inform the assessment and control of risks at all types of 1. level crossings, through a thorough understanding of the user. A number of principles are set out, describing ORR's expectations for identifying and controlling the risks, and a list of key factors to consider accompany each principle.
- 2. This guidance does not place additional burdens on duty holders, introduce new duties, or prescribe how a level crossing should be designed, operated or maintained. Further information about level crossings is available on our website.

### **ORR's role**

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3. ORR is the independent safety and economic regulator for Britain's railways. We strive for a railway that operates safely, reliably and provides value for taxpayers and customers. We protect the health and safety of people who work in the rail industry or those affected by its activities, by ensuring railway businesses have effective health and safety management systems in place. This includes identifying, assessing and controlling risks properly.

### Who is this document for?

- 4. The principles contained in this guidance apply to the design, management and operation of level crossings on:
  - mainline railways (National Rail); •
  - non-mainline railways (e.g. heritage railways, metro systems, rail freight sites);
- 5. This guidance is a resource for anyone involved in level crossing safety, those whose activities impact on level crossing safety, and users of level crossings. Specifically, for those in the railway industry, traffic authorities, local authorities and others associated with the railway, such as landowners who have rights over the railway.
- 6. This guidance is likely to be relevant to people in the following roles in these organisations:
  - designers, planners and engineers;

those dealing with planning applications, access and public rights of way matters: 

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- managers, staff and volunteers with responsibilities which affect safety at, or near, level crossings.
- 7. This guidance is not specifically aimed at tramways but may be useful reference material when designing tramway crossings. More information on tramways is available on ORR's website.

### How to use this document

- 8. The main purpose of this guidance is to inform the assessment and control of risks at a level crossing, recognising that every level crossing is different and its individual circumstances need to be taken into account.
- 9. We encourage consideration of the 'whole-system' in which a level crossing operates, by this we mean understanding how people, processes and technology work together to deliver a safe level crossing. A level crossing is an interface between the highway and the railway and involves a wide range of users and different parties who each have an impact on safety. The principles reflect this by focusing on users, the railway and the highway. We also emphasise the importance of collaboration between the various parties who contribute to level crossing safety.
- 10. For the purpose of this guidance, when we use the term 'highway' we also include private roads. A highway is usually defined as any road (including byways), footpath or bridleway to which the public have access.
- 11. Each of the principles in this guidance describes an ORR expectation for identifying or controlling the risks at a level crossing. A list of factors for consideration accompany each principle. We encourage you to consider all the principles and factors in this guidance. Not all principles and factors will be relevant for all level crossings; you may also need to identify other factors for level crossings where there are unusual circumstances. This is because each level crossing should have its own site specific risk assessment.
- 12. We have case studies to illustrate how the principles may be applied available on our website. A glossary of key terms is provided at Annex A.
- You will also need to take account of other health and safety guidance, legislation 13. and standards relevant to the railways and public highways. Equally, you will need to comply with relevant equality legislation and consider other relevant standards and guidance. Further information is available on our website.

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### Collaboration

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- 14. It is particularly important that all those involved in the process of level crossing risk assessment work together so that opportunities can be taken to eliminate and reduce risk. Early engagement and consideration of solutions from different perspectives will provide better opportunities for innovation in managing risk. For example, a local housing development scheme which could increase use of a footpath crossing may provide an opportunity to replace the level crossing with a bridge as part of the development scheme.
- There should be a joined up, collaborative approach to managing and improving level 15. crossing safety between the infrastructure manager, traffic authority, local authority, train operating companies (including freight), users (particularly for private userworked crossings) and other organisations such as the British Transport Police.
- 16. Where level crossings on public highways are under review, it is vital that the relevant local traffic authority is engaged in early discussions. This allows local traffic factors to be taken into account when designing level crossing controls. This is increasingly important given the greater volumes of road and rail traffic, and the impact the length of time that a level crossing is closed can have on road traffic. Equally, when there are temporary or permanent changes to highways that affect a level crossing, the traffic authority needs to discuss these with the crossing operator.
- 17. We support the use of joint plans which help to provide a structured and long-term approach to collaboration. These can be used to identify relevant organisations and user groups, gather relevant information and data (such as traffic volumes), local knowledge and incident history and document the necessary policies and processes.

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### 2. Level crossing risk assessment

### Human factors in level crossing design

- 18. Good level crossing design should understand the needs and limitations of the user, taking into account normal use, reasonably foreseeable human error and unintended methods of use. It should also consider the needs of those operating and maintaining the level crossing.
- 19. Level crossing users are individuals and differ, for example, in their mode of transport, age, sensory and mobility capabilities, familiarity with using level crossings and perception of risk. They may use the crossing for one part of a journey and have other demands or distractions on their mind, particularly in relation to the rush and pressures of daily life.
- 20. Every user will develop their own understanding of how to use a level crossing from the information available to them and their experience of similar situations. This understanding may have to be built up very quickly if they are unfamiliar with a level crossing and using it for the first time. Or they may be very familiar with a level crossing and have already developed and refined their understanding of how to use it. The user's understanding may not match how the level crossing is intended to be used. This means it is preferable to adopt a level crossing design that minimises cognitive demands and places as little onus as possible on the user to take decisions about when it is safe to cross the railway. Designers should also be aware that because of their level of expertise and familiarity, they may overestimate the intuitiveness of their design and therefore likelihood of users behaving as expected.
- 21. The points below set out some considerations for level crossing design:

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- understand natural human tendencies, such as people's willingness to wait. People will look for a quicker and easier way of doing something, especially if they are regular users. They may build up assumptions about the timing of trains and when they consider it is safe to cross, however trains do not always run to time or freight trains may be time tabled when not expected.
- take account of how people can react when required to make quick decisions that affect safety.

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- recognise people's expectations from the world around them on how something should work can be utilised to develop effective control measures e.g. people know that a green light means go and a red light means stop. Equally, where control measures do not meet with people's expectations for how something should work, risk can be introduced e.g. if there is inconsistency between the two sides of the crossing.
- use engineering controls to remove the risk of human error e.g. ensuring that once a railway signal has been cleared to allow a train to proceed towards a crossing, there can be no change to the equipment protecting the crossing. Where there is the potential for errors when people are expected to communicate with the crossing controller, consider other more reliable technological means to let users know when it is safe to cross. For all crossings, think about how to simplify and reduce the number of tasks that people are expected to perform and the instructions they are expected to follow in order to minimise their cognitive load.
- make it clear to people what they are expected to do. Where user action is required, such as closing gates, it is beneficial to make this easy, reinforce the need for the action to be completed, and confirm that it has been completed by giving feedback to the user. This is particularly important where there is a known problem e.g. where gates are being left open, electronic signs can remind users to close the gate.
- consider use of natural and/or artificial constraints, e.g. fencing on the approach to a crossing, to guide the user to the next appropriate decision or action.

### What a risk assessment involves

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- 22. Health and safety law requires railway duty holders to reduce the level of risk from their operations so far as is reasonably practicable. Level crossings present a particular challenge because they are at the interface between the railway and the highway, so require a collaborative approach between those involved, particularly as level crossing risks are not all under the direct control of the railway duty holders.
- 23. It is essential that decisions and options for level crossing control measures are informed by a suitable and sufficient assessment of the risks. This should be site specific and completed by competent people with thorough knowledge of the risks and the application of controls associated with level crossings, as well as a good

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Identify the hazards - An essential part of this will be to understand how the level crossing is used, both in normal and abnormal operating conditions, and who the users are. The safe user principles and factors set out in this document will help you to do this.

Assess the risks - This is about deciding how likely it is that someone could be harmed by each of the hazards identified and how serious it could be. The consequence and likelihood of harm should be considered in combination when assessing the significance of risks.

**Control the risks** - First consider whether the risk can be eliminated and if this is not reasonably practicable to achieve then consider how the risk can be controlled to reduce the likelihood of harm, following the principles of prevention described later. The safe railway and safe highway principles and factors set out in this publication will help you do this.

Record your findings - This should include documenting the hazards you have identified and the controls you have put in place.

**Review the controls** - 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.

24. When a risk assessment is reviewed because the level of risk has changed at a level crossing, e.g. because the speed and/or frequency of rail services has increased on a route, you must ensure you continue to meet the legal duty to reduce risk so far as is reasonably practicable. There may be situations where an increase in risk is acceptable because it is not reasonably practicable to reduce that risk.

### **Principles of prevention**

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Arrangements for managing risk at level crossings should follow the principles of 25. prevention which are found in The Management of Health and Safety at Work Regulations 1999<sup>1</sup>. The following paragraphs set out an ideal order to follow when deciding how to manage risk at a level crossing.

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<sup>&</sup>lt;sup>1</sup> The Management of Health and Safety at Work Regulations 1999, schedule 1.

### Elimination

- The first consideration for all level crossings should be whether there are reasonably 26. practicable alternatives to a level crossing, this is best considered at the design stage of a level crossing as part of a whole system approach.
- 27. Proposals for new level crossings are rare, but projects to reinstate old railways may include proposals to reinstate a level crossing which previously existed on the route. During the design of a new railway or reinstatement scheme, there are likely to be fewer constraints and greater flexibility for identifying alternatives. In principle, ORR does not support the creation of new level crossings where there is a reasonably practicable alternative, and we encourage alternatives such as diversions, bridges or tunnels to be fully explored and delivered where reasonably practicable. Each situation should be considered on a case-by-case basis, taking account of the nature of the railway operations, surrounding environment and foreseeable users
- 28. For an existing level crossing, the risk assessment should always consider whether closure is a reasonably practicable option. However, we recognise that there are many factors to be considered, including the legal arrangements for closing rights of way. The cost of alternatives has to be taken into account but also the feasibility of alternatives e.g. level crossings are often located in built up areas where it is simply not possible to construct a bridge without causing significant detriment to local people. There may be local opinions either for or against a level crossing and good communication between the railway, the local authority, and other affected parties such as users and landowners is vital in these situations.
- 29. Using a risk assessment approach enables the costs and benefits of level crossings to be compared with the costs and benefits of alternatives to a level crossing, such as a bridge. This should also take into account the wider implications, such as the possibility that risk may be transferred to another level crossing.

### **Engineering controls**

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30. Where it is not reasonably practicable to close a level crossing, engineering controls should be considered. There is now a range of technologies available for level crossings. In addition, the cost has been decreasing over time, as the technologies are refined and the efficiency with which they can be installed increases. This has increased the options available for installing engineering controls e.g. by providing an active warning system in preference to relying on the user to look out for trains and determine whether it is safe to cross the railway. Another example is the use of obstacle detection systems at road level crossings, which check that a level crossing is clear for trains to proceed and can reduce human error and signaller workload.

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#### Administrative controls

- 31. Administrative controls such as signage and instructions should be used in conjunction with other control measures where this is reasonably practicable, as they place a heavy reliance on the user and do not actively manage the risks.
- 32. Administrative controls also include the safe system of work for operating the level crossing under normal and abnormal operating conditions. Engineering controls should be used where reasonably practicable, however administrative procedures and processes will be required at most level crossings.

#### Reasonable practicability and decision making

- Reducing risk so far as is reasonably practicable involves a judgement as to whether 33. the risk can be controlled if the duty holder takes certain measures. The level crossing operator has a duty to manage risks to those who use a level crossing, including rail employees, rail passengers and members of the public.
- 34. The Courts have decided that risk control measures should be deemed reasonable unless the cost of the measure is grossly disproportionate when compared to the risk. There is no authoritative guidance on what factors should be taken into account when deciding whether cost is grossly disproportionate and no single algorithm which can be used to determine gross disproportion; it is a case-by-case, site-by-site judgement. Although there is no authoritative case law on what constitutes gross disproportion, ORR supports the view of the Health and Safety Executive that where the risk is greater a more significant degree of disproportion is justified.

### Applying the gross disproportion judgement

- 35. Duty holders have to judge the risks at a level crossing. The risks to individuals and the likelihood and severity of the consequences of an incident at a level crossing, should be taken into account along with the specific characteristics of each crossing. This should be weighed against the cost in money, time and trouble or effort of options to eliminate, reduce, or mitigate risk.
- Gross disproportion is a matter of informed judgement on a case-by-case basis for 36. the duty holder. ORR does not set out what an appropriate gross disproportion factor would be for a level crossing. This is for two key reasons. Firstly, a single factor cannot be used for such a variety of circumstances as those found at level crossings. Secondly, the choice of factor should take account of the degree of risk involved, the uncertainty of any analysis and the potential for significant harm, which can only be determined on a case-by-case basis.

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### 3. Safe for the user

This section is for the identification of hazards at a level crossing. It follows the user's journey, from approaching the crossing to travelling over it and exiting it. It also asks you to consider the different types and characteristics of users at a crossing, which will identify some as being more vulnerable than others. The overall aim being to ensure that all foreseeable hazards are identified.

There should be comprehensive identification and understanding of all foreseeable users *before* considering the railway and public highway principles.





### **User Principle 1: Understand all foreseeable level** crossing users.

To help you achieve this outcome, you should consider, at least, these factors:

- (a) use a variety of quantitative and qualitative methods to gather evidence in order to get a good understanding of who uses the level crossing, how they use it and the frequency and pattern of use e.g. daily, weekly, seasonal variations and times of peak usage;
- (b) nearby local facilities, e.g. stations, schools, care homes, national leisure routes, seasonal attractions or event venues and their foreseeable users e.g. people with luggage, children and elderly people;
- users with protected characteristics under the Equality Act 2010. You should (c) ensure the specific risks these users encounter are identified and have due regard to eliminating or reducing these risks to promote equality of opportunity for these users;
- (d) users with particular characteristics that impact on their safe use of the level crossing, e.g. dog-walkers, users crossing in groups, horse-riders, cyclists, motorcyclists;
- users who may be unfamiliar with a level crossing or who may have difficulties (e) understanding instructions, e.g. delivery or commercial vehicle drivers and seasonal agricultural workers;
- (f) livestock driven on foot over the level crossing, when this is likely, and who is in charge of the livestock;
- (g) types of vehicles using the level crossing and how their particular characteristics might impact on the safe use of the level crossing e.g. long slow vehicles or farm machinery;
- users of private crossings who operate crossing controls, including those who (h) need to brief others on how to do so safely, to understand how and when they use the level crossing and review/identify safe systems of work.

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### **User Principle 2: Understand foreseeable user** behaviours or actions at, or near, the level crossing.

To help you achieve this outcome, you should consider, at least, these factors:

- gather data on how users behave at the level crossing, including when there are (a) known problems, e.g. through the use of incident data and technology such as cameras;
- (b) why some users may not follow the expected route over a level crossing, e.g. local factors including layouts, the proximity of structures such as signal boxes, nearby footpaths, behaviour when there is a station nearby, or pubs/clubs are nearby;
- (c) people deliberately taking risks at a level crossing e.g. going onto a level crossing that has been closed for an approaching train;
- (d) clothing and equipment e.g. hoods and headphones which may affect awareness and/or concentration:
- animals accompanying users over the level crossing e.g. dogs and horses and (e) their potential impact on behaviour;
- (f) how passengers access any nearby platforms, information notices, ticket sales points or car park machines and the effect of this on the number of times a user needs to cross the railway and their willingness to wait;
- routine users who may develop assumptions and practices that can underestimate (g) risks, especially when the system is not operating as it should;
- foreseeable user behaviour when level crossing equipment does not operate as (h) expected by the user e.g. if the barriers have malfunctioned.

### User Principle 3: Understand how users become aware of the level crossing.

To help you achieve this, you should consider, at least, these factors:

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(a) information and cues provided to warn users they are reaching a level crossing so they can modify their actions, e.g. signage, highway markings, fencing, changes in the approach surface;

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#### User Principle 4: Provide a safe and convenient waiting place for users at the level crossing and where necessary on the approaches to the level crossing.

To help you achieve this, you should consider, at least, these factors:

- drivers of long, large or slow vehicles, farmers with livestock, or horse riders who (a) may need a place to wait on the approach to the level crossing so they can communicate with the crossing controller;
- (b) a safe place at the level crossing where the user can wait whilst a train passes or identify when it is safe to use the level crossing;
- depending on the crossing controls, users will need to undertake different actions (C) at the waiting place, and their needs should be accommodated. Some level crossings require users to have good visibility of the track, which can be affected by the height of the user e.g. those in tractors and wheelchairs, and their distance from the track:
- physical controls, e.g. gates, fencing, chicanes, vegetation, structures and their (d) positive (but also negative) impact on the effectiveness of the waiting place.

### User Principle 5: Provide information to enable users to safely cross at the level crossing.

To help you achieve this, you should consider, at least, these factors:

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- (a) how, when and where users need to receive information to make decisions about when it is safe to cross or whether they should wait;
- communicate information and cues in the correct sequence, so the user clearly (b) understands what they need to do. The surrounding environment, mode of transport and the importance of physical controls such as barriers and gates should be taken into account;
- impact of time of day, seasons and weather conditions on the effectiveness of the (C) control measures provided for the user, e.g. artificial lighting may be necessary and any seasonal or daytime variations in sun glare may need to be mitigated;

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#### User Principle 6: Provide a suitable warning for users that a train is approaching to enable them to be in a safe place before a train passes.

To help you achieve this, you should consider, at least, these factors:

- (a) an active warning system in preference to relying on the user to determine whether or not a train is approaching the level crossing;
- (b) user behaviours and actions in relation to the operation of the level crossing, e.g. to prevent them from being trapped within a closed crossing or starting to cross when it is unsafe to do so;
- (c) foreseeable actions of different users in a 'another train coming' scenario, these trains may be coming in the same or different directions; one may be inaudible and hidden from view;
- adequate visibility along the railway where sighting distances are part of the (d) intended control measures e.g. vegetation management, the identification of lineside equipment that limits visibility and the impact of curved track;
- number of users and their characteristics, traffic volumes and time it takes to cross (e) the railway in determining the closure sequence in relation to the likelihood of a descending barrier, or moving gate, striking a user or a train arriving when a user is on the crossing;
- impact of long and/or variable waiting times on user behaviour, e.g. impatience (f) and risk taking behaviour such as attempting to beat/weave-around a closing level crossing barrier, or disregarding miniature stop lights and audible warnings;
- (g) where users require permission from a crossing controller to cross, the information required and how this is conveyed.

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### User Principle 7: Users should be able to cross safely without stopping.

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To help you achieve this, you should consider, at least, these factors:

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## User Principle 8: The level crossing should be left in a safe state for other users.

To help you achieve this, you should consider, at least, these factors:

- minimising reliance on the user to return to the level crossing to a safe state (a) through the use of technology;
- encourage the desired behaviour after users have crossed, especially in relation to (b) any further actions that are required, e.g. returning gates to a closed position;
- crossing equipment and method of operation should be consistent on both sides (c) e.g. any barriers or gates;
- (d) provision of information on how to report defects and misuse of level crossing equipment;
- users who have crossed the railway should be able to continue their journey (e) without blocking the exit for other users.

## User Principle 9: Understand how the level crossing is managed and operated by railway staff.

To help you achieve this, you should consider, at least, these factors:

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how the operating arrangements may create risks to those operating the level (a) crossing, including in foreseeable abnormal conditions; 

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## 4. Safe railway

This set of principles guides your risk control measures for a level crossing from the perspective of the railway. The primary safety consideration is to prevent a collision between a train and crossing user. Where this involves a large obstruction there is also the potential for a train to be derailed.



# Railway Principle 1: A level crossing should be designed with protective measures so it is safe for users.

To help you achieve this, you should consider, at least, these factors:

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(a) placing the least reliance on human intervention or responses from railway staff or users as possible. Risk control measures include:

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- prevention of access to the railway by provision of barriers or gates activated or locked by the approach of a train;
- alerting users to an approaching train by visual and/or audible active warnings;
- gates or barriers, a suitable distance from the railway.
- (b) appropriate monitoring of the level crossing asset to ensure it is functioning as intended, e.g. lights, barriers and emergency telephones. This needs to take into account how failures and other issues, such as a gate being left open, will be detected;
- (c) minimise the likelihood of equipment failures that result in unsafe situations;
- (d) displays, controls and mechanical components which provide the user with clear information on level crossing status, the approach of trains, and whether it is safe to cross;
- (e) user behaviour if level crossing equipment fails, including the impact of frequent failure and how this can lead to unsafe assumptions;
- (f) minimise the risk of a user being delayed or becoming trapped on a level crossing when a train is approaching, including consideration of the:
  - width and surface profile of the highway throughout the level crossing;
  - width and design of the gates/barriers on each side of the railway and their impact on entering and exiting the level crossing;
  - crossing closure sequence, so it provides sufficient warning of an approaching train but also allows safe exit if a user is already on the level crossing. These elements need to be balanced because extended waiting times can encourage risk taking behaviour;
  - height and position of any load gauges above the levelled highway surface;
  - methods to prevent barriers or gates from unintentionally closing while the level crossing is being used;

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(g) prevent users being injured as a result of being struck by descending barriers or moving gates;

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### **Railway Principle 2: Signalling controls at a level** crossing should result in it being clear of users or obstructions before a train arrives.

To help you achieve this, you should consider, at least, these factors:

- an automatic system, of sufficient safety integrity, that detects people or (a) obstructions on the level crossing before closing it and allowing a train to enter;
- prevent a train that has passed a protecting signal at danger or exceeded its (b) movement authority from reaching the level crossing by providing a safety overlap (to the signal) reinforced by engineering controls (train protection systems that will bring the train to a stand);
- where it is not possible to provide an effective safety overlap or train protection (C) system at a protecting signal, alternative protective measures should be provided. E.g. initiating the closure sequence before the protecting signal is reached, or providing an appropriate warning to users so that if a train passes a protecting signal at danger, they know to leave the level crossing if they are on it, or not to enter it.

### Railway Principle 3: Take all foreseeable rail movements into account.

To help you achieve this, you should consider, at least, these factors:

- all foreseeable directions that trains and other rail vehicles, including road rail (a) vehicles, might approach from, and their operating characteristics, including the frequency of trains and their speed;
- avoid train movements which would require a train to wait on a level crossing; (b)
- specify any circumstances when a level crossing attendant will be required to (c) operate the level crossing.

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### Railway Principle 4: It should not be possible to re-open railway controlled barriers or gates until the train has fully passed over the level crossing, or stopped in advance of the level crossing.

To help you achieve this, you should consider, at least, these factors:

- all foreseeable operating circumstances, including the speed, braking distance of (a) trains and another train coming;
- (b) the level crossing and signalling controls should place the least reliance on procedures and correct actions by the crossing controller;
- (c) avoid trains stopping on a level crossing. It should not be possible to open the level crossing to pedestrian or road traffic if a train has stopped on it.

### Railway Principle 5: People working on the level crossing should be able to do so safely.

To help you achieve this, you should consider, at least, these factors:

- (a) facilitate safe access to the level crossing and its equipment for maintenance, e.g. minimising working at height or availability of parking areas for maintenance vehicles;
- how the level crossing will be safely operated by railway staff during normal and (b) abnormal conditions e.g. manual operation of gates creating risks from road traffic;
- processes and procedures to manage the risk of injury from machinery and other (c) equipment;
- (d) lighting conditions, including light from nearby sources, which may impact on the visibility of the level crossing;
- avoid lighting that impairs the crossing controller being able to see approaching (e) train headlights.

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### **Railway Principle 6: Avoid road vehicles becoming** stranded or grounded.

To help you achieve this, you should consider, at least, these factors:

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- foreseeable vehicle characteristics, e.g. vehicle length, wheel base or ground clearance;
- entry and exit gradients and their impact on any vehicle clearance from OLE.
- (b) a means of communication with the level crossing controller where required;
- contingency plans for dealing with a stranded vehicle. (c)

#### **Railway Principle 7: Prevent livestock and other large** animals such as horses straying onto the railway.

To help you achieve this, you should consider, at least, these factors:

- (a) foreseeable use of the level crossing and the likelihood of livestock or other large animals being in the vicinity;
- (b) measures to prevent access to the level crossing, e.g. gates, lick guards, cattle grids, holding pens and fencing;
- measures to prevent straying onto the line from the level crossing, such as cattle-(c) cum-trespass guards.

#### **Railway Principle 8: Discourage trespass onto the** railway and vandalism.

To help you achieve this, you should consider, at least, these factors:

- provide the shortest route possible across the railway, with a defined route from (a) entry to exit;
- the route over the level crossing should be obvious to the user, e.g. through the (b) provision of well-maintained fenced approaches, distinct crossing surfaces and edge markings;
- (c) anti-trespass guards to deter access onto the railway;

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design features for level crossing equipment to improve resilience against (d) vandalism e.g. blocking public access to equipment and the use of protective meshes;

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## Railway Principle 9: Take account of foreseeable environmental conditions.

To help you achieve this, you should consider, at least, these factors:

- (a) foreseeable weather conditions, e.g. fog, ice or wind noise;
- (b) local environment e.g. ambient noise levels, geographical features;
- (c) natural light conditions, e.g. sun glare (direct and reflected);
- (d) where identified as necessary, sufficient lighting should be provided. This should not impair the ability of users to see approaching trains where the safe use of the level crossing relies on this.



## 5. Safe highway

This set of principles guides risk considerations for a level crossing from the perspective of the highway and is concerned with the approaches to the level crossing. The primary safety consideration is to prevent a collision between a level crossing user and a train. These principles also cover preventing road traffic incidents at, or near, the crossing.



## Highway Principle 1: Warn users that they are nearing the level crossing by providing information.

To help you achieve this, you should consider, at least, these factors:

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(a) signage and other measures should be provided at appropriate locations on the approaches to the crossing;

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## Highway Principle 2: Highway approach surfaces should enable users to cross safely.

To help you achieve this, you should consider, at least, these factors:

- (a) approaches and profiles should be consistent with those at the level crossing,
  e.g. minimising slopes and acute angles to achieve an even passage over the level crossing;
- (b) approach surfaces and profiles should be maintained so they continue to be suitable e.g. profile, colour, construction material and grip.

## Highway Principle 3: Minimise the risk of road traffic blocking back over the level crossing.

To help you achieve this, you should consider, at least, these factors:

- (a) road markings and/or signage, e.g. to prohibit overtaking, turning across the opposite carriageway or parking or waiting on the carriageway;
- (b) linking road traffic light signals with the level crossing closure sequence;
- (c) changes to road layout and features to improve traffic flows, e.g. providing waiting areas or addressing restrictive road layouts and gradients.

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## Highway Principle 4: Design highway approaches to avoid vehicles grounding on the level crossing.

To help you achieve this, you should consider, at least, these factors:

(a) the surface profile or other elements of the road layout;

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#### Highway Principle 5: Take account of foreseeable environmental conditions on the level crossing approaches.

To help you achieve this, you should consider, at least, these factors:

foreseeable weather conditions, e.g. fog or ice; (a)

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- (b) natural light conditions, e.g. sun glare (direct and reflected);
- (c) where identified as necessary, sufficient lighting should be provided;
- (d) maintain visibility of the level crossing and its equipment e.g. by vegetation management and maintenance of signage and road markings so that they remain visible and legible.



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## **Annex A: Glossary**

For the purpose of this document, the following definitions are used.

another train coming	Also known as 'second train coming' and 'hidden trains', this is when a train passes over a level crossing with another train approaching. The second train may be obscured by the first train.	
blocking back	A situation where road vehicles enter a level crossing when they are unable to leave because the exit is blocked by other vehicles, so vehicles are stationary on the level crossing.	
conductor rail	Also known as 'third rail', a conductor rail provides trains with up to 750 volts DC. The live rail is raised and mounted on insulators at the sleeper end.	
crossing controller	A person who controls the operation of a level crossing either at the crossing or remotely from a control centre.	
flangeway gap	The gap between rails and highway which allows rail vehicle wheels to pass through.	
highway	A highway is any road (including byways), footpath or bridleway to which the public have access. For the purpose of this guidance the meaning of highway should be interpreted as including private roads.	
level crossing	A level crossing is where a railway crosses a road on the level (i.e. without the use of a tunnel/underpass or bridge). NB A road would include footpaths, bridleways and cycle ways.	
overhead line equipment (OLE)	Overhead line equipment refers to the overhead wires and supporting infrastructure that carry electricity at 25,000 volts (AC) or 750 to 1500 volts (DC) to power electric trains.	
protected characteristics	There are nine groups of people with protected characteristics defined in the Equality Act 2010: age, disability (a physical or a mental condition which has a substantial and long-term impact on the ability to do normal day to day activities), gender reassignment, marriage and civil partnership, pregnancy and maternity, race (colour, or nationality, or ethnic or national origins), religion or belief, sex and sexual orientation.	
skewed crossing/skew	A level crossing at which the angle measured from the public highway to the running rail is not at a right angle	

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A 'whole-system' approach of level crossing safety by setting out the needs of crossing users as well as risk assessment considerations from the railway, and highway perspectives.



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## JP3





# Enhancing Level Crossing Safety 2019 – 2029

A long-term strategy targeting improved safety on Great Britain's railway

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## FOREWORD



Andrew Haines chief executive

Level crossings were built when the railway was first constructed in the Victorian times. They are used to connect communities across the UK, from residential and industrial areas, to high streets and farmland.

If we were to build the railway from scratch today, we wouldn't include level crossings. They pose a risk to our passengers and members of the public, who can also be delayed if there is a fault or incident at a level crossing. Drivers, cyclists and pedestrians can also find themselves delayed in their journeys by waiting for trains to pass through crossings. However, we know what an important part of dayto-day life these crossings play for the communities around them.

That's why we have worked really hard to make sure the level crossings on our railway are as safe as they can be, and as a result we have one of the best safety records in Europe. This is a commendable achievement considering our railway is one of the most intensively used in the world. But for me, this is still not good enough. There are far too many near misses and there are still, sadly, fatalities on level crossings.

Simply put, the safest level crossing is a closed one. We know that closing our level crossings isn't always a realistic option for the communities they serve. That's why since 2009, we have invested over £200million in improving safety at thousands of crossings, which includes closures, building bridges, identifying new safer rights of way, installing new barriers and warning systems, new signage and educating the people that use them how to be safe around them. Furthermore, we have introduced over 100 level crossing managers to gain a greater understanding of not only the level crossing itself, but the people who use them and the surrounding communities.

We've closed over 1,100 level crossings since 2009. With this, the hope would be that the number of incidents would have reduced, however, with more road journeys and an increasing population, coupled with growing public demand for train travel in and out of our economic hubs, more services are being introduced and sadly incidents continue. Overall, we see the same number of incidents despite having considerably less level crossings. That means there are more incidents per crossing now than there was five years ago.

Level crossing safety remains one of our key priorities. Further improvements to manage the safety of public and passengers are still required, this strategy sets out our objectives to make the railway a safer place for the people who use it and cross it. Our challenge, in collaboration with road and rail industry colleagues, remains the continued management of risk to be as low as reasonably practicable at level crossings while keeping the communities we work in safe and connected.

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## **EXECUTIVE SUMMARY**

## Our approach to managing level crossing safety

Since 2009, we have made significant improvements in our management of level crossings, greatly improving safety and reducing opportunities for injuries and accidents across the network. We have a legal duty in health and safety legislation to, so far as reasonably practicable, not expose our passengers, the public or our workforce to risk at our level crossings.

Britain's level crossing safety record, which is one of the best across the world, reflects our efforts. But despite our investment and focus, level crossings continue to present a risk to the public. With accidents still occurring each year, we recognise the need to improve further and target continuous improvement in key areas.

Enhancing Level Crossing Safety is our strategy to manage the safety and reliability of level crossings in Great Britain for the next 10 years. It is aligned to the rail industry strategy Leading Health and Safety on Britain's Railway which targets improved safety at level crossings as one of its 12 key priorities.

#### Our long-term level crossing safety vision is:

• No accidents at level crossings on Britain's main line rail network

#### Our strategic long-term goals for level crossings are clear:

- Reduce safety risk to the public, passengers and our workforce
- Increase rail capacity and performance across the network
- Reduce operational and financial risk

## We will reach these goals by meeting the following level crossing strategic objectives:

- Maximise risk reduction
- Fewer fatalities, injuries and near misses
- Reduce the likelihood of human error
- Change user behaviour
- Improve reliability at our level crossings

## To meet these objectives Enhancing Level Crossing Safety clearly identifies four areas of targeted focus:

- Risk Management
- Technology and Innovation
- Competence Management
- Education and Enforcement

All of which are underpinned by the need for effective collaboration.

*Enhancing Level Crossing Safety* is designed around ALARP (as far as reasonably practicable) principles. It is an iterative strategy that will evolve over time to take account of emerging risks and trends which take precedence or require equal focus.



# 01 INTRODUCTION

#### Enhancing level crossing safety

Closing level crossings is the only way to fully eradicate the risk and sometimes we need to do that even if that means adversely affecting the community they serve. However, it is not possible or practicable to immediately close all level crossings. Aside from the financial and practical constraints, user convenience still needs to be a key consideration. A broad range of targeted interventions and initiatives are therefore needed to manage safety at crossings which remain open.

As part of our licence to operate and manage Britain's railway infrastructure, we have the legal duty to protect our passengers, the public and our workforce, and to reduce risk at our level crossings so far as is reasonably practicable.

*Enhancing Level Crossing Safety* provides the necessary overarching strategy to manage risk at level crossings. Its objective is to improve the safety of passive<sup>1</sup> and protected<sup>2</sup> crossings through effective collaboration and the delivery of targeted improvements.

#### The strategy provides:

A clearly defined vision that maximises risk reduction from investment

- The strategy underpins the company's policy on level crossing safety
- A common set of risk management objectives, priorities and processes that are shared across the business are consistently applied
- Efficiencies and opportunities that are shared through the procurement and delivery of solutions

A reference point for all Network Rail employees as to how level crossing safety is managed

- The strategy is visible and recognised across the business
- Corporate goals are understood by everyone, with safety at the forefront of all activities which interface directly or indirectly with level crossings
- The strategy sets direction and focus and helps to prioritise areas of greatest risk
- A holistic approach to risk management is applied, negating duplicated effort, waste and sub-optimal decision making

A reference point for rail industry colleagues, local authority stakeholders, the Office of Rail and Road (ORR) and the public as to how level crossing safety is managed

- The strategy is transparent with clearly articulated goals which target improved safety and enhanced reputation
- The strategy identifies how we will continue to meet our health and safety obligations in this area of risk management
- Collaboration and cross-industry working is understood and endorsed across all disciplines
- Good practice is adopted by all parties in Great Britain and is shared internationally with rail industry colleagues





<sup>1</sup> Footpath, bridleway, open, public and private vehicle crossings which require users to make safe decisions to

traverse based on sighting alone or interface with Signallers using telephones (where provided). <sup>2</sup> Crossings equipped with stop lights, alarms and/or barriers which warn users of applos (and the second s



# 02 our safety record

There are around 6,000 level crossings across the network. They range from the most basic passive crossings, which rely on users making informed decisions to cross safely, through to public road crossings equipped with active risk controls.

Great Britain can demonstrate a very good safety record at level crossings in comparison to any major rail network in the world. Our good record is assisted by factors such as:

- i. relatively few level crossings compared to other major rail networks;
- ii. public awareness of rail/level crossing safety is generally good; and
- iii. a sustained investment and focus in successive years since 2009.







Figure 2: Level crossing incident rate across Europe per million train kilometres 2013 – 2017<sup>3</sup>

Despite our very good record, there is more we can do to prevent accidents at level crossings as there remains opportunity for human error to occur, for users to be distracted and for deliberate misuse to take place. Level crossings therefore not only present a risk to individual users, but where they facilitate vehicular access over the railway, they also increase the likelihood of potentially high risk train accidents.

Due to the nature of the road and rail networks in Great Britain, both types of infrastructure are extremely congested in parts of the country. These pockets of activity further increase the challenge of managing level crossing safety and intensify the opportunity for accidents to happen.

It is therefore to be expected that **level crossings represent one of the principal public safety risks on the railway**. Even though risk has been significantly reduced over successive years they still account for 6%<sup>4</sup> of the total railway system risk.





The All Level Crossing Risk Model (ALCRM) identifies, as shown in figure 4 below, that while Automatic Half Barrier Crossings (AHBs) account for just 6 % of the total estate they hold 32 % of total modelled risk and 75 % of our level crossings require the user to make the decision on whether it is safe to cross.



Figure 4: Level Crossing Type vs Risk per Crossing Type

Level crossing risk is driven by a number of external factors. If we were to do nothing more than maintain and renew level crossings like-for-like, it would be expected that **risk increases** would outpace efforts to manage safety as low as reasonably practicable. This is due to factors such as:

- Increased road/rail traffic
- Changing population (e.g. increased diversity, access by more vulnerable people)
- Congested pockets of road/rail/footpath networks
- Changes in public attitudes and expectations that risks are designed out, increasing the likelihood of errors

Our focus, through delivery of this level crossing safety strategy, is to prevent injuries and loss of life, so far as is reasonably practicable, by working to address legacy issues and to design out foreseeable risks of the future.

<sup>&</sup>lt;sup>3</sup> Source: Eurostat Data – extracted 2019.

<sup>&</sup>lt;sup>4</sup> As measured by Rail Safety & Standards Board (RSSB); source Safety Risk Model (SRM) v8.5, March 2018.



# 03 our purpose, vision and approach

We exist to get people and goods where they need to be and to support economic growth and productivity in an environmentally sustainable way. The railway connects homes with schools and workplaces, businesses with markets and can help unlock new land for house building. It is also part of the social fabric of our nation, connecting people with friends, family and loved ones. We are...

"A company that is on the side of passengers and freight users; that is easy to engage with and a dependable partner; a company people are proud to work for; instinctively recognised as an industry leader."

Our role is to run a safe, reliable and efficient railway, servicing passengers and freight users and the communities we work in.

Ideally, we would not have any level crossings. However, we recognise roads and walking routes are public rights of way and therefore running a safe and reliable railway must be delicately balanced with the number of level crossings in operation, and the people who use them.

We estimate that over 3.5 million vehicles and over 600,000 pedestrians or cyclists use our level crossings every day and given that trains can travel over those same crossings approximately 400,000 times per day, it is unfortunately inevitable that incidents will happen.

For members of public that experience near misses, or even direct contact with a train, whether that is in a car, on a bike, by foot or any other means, it can be very scary. With two accidental fatalities in 2018/19 and six the year before, we must never forget how dangerous level crossings can be. Not only do these incidents alter lives, they also result in delays for passengers who are trying to get home, to their hospital appointments or to pick their children up from school. In the past few decades, passenger numbers have soared, the number of train services has increased, and our network is now congested. Our Victorian rail network was never designed to accommodate so many trains. The sheer amount of traffic on the network means that even the smallest incident can have a significant knock-on impact.

To help reduce this impact we look at every level crossing in detail. Deciding how to manage each single level crossing is done through risk assessment and expert judgement. We work closely with the level crossing's authorised users and liaise with communities around them. Often, the solution to improve safety at one crossing is different to the next.

# 04 OUR SAFETY VISION, GOALS AND OBJECTIVES



everyone home safe every day Network Rail's core safety vision is '*Everyone home safe every day*'. Of the 12 key commitments within our safety vision, two are particularly relevant to how we manage level crossing safety. These are:

- We will relentlessly strive to find new ways to keep ourselves, colleagues, passengers and the public safe.
- We will design, construct, inspect, operate and maintain the railway to keep everyone safe.

Underpinning our company safety vision is our Home Safe Plan which comprises of a series of projects that target risk reduction in key safety areas. Building on our home safe commitments, our long-term safety vision for level crossings targets 'no accidents at level crossings'.

Our vision for no accidents is shared with our vision for collaboration, a critical factor in successful risk management. We must work together as rail infrastructure owners, train operators, transport police, local authorities and highways agencies to effectively tackle safety at our rail, road and footpath intersections. This applies at all levels, from a strategic tier to frontline operations. This vision successfully encompasses the overarching principles of the rail industry safety strategy Leading Health and Safety on Britain's Railway and its challenge to improve level crossing safety.

We are committed to improving level crossing safety and will do all that is reasonably practicable to close crossings and improve safety at those which remain open.





# 05 ROLES AND INTERFACES



This document provides a clear strategic framework for enhancing level crossing safety, endorsed and to be delivered by a devolved business. To effectively tackle level crossing safety requires effective collaboration. Through the industry's Level Crossing Strategy Group and System Safety Risk Group meeting structures, Network Rail will lead the industry in promoting collaborative practice. We will also champion collaboration across all other sectors, from engagement within parliamentary channels through to discussions with land owners, authorised users of private level crossings and the general public.

With shared objectives and co-operation across all sectors, there will be greater opportunities to improve public safety at level crossings. Crucial to this is funding, which is an essential enabler in delivering high volume risk reduction activity. We will work closely with ORR and Department for Transport (DfT) colleagues to demonstrate that plans for risk reduction activities are effectively targeted and offer appropriate levels of safety benefits and value for money. The case for dedicated investment will always be made with demonstrable returns evidenced within strategic plans.

Collaboration and shared goals within our own organisation are as critical as the relationships with external partners. *Enhancing Level Crossing Safety* will be used within Network Rail to promote the message of closing level crossings where possible and making those that remain open safer. We will also make use of safety education campaigns and channels such as the Network Rail intranet to broaden communication and awareness.

The general public must also contribute toward improved level crossing safety, eradicating risk taking behaviours and safely using level crossings. Our continued use of safety awareness campaigns, promotion of safety through social media networks, in addition to local activity and engagement will be used to educate and reinforce the safety messages.



Legislative change that will allow us to work more closely with local authorities, highways agencies and private landowners in our efforts to reduce level crossing risk is welcomed. We will continue to press for change as parliamentary time allows and work closely, forging good working relations, with public authorities and local communities.

Our train operator colleagues continue to provide vital reporting, helping us better understand risk hotspots and real-time activities. We welcome this continued support and our future opportunities to work jointly, for example in the promotion of safety awareness messages, to improve level crossing safety and increase performance on the network.

Our partnerships mean that we have the necessary support network to continue our journey as world leaders in level crossing safety. Using platforms such as the industry's safety groups to progress our strategy and provide the necessary collaborative leadership to improve, we aspire to push the boundaries further still and to be united in our long-term vision of no accidents at level crossings. Figures 5 and 6 illustrate the types of effective collaboration needed, both internally and externally, to enhance level crossing safety.

## Managing safety within our own organisation

Within our own organisation, the principles of this safety strategy will be applied when work interfaces directly or indirectly with level crossings.

Enhancing Level Crossing Safety extends across our business, to many roles and functional areas and applies not only to those who manage safety on a daily basis, but to those whose actions may introduce risks and hazards at level crossings. For example; train planning, possession management, maintenance, renewals and enhancements, they all play a role in level crossing safety.

A joined-up way of working must be applied if we are to manage the safety of level crossings holistically, negate duplication and waste, and optimise risk management solutions and investment. Doing more to continue to reduce procurement and installation costs is essential if we are to bring about efficiencies and opportunities to do more for less.

Transparent asset management plans visible across all sectors of the business will also help to drive such collaborative efficiencies.

'A joined-up way of working must be applied if we are to manage the safety of level crossings holistically, negate duplication and waste, and optimise risk management solutions and investment.'

# 06 TAKING SAFE DECISIONS

Network Rail has provisions in place that govern safety-based decision making. The company's Health and Safety Management System details this more fully in section 3.8 Safety Decision Criteria.

The industry's Taking Safe Decisions framework, which sets out a structure for taking decisions and helps meet the reasonably practicable legal standard, has been adopted by Network Rail. Risk assessment appraisal methods and professional judgement are applied to safety investments in determining reasonable practicability.

The industry's Taking Safe Decisions risk management framework is illustrated below.



Figure 7: Taking safe decisions

#### ALARP

A recognised challenge that extends beyond the rail sector is economic constraint. We must adopt a responsible position in how we spend public money.

While we have a vision to eliminate accidents at level crossings, the question of what is reasonably practicable to do, must to be considered. This applies at every individual location.

We always seek to comply with the law and cost benefit analysis is used to determine how best to achieve this. Where increased investment is required to manage safety, risk-based decisions are made using the test of 'as low as reasonably practicable'. (ALARP) In making decisions about safety expenditure, reasonable practicability needs to be evaluated. In so doing, we will consider the collective risk (aggregated over all exposed groups, which will include members of the public, passengers and staff) that is present, against the sacrifice (money, time and effort) involved in the measures necessary to avert the risk. If it is shown that there is a gross disproportion between them and the risk is inconsequential in relation to the sacrifice, then a case may be made that the investment, or measure, is not considered to be reasonably practicable to progress.

In reaching such a judgement, a quantifiable risk-based cost benefit analysis (CBA), which also accounts for whole-life cost, will be undertaken to aid decision making.








In making ALARP decisions, we will not accept a decrease in risk at one location as offsetting risk increases in other locations, unless risk is also managed to ALARP.

Investment in level crossing safety must also be balanced against other safety risks. Competing priorities may, for example, occur with embankments, structures, track, signalling, through trespass and at stations. Thus, it may not be possible and within funding to immediately implement long-term safety improvements at all level crossings. Where such prioritisation is needed, interim controls will be applied to mitigate risk. Through a safety management framework of re-assessment and monitoring, we can continuously evaluate safety risks and prioritise expenditure appropriately, making sure risks are managed ALARP and public money is invested wisely.

As well as always complying with the legal duties placed upon us, there may be occasions when, for good business reasons, we decide to make changes to level crossings that provide further improvements for both passengers and public which go above and beyond what would otherwise be deemed 'reasonably practicable'.



Figure 8: Our appetite for investment in level crossings

# **OUR FOCUS**

'We will continue to work with communities, private landowners and local authorities to find safer ways to cross the railway.' Enhancing level crossing safety sets out our strategic direction, providing the vehicle for effective collaboration across the industry to reduce level crossing risk to as low as reasonably practicable. It is delivered through activities which are both internal and external to Network Rail and centres on four focal areas which affect both our passive and automatic level crossings targeting user mistakes or errors (including slips and lapses), deliberate misuse, asset failures and defects, and operator errors. This section looks at each of the four areas and considers how we will work over the next 10 years to improve the safety of level crossings.

Risk to the users of a level crossing is greatest where we ask the user to take more decisions for themselves. Therefore, risk reduction at passive level crossings is the first priority. Second, the automatic level crossing estate where opportunity for error and misuse continues.

# Managing level crossing safety in a time of growth

A growth in rail traffic is required to accommodate a forecasted 40% increase in passenger numbers by 2050 and to support the government's Rail Freight Transport Strategy. Our level crossings are an important part of the operational





railway system and we need to ensure that level crossing safety is included in the discussions when we look for opportunities to increase rail traffic on our network.

To support those discussions, we will work to better understand the impact rail traffic increases will have on the safe operation of our level crossings and how it may affect the communities we serve.

As such, we will collaborate with the DfT and our train and freight operator colleagues to identify and manage the risk from proposed franchise requirements, freight and open access requirements and any subsequent timetable changes.

We will develop and embed processes that allow for full and proper understanding of risk changes to our level crossings at the earliest opportunity. By affording us enough time we will be able to determine, implement and/or install solutions to mitigate the risk increases, created by higher numbers of traffic moments at our level crossings, where required, thus allowing us to maintain a well performing railway.

### Closures

The closure of a level crossing is the only true way to guarantee that risk has been eradicated and accidents cannot occur. Closures of passive footpath, bridleway and user worked crossings have been a focus of strategic investment since 2009.

However, we must recognise the importance of community, and how our level crossings do, in some circumstances, allow communities to remain connected. We will continue to work with communities, private landowners and local authorities to find safer ways to cross the railway. Opportunities will be taken, in accordance with ALARP principles, to close level crossings by using legislation including, where appropriate, the Transport and Works Act 1992. The risks of traversing the railway will be balanced against the risks of diversionary proposals. We will take account of demographic needs and user convenience within option selection. Public safety will always be at the forefront of decision making.

Wherever practicable and safe to do so, any diversions will seek to utilise conveniently located over-bridges or underpasses to assure public money is efficiently managed.

The support and partnerships of train operating company colleagues is welcomed in closing station crossings used by rail staff, where alternative/lift access is provided.

# 07 TECHNOLOGY AND INNOVATION

Technology will be used to make level crossings which remain open safer and generate improved performance and capacity on the network. We will seek out innovative technology, working with suppliers and other partners to reduce costs and generate financial efficiencies. Whole-life costs will be taken into consideration in tandem with the safety benefits of solutions.

To reduce the likelihood of human error and improve safety, we will continue to use available technology and look to future innovation opportunities to develop new solutions.

The use of technology at our level crossings is a central element of the level crossing safety strategy. It is a crucial measure in improving the safety of sighting-only crossings and protecting users of our highest risk footpath, bridleway and user worked level crossings.

Through appropriate deployment of technology, we are able to reduce risk and generate safety benefits, and maintain convenience to the users which reflect the importance of these solutions and support the investment made.

In targeting technology at passive crossings, we will prioritise in equal measure:

- Locations of high risk, high line speeds and high traffic volumes
- Footpath and bridleway crossings with sighting deficiencies protected by whistle boards; targeting those with known usage during the night-time quiet period<sup>5</sup> and working to eradicate whistle boards from the network

- Footpath and bridleway crossings providing access to schools and local amenities which are used by cross-sections of the community, notably by those who may be considered most at risk
- User worked crossings equipped with telephones in long signal sections
- User worked crossings equipped with telephones where Signaller workload and call volumes are assessed to be demanding
- User worked crossings which rely on sighting alone and which are assessed to present greatest risk of train accidents

In targeting technology at automatic crossings, we will prioritise:

- Unprotected automatic crossings the automatic half barrier crossing
- Automatic crossings that rely on people, whether the signaller or train driver to confirm whether it is clear before allowing a train to pass over the level crossing
- Improvement and installation of both visual and audible warnings

### Train detection warning systems

Audible warning devices (AWDs), overlay miniature stop lights (OMSLs) and integrated miniature stop lights (MSLs) will continue to be used to improve user awareness of approaching trains, reduce the likelihood of errors and lapses and safeguard vulnerable members of society from greater harm. At crossings which provide vehicular access over the railway, technology can significantly reduce the chance of high-risk train accidents. We will continue to innovate and develop new solutions that will allow us to place train detection warning systems at a greater number of level crossings and those solutions will be targeted at the user worked crossings which present greatest risk.

# Enhancing Level Cr<u>ossing S</u>afety 2019 - 2029\_



### Automatic half barrier level crossings

Whilst generating a proportionally high level of risk, automatic half barrier crossings do offer user convenience through minimised barrier down times. This has the potential to reduce road delays and congestion. In contrast, however, the opportunity for user error or deliberate red light violations and barrier weaving is always present and offsets much of this benefit. Consequently, the location of half barrier crossings is critically selected.

To improve levels of protection, but maintain convenience levels, we will continue to develop a variant to half barriers by using obstacle detection technology to design an AHB+ crossing type. This solution will retain the convenience of limited road closure times, but users will be protected by full barriers.

AHB+ technology, when available, will be deployed as part of risk-based improvements, upgrades and enhancements. Prioritised locations will be driven through risk assessment and will include those at stations, where there is high pedestrian use e.g. on the route to schools, stations or holiday parks and on highspeed lines. Specifically, AHB crossing types will not be renewed as equivalent like-for-like assets where they are adjacent to stations or regularly used by school children.

Other types of automatic half barrier or open crossings will be enhanced with automatic full barrier technology as identified through risk assessment.

### Improved visual and audible warnings

There are a number of miniature stop light (MSL) equipped level crossings on the network which only provide users with a visual warning of approaching trains. We will identify these crossings and, based on risk, develop plans to install audible warning devices or make provisions, as part of renewals, to replace

equipment with more modern solutions. Decisions to prioritise these locations will be balanced against other passive crossings where there are currently no train detection warning systems installed and where risk may be greater.

Some AHB level crossings conform to a previous design standard meaning that the audible warnings cease to sound when the half barriers reach the lowered position. These locations will be brought up to current design standards whereby the audible warnings continue until the end of the completed sequence, i.e. after the train has passed clear and the barriers have raised.

In accordance with risk assessment output, we will further introduce 'another train coming' spoken alarms at locations throughout the country, targeting automatic crossings where there is regular pedestrian footfall and a high likelihood of more than one train passing another within a single crossing sequence.

As enhancements with audible warnings are progressed, environmental noise impact on lineside neighbours will be taken into account and volumes adjusted within available tolerances so far as is practicable. We will continue to upgrade our 50W halogen bulb road traffic light signals (RTLS) to light emitting diode (LED) lamps to improve the visibility of stop lights at level crossings. Locations identified as not currently being fitted with LEDs will be upgraded as part of renewal and enhancement schemes.

Work with suppliers to utilise new technologies that may provide even better visual warnings than the current LED RTLS will continue, and such technology will be used at locations where sun glare is a known concern.

### Signage

Signs which convey safety messages must be clearly articulated such that they can be easily and expediently understood. The signs found at passive level crossings, which are mandated by legislation, have not evolved in many years and are not necessarily optimised for modern society or ergonomically designed around human factors studies.

Network Rail is therefore working in partnership with the ORR to review and update all mandatory signage at footpath, bridleway and user worked crossings. This work is building on the human factors studies and recommendations within RSSB commissioned research projects T983 Signs at private level crossings, and T984 Research into the causes of pedestrian accidents at level crossings and possible solutions. Improvements to signage at public road level crossings will follow once the prioritised work at passive crossings is concluded.

New signage will be deployed in a targeted and controlled way. We will work with the DfT and ORR to progress changes in legislation to formalise new signs in law.

### **Improved layout**

In parallel with improving signs, we will work to enhance the ergonomics of passive crossings as a long-term objective, using our good practice guidance to remove signage clutter. The findings of RSSB research paper T984 will form the basis of demarcating the danger zone, or area within the confines of the level crossing.

Guide-fencing and chicanes will be used to help direct users along safe paths to improve awareness and behaviours. We will use these measures at skewed crossings which are upgraded to rightangled surfaces and where original access points are retained.

Locations will be prioritised based on risk and qualitative judgement, making use of opportunities to make incremental improvements during risk assessment and asset inspection site visits.

# The next generation of obstacle detection

First generation obstacle detection uses both RADAR (radio detection and ranging) and LIDAR (light imaging detection and ranging) to detect the entire crossing surface for obstructions. Whilst the combined system has been successfully deployed at almost 100 locations nationally, the lower LIDAR necessitates expensive profiling work and introduces potential failure modes which cause disruption and secondary risk.

A second generation of obstacle detection technology that will exceed current capability and avoid the need for a supplementary LIDAR (or equivalent) system is being explored. Such technology may prove suitable for use at different crossing types as part of a range of risk reduction solutions and safety enhancements.

### Innovation

In addition to managing our known legacy issues, we will pool our expertise, taking opportunities to innovate such as those within a Digital Railway, to design level crossing improvements which target user mistakes or errors (including slips and lapses), deliberate misuse, asset failures and defects and operator errors.

We will tailor technology specifications according to risk, enabling wider deployment of safer but affordable designs. In designing for safety, areas of focused activity will include:

- Predictor technology to enable consistent and optimised train detection warnings, leading to minimised waiting times, enhanced user convenience, improved safety and increased rail performance
- Development of remote condition monitoring to:
  - Prevent failures (so far as is reasonably practicable)
  - Improve notification of faults and failures to enhance safety and reduce maintenance costs
  - Facilitate better data collection leading to improved analytics and improved safety
  - Provide robust intelligence post incident or as a result of allegations of faults and failures
- Use of video analytics to assist monitoring of CCTV controlled crossings





INSTRUCTIONS 1. Check that green light shows 2. Open both gates STOF 3. Check that green light still shows 4. Cross quickly 5. Close both gates 6. If no light do not cross-Red Telephone crossing Greei operator Drivers of large or slow vehicles or of animals - phone Clear for permission to cross Wait for Gree

> Locations will be prioritised based on risk and qualitative judgement, making use of opportunities to make incremental improvements during risk assessment and asset inspection site visits.



# 08 RISK MANAGEMENT

Effective risk management of our level crossings requires us to not only look at level crossings as a physical asset, but as a system of systems, and we must remember that our level crossings connect the railway to other public rights of way.

As part of condition-led renewals, we will take opportunities to look holistically at current and future road, rail and environmental proposals to efficiently manage risk.

We also need to continue improving our risk management capabilities.

### Risk assessment process improvements

We will continue to build on the good work undertaken by level crossing managers, seeking ways to continually improve our risk assessment processes so that emerging human factors risks, and other hazards are fully incorporated within core risk management activity. Further improvements in the number of extended censuses undertaken within risk assessments will be made to provide the best intelligence possible to determine when level crossings are used, at what frequency and by whom (user demographics, vulnerable and encumbered usage etc.).

Other transport systems, such as the roads network, will be explored to determine if alternative good practice measures exist to best represent vulnerable users within traverse time calculations. If it is established that well-founded procedures exist, we will explore how we might adjust our processes to align with these.

We will work with local authorities to understand the impact that our level crossings have on the wider local road network. Determining how our level crossings interact with the road network will give better information for our system risk understanding.

Improvements to the process of undertaking a narrative risk assessment (NRA) will be made in conjunction to enhancing the content and appearance of the document. It will evolve to support steady-state, renewals and enhancement project risk assessments. This will take account of lessons we have learnt and improve consistent risk assessment across the business.

### The next generation of the All Level Crossing Risk Model (ALCRM)

Network Rail has used ALCRM since 2007 to quantitatively support its qualitative risk assessment of level crossing safety. In 2017, RSSB led the completion of research project T936 to update the algorithms such that they are further enhanced and aligned with the industry's Safety Risk Model (SRM).

These changes will be incorporated into the risk model to optimise calculated risk and enhance decision making, elevating the accuracy of risk assessments further still. A new Level Crossing Decision Support Tool will bring risk, asset and safety incident data into one place to help prioritise action.



# 09 COMPETENCE MANAGEMENT



Employee competence is a critical area of importance for Network Rail. Effective training and high levels of competence are conducive to effective risk management and tangible safety improvements at level crossings.

Accordingly, we will continue to invest in the training and competence of our level crossing managers, making sure that it is continuously adapted to account for change. Training and competence will be a particular area of focus in the development and deployment of the next generation of ALCRM, enhanced NRAs and/or as human factors intelligence or incident analysis modernises current thinking. Training, competence, and assurance frameworks will continue to evolve to improve levels of consistency, quality and capability within the organisation. Where practicable this will be extended to others who interface with level crossings, such as those who undertake level crossing designs, produce ground plans or level crossing orders.



# 10 EDUCATION AND ENFORCEMENT

### Influencing user behaviour

Getting people to behave safely around level crossings relies on them knowing how to behave safely and choosing to do so. This needs to be done before, during and in some cases after someone has used the crossing.

The 'before' requires education of safety risks and good habits around level crossings, the 'during' reinforces expected behaviour and 'after' re-educates on safety risks, good habits and expected behaviour where required. Promoting safety awareness has been a critical part of improving level crossing safety, and indeed, rail safety for many years. We will continue to teach communities how to behave safely at level crossings giving them all the information they need. We will, in collaboration with the British Transport Police and other partners such as the National Farmers Union (NFU), trade groups and our train operator colleagues, deliver key safety messages to coincide with trending risks, seasonal trends and partner led campaigns – keeping information fresh and engaging. We will target known 'at risk' groups such as those most vulnerable or prone to errors, lapses or deliberate acts and the communities where our level crossings are situated or nearby. We will do this by engaging in local community outreach activities such as visits to schools, clubs, societies as well as with level crossing users directly.

Those people who choose to behave unsafely will be addressed both through education and enforcement. We will undertake national campaigns aimed at changing the factors that drive unsafe behaviour e.g. mental health issues, anti-authority attitudes, inattention and intoxication. This activity will tackle, at a mass scale, the factors that lead to unsafe behaviours around level crossings. Increased awareness will also be promoted within our own organisation, helping our employees to become ambassadors for level crossing safety inside and outside of work.

### Red light safety equipment (RLSE)

Over the past five years, Network Rail has worked with suppliers to develop Home Office Type Approved (HOTA) digital red light enforcement cameras, known as RLSE. This safety initiative has been successfully installed at 33 automatic level crossings around the country.

RLSE has been quantitatively established to significantly improve situational awareness and user behaviour, with safety related incidents reduced by as much as 90 % at certain locations.

We will continue to rollout RLSE as a means of improving safety at automatic level crossings, targeting our high-risk locations. RLSE will also be used to bolster safety at full barrier signal protected crossings which are subject to significant road vehicle violations in an aid to improve performance, train running and reduce the likelihood of perturbed working and imported secondary risks.

### **Mobile Safety Enforcement**

A fleet of 15 British Transport Police (BTP) staffed mobile safety vehicles, equipped with automatic number plate recognition cameras, have operated throughout the country for the past five years. They have been deployed proactively and reactively at public road level crossings which are high risk or prone to regular bouts of deliberate misuse.

The BTP led driver education course has been successful in raising awareness and reducing the likelihood of repeat offences for drivers caught behaving in an unsafe manner. Prosecution is also used for more serious offences and repeat offenders.

The current fleet of MSVs continue to provide a valuable service as they draw toward life-expiry. In exploring a new mobile solution, evaluation of the safety benefits and cost of new mobile enforcement equipment will be undertaken. We will take account of lessons learnt and seek cost-effective technology to optimise investment and improve efficiency.

Any future investment in mobile enforcement equipment will be supported by a safety, performance, financial and reputational cost benefit analysis and underpinned by ALARP principles.







# 11 DELIVERY

### Embedding and delivering our Enhancing Level Crossing Safety Strategy

Delivering the objectives laid out within the strategy will require us to treat level crossings as a system of systems requiring an increased level of collaboration.

Effective collaboration starts with a common understanding of the goals and objectives. Industry experts were consulted in the development of this strategy and there is agreement what needs to be done. We will continue to, through the Industry Level Crossing Strategy Group, to develop a wider industry understanding of level crossing risk and establish the best collaborative delivery models across all our external stakeholders.

Our Level Crossing Integrated Review Group will drive through the delivery of this strategy within our organisation.

Supported and guided by this strategy, our Strategic Business Plans show how we intend to deliver safe and reliable level crossings for public and passengers, now and in the future.

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# **KEY INFORMATION**

### Understanding our level crossings

Our Level crossing safety site provides a one-stop shop understanding of our level crossings, providing information on crossing locations and risk and information on how to use crossings safely. https://www.networkrail.co.uk/communities/safety-in-the-community/level-crossing-safety/

### Level crossing safety education

Having worked closely with teachers and students to develop resources that will help run fun, engaging and interactive activities that match different curriculum areas and deliver OFSTED requirements of PHSE teaching.

Our Safety education site provides teachers with resources aimed at Key Stages 1 to 4 (Scotland P1 to S4) providing safety awareness to young people in their early years and providing those at secondary school with the information and skills to stay safe as they enjoy greater independence.

### Key Stages 1 and 2 (Scotland P1 to P6)

https://www.networkrail.co.uk/communities/safety-in-the-community/safety-education/primary-school-resources/

### Key Stages 3 and 4 (Scotland P7 to S4)

https://www.networkrail.co.uk/communities/safety-in-the-community/safety-education/secondary-school-resources/

### Welsh Baccalaureate

We have also worked to develop resources that support the Rail Safety Community Challenge which forms part of the WJEC Welsh Baccalaureate Framework https://www.networkrail.co.uk/communities/safety-in-the-community/safety-education/welsh-baccalaureate/

### **Company Strategy**

Enhancing level crossing safety 2019-2029

### **Endorsement and authorisation**

Endorsed by: Andrew Haines, chief executive

Authorised by: Allan Spence, head of corporate passenger and public safety

# Accepted for issue by:

Robert Wainwright, head of level crossings

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# JP4

Document NR.L2.XNG.001

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Ref:	NR/L2/XNG/001
Issue:	3
Date:	05 December 2020
Compliance date:	06 March 2021

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This Network Rail document contains colour-coding according to the following Red–Amber–Green classification.

### Red requirements – no variations permitted

- Red requirements are to be complied with and achieved at all times.
- Red requirements are presented in a red box.
- Red requirements are monitored for compliance.
- Non-compliances will be investigated and corrective actions enforced.

Amber requirements – variations permitted subject to approved risk analysis and mitigation

- Amber requirements are to be complied with unless an approved variation is in place.
- Amber requirements are presented with an amber sidebar.
- Amber requirements are monitored for compliance.
- Variations can only be approved through the national variations process.
- Non-approved variations will be investigated and corrective actions enforced.

Green guidance – to be used unless alternative solutions are followed

- Guidance should be followed unless an alternative solution produces a better result.
- Guidance is presented with a dotted green sidebar.
- Guidance is not monitored for compliance.
- Alternative solutions should be documented to demonstrate effective control.

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<sup>&</sup>lt;sup>1</sup> This can include gross proportionate project costs with the agreement of the Network Rail Assurance Panel (NRAP).

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### Issue record

Issue	Date	Comments
1	December 2006	New standard
2	June 2008	Phase 2A / Engineering reorganisation responsibility change
3	December 2020	Replaces NR/L2/OPS/100 and revised based on current way of working

# **Reference documentation**

NR/L2/OPS/031	Risk assessment and briefing of timetable change
NR/L2/XNG/101	Temporary Vehicular Level Crossings and Temporary Increased Use of Existing Level Crossings
NR/L2/SIG/19608	Level Crossing Infrastructure: Inspection and Maintenance
NR/L2/SIG/30021	Alterations to Authorised Line Speeds
NR/L2/XNG/30012/L110	Protection Choice, Layout Configuration and Overrun Risk
NR/L3/XNG/207	Level Crossing Manager: Competence Framework
NR/L3/XNG/308	Risk Assessing Level Crossings
NR/L3/XNG/309	Level Crossing Administration

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### 1 Purpose

This procedure sets out the process requirements that enable Network Rail to manage the safety and convenience of its level crossings and fulfil its legal duties under health & safety legislation.

It provides a robust and consistent risk management and option selection process for new and existing level crossings and helps determine the over-arching safety requirements for them.

### 2 Scope

This process shall be applied to both new and existing level crossings on Network Rail Managed Infrastructure.

This process does not apply to:

- authorised walking routes that cross the railway unless they are classified as a staff crossing with active warning equipment (such as white lights); and
- road rail access points or track access points.

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OFFICIAL

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# 3 Roles and responsibilities

R – R perso respo certai	<b>Responsible</b> is the on or people who are onsible for performing a in task or action.															
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7	Risk Assessment and Risk Management	R	R	R	R		A*	С	С	С		С	С		I	
8	Authorised Users	R	Α													
9	Level Crossing Orders	R	А	A											А	A
10	Records	R	RA												А	

Table 1 – RACI chart

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# 4 Definitions

For the purpose of this document, the following terms and definitions apply.

Term	Definition
All Level Crossing Risk Model (ALCRM)	Network Rail's quantitative safety risk modelling system which is used to assess the safety of individual level crossings as part of the risk assessment process.
Authorised walking route	A designated route providing access to places of work for railway staff (including booking-on points and stabling points) and which is suitable for use by people not certificated as competent in personal track safety.
Automatic crossing	A level crossing where the protective equipment is automatically activated by an approaching train and where no interlocked signal protection is provided.
Blocking back	The formation of a stationary or slow-moving queue of road traffic over a level crossing.
Crossing time	Time taken for a user to traverse the crossing from the decision point to a position of safety on the other side of the railway. Crossing time includes time taken for the user to make a decision to cross.
Decision point	The point at which a level crossing user makes a decision to cross or wait for an approaching train to pass.
Level crossing	An intersection where a road, footpath or bridleway crosses the railway over one or more railway tracks on the same level.
	For the purposes of this standard, this also includes roads within depots and yards and authorised walking routes fitted with active warning equipment.
Level crossing type	A recognised combination of control measures used at level crossings which form asset types, for example ABCL (automatic barrier crossing, locally monitored); CCTV monitored barrier crossing; staffed gated crossing.
Level crossing user ("user")	A person who uses a level crossing to cross the railway.
Narrative risk assessment (NRA)	The documented risk assessment for each level crossing on Network Rail managed infrastructure. It includes the quantitative risk calculations of ALCRM

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Term	Definition
	and the qualitative expert judgement of level crossing managers to generate a balanced assessment of risk.
New level crossing	A level crossing, permanent or temporary, provided at a location where previously there was no means of crossing the railway at the same level; or A level crossing altered to provide vehicular access where previously there was no vehicular access; or A level crossing altered to provide access for equestrians and cyclists where previously there was only access for pedestrians
Railway staff	A person employed in the railway industry, acting in accordance with their duties.
SFAIRP	So Far as is Reasonably Practicable – the term used to describe the legal requirement for managing risk. This involves evaluating the magnitude of risk and comparing it against the effort, time and money to control it.
Signaller	A person responsible for the operation of the signalling system, to safely control the passage and regulation of trains, usually located in a signal box.
WARA	Work Activity Risk Assessment
Whistle board	A sign to instruct the train driver to sound the train horn. Normally provided where there is inadequate sighting to warn users of approaching trains.

# Table 2 – Terms and definitions

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# 5 Level crossing risk management and option selection principles

### 5.1 Principles overview

Level crossings shall be subject to risk assessment in accordance with NR/L3/XNG/308.

In compliance with the Network Rail investment requirements, cost benefit analysis shall be used to support decision making.

Safety risks at level crossings shall always be managed so far as is reasonably practicable (SFAIRP), this involves evaluating the magnitude of risk and comparing it against the effort, time and money needed to control it.

Recognising that the safest level crossing is a closed one, closure shall always be investigated as part of option selection, taking account of public safety, cost, performance and societal needs.

Where it not possible to close a level crossing, downgrading the rights of way (for example removing vehicular rights) shall be investigated.

Where closure cannot be achieved, protection levels shall be informed by the narrative risk assessment and taking account of:

- the risk of harm;
- the impact on convenience of level crossing users;
- the impact on the workload of the operator;
- the impact on the train performance; and
- whole-life cost.

The Level Crossings Act 1983 requires that the level crossing user's convenience, as well as safety, is considered.

Where renewal of level crossing equipment or signalling renewals provides reasonable opportunity, the protection method of level crossings shall be reviewed, and crossings upgraded where reasonably practicable. The narrative risk assessment shall be updated as necessary.

**NOTE 1:** by incorporating level crossing upgrades into re-signalling or re-control projects, this should reduce overall costs to Network Rail and introduce efficiencies in how we manage safety of the railway.

NOTE 2: Also refer to NR/L2/SIG/30009/E810

Options which affect the safety, performance or convenience of level crossings, shall be agreed by key stakeholders within Route businesses as part of Steering Group meetings.

**NOTE 3:** see Section 7.2 on Steering Group meetings.

### 5.2 New level crossings

A new level crossing, permanent or temporary, shall be provided only if it is grossly disproportionate to provide some other means of crossing the railway.

A new level crossing shall provide the minimum rights of way needed to accommodate the required access over the railway.

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A new level crossing may also be provided to replace one or more existing level crossings when it enhances the safety of level crossing users and the railway network.

New level crossings shall not be introduced onto Network Rail managed infrastructure in the following circumstances:

- 1. where the permissible speed is greater than 125mph (200 km/h); or
- 2. for footpath, bridleway or user worked crossings, where there are more than two running lines.

Proposals for new level crossings shall be reviewed by the Technical Authority. The Regional Managing Director shall authorise new level crossings in accordance with the above conditions.

**NOTE 1:** anyone proposing a new level crossing is encouraged to approach the Technical Authority as early as possible in the option selection process and make appropriate provision in the project plan.

# 5.3 Existing level crossings

Where level crossings exist, no permissible line speed greater than 125mph (200 km/h) shall be introduced unless the affected level crossings are legally closed.

When a risk assessment has been undertaken, reasonably practicable options to mitigate risk shall be identified in accordance with the following hierarchy of controls:

1. Eliminate the risk through closure;

**NOTE 1:** where this is a level crossing with public status, this <u>will</u> require a legal temporary stopping up order (TTRO) until the crossing can be permanently closed.

- 2. Introduce new or improved technology to upgrade the current crossing protection;
- 3. Upgrade the crossing with additional levels of protection e.g. AHB to MCB-OD, FPW to FPWMSL;
- 4. Improve the crossing layout;

NOTE 2: e.g. reduce skew, provide guide fencing.

5. Install new clearer instructional signage, ergonomic design to improve user comprehension

**NOTE 3:** where this is a level crossing with public status, this <u>may</u> require a legal temporary stopping up order (TTRO) to enable the modified work to improve safety to conclude.

- 6. Introduce new or improved operational procedures
- 7. Educate users, use stakeholder engagement and safety awareness events to improve user comprehension on safe crossing protocols
- 8. Enforce behavioural change, e.g. red-light safety cameras, mobile safety vehicles, BTP presence and engagement with stakeholders

The reasonably practicable option(s) shall be progressed for implementation based on a combination of cost benefit analysis and structured expert judgement.

Investment in level crossing safety shall be balanced against other safety risks.

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Competing priorities may, for example, occur with embankments, structures, track, signalling, through trespass and at stations. Thus, it may not be possible and within funding to immediately implement long-term safety improvements at all level crossings.

Where such prioritisation is needed, interim controls shall be applied to mitigate risk where reasonably practicable to do so.

Where it has been determined that closure or additional control measures are not reasonably practicable, no further action other than routine inspection and monitoring is required until the next risk assessment is due or reasonable opportunity arises.

# 6 Competence for undertaking level crossing risk assessments

Level Crossing Managers shall complete all training modules applicable to the role in accordance with the competency requirements needed to undertake their duties.

Route Level Crossing Managers shall have in place a mentorship programme to contextualise the content of the training modules and then assess their competency prior to permitting them to work alone.

Level Crossing Manager competence shall be continuously assessed in accordance with NR/L3/XNG/207.

### 7 Risk assessment and risk management

# 7.1 General

An assessment of level crossing safety, performance and convenience shall consist of a signed off NRA, that is compliant with NR/L3/XNG/308, with supporting ALCRM calculations to generate a balanced assessment of risk for each level crossing.

NOTE 1: NR/L3/XNG/308 details the NRA process

The narrative risk assessment shall contain evidence of the following:

- a) The level crossing environment and local factors;
- b) Level crossing usage [train service and user census];
- c) Stakeholder consultation;

**NOTE 2:** Including but not limited to, engagement with authorised users, operations, ergonomics, asset management, liabilities negotiations

- d) Incident history;
- e) ALCRM calculations and risk evaluation;
- f) Residual risks and hazards;

**NOTE 3:** including but not limited to, infrastructure, rail operations, environmental conditions, user behaviour and third-party interface

g) Future developments;

**NOTE 4:** including but not limited to, third party developments, timetable change, line speed enhancements, re-signalling schemes & local authority transport plans.

h) Option evaluation and cost benefit analysis;

**NOTE 5:** by using the CBA tool available from the Technical Authority.

i) Summary and recommendations;

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- j) Steering group decision regarding recommended option(s);
- k) Conclusion and sign-off.
- NOTE 6: see Appendix B guidance an NRA content

The minimum frequency of level crossing risk assessments shall be based on the calculated risk for each crossing as defined in NR/L3/XNG/308.

# 7.2 Steering group

Each Route (or Region) shall have in place a suitable framework to assess the recommended options within narrative risk assessments (steady or future state), providing assurance that the appropriate form of protection has been selected and documented accordingly.

NOTE 1: recommended options include interim and long-term plans to manage risk.

**NOTE 2:** to de-risk options taken forward for implementation, the steering group should take place as early as possible following risk assessment and option selection.

Steering group meetings, or an equivalent, shall:

1. Contain a quorum of stakeholders with the necessary expertise to represent key business areas;

**NOTE 3:** includes, Route Level Crossing Managers, Level Crossing Manager(s), Operations Managers/Local Operations Managers, Signalling & other Asset Management representatives, Liability Negotiations Managers – or nominated representatives

- 2. Use professional judgement to reach agreement as to whether to approve or reject options, taking account of the qualitative and quantitative rationale contained within the narrative risk assessments;
- 3. Where options are approved, agree responsible owner to progress funding and agree prioritisation within work-banks;
- 4. Meet with a periodicity that enables decisions relating to option selection to form part of conclusions within narrative risk assessments and be signed off in accordance with the timescales contained within NR/L3/XNG/308.

The outcome from the steering group shall be recorded and where required provide assurance into the Preliminary Approval stage of the Signalling and Level Crossing Scheme Technical Approval Process, NR/L2/SIG/30035, that the appropriate form of level crossing protection is being implemented.

Where selected options change later in the project lifecycle, for example due to engineering factors identified during the design stage or in later technical approvals, then the changed options shall be resubmitted for reconsidered by the steering group.

### 7.3 Trigger risk assessments

In addition to the scheduled frequencies, risk assessments shall also be reviewed, and updated as necessary, in the following circumstances:

- 1. When the volume of vehicular traffic, pedestrians or animals using a level crossing has changed significantly;
- 2. When the volume of rail traffic has changed significantly;
- 3. When rail-infrastructure changes have occurred;

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- 4. Following a report of significant change in the environment on the approach to a level crossing;
- 5. Upon identification of possible change in land use that could affect the level crossing; and
- 6. Following an expression of concern that changes the risk profile significantly.

**NOTE 1:** an expression of concern might come from within Network Rail, a Train Operator, the safety regulator (ORR), an authorised user, or the relevant Highway Authority for example.

# 7.4 Risk Modelling

ALCRM modelling shall be undertaken in the following circumstances:

- 1. As part of timetable change risk assessment as outlined in NR/L2/OPS/031;
- 2. Prior to responding to planning proposal consultations;
- 3. As part of proposals to change the rail infrastructure;
- 4. As part of franchise specification proposals
- 5. As part of a significant change in level of land use by authorised users.
- 6. As part of ALCRM modelling, NRAs shall be reviewed and updated as necessary.

Accidents and incidents at level crossings shall be monitored as part of daily checks of the Route Control Log. Where the incident involves a vehicle being struck or results in an accidental fatality involving a pedestrian, a full risk assessment shall be undertaken. For all other incidents, see NR/L3/XNG/308, a risk-based decision shall be taken as to whether a new risk assessment is required. A record of this decision shall be held on the level crossing file.

# 8 Level crossing renewals, upgrades and wider enhancements

When a level crossing is due for renewal the conclusions and recommendations of the NRA shall be used to determine the appropriate level crossing type and protection required.

Where an enhancement whether to road or rail is being considered the NRA shall continue to be the sole assessment for the level crossing and options held within it will be progressed through the wider enhancement scheme where reasonably practicable.

Where an enhancement whether to road or rail changes the proposed option, the NRA shall be updated accordingly.

This includes the use of cost benefit analysis.

The reviewed/bolstered NRA shall be then be taken to the Route Steering Group [see section 7.2] to seek acceptance of any revisions to conclusions and recommendations.

# 9 Third party changes

Changes in land use, including planning applications, shall be evaluated to determine if they have an adverse effect on the safety, performance and operation of level crossings.

Responses to planning applications shall be given in accordance with the required timescales.

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**NOTE:** refer to section 7.3 regarding risk modelling and risk assessment requirements

### 10 Pursuing closure and/or reduction in status

When the opportunity arises, and there is a viable business case, the relevant Liability Negotiations Manager shall pursue closure or reduction in status of all types of level crossings. The Head of Liability Negotiation shall be accountable to instruct solicitors for the legal release of private rights.

### 11 Stakeholder engagement

### 11.1 Operations

Operations shall work collaboratively with Level Crossing Managers as part of assessing the safety of level crossings (as appropriate).

Narrative risk assessments shall include content relating to:

- 1. Signaller workload and the risks of human error;
- 2. Signal box ergonomics, incorporating displays and long signal sections;
- 3. Cross-referenced checks with occurrence books;
- 4. Notes on voice communication checks undertaken with or by the Local Operations Manager (or nominated deputy);
- 5. Notes on operational irregularities relating to the level crossing.

NOTE: further details are contained within Appendix B, section 4.2

### **11.2 Authorised users**

The NRA process shall confirm the authorised user database is up to date.

Level crossing managers shall make use of suitable opportunities to verify that authorised user details remain correct, and where changes are identified, they shall update the liability negotiations teams with this information.

**NOTE:** suitable opportunities includes, as part of asset inspection, during the risk assessment, or when undertaking calls, correspondence or site visits not related to the risk assessment

Liability negotiations teams shall verify details through land registry checks as appropriate.

Authorised users of each user worked crossing shall be written to as part of each risk assessment.

The letter shall be used to:

- 1. Invite them to participate in the risk assessment;
- 2. Remind them of the safe crossing protocols that they need to follow;
- 3. Remind them of their legal obligations to brief invitees, employees and tenants on safe crossing protocols;
- 4. Request information about their use of the crossing, patterns of use and the vehicle types used;

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- 5. Request an understanding of any changes in land use, tenancy details and other matters relating to safe operation; and
- 6. Ask if they are willing to consider closure of the crossing or lock it when not in use.

# 11.3 Others

Stakeholder engagement is integral to the risk assessment of level crossings.

So far as is reasonably practicable, Level Crossing Managers shall work collaboratively with internal and external stakeholders to manage the safety of level crossings. Those internal to Network Rail shall provide the necessary support as part of this process.

Intelligence received and other discussions that help inform risk-based decisions shall be recorded within the narrative risk assessment.

# 12 Level crossing orders

Level crossing orders for public road level crossings shall be maintained in compliance with the Level Crossing Act 1983 and the Level Crossing Regulations 1997.

Level crossing orders shall be required when:

- 1. amending the arrangements at a level crossing already subject to an order;
- 2. changing the level of control at a public road level crossing that does not have a current order;
- 3. requested to submit an order by the Secretary of State.

NOTE 1: General Counsel provides legal guidance to those preparing orders

### 13 Level crossing files

A file shall be maintained for each level crossing in accordance with NR/L3/XNG/309.

It shall contain as minimum:

- 1. Level crossing order, if applicable
- 2. Ground plan, if applicable;
- 3. Narrative risk assessment (current and historical);
- 4. Correspondence regarding risk reduction and other works;
- 5. General correspondence'

Level crossing files shall be maintained for the lifetime of a level crossing and for 7 years thereafter.

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# Appendix A - Minimum combinations of control measures for renewals, upgrades and new level crossings

The requirements in the table in this appendix shall be followed where risk assessment has identified improvements in protection arrangements are required so far as is reasonably practicable.

Current crossing type meeting these requirements	Station footpath crossing	Barrow crossing
Additional requirements	An active visible warning is required where direct observation of trains does not give sufficient warning time e.g., white light indicators. Audible warning of the approach of a second train shall be considered where the level of risk justifies it.	Either an active visible warning (e.g., white light indicators) or a phone to signaller is required where direct observation of trains does not give sufficient warning time
Limit on train speed	Not to be provided where permissible train speed > 100 mph	Not to be provided where permissible train speed > 100 mph
Active audible warning required?	Sometimes – see additional requirements	S
Active visible warning required?	Sometimes - see additional requirements	Sometimes - see additional requirements
Phone to signaller required for user?	õZ	Sometimes - see additional requirements
Fixed signs required?	Yes	Kes
Type of barrier required	None	None
Monitored by:	Not monitored	Not monitored
Controlled by:	Railway passenger at a station to gain access to a platform (pedestrian only)	Railway staff supervised at a station to gain access to a platform (pedestrian only, or with barrows and trolleys)
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Current crossing type meeting these requirements	Footpath crossing	Bridleway crossing. User worked crossing.	OC (Open Crossing)
Additional requirements	Active visible and audible warnings are required where direct observation of trains does not give sufficient warning time or where permissible train speed > 100 mph.	<b>Either</b> a phone to signaller <b>or</b> an active visible warning is required where direct observation of trains does not give sufficient warning time or permissible train speed > 100 mph. An active audible warning is also required where an active visible warning is provided at a crossing over which there is a public right of way. Not to be provided on public roads.	There should not be more than one line over the crossing. Only to be provided in depots or on sidings. The maximum daily traffic moment not normally to exceed 2000 or the peak hour traffic moment 30 or the maximum actual daily road vehicle user 200. The 85%ile road speed at the crossing to be less than 35 mph.
Limit on train speed	Not to be provided where permissible train speed > 125 mph	Not to be provided where permissible train speed > 125 mph	The speed of trains over the crossing should not exceed 10 mph
Active audible warning required?	Sometimes - see additional requirements	Sometimes - see additional requirements	Ŝ
Active visible warning required?	Sometimes - see additional requirements	Sometimes - see additional requirements	Z
Phone to signaller required for user?	Ŷ	Sometimes - see additional requirements	Ž
Fixed signs required?	Yes	Yes	Yes
Type of barrier required	Gate or stile	Gate or lifting full barrier	Poo
Monitored by:	Not monitored	Not monitored	Not monitored
Controlled by:	User (pedestrian only)	User (including vehicle driver, horse rider, cyclist, person moving farm animals on the hoof and pedestrian)	User (including vehicle driver, horse rider, cyclist, and pedestrian)
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Current cro meetin require	AOCL (Automatic Op locally monito	ABCL (Automatic Barrie Crossing, locally monitored)
Additional requirements	Only to be provided in a depot/siding and not to be provided where there is more than two running lines.	Not to be provided where there are more than two running lines. Barriers are to close only the entrances to the crossing, leaving the exits clear.
Limit on train speed	Speed of trains to be limited so that drivers can stop short of the crossing from the point at which the crossing comes fully into view. The crossing speed shall not exceed 55 mph	Speed of trains to be limited so that drivers can stop short of the crossing from the point at which the crossing comes fully into view. The crossing speed shall not exceed 55 mph
Active audible warning required?	Yes	Yes
Active visible warning required?	Yes	Yes
Phone to signaller required for user?	Yes	Yes
Fixed signs required?	Kes	Yes
Type of barrier required	None	Lifting half barrier
Monitored by:	Train driver	Train driver
Controlled by:	Automatic control system	Automatic control system
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Current crossing type meeting these requirements	AHBC (Automatic Half Barrier Crossing)	AFBCL (Automatic Full Barrier Crossing, locally monitored)
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Additional requirements	Not to be provided where there are more than two running lines. Not to be provided where grounding or blocking back of traffic is considered likely. Not to be renewed if adjacent to stations or near schools. Barriers are to close only the entrances to the crossing, leaving the exits clear.	Not to be provided where there are more than two running lines.
Limit on train speed	Not to be provided where speed > 100 mph	Speed of trains to be limited so that drivers can stop short of the crossing from the point at which the crossing comes fully into view. The crossing speed shall not exceed 55 mph
Active audible warning required?	Yes	Yes
Active visible warning required?	Yes	Yes
Phone to signaller required for user?	K es	< es
Fixed signs required?	Yes	Yes
Type of barrier required	Lifting half barrier	Lifting full barrier
Monitored by:	Signaller	Train driver
Controlled by:	Automatic control system	Automatic control system
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#### Appendix B – Core requirements for a narrative risk assessment template

The details shown below set out the core elements that shall be included within relevant narrative risk assessments to confirm a robust assessment of safety is undertaken.

NOTE: the elements below do not mandate an order in which information should be written

Photographs should be used to support observations within narrative risk assessments wherever practicable.

#### 1 Title page

Crossing name, date of risk assessment and a photograph of the level crossing.

The photograph should contextualise the crossing within its environment i.e. a crossing approach picture should be used.

#### 2 Reason for risk assessment

A reason why the risk assessment has been undertaken should be identified within the NRA, for example as part of a scheduled risk assessment frequency, following an accident or a series of safety events, following local environment changes, or following infrastructure/operational changes.

#### 3 Level crossing overview

#### 3.1 Summary

The level crossing overview familiarises readers with the location, crossing type and ALCRM calculated risk.

Summary details includes:

- 1. Level crossing name
- 2. Level crossing type
- 3. ELR, miles and chains
- 4. Route and/or Region
- 5. Number of running lines
- 6. Maximum permissible line speed over the level crossing
- 7. Electrification and type
- 8. Supervising signal box / control centre
- 9. Road name and type or footpath number
- 10.OS grid reference.
- 11. Postcode
- 12. Local / highway authority
- 13. Title & date of the level crossing order (if applicable)

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- 14. Level crossing layout plan number, version and date (if applicable)
- 15. ALCRM calculations total FWI, risk per traverse letter and collective risk number

Orientation of the crossing or the railway as appropriate

#### 3.2 Description of the crossing and its environment

A satellite image and map provides a visual representation of the topography of the crossing, including nearby roads and the crossing approaches

NOTE: a minimum 1:25,000 scale should be used

Extract from the sectional appendix contextualises the railway environment

Asset description including a summary of the protection provided and/or layout characteristics such as guide fencing

#### 3.3 The geographical nature of the area

Describe the surrounding area and land use.

- 1. Rural, urban or coastal location
- 2. Residential, industrial, town or village environment
- 3. Local properties, businesses and amenities that could affect safety of the crossing, for example shops, supermarkets, schools, sheltered housing, rail/bus station, religious centres, cinemas, pubs, seasonal events

**NOTE**: local amenities or attractions that can affect the level crossing might not always be adjacent to it

- 4. Highways information, for example the route over the crossing might be classified as a designated diversionary route, it might be subject to flooding and might have specific gritting arrangements in place
- 5. Notable changes in land use and/or changes in authorised users
- 6. Whether it is a heritage, conservation or SSSI area
- 7. Whether adverse weather is known to occur such as fog and sea mist
- 8. If the crossing is on a flood plain

#### 3.4 Approaches

Name, classification and road number as appropriate:

- 1. Whether roads and footpaths are public or private and if bridleway rights exist;
- 2. Highway layout including the number of lanes, reference to junctions and side roads, whether a pavement is provided, surface characteristics which might cause reflections or poor adhesion for vehicles and whether tactile paving is present;
- 3. Impact of any gradients, this includes both approaches and the area within the confines of the crossing which might result in risk of grounding;

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NOTE 1: Nairn's risk assessments should support this

- 4. Legal speed limit on the approaches and over the level crossing, qualitative notes on compliance to the speed limits;
- 5. Whether the crossing is on a skew and if it causes a safety risk for users;

**NOTE 2**: see guidance documents, LCG06 Deviating from the marked carriageway and LCG19 Skewed crossings, assessing the effects on pedestrian users.

6. If sun glare is a known risk when viewing the crossing equipment or approaching trains;

**NOTE 3:** also see guidance document, LCG13 Risk assessing for sun glare at public road level crossings.

- 7. Condition of the approaches such as vegetation that could obscure signs or road traffic signals;
- 8. Distraction risks such as parked cars, low flying aircraft, ambient noise;

**NOTE 4:** include notes on audibility of train horns especially where whistle boards are fitted.

9. Lighting in the vicinity of the crossing that might result in glare or necessitate eyes to adjust, including going from light approaches to a darker crossing environment.

#### 4 Rail operations

Rail operations and Signaller interface is a key component of the risk assessment.

#### 4.1 Rail approach and usage

Train count for passenger and freight. For station level crossings, and those in close proximity to stations, include the mix of stopping and non-stopping services

Details relating to line speed(s):

- 1. Speed over the crossing;
- 2. Permissible speed changes on the approach to the crossing, including speed differentials for different classifications of trains;
- 3. Attainable speeds/variations in speed due to junctions, stations, including the impact of stopping and non-stopping services
- 4. Likelihood of trains passing on the crossing and whether there a risk to sighting from trains passing each other in the vicinity of the crossing

Operational risks such as:

- 1. Trains that may stop on the crossing or on the approach to the crossing due to location of signals for train regulation purposes, stabling of rolling stock, looping of freight trains etc. This can have an impact on access and sighting
- 2. Shunting movements that may impact on sighting or crossing activation
- 3. Bi-directional train movements that may also impact on sighting or crossing activation

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Whether the railway line over the crossing is on a potential diversionary route

Details of the risk of overrun at protecting signals as detailed within NR/L2/SIG/14201 Signalling Risk Assessment Handbook (where applicable)

**NOTE:** details of NR/L2/SIG/14201 assessments will be available from the Route Operations Risk Control Coordinator who can also help interpret the results and advise on any mitigation needed

#### 4.2 Signaller interface

It is important to evaluate the interface with Signallers within the narrative risk assessment. Areas of focus should include:

- Signaller workload, incorporating risk of human error, workload issues, repetition of tasks, number of crossings the Signaller has to interface with, signal box special instructions relating to level crossings, local methods of working when granting permission to cross or application of stopping/nonstopping controls, considering long signal sections – include reference to WARA and other assessments if known
- Signal box ergonomics, incorporating long signal sections risks, reference to crossings recorded on diagrams/panels/VDUs, crossings ordered chronologically on diagrams/panels/VDUs and telephone concentrators, CCTV monitor blind spots/bleaching (B&W or colour) – include reference to ergonomic risk assessments if known
- 3. Cross-reference checks with occurrence books to gain intelligence on use, patterns of use and time requested, and given, to cross
- 4. Notes on voice communication checks with LOM
- 5. Notes on operational irregularities, e.g. trapping of pedestrians and vehicles, permission to cross with a train in section, failure to caution, incidents involving hand signallers and/or during engineering work (including unsignalled movements)

#### 4.3 Train operator interface

Notes on:

- 1. Intelligence of incidents, local practices observed, and other risks and hazards identified by train crew including sighting of the crossing, interface with whistle boards and multi-tasking/distraction risks
- 2. Details of any cab rides undertaken, and sighting observations made

#### 5 Level crossing design, operation and condition

Asset condition, design, performance and future plans inform risk-based decisionmaking.

Include information on:

1. Renewal date from SICA report (if applicable)

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- 2. Derogations to current standards e.g. equipment type, layout, operational compliance.
- 3. Faults and failures including trends and impact on performance:
  - Asset inspection
  - SICA report
  - FMS
  - DST
- 4. Warning times of level crossing equipment incorporating design and onsite observations
- 5. Impact of crossing closure on society, user convenience and willingness to wait:
  - Barrier down time within the hour peak time and average throughout the day
  - Train arrival times and compliance to relevant standards

NOTE: proximity to stations, train frequency and likelihood of trains passing will influence this

- 6. Notes on additional mitigation such as red standing man, red light safety cameras, barrier protection, surveillance cameras
- 7. Notes from any discussions with the RAM team relating to future plans for the crossing, including incorporation within re-signalling projects if known

#### 6 Census

#### 6.1 General

User census incorporating frequencies, patterns of use and user demographics (including vehicle types) is a critical element of the risk assessment process.

**NOTE:** guidance on census can be found in level crossing guidance document LCG02 Census good practice.

Reference should be made to type of census, date and duration and other intelligence such as engagement with authorised users, operations, local residents and businesses etc.

The following information should also be supplied:

- 1. The weather conditions at the time
- 2. General observations relating to user behaviour, deliberate misuse, user error or unusual occurrences, user distractions, ambient noise, parked cars, road traffic diversions, road works etc.
- 3. Commentary on peak and off-peak census, including patterns of use (where known)

Where seasonal variation is identified, a second census should also be referred to within the narrative risk assessment and detailed in the same way.

#### 6.2 Road traffic census

A vehicular census should include information on:

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- 1. Number of cars
- 2. Number of light goods vehicles
- 3. Number of motorcycles
- 4. Number of heavy goods vehicles
- 5. Number of agricultural vehicles (tractors and vehicles with trailers)
- 6. Number of buses
- 7. Number of pedal cyclists
- 8. Number of equestrians
- 9. Occurrences of herded animals

Include a narrative of any occurrences of large and slow-moving vehicles, including those with abnormal loads (if applicable)

Include narrative on average speeds – are they in keeping with environment, speed limits

Also include information on blocking back (if applicable)

**NOTE**: blocking back information should consider the impact on safety and also crossing operation and performance

#### 6.3 Pedestrian Census

A pedestrian census should include information on:

- 1. Number of adult pedestrians
- 2. Number of accompanied children
- 3. Number of unaccompanied children
- 4. Number of cyclists
- 5. Number of equestrians
- 6. Number and types of vulnerable and encumbered users, which might include:
  - the elderly;
  - mobility impaired or in mobility scooters/wheelchairs;
  - dog walkers (dogs both on, and off the lead);
  - pedestrians wearing head covering clothing (i.e. hoodies);
  - pedestrians using a mobile device or wearing headphones;
  - pedestrians riding or pushing a cycle (behavioural);
  - pedestrians carrying heavy bags or equipment affecting ability to cross safely

**NOTE:** guidance on vulnerable users can be found in level crossing guidance document LCG02 Census good practice.

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#### 7 Sighting and traverse time requirements

Sighting and traverse requirements inform us as to whether we are meeting legal compliance, in addition to determining if further risk controls are required.

Should include:

- 1. Description of decision points and actual distance (metres) from the nearest running rail
- 2. Distance from decision point to 2m clear of the furthest running rail
- 3. Whether decking is provided, if it is skewed, type and provision of non-slip surface
- 4. Traverse time (seconds) for pedestrians and vehicles (as detailed in LCG01), accounting for:
  - Vulnerable users
  - Slowest vehicles type
- 5. Minimum sighting requirements taking account of:
  - highest line speeds,
  - temporary or emergency speed restrictions
  - attainable speeds (where this can be justified and is recorded within the NRA)
- 6. Actual sighting distances available
- 7. Include impact of signalled bi-directional movements

# 8 Impact of sun glare

The risk of sun glare should be noted for both passive and protected crossings.

Depending on the crossing type, notes should refer to either the orientation of the crossing or the orientation of the railway and highlight the risks of sun obscuring crossing equipment or approaching trains respectively.

For level crossings on public roads, where LCG13 - Risk assessing for sun glare at public road level crossings, has identified level crossings shown within Annex D, the risk assessment form in Annex C shall be completed and appended to the NRA.

This process shall also be applied to public road level crossings where sun glare risk is identified as a concern and that do not already feature in Annex D.

#### 9 Incident history

Provide details of safety events at the level crossing that are relevant to the risk assessment. This should include:

- 1. Accidental fatalities
- 2. Deliberate acts (suicides/attempted suicides)
- 3. Collisions

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- 4. Near misses
- 5. Road vehicle violations including collisions with equipment
- 6. Other user errors or deliberate acts including gates left open or incorrect methods of crossing operation etc.

In addition to summary details and volume of events, also include:

- 1. Where the data has been obtained from, e.g. SMIS, DST, RLSE, MSVs, Signaller misuse reporting tool, including third-party advice/stakeholder engagement
- 2. A narrative relating to the frequency of incidents, incorporating whether there are regular types of events, patterns of events or other trends identified

#### 10 Risks and hazards

Identified risks and hazards, including precursor events are critical to the risk assessment and deciding if risk is tolerable or intolerable.

Refer to ALCRM calculations, key risk drivers and assessors structured expert judgement within the narrative.

#### 10.1 Vehicular risks

List the vehicular risks, the list provided is not exhaustive:

- 1. Weaving around lowered barriers
- 2. Red light violations
- 3. Risk of grounding
- 4. Sunlight issues including sun glare, bleaching out of crossing equipment, reflections from the road surface following rain
- 5. Late braking exacerbated by fast straight roads and/or steep gradients
- 6. Blocking-back or other issues caused by nearby road junctions
- 7. High and frequent vehicle moment, high proportion of HGVs, those which are large and slow moving or carrying hazardous goods
- 8. Insufficient carriageway width for large vehicles to pass easily on the crossing
- 9. Overhead line equipment which might impact high-sided vehicles
- 10. Ice, mud, flooded or pot-holed roads which effect traction and ability to stop

Risks associated with crossing design incorporating levels of protection, audible, visual warnings, signage, positioning of equipment and layout

Parallel roads that are in close proximity to the crossing and which might exacerbate the risk of vehicles turning onto the railway in error

Conspicuity of crossing equipment taking account of road approaches, road speeds and risks of distraction

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Provision or absence of street lighting which may introduce human factor risks when transitioning from light approaches to a darkened level or crossing or vice versa i.e. sensitivities associated with eyes

UWCTs which are in long signal sections

Decision points and visibility of approaching trains from within seating positions of vehicles likely to use the level crossing, taking account of height and length of vehicles which might also foul gauge

#### 10.2 Pedestrian, cyclists and horse riders' risks

List the risks, the list provided is not exhaustive:

- 1. Sighting compliance and calculated crossing times
- 2. Audibility and suitability of whistle boards (where provided)
- 3. Regular bouts of adverse weather conditions which might affect sighting of approaching trains, e.g. fog and sea mist
- 4. Risk of sun glare, bleaching of MSLs or masking approaching trains
- 5. Sighting obscuration issues
- 6. Risks of another train coming including sighting obscuration risks, e.g., hidden trains.
- 7. Variances in approach speeds due to stopping and non-stopping services, line speed differentials and variances due to junctions, speed restrictions etc.
- 8. Vulnerable users and associated risks to them
- 9. Frequency of use and reasons for use, e.g. high-volume, community link, provides access to leisure attraction such as a beach or caravan park, station proximity etc.
- 10. Access issues (where identified), taking all demographics into account including those on mobility scooters or in wheelchairs, mobility impaired or encumbered e.g. with pushchairs
- 11. Crossing layout, ergonomic positioning of signs, telephone equipment, gates, chicane fencing etc and risks of poor designs
- 12. Signage information, optimal with key safety messages prioritised, duplicate information, poorly ordered, signage clutter etc.
- 13. Where technology is provided, if equipment is ergonomically and optimally positioned, accounting for all user groups including equestrians, if audible warnings are set at the appropriate volume etc.
- 14. Where technology is provided, if warning time is optimal for pedestrian users, considering the risks associated with willingness to wait
- 15. Suitability and width of crossing surface accounting for user demographic, including risks of skewed alignment, condition, construction type
- 16. Observed issues with decision points

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- 17. Risks of distraction, including sources of ambient noise from adjacent buildings or low flying aircraft, locations where only one ticket machine is provided at station crossings, people crossing in groups or with animals etc.
- 18. Risks associated with darkness or transitioning from dark to light or light to dark environments, including slip, trips and falls, ability to read and follow instructional signage, ability to see approaching trains whilst eyes adjust etc.
- 19. Deliberate misuse intelligence, including trespass, loitering on or around the level crossing, climbing over lowered barriers or other equipment, deliberately running in front of trains etc.

#### **11 Future developments**

- Record details about any planned future developments that could affect risk at the crossing; e.g. significant infrastructure changes, housing developments, superstores, schools etc. Details are to be provided of the applicable planning authority and the date contact was made. Refer to any correspondence or discussions held within Road Rail Partnership Groups or with authorised users regarding changes in land use. Also include details of any risk modelling undertaken.
- 2. Provide information regarding any potential line speed changes, service strengthening, planned changes to rolling stock and any associated risks. Include details of the source material; e.g. contact with the RAM, Network Rail planning team, scheme sponsor etc (as applicable).
- 3. Refer to long-term strategies and Include line of route information such as:
  - nearby level crossings that could be subject to change and which could affect the risk at the level crossing being assessed. Examples include closure of another level crossing which creates a diversion over the assessed crossing or the upgrade of a nearby AHB where the increased barrier down time might lead to an increase in road traffic over the assessed crossing;
  - any proposed upgrade to nearby lines which could lead to increased train paths, either permanently or as a diversionary route. This includes line speed enhancements, re-signalling schemes, electrification projects and the impact of any re-controls. Refer to any correspondence or discussions held and also include details of any risk modelling undertaken; and
  - include any analysis that has been undertaken on the social and economic costs of crossing upgrades through use of the AXIAT.

#### 12. ALCRM output and option evaluation

The corporate CBA tool relating to level crossing safety shall be used to support decision making.

It is important to include both interim and long-term risk mitigation within narratives, risk modelling and CBA (as applicable).

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Evidence should be provided summarising:

- 1. Interpretation of current risk levels;
- 2. Evidence of optioneering and safety benefits for evaluated risk mitigation;
- 3. Cost benefit analysis incorporating whole life cost of risk mitigation;
- 4. Qualitative judgement supporting recommended risk mitigation; and
- 5. Recommended options to improve safety or decisions supporting tolerable risk, i.e. risk is managed SFAIRP (as appropriate).

#### 13. Conclusion and recommendations

- 1. Summary of the risk assessment, incorporating risks and hazards identified, reference to calculated risk (where the asset resides in terms of priority based on type, Route, national data), qualitative structured judgement, observations and stakeholder input
- 2. Proposed risk mitigation to improve safety and the decisions made by the Steering Group relating to acceptance or rejection of recommendations
- 3. Anticipated timescale for implementation of agreed recommendation(s) (if known)



#### Standard and control document briefing note

Ref: NR/L2/XNG/001	Issue: 3		
Title: Provision and risk management of level crossings			
Publication date: 05 December 2020	Compliance Date: 06 March 2021		
Standard/Control Document Owner: Head of Level Crossings	Safety		
Technical lead/contact for briefings: Tim Clark, Level Crossing	Safety Manager <b>Tel:</b> 07799 336978		
Purpose:	Scope:		
This procedure sets out the process requirements that enable Network Rail to manage the safety and convenience of its level crossings and fulfil its legal duties under health & safety legislation. It provides a robust and consistent risk management and option selection process for new and existing level crossings and helps determine the over-arching safety requirements for them.	<ul> <li>This process shall be applied to both new and existing level crossings on Network Rail Managed Infrastructure.</li> <li>This process does not apply to: <ul> <li>authorised walking routes that cross the railway unless they are classified as a staff crossing with active warning equipment (such as white lights); and</li> <li>road rail access points or track access points.</li> </ul> </li> </ul>		

#### **Overview of change**

NR/L2/OPS/100 has not been updated since June 2008 and does not reflect the implementation of the Level Crossing Manager organisation in 2013. This review will update the standard to reflect the business as usual working of the LCM organisation together with defining the minimum requirements for a Narrative LC Risk Assessment.

The reference number has been amended to reflect transfer of ownership to Head of Level Crossings Safety.

#### **Detail of change**

Section(s)/clause(s)	Summary of changes	
Section 5	Updated to include principles overview and processes updated for new and existing level crossings	
Section 6	Competence given its own section and bolstered to reflect current processes	
Section 7	Risk assessment section updated to reflect current best practise and to mandate Route Steering Groups	
New Section 8	LC renewals, upgrades mandated to use the Narrative Risk Assessment as the sole LCRA	
New Section 9	To define processes with third party changes, planning applications etc	
New Section 10	Making closure/reduction in status process clear	
New Section 11	Stakeholder engagement section to encourage/promote collaboration with Operations. Crossing users etc	
Appendix A	Updated and now includes AFBCL & MCBOD	
New Appendix B	Setting out the core requirements for the narrative risk assessment and the inclusion of reference to NR/L2/SIG/14201 to include details of LX/SORAT in the NRA.	

#### **Reasons for change**

The revised standard reflects the changes to level crossing risk management and the implementation of the LCM organisation in 2013. It also introduces the addition of the Narrative Risk Assessment process and defines the minimum requirements for version 2 of that process. Recommendations closed out:.RAIB Moreton-on-Lugg Rec.2, F.I.,Hockham Road A9.1, F.I.,Routs A9.5.

#### Affected documents:

Reference	Impact
NR/L2/OPS/100 ISSUE 2	Superseded

#### **Briefing requirements:**

#### Will Briefing Management System be used to deliver the briefing to posts listed below? No

Technical briefings are given to those who have specific responsibilities within this standard/control document.

Awareness briefings are given to those who might be affected by the content but have no specific responsibilities within the standard/control document.

Details of the briefing arrangements are included in the associated briefing programme.

All posts identified for briefing must be as described in OrgPlus.

Roles are directly briefed and do not cascade briefings.

<b>Briefing</b> (A-Awareness/ T-Technical)	Post	Function	Responsible for cascade briefing? Y/N
Т	Route Level Crossing Manager	Regions	Ý
Т	Route Asset Manager [Signalling]	Regions	Y
Т	Regional Head of Engineering [Signalling & Telecoms]	Regions	Y
T Regional Engineer [Signalling & Telecoms]		Regions	Y
Т	Principal Route Engineer [Signalling]	Regions	Y 194

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Т	Programme Manager [LXPMO, York]	Capital De	livery
Briefing (A-Awareness/ T-Technical)	Role	Functio	on
A	Local Operations Manager	Regions	Y
A	Infrastructure Director	Regions	Y
A	Head of Maintenance Delivery	Regions	Y
A	Director Engineering & Asset Management, Wales & Western	Regions	Y
А	Director Engineering & Asset Management, Southern	Regions	Y
A	Director Engineering & Asset Management, Scotland	Regions	Y
A	Director Engineering & Asset Management, NW&C	Regions	Y
А	Director Engineering & Asset Management, Eastern	Regions	Y
А	Section Manager [Off Track]	Regions	Y
A	Head of Health, Safety & Environment [North East]	Regions	Y
A	Head of Health, Safety & Environment [East Coast]	Regions	Y
A	Head of Health, Safety & Environment [East Midlands]	Regions	Y
A	Head of Health, Safety & Environment [Anglia]	Regions	Y
A	Health Safety & Environment Director, Scotland	Regions	Y
A	Health Safety & Environment Director, North West & Central	Regions	Y
A	Health Safety & Environment Director, Wales & Western	Regions	Y
A	Health Safety & Environment Director, Southern	Regions	Y
Т	Regional Asset Manager [Signalling]	Regions	Y

**NOTE:** Contractors are responsible for arranging and undertaking their own Technical and Awareness Briefings in accordance with their own processes and procedures.

# JP5

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Content approved by: 1 ...... .....

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#### **User information**

This Network Rail document contains colour-coding according to the following Red–Amber–Green classification.

#### Red requirements – *no variations permitted*

- Red requirements are to be complied with and achieved at all times.
- Red requirements are presented in a red box.
- Red requirements are monitored for compliance.
- Non-compliances will be investigated and corrective actions enforced.

Amber requirements – variations permitted subject to approved risk analysis and mitigation

- Amber requirements are to be complied with unless an approved variation is in place.
- Amber requirements are presented with an amber sidebar.
- Amber requirements are monitored for compliance.
- Variations can only be approved through the national variations process.
- Non-approved variations will be investigated and corrective actions enforced.

Green guidance - to be used unless alternative solutions are followed

- Guidance should be followed unless an alternative solution produces a better result.
- Guidance is presented with a dotted green sidebar.
- Guidance is not monitored for compliance.
- Alternative solutions should be documented to demonstrate effective control.

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#### Compliance

This Network Rail standard/control document is mandatory and shall be complied with by Network Rail Infrastructure Limited and its contractors if applicable from 5<sup>th</sup> September 2020.

Where it is considered not reasonably practicable<sup>1</sup> to comply with the requirements in this standard/control document, permission to comply with a specified alternative should be sought in accordance with the Network Rail standards and controls process, or with the Railway Group Standards Code if applicable.

If this standard/control document contains requirements that are designed to demonstrate compliance with legislation they shall be complied with irrespective of a project's Governance for Railway Investment Projects (GRIP) stage. In all other circumstances, projects that have formally completed GRIP Stage 3 (Option Selection) may continue to comply with any relevant Network Rail standards/control documents that were current when GRIP Stage 3 was completed.

**NOTE 1:** Legislation includes Technical Specifications for Interoperability (TSIs).

**NOTE 2:** The relationship of this standard/control document with legislation and/or external standards is described in the purpose of this standard.

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<sup>&</sup>lt;sup>1</sup> This can include gross proportionate project costs with the agreement of the Network Rail Assurance Panel (NRAP).

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#### Issue record

Issue	Date	Comments
1	September 2020	Content transferred from NR/L3/OPS/045/3.08

#### **Reference documentation**

NR/L2/OCS/031	Assessing and assuring the impact of operational risks relating to changes to the train plan
NR/L2/OPS/100	Provision, Risk Assessment and Review of Level Crossings
NR/L2/SIG/30021	Alterations to Authorised Line Speeds
NR/L3/INF/02226	Corporate Records Retention Schedule
NR/L3/XNG/207	Level Crossing Manager Competence Framework

#### Legislation

This standard/control document has been reviewed to confirm it complies with the following legislation:

Health and Safety at Work etc. Act 1974

The Management of Health and Safety at Work Regulations 1999

Level Crossing Act 1983

The Railways and Other Guided Transport Systems (Safety) Regulations 2006 (as amended)

Road Traffic Act 1988 & 1991

The Traffic Signs Regulations and General Directions 2016

The Private Crossings (Signs and Barriers) Regulations 1996

Compliance with this standard/control document does not, on its own, provide compliance with the legislation listed.

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# 1 Purpose

This standard provides a process for risk assessing level crossing assets.

It contributes to the control of the following high-level risks:

- a) Level Crossings: vehicle, person or animal on the line at risk of collision; and
- b) Level Crossings non-collision (with train) incident.

Level crossing risk assessments form part of a multi-disciplinary process that demonstrates that level crossings remain safe, reliable and legally compliant.

# 2 Scope

This standard describes a method of risk assessing operational level crossings on Network Rail's managed infrastructure. It includes:

- a) the core level crossing risk assessment process;
- b) frequency of risk assessments;
- c) use of the All Level Crossing Risk Model (ALCRM) as the risk model;
- d) monitoring and response to level crossing incidents and accidents; and
- e) level crossing risk records.

It does not apply to authorised walking routes that cross the railway unless they are classified as a staff crossing with white lights. It does not apply to road rail access points or track access points.

A flowchart of the process is shown in Appendix A.

# 3 Roles and responsibilities

R – Res person respons certain	<b>sponsible</b> is the or people who are sible for performing a task or action.				
A – An is one v accoun that a ta comple	Accountable person who has overall tability to make sure ask or action is ted.		L		
<b>C – Co</b> an inpu action, informa docume worksh	<b>nsulted</b> people have t into the task or this can be providing tion, reviewing ents or attending ops etc.	j Manager	rossing Manager		sk Advisor
I – Info those w of a tas	<b>rmed</b> people are /ho receive the output k or process.	Crossinę	tevel C	Assessor	ations Ris
* Denot delegat	tes option for ion	Level	Route	Risk /	Opera
5	General	R	AC		

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6	Competence	R	AC		
7	Risk Assessment Frequency	R	AC		
8	Risk Assessment Process – Collate Information	R	AC		
9	Risk Assessment Process – Identify Risk Controls Optioneering	CI	CI	AR	
10	Risk Assessment Process – Implement Risk Controls	CI	RCI	AR	R
11	Level Crossing Incidents and Accidents	I	I	AR	I
12	Level Crossing Risk Records	R	RA	RA	А

# Table 1 – RACI chart

#### 4 Definitions

Term	Definition
Optioneering	Optioneering is the opportunity to investigate potential safety improvements at a level crossing or its environment. Options that are modelled in ALCRM and selected for progression should be practicable and targeted toward the risks and hazards identified.
Risk Assessor	The Risk Assessor will almost always be the Level Crossing Manager. In certain cases, such as sickness, vacancies or annual leave, these duties may also be undertaken by the Route Level Crossing Manager or Operations Risk Advisor.
Operations Risk Advisor	Where a Route has appointed an Operations Risk Advisor to oversee line management responsibility for Level Crossing Managers, their RACI responsibilities conform to those of the Route Level Crossing Manager.

# Table 2 – Terms and definitions

**NOTE:** This is a generic RACI and Route specific responsibilities may be used – Routes are responsible for briefing such changes to their users.

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#### **5** General

5.1 Operational level crossings on Network Rail managed infrastructure shall be risk assessed as required by NR/L2/OPS/100.

5.2 Risk assessment of level crossings shall include:

- a) an ALCRM assessment of risk incorporating site visit, census and data collection;
- b) demonstration of collaborative working with stakeholders;
- c) optioneering; and
- d) production of a Narrative Risk Assessment (NRA).

Level crossings shall be risk assessed at the required frequencies (see clause 8).

At hybrid level crossings where separate public and private rights exist, a separate risk assessment shall be conducted for each element of the asset.

**NOTE 1**: All elements of a level crossing risk assessment should normally be undertaken by the same person.

**NOTE 2**: An example of a hybrid level crossing is one where a public footpath and private vehicle gates each provide separate means of access across the railway.

#### 6 Competence

6.1 Level crossing risk assessments shall be undertaken by risk assessors who:

- a) have completed the level crossing risk assessment training; and
- b) have demonstrated the capabilities necessary to undertake level crossing risk assessments; or
- c) are under mentorship by someone who is competent to undertake level crossing risk assessments.

**NOTE:** The level crossing competence framework is shown in NR/L3/XNG/207.

#### 7 Risk assessment frequency

#### 7.1 Calculated Frequency

The frequency of level crossing risk assessments shall be based on the calculated risk for each crossing.

The calculated frequency is the minimum frequency at which crossings shall be risk assessed.

**NOTE:** The minimum risk assessment frequencies are calculated by ALCRM using the live risk scores. Risk assessment frequencies may be increased, see clause 7.2.

Crossings are placed into one of four categories. The categories, their associated risk assessment frequency and categorisation criteria are shown in Table 3.

The risk assessment frequency for hybrid level crossings shall be determined by the highest risk score.

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

#### Table 3 – Risk assessment frequency and risk categorisation criteria

**NOTE:** Level crossing MSTs in Ellipse should align to ALCRM frequencies and be reviewed as part of an annual check of risk assessment frequencies.

#### 7.2 Calculated risk assessment frequency review

The risk assessor shall review the risk assessment frequencies calculated by ALCRM and record their decision when the frequency is increased.

The frequency may be increased where structured expert judgement or limitations in ALCRM's ability to model crossing specific risks are present.

#### 7.3 Additional risk assessment triggers

A level crossing risk assessment shall be carried out:

- a) at the evaluation stage for new crossings, proposed renewals, or alterations to the type of protection;
- b) after commissioning of the renewal or safety enhancement of a level crossing;
- c) within four weeks of a formal expression of concerns from internal or external stakeholders, e.g. TOCs (Train Operating Companies), ORR (The Office of Rail Regulation), highways authority, authorised user;
- d) before significant timetable changes (as a minimum, optioneering of the impact of timetable change);

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**NOTE 1:** See NR/L2/OCS/031 before alterations to permissible line speeds, see NR/L2/SIG/30021.

- e) within four weeks of an incident of misuse, near miss or accident which triggers the requirement for a risk assessment, see Table 4;
- f) before Network Rail responds to planning proposal consultations that indicate a substantial change in traffic volumes, patterns or speeds (as a minimum, optioneering of the impact of traffic volume);
- g) following a report of a significant change in the environment which has an impact on a level crossing;
- h) within four weeks of receiving information of substantial increase in road traffic volume;
- i) before infrastructure changes that affect a level crossing, e.g. new lines / sidings, line closures or the reopening of mothballed lines.

**NOTE 2:** Risk assessments are also undertaken to support decision making for enhancements projects or standalone renewals.

**NOTE 3**: Apply structured expert judgement when deciding if changes are significant or substantial.

**NOTE 4:** In the case of very lightly used crossings a small increase in the number of road vehicles will have a greater impact on risk.

#### 8 Risk assessment process – collate information

#### 8.1 Initial contact with authorised users of User Worked Crossings (UWC)

Risk assessors shall use the Level Crossing Sharepoint system to correspond with authorised users. Authorised users of user worked crossings shall be sent the templated authorised user initial letter which includes the authorised user questionnaire. Letters shall be sent between two and three months before the date of the next scheduled risk assessment.

**NOTE:** Contact with authorised users of user worked crossings is important to support our understanding of risk. It enables us to work jointly with authorised users to improve level crossing safety.

Letters shall be sent with a pre-paid envelope for authorised users to respond.

Authorised users might provide an email address as their preferred means of contact. In these circumstances, authorised user letters should be sent as email attachments.

#### 8.2 Follow up contact with authorised users of User Worked Crossings

Where contact telephone numbers are available, risk assessors shall telephone authorised users to confirm their attendance at the site visit.

# 8.3 Prepare for site visit

Risk assessors shall prepare for the site visit. As a minimum this shall include:

- a) completing the office based element of the risk assessment;
- b) a review of previous census data;
- c) deciding which type of census will be undertaken and which equipment shall be used;

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**NOTE 1:** Factors to take into account include time of day, duration and need for a second census due to seasonal variations.

- d) obtaining crossing usage information held by the controlling signal box e.g. records of requests to use the crossing entered in the occurrence book for user worked crossings, drivers of long or slow moving vehicles, herding animals; and
- e) using appropriate 'smart' sources of information, e.g. local sources of information on crossing usage held in site logs by businesses or reports from residents, Google maps, local authority websites, SMIS (Safety Management Information System).

**NOTE 2:** See Level Crossing Guidance documents LCG 01 and LCG 02 which are available on the Level Crossings Hub.

#### 8.4 Stakeholder involvement

Risk assessors shall decide if stakeholder representation is needed during the site visit. Arrange to meet stakeholders on site when their attendance is needed.

#### 8.5 Carry out site visit

Risk assessors shall use a mobile device when undertaking the risk assessment site visit.

Risk assessors shall use the mobile device to record site visit inputs to risk assessments. The mobile device shall only be used in a position of safety.

**NOTE:** The mobile device presents risk assessors with the relevant questions for the crossing being risk assessed. It provides risk assessors with the available fields and options to record the inputs to the risk assessment.

If the mobile device fails, risk assessors can undertake risk assessment site visits using data collection forms.

# 8.6 Confirm usage – no users observed

At crossings where a quick census is undertaken, no users are observed and there is no visual or other supporting evidence of crossing use:

# EITHER:

- a) where possible carry out appropriate local investigations to substantiate usage, e.g. contact the authorised user, speak to nearby residents, check the internet for local walking groups etc...; and
- b) deploy census equipment for a minimum of one month to verify if the crossing is being used.

If the collated information / evidence from investigations support that the crossing is not being used then:

- a) where possible, establish and record if non-usage is temporary or permanent;
- b) record no use as an estimated census in ALCRM and add supporting commentary.

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**NOTE 1:** Where permanent non-use has been established, closure should be investigated and if practicable pursued.

**NOTE 2:** If agreement can be reached with the authorised user, lock crossing out of use until such time as it is needed again.

OR:

- a) if local investigations are not possible;
- b) record no use as an estimated census in ALCRM and add supporting commentary.

Local investigations will generate one of two outcomes:

# EITHER:

- a) the crossing is being used and the risk assessment shall be updated with the revised census information and new risk assessment detail and the asset should continue to be risk assessed at the required frequency; or
- b) the crossing is not being used and the M13 risk assessment remains valid. Confirm its M13 status in ALCRM with suitable commentary and continue to monitor for use during asset inspection visits.

If monitoring during asset inspection visits identifies that the crossing is being used, conduct a new risk assessment within four weeks.

If informed that a crossing with M13 status is being used, a new risk assessment shall be conducted within four weeks.

**NOTE:** Interim measures might be needed before the new risk assessment is conducted.

A flowchart of the action to take is shown in Figure 1.



Figure 1 – Action to take when no users observed

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# 8.7 Post site visit follow up

After completing the site visit, follow up checks might be needed. These can include:

a) checking the accuracy of data collected; or

b) speaking to an outside party, e.g. a local business; or

c) conducting an additional site visit.

# 8.8 Submit data into ALCRM

Risk assessors shall upload the data collected for the risk assessment into ALCRM from the mobile device.

**NOTE:** To avoid loss of data, always upload the data collected where full Wi-Fi is available.

Where risk assessment data is not recorded on the mobile device, e.g. device failure or paper copy used, risk assessors shall manually enter the data into ALCRM.

# 8.9 Check for existing safety benefits

Check the mitigations tab of the previous risk assessment in ALCRM to determine if any safety benefits have been applied, e.g. spoken alarm or red light safety equipment. Apply the safety benefits to the new risk assessment if still applicable.

#### 8.10 Carry out ALCRM sign-off checks

A sign-off check shall be undertaken for each risk assessment. This shall be conducted by a person who meets the requirements of clause 7.

The person undertaking the check shall focus on key inputs and sense check all data for errors and anomalies. Any issues identified shall be discussed with the relevant risk assessor. Agreement shall be reached on any corrective action to be taken prior to sign off.

# 8.11 Sign-off ALCRM risk assessment

Risk assessments shall be signed off in ALCRM:

a) within six weeks of the site visit; and

b) by a person who meets the requirements of clause 7.

# 8.12 Changes to risk assessment frequency

ALCRM provides a warning of change in risk assessment frequency.

If the risk assessment frequency has changed, the risk assessor shall arrange for the relevant MST (Maintenance Schedule Task) in Ellipse to be updated.

**NOTE 1:** Information on changes in risk assessment frequency is held on the Analyse Results page. The change in frequency management report (available on the Level Crossings Hub) can be run periodically to identify changes in risk assessment frequency.

**NOTE 2:** MSTs are updated by the Systems Support Manager. If the ALCRM score has changed to M13, the MST should be turned off.

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#### 9 Risk assessment process – identify risk controls optioneering

#### 9.1 Optioneering short and long term solutions

Optioneering shall be undertaken on all risk assessments. Optioneering shall be undertaken within 12 weeks of the site visit. Options to be progressed shall be identified and set to 'recommended' status within this timescale.

Potential risk controls shall be identified taking account of:

- a) the ALCRM outputs;
- b) key risk drivers;
- c) structured expert judgement; and
- d) other sources e.g. advice from other experts or key stakeholders.

Risk controls shall include short and long term solutions as appropriate.

New Level Crossing Orders place requirements on Network Rail and local authorities to agree long term strategies for public road level crossings.

Discussions and agreements shall be referenced in the NRA, see clause 9.10, and recorded in the level crossing file, see clause 12.

**NOTE 1:** Risk assessors can create a first version of the NRA to assist with identifying risk controls during optioneering.

**NOTE 2:** The Level Crossing Risk Management Toolkit (LXRMTK) <u>http://www.lxrmtk.com</u> and the Level Crossing Risk Management Catalogue are good sources of risk control and human factors information.

**NOTE 3:** See clause 9.9.2 for action to be taken when risk is deemed to be adequately managed by existing controls and no further mitigations are reasonably practicable.

**NOTE 4:** It is good practice to agree long term strategies for all public road level crossings and footpath crossings with local authorities. All long term strategies should be developed in consultation with the Route Asset Manager.

#### 9.2 Optioneering interim risk controls

Interim risk controls might be needed in addition to short and long term solutions.

As a minimum, interim risk controls shall be evaluated and progressed in the following circumstances:

- a) deficient sighting; or
- b) where a significant risk would exist pending delivery of short or long term solution(s).

**NOTE:** See guidance on Managing Interim Risk at Level Crossings. Interim risk controls should be modelled as short term options in ALCRM.

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# 9.3 Copy previous options

Relevant options from the previous risk assessment shall be copied onto the new live risk assessment.

Relevant options can include those that:

- a) control risk and have not previously been recommended or approved;
- b) have been previously recommended and are awaiting financial authority to progress to approved stage; or
- c) are approved options awaiting delivery.

**NOTE:** Previous options being copied should be checked and where needed amended for consistency with the new risk assessment, e.g. census numbers, sighting distances, train service data.

#### 9.4 Analyse results

Modelled options shall be analysed to determine which:

- a) give the greatest safety benefit as measured in Fatalities and Weighted Injuries (FWI);
- b) are effective at controlling and / or reducing risk conditions present at the crossing, e.g. address key risk drivers, known incidents of misuse or potential consequences of an incident or environmental risk; and
- c) are achievable and practicable.

# 9.5 Carry out Cost Benefit Analysis (CBA)

CBA shall be carried out on options that meet the requirements of 9.4. The CBA shall be completed using the Network Rail CBA tool.

The CBA will give a benefit to cost ratio. CBA shall be used to support the decision when selecting options that will be progressed.

The following can be used to support decision making:

- a) benefit to cost ratio is ≥ 1: positive safety and business benefit established;
- b) benefit to cost ratio is between 0.99 and 0.5: reasonable safety and business benefit established; and
- c) benefit to cost ratio is between 0.0 and 0.49: weak safety and business benefit established.

CBA might not be needed in all cases, e.g. low cost solutions or remedies for enforcement action. CBA gives an indication of overall business benefit. It should be used to support, not override, structured expert judgement when deciding which option(s) to progress. CBA does not always adequately reflect the safety benefit that can be achieved by implementing an option.

**NOTE:** Where a business to cost ratio is < 1, supporting documentation will be needed to progress an option.

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# 9.6 Final option selection

Decide which option(s) will be progressed for implementation.

**NOTE 1:** This could include discussing with and obtaining the support of the wider Route team.

**NOTE 2:** More than one option can be progressed. Option(s) can include interim, short and long term risk controls.

#### 9.7 Recommend option(s)

All option(s) that are:

a) being progressed; or

b) are to be progressed in the future;

shall be set to 'recommended' status in ALCRM.

**NOTE:** The ALCRM User Guide gives guidance on recommending options. Optioneering guidance is being developed.

#### 9.8 Seek option approval

Obtain approval for the selected option as appropriate.

Seek financial authority for the selected option(s) where needed.

**NOTE:** This includes obtaining the support of an Investment Panel where appropriate. A sponsor might be appointed.

For technical solutions, establish the high level feasibility of selected option(s).

# 9.9 Option(s) approved

#### 9.9.1 Options to be progressed

When a feasible option has obtained approval, including financial authority where needed, it shall be set to 'approved' status in ALCRM.

Review the progress of recommended option(s) that have not gained financial authority or where feasibility has not been established within six months. Establish if the option remains viable.

Risk assessors shall revisit option selection if options are not approved or are not viable and evaluate if there are other controls which might be better suited to manage safety.

**NOTE:** Further information is in 9.1 and 9.2.

#### 9.9.2 No options to be progressed

Risk assessors shall 'recommend', 'approve' and 'implement' a 'no further so far as is reasonably practicable (SFAIRP) mitigation identified' option where:

- a) risk is deemed to be adequately managed by existing risk controls, e.g. at a CCTV level crossing; and
- b) no further safety benefits are reasonably practicable.

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# 9.10 Complete a Narrative Risk Assessment (NRA)

The risk assessor shall complete a NRA for the level crossing being risk assessed.

As a minimum a NRA shall contain:

- a) information automatically extracted from ALCRM;
- b) enhanced qualitative narrative to greater articulate the risks present and support decision making;
- c) conclusions relating to the management of risk in the interim, short and long term; and
- d) evidence of risk control option(s) identified, those being progressed and those identified for future progression.

The NRA shall be completed within 12 weeks of the site visit.

**NOTE 1:** The process for creating and guidance for completing NRAs are available on the Level Crossings Hub.

**NOTE 2:** The NRA is a risk assessment report for the level crossing. It should be written in report format.

**NOTE 3:** Review and update the joint long term strategy for all public road crossings when completing the NRA.

# 9.11 NRA quality assurance process

All Level Crossing Managers (LCMs), Route Level Crossing Managers (RLCMs) and their nominated representatives shall undertake an assurance of the quality and consistency of level crossing risk assessments.

Checks should include:

- a) accuracy of information collected as part of the core ALCRM data collection activity;
- b) consistency of information; tracking for content which conflicts or is ambiguous;
- c) detail of qualitative information; completeness, robustness, appropriateness;
- d) identification of risks and hazards; relative to crossing users and crossing environment;
- e) story board of NRA; content flows from beginning to end e.g. there are no new hazards denoted in the conclusions section which do not feature earlier in the NRA;
- f) the risk controls considered, recommended or rejected are appropriate to address the risks and hazards identified and are proportionate to these risks;
- g) cost benefit analysis is completed, where this is required, and the BCR supports the recommended action(s) and/or legal, moral and economic considerations together with time, money and effort support proposals;
- h) the language used is consistent with agreed protocols and terminology and would not be considered emotive or inappropriate; e.g. Deliberate misuse and user human error are applied correctly, and 'misuse' is avoided in narratives

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The NRA assurance process shall be completed within 12 weeks of the site visit. A flowchart detailing the process overview is shown in Figure 2.



Figure 2 – NRS quality assurance process overview

# 9.12 Notify authorised users of risk assessment outcome

When the risk assessment is complete, the risk assessor shall send authorised users of user worked crossings the templated authorised user follow up letter and appropriate safe crossing usage information.
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If the authorised user has provided alternative contact details, e.g. an email address, and confirmed they prefer to be contacted using these details, the letter shall be sent using the alternative contact details.

NOTE: Authorised user letter templates are contained in the Level Crossing Sharepoint.

#### **10** Risk assessment process – implement risk controls

#### 10.1 Stakeholder management

Risk assessors shall:

- a) maintain contact with stakeholders to keep them updated on the progress of approved options;
- b) inform stakeholders that work is due to take place before it commences.

#### **10.2 Track option implementation**

Risk assessors shall progress and track option(s) until they are implemented. Liaise with the sponsor and / or delivery agent as needed.

Work closely with teams implementing the works.

Recommended option(s) that have not been progressed within 12 months of the risk assessment date shall be reported six monthly. The report shall be run by the Route Level Crossing Manager (RLCM) / Operations Risk Advisor (ORA).

**NOTE 1:** The suite of ALCRM management reports includes an optioneering report.

**NOTE 2**: Risk assessors should review the recommended options report to advise if options are still viable.

#### **10.3 Implement delivered option**

Risk assessors shall establish that an option has been implemented and the expected safety benefits are achieved.

Evidence of implementation can include:

- a) site visit;
- b) photographs; and
- c) documentary evidence, e.g. changes to ground plans, Level Crossing Orders etc.

When this has been established the option status shall be set to 'implemented' in ALCRM.

If the crossing is closed, update ALCRM to reflect temporary or permanent closure by implementing an M13 option and changing the core details to the respective status.

Follow the requirements of 8.12 to determine if the risk assessment frequency has changed.

**NOTE 1:** This will generate a new live risk assessment. The risk assessment date will remain as the date of the site visit on which the implemented option is based.

**NOTE 2:** Guidance on closing and archiving crossings in ALCRM is given in AUG/CA, which is available on the Level Crossings Hub.

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**NOTE 3:** Implementing a risk control option can result in a change to the risk assessment frequency and reduce the FWI.

#### 10.4 Carry over ongoing options

Where more than one option is being progressed, carry over any other ongoing recommended or approved options to the new live risk assessment, see 9.3.

#### 10.5 Notify stakeholders

Notify internal and external stakeholders of implemented options.

#### 10.6 Decide if a new risk assessment is needed

Factors to take into account include:

- a) the time elapsed between the date of site visit and delivery of implemented option; and
- b) the requirements of 7.3.

Restart the process if a new risk assessment is needed.

#### 11 Level crossing incidents and accidents

#### 11.1 Identifying incidents and accidents

Risk assessors shall review daily Route Control logs and SMIS downloads to identify incidents and accidents affecting level crossings for which they are responsible.

Risk assessors shall also act proactively, taking account of other smart sources of intelligence such as red light safety equipment or census cameras, if such sources identify incidents which are not recorded through Route Operations Control.

This includes incidents of misuse, near misses and accidents.

#### 11.2 Follow op to incidents and accidents

Risk assessors shall implement the actions described in Table 4.

When undertaking trigger risk assessments of user worked crossings, risk assessors shall document the method of contact and attempts to contact authorised users in the relevant level crossing file.

Involve other stakeholders in the review of risk assessments, findings and recommended actions arising from incidents and accidents.

Stakeholders include Highway Authorities, Environment Agency, the BTP (British Transport Police), Emergency Services and Road Rail Partnership Groups, etc.

**NOTE 1:** Risk assessors should keep a record of incidents and accidents on the level crossings for which they are responsible to help identify when the triggers given in Table 2 are reached.

**NOTE 2:** Risk assessors should identify potential factors that might cause or increase misuse and the controls to address the risks. Risk assessors should maintain regular contact with Community Safety Managers so they are aware of route crime incidents at level crossings.

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#### **11.3 Report reconciliation**

Risk assessors shall reconcile data recorded in the Route Control log and SMIS for each period within one week of receipt of the report. Risk assessors shall inform the Safety Reporting Team) of any discrepancies. Risk assessors shall reach agreement with the Safety Reporting Team on any discrepancies identified and how they will be recorded in SMIS.

**NOTE 1:** Report reconciliation can be undertaken by technical clerks or other nominated representatives should this better align with individual Routes operating structures.

**NOTE 2:** Risk assessors might receive other reports or information about incidents and accidents from local sources that can clarify the location or circumstances of incidents.

#### 12 Level crossing risk records

#### All records shall be retained as per the timescales defined in NR/L3/INF/02226.

Records shall include:

- a) copies of all correspondence sent to the authorised users of user worked crossings;
- b) copies of completed NRAs;
- c) correspondence related to the consideration of and decisions about proposed risk controls;
- d) correspondence relating to actual or potential closures;
- e) long term strategy agreements and proposals;
- f) actions taken as a result of monitoring and in response to incidents and accidents;
- g) general correspondence relating to the risk management of level crossings.

1308	2020	Action Required	Undertake additional risk assessment	Undertake additional risk assessment
NR/L3/XNG	05 September	Trigger	After each reported occurrence (except pedestrian suicides)	After each reported occurrence (except pedestrian suicides)
	date: (	Definition of Accident	Train has struck a vehicle or pedestrian or a vehicle has struck a train	Train has struck a vehicle or pedestrian or a vehicle has struck a train
Ref: Issue:	Date: Compliance	Action Required	Undertake additional risk assessment unless within 6 months of last routine risk assessment or a risk assessment has already been undertaken in accordance with this table within the last 12 months	Undertake additional risk assessment unless within 6 months of last routine risk assessment or a risk assessment has already been undertaken in accordance with this table within the last 12 months
		Trigger	After each reported occurrence	After each reported occurrence
		Definition of Near Miss	Crossing of the line during the warning sequence by vehicles or pedestrians necessitating emergency braking to be initiated by the train driver or too late for avoiding action to be taken	Barrier Strikes after the crossing clear button is pressed
		Action Required	Undertake additional risk assessment unless within 6 months of last routine risk assessment or a risk assessment has already been undertaken in accordance with this table within the last 12 months	Undertake additional risk assessment unless within 6 months of last routine risk assessment or a risk assessment has already been undertaken in accordance with this table within the last 12 months
		Trigger	3 times in a period of 12 months	3 times in a period of 12 months
		Definition of Misuse	Crossing of the line during the warning sequence by vehicles or pedestrians Irregular use of the crossing by a long, low or slow moving vehicle	Crossing of the line during the warning sequence by vehicles or pedestrians Barrier Strikes before the crossing clear button is pressed
		Crossing Type	ABCL, AHB, AOCL(+B), AOCR	MG type, MG

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						Date:		05 September 2	020
						Compliance	date: (	05 September 2	020
Crossing Type	Definition of Misuse	Trigger	Action Required	Definition of Near Miss	Trigger	Action Required	Definition of Accident	Trigger	Action Required
Open	Crossing of the line during the approach of a train (within the minimum required sighting distance)	3 times in a period of 12 months	Undertake additional risk assessment unless within 6 months of last routine risk assessment or a risk assessment has already been undertaken in accordance with this table within the last 12 months	Crossing of the line during the approach of a train by vehicles or pedestrians necessitating emergency braking to be initiated by the train driver or too late for avoiding action to be taken	After each reported occurrence	Undertake additional risk assessment unless within 6 months of last routine risk assessment or a risk assessment has already been undertaken in accordance with this table within the last 12 months	Train has struck a vehicle or pedestrian or a vehicle has struck a train	After each reported occurrence (except pedestrian suicides)	Undertake additional risk assessment assessment
User worked crossing type	Crossing of the line during the approach of a train (within the minimum required sighting distance) Non use of telephone when provided (except incidents of the user failing to call back after use) Crossing when the MSLs are red Gates left open	3 times in a period of 12 months	Undertake additional risk assessment unless within 6 months of last routine risk assessment or a risk assessment has already been undertaken in accordance with this table within the last 12 months Make contact with authorised user to invite them to attend the risk assessment	Crossing of the line during the approach of a train by vehicles or pedestrians necessitating emergency braking to be initiated by the train driver or too late for avoiding action to be taken	After each reported occurrence	Undertake additional risk assessment unless within 6 months of last routine risk assessment or a risk assessment has already been undertaken in accordance with this table within the last 12 months Make contact with authorised user to invite them to attend the risk assessment	Train has struck a vehicle or pedestrian or a vehicle has struck a train	After each reported (except pedestrian suicides)	Undertake additional risk assessment If appropriate, make contact with authorised user to invite them to attend the risk assessment

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/308	~	2020	2020	Action Required	Undertake additional risk assessment
NR/L3/XNG		05 September ;	05 September 2	Trigger	After each reported occurrence (except pedestrian suicides)
			date:	Definition of Accident	Train has struck a pedestrian or horse
Ref:	Issue:	Date:	Compliance	Action Required	Undertake additional risk assessment unless within 6 months of last routine risk assessment or a risk assessment has already been undertaken in accordance with this table within the last 12 months
				Trigger	After each reported occurrence
				Definition of Near Miss	In any of the following circumstances: • crossing of the line during the approach of a train • crossing when the MWLs are red • crossing when the White Light Indicator is extinguished necessitating emergency braking to be initiated by the train driver or too late for avoiding action to be taken
				Action Required	Undertake additional risk assessment unless within 6 months of last routine risk assessment or a risk assessment has already been undertaken in accordance with this table within the last 12 months
				Trigger	3 times in a period of 12 months
				Definition of Misuse	Crossing of the line during the approach of a train (within the minimum required sighting distance) Crossing when the MSLs are red MSLs are red White Light Indicator is extinguished
				Crossing Type	BW, FP, pedestrian crossings

Table 4 – Responding to incidents and accidents

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Ref:

Date:

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#### Standard and control document briefing note

Ref: NR/L3/XNG/308	Issue: 1		
Title: Risk assessing level crossings			
Publication date: 05 September 2020	Compliance Date: 05 September 2020		
Standard/Control Document Owner: Head of Level Crossings			
Technical lead/contact for briefings: Darren Cottrell, Level Crophanning Manager	Dessing Asset Strategy & Tel: 07767 644687		
Purpose:         This standard provides a process for risk assessing level crossing assets.         It contributes to the control of the following high-level risks:         a)       Level Crossings: vehicle, person or animal on the line at risk of collision; and         b)       Level Crossings – non-collision (with train) incident.         Level crossing risk assessments form part of a multidisciplinary process that demonstrates that level crossings remain safe, reliable and legally compliant.	<ul> <li>Scope: This standard describes a method of risk assessing operational level crossings on Network Rail's managed infrastructure. It includes:</li> <li>a) the core level crossing risk assessment process;</li> <li>b) frequency of risk assessments;</li> <li>c) use of the All Level Crossing Risk Model (ALCRM) as the risk model;</li> <li>d) monitoring and response to level crossing incidents and accidents; and</li> <li>e) level crossing risk records.</li> <li>It does not apply to authorised walking routes that cross the railway unless they are classified as a staff crossing with white lights. It does not apply to road rail access points or track access points.</li> <li>A flowchart of the process is shown in Appendix A.</li> </ul>		
Overview of change	I		

All content of NR/L3/OPS/045/3.08 has been transferred to this standard. The technical content has not been amended.

Detail of change	
Section(s)/clause(s)	Summary of changes
Throughout	Minor editorial changes. No change in technical content.
9.11	Removal of reference to LCG 18 NRA Route self-assurance process.

#### **Reasons for change**

The standard has been published to allow transfer of ownership of all content in NR/L3/OPS/045/3.08 from Operations SCSG to Signals and Level Crossings SCSG. The technical content has not been amended. This transfer has been undertaken to bring level crossing risk management and level crossing competence standards under one framework. This is in line with the level crossing system framework the Technical Authority is moving towards.

NR/L3/OPS/045/3.08 has been withdrawn and made historic.

Affected documents:	
Reference	Impact
NR/L3/XNG/308 ISSUE 1	New
NR/L3/OPS/045/3.08 ISSUE 1	Withdrawn

#### **Briefing requirements:**

#### Will Briefing Management System be used to deliver the briefing to posts listed below? Yes

Technical briefings are given to those who have specific responsibilities within this standard/control document.

Awareness briefings are given to those who might be affected by the content but have no specific responsibilities within the standard/control document.

Details of the briefing arrangements are included in the associated briefing programme.

All posts identified for briefing must be as described in OrgPlus.

Roles are directly briefed and do not cascade briefings.

<b>Briefing</b> (A-Awareness/ T-Technical)	Post	Function	Responsible for cascade briefing? Y/N
А	Route Level Crossing Manager	Regions	Y
А	Level Crossing Manager	Regions	N
А	Route Asset Manager [Signalling]	Regions	N
A	Head of Liability Negotiation 224	Technical Authority	Y 224

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A	Liability Negotiations Manager	Regions	Y
A	Liability Negotiations Adviser	Regions	N
A	Operations Risk Advisor	Regions	N
A	Programme Manager [Public & Passenger Safety]	Regions	N
A	Head of Corporate Passenger & Public Safety	Technical Authority	Y
A	Health Safety & Environment Director, North West & Central	Regions	N
A	Health Safety & Environment Director, Southern	Regions	Ν
A	Health Safety & Environment Director, Wales & Western	Regions	Ν
A	Head of Route Safety Health & Environment	Regions	N
A	Head of Route Safety Health & Environment [North West]	Regions	N

**NOTE:** Contractors are responsible for arranging and undertaking their own Technical and Awareness Briefings in accordance with their own processes and procedures.

# JP6

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lssue:	8
Date:	04 September 2021
Compliance date:	04 September 2022

.....

# Level 2

## **Business Process**

# Inspection of Level Crossing Systems

#### Approvals

Content approved by:

Susannah Walker, Technical Lead

Content approved by:

Robert Wainwright, Standard and Control Document Owner

Approved for publication by:

SG .....

John Winnifrith, Standards and Controls Management

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#### User information

This Network Rail standard contains colour-coding according to the following Red– Amber–Green classification.

Red requirements - no variations permitted

- Red requirements are always to be complied with and achieved.
- Red requirements are presented in a red box.
- Red requirements are monitored for compliance.
- Non-compliances will be investigated, and corrective actions enforced.

Amber requirements – variations permitted subject to approved risk analysis and mitigation

- Amber requirements are to be complied with unless an approved variation is in place.
- Amber requirements are presented with an amber sidebar.
- Amber requirements are monitored for compliance.
- Variations can only be approved through the national variations process.
- Non-approved variations will be investigated, and corrective actions enforced.
   Green guidance to be used unless alternative solutions are followed
- Guidance should be followed unless an alternative solution produces a better result.
- Guidance is presented with a dotted green sidebar.
- Guidance is not monitored for compliance.
- Alternative solutions should be documented to demonstrate effective control.

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#### Compliance

This Network Rail standard/control document is mandatory and shall be complied with by Network Rail Limited and its contractors if applicable from 4<sup>th</sup> September 2022.

Where it is considered not reasonably practicable<sup>1</sup> to comply with the requirements in this standard/control document, permission to comply with a specified alternative should be sought in accordance with the Network Rail standards and controls process, or with the Railway Group Standards Code if applicable.

If this standard/control document contains requirements that are designed to demonstrate compliance with legislation they shall be complied with irrespective of a project's Governance for Railway Investment Projects (GRIP) stage or Project Acceleration in a Controlled Environment (PACE) phase. In all other circumstances, projects that have formally completed GRIP Stage 3 (Option Selection) or PACE strategic development & project selection phase may continue to comply with any relevant Network Rail standards/control documents that were current when GRIP Stage 3 or PACE phase 1 was completed.

**NOTE 1:** Legislation includes National Technical Specification Notices (NTSNs).

**NOTE 2:** The relationship of this standard/control document with legislation and/or external standards is described in the purpose of this standard.

#### Disclaimer

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<sup>&</sup>lt;sup>1</sup> This can include gross proportionate project costs with the agreement of the Network Rail Assurance Panel (NRAP).

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#### Issue record

Issue	Date	Comments
1	April 2004	First Issue
2	Feb 2006	Revised to reflect use of dedicated Level Crossing Inspectors
3	26/08/2008	Revised to reflect new posts in organisational change
4	01/12/2008	Revised after review to correct inconsistencies and to include reference to Sleeping Dogs and Mothballed Crossings plus a dedicated check sheet for Surface Systems (Level Crossing Decks) [Later withdrawn due to anomalies].
5	04/12/2010	Revision of document to be up issued to Issue 5 and also, to include recommendations from RAIB reports, detail from TI 142, revised LXi28 Surface Systems (Level Crossing Decks) and new decking profile check sheet.
6	04/06/2011	Standard reissued as import and export from DOORs corrupted issue 5.
7	27/05/2014	Revised to clarify process, change responsibilities for inspections to Level Crossing Managers and introduce assurance appendices.
8	04/09/2021	Revised to provide a risk based approach to level crossing inspection and defect management

#### **Reference documentation**

NR/L3/XNG/308	Risk Assessing Level Crossings
NR/L2/XNG/202	Prioritisation of Level Crossing Defects
NR/L2/OHS/019	Safety of people at work on or near the line
NR/L2/CSG/STP001/04	Managing Variations to Network Rail Standards and Control
	Documents and Railway Group Standards

#### Legislation

This standard/control document has been reviewed to confirm it complies with the following legislation:

Health and Safety at Work Act 1974 (HASAWA) Level Crossings Act 1983 Level Crossings Regulations 1997 Management of Health and Safety at Work Regulations 1999

Compliance with this standard/control document does not, on its own, provide compliance with the legislation listed.

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#### 1 A Purpose

This business process forms part of the Level Crossing Inspection and Maintenance Control for managing the high-level risks:

- a) vehicle, person or animal on the line at risk of collision;
- b) incident on or near Level Crossing not involving a railway vehicle.

Failure to adhere with this document could lead to a loss of safety around the level crossing system.

#### 2 Scope

This business process defines the requirements on Route Level Crossing teams and Infrastructure Maintenance Delivery teams for inspection of all level crossing assets on Network Rail managed infrastructure. It includes:

- a) defining the level crossing inspection intervals and programming inspections;
- b) planning and preparing for level crossing inspections;
- c) undertaking level crossing inspections; and
- d) completing level crossing inspections and recording defects.

It does not apply to authorised walking routes, road rail access points or track access points that cross the railway unless they are classified as a staff crossing with white lights.

#### 3 Terms and Abbreviations

Terms and abbreviations used in this document are described in Table 1 and Table 2 respectively.

Term	Definition
Barrow	A level crossing at the end of a station platform for use by (or under the supervision of) rail staff.
Frequency	The time between applications of a maintenance task.
Maximum Frequency	The maximum frequency between inspections that can be justified.
Mothballed crossings	A level crossing on a line which is no longer used by rail traffic but has not been subject to permanent network change. The crossing however may still be used by the public and still requires inspection and maintenance.
Normal Inspection Frequency	The normal inspection Frequency to be applied to each crossing type as defined in Appendix A.
Prioritisation	Identifying the severity of a defect in accordance with Network Rail standards and therefore how quickly re-inspection, mitigating action or resolution is required.
Sleeping Dog	A level crossing generally of the UWC, FP, or Bridleway type where the right to cross still legally exists, but there is no evidence of use. There may be little, or no trace of the level

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	crossing infrastructure and maintenance has been withdrawn. These level crossings are reinstated and brought back into use when the right is later exercised.
Temporarily Closed Crossings	A level crossing of any type that has been temporarily legally closed for traversing the railway due to circumstances such as extended engineering work, adjacent developments etc., but where the intention remains to re-open the level crossing. The infrastructure remains in place and the crossing still requires inspection.
Watchman	Individual appointed to manage immediate risk associated with a defect. They do not need specific competency but should understand the consequence of the defect they are protecting (e.g., LCM, Pway, Signalling technician or level crossing attendant, MOM).
Work Arising Identification Form (WAIF)	Electronic or paper record for recording work arising from an inspection.

#### Table 1 Terms

Abbreviation	Description
ABCL	Automatic Barrier Locally Controlled
AFBCL	Automatic Full Barrier Crossing Locally Monitored
AHBC	Automatic Half Barrier Crossing
ALCRM	All Level Crossings Risk Model
ABCL	Automatic Barrier Crossing Locally Monitored
AOCL	Automatic Open Crossing Locally Monitored
AOCL+B	Automatic Open Crossing Locally Monitored with Barriers
AOCR	Automatic Open Crossing Remotely Monitored
BW	Bridleway
FDM	Field Data Manager
FP	Footpath
ICC	Integrated Control Centre
IME	Infrastructure Maintenance Engineer
LCM	Level Crossing Manager
МСВ	Manually Controlled Barriers
MCB-OD	Manually Controlled Barriers with Obstacle Detector
MG	Manned Gates
MPC	Maintenance Protection Co-Ordinator

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Abbreviation	Description	
MSL	Miniature Stop Lights	
OC	Open Crossing	
ORA	Operations Risk Advisor	
RLCM	Route Level Crossing Manager (or equivalent role)	
SM(OT)	Section Manager Off Track	
SP(OT)	Section Planner Off Track	
SSM	System Support Manager	
ТМО	Traincrew Manually Operated	
ТМЕ	Track Maintenance Engineer	
UWC	User Worked Crossing	
WAIF	Work arising identification form	

**Table 2 Abbreviations** 

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#### 4 Level Crossing Inspection Process

Figure 1 Process flow chart

#### 4.1 Inspection Frequencies

All LCM's inspections shall be scheduled in Ellipse.

The IME shall be accountable for confirming the correct frequencies are applied to LCM's inspections.

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The inspection frequencies defined in Appendix A shall be applied at each level crossing.

The inspection frequencies shall be dependent on the ALCRM risk category of the level crossing and level crossing type.

All crossings shall be subject to inspection at the normal frequency defined in Appendix A unless the inspection frequency has been extended to the maximum frequency defined in Appendix A.

If the inspection frequency is extended to the maximum, a site-specific risk assessment shall be approved which includes an assessment of crossing risk and asset condition.

**NOTE 1:** The template in NR/L2/XNG/19608/F02 can be used to assess level crossing risk when applying to change the level crossing inspection frequency.

The inspection frequency shall not exceed the maximum frequency defined in Appendix A.

When changes to the ALCRM risk model results in a change to the risk category, the LCM shall review the inspection frequency. Should the change result in a higher risk score which means an increased inspection frequency is required, they shall instigate a change to the inspection frequency with the SSM and IME in the relevant Infrastructure Maintenance Delivery Unit.

Any crossing that uses sighting distance as the main risk mitigation measure shall be scheduled for inspection in the vegetation growing period.

**NOTE 2:** The period between April and September inclusive is deemed to be the vegetation growing period.

The tolerance applied to level crossing inspection is 7 days, following which the inspection is deemed non-compliant.

#### 4.2 Preparing for the Inspection

Figure 1 shows the process flow for the level crossing asset inspection.

This shall be followed for all inspections.

The LCM shall liaise with the SP[OT] to arrange for a safe system of work to be created for the inspection visit in accordance with NR/L2/OHS/019.

The LCM shall assemble the information, equipment and documentation required to conduct the inspection including:

- a) the level crossing ground plan for all public road level crossings or in the absence of a level crossing ground plan, a site sketch of the level crossing arrangements;
- b) the level crossing order for all public road level crossings where available;
- c) an extract of a signalling plan showing any lineside signage on the approach to the level crossing;

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- a list of the outstanding defects (WAIFs) and faults associated with the crossing, including any issues related to 3<sup>rd</sup> parties on approach to the level crossing;
- e) site safety documentation;
- f) tools and equipment to perform minor repairs to level crossing systems identified on site.

**NOTE:** Where no level crossing ground plan or site sketch exists for the level crossing, the LCM should produce a site sketch containing the level crossing arrangements.

#### 4.3 Conducting the Inspection

The LCM shall conduct the inspection using the scripts provided on Network Rail's approved mobile application.

The inspection script shall be completed on site at the level crossing.

The checklists selected shall cover all the level crossing functionality and infrastructure elements as part of the level crossing to be inspected.

The LCM shall work through the pre-loaded question set checklist in order.

**NOTE:** The inspection checklist matrix applicable to each crossing type is detailed in Appendix B and is mirrored in the mobile solution.

Where faults or defects are discovered, the asset condition shall be described as 'unacceptable' or 'acceptable – defect rectified'. Unless a work order is in place following a previous inspection, a defect shall be raised using a WAIF. In this case, the existing work order number shall be recorded in the notes section of the electronic script for audit purposes.

The signaller shall be informed immediately for all defects which could affect the safety of the line, or where defects might impact on level crossing users' safety.

#### 4.4 Raising Defects

Defects identified shall be prioritised in accordance with NR/L2/XNG/202.

NR/L2/XNG/202 gives the minimum actions to be taken on site, the mitigation measures that can be applied, and the temporary repairs to be made.

When conducting the inspection, the LCM shall check all existing defects and act as follows:

- a) escalate any defect that has deteriorated and requires more urgent attention to the responsible section manager and/or fault control, and arrange for further action in accordance with NR/L2/XNG/202;
- b) where the degradation of the asset has not led to increased risk at the crossing, consider recommending to the appropriate Section Manager that the date on the Work Order is reprioritised;

**NOTE:** The Section Manager may use the LCM recommendation as justification to re-prioritise the work order.

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c) where the defect is no longer present notify the appropriate Section Manager and arrange for the Work Order to be closed or cancelled.

No action is required for defects which are not in the categories listed in points a-c above.

All defects shall be recorded by creating a WAIF and reported as a fault with the ICC as per the requirements of NR/L2/XNG/202.

#### 4.5 3<sup>rd</sup> Party Defects

The LCM shall take ownership of all 3<sup>rd</sup> party defects identified as part of level crossing inspection activities and raise a WAIF against the level crossing asset in Ellipse.

The LCM shall liaise with the MPC where escalation is required.

The LCM shall then advise the appropriate Section Manager that the work has been completed satisfactorily. The Section Manager shall arrange for the Work Order to be closed.

#### 4.6 Repairing Defects

Where possible the LCM shall repair minor defects which are identified as part of the level crossing inspection provided:

- a) it is safe to do so;
- b) they are competent; and
- c) it does not contravene Street Works Act (1991) legislation.

The LCM shall report defects identified as part of the level crossing inspection which require the appointment of a watchman to infrastructure control. Infrastructure control shall arrange for resources to be supplied from the local Infrastructure Maintenance Delivery Unit.

The LCM shall perform the watchman duties until either:

- a) relieved by rapid response resource;
- b) relieved by the Infrastructure Maintenance Delivery Unit staff; or
- c) further mitigations are employed to manage risk.

#### 4.7 Completing the Inspection

The LCM shall submit the completed inspection script and close the work order.

The LCM shall submit WAIFs for all new infrastructure defects identified with priorities in accordance with NR/L2/XNG/202.

The SP[OT] shall review the submitted WAIFs including any notes and arrange for Ellipse to be updated.

The SP[OT] shall arrange for work associated with WAIFs that are the accountability of other engineering disciplines to be transferred to the appropriate work group.

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The LCM shall provide detail to the appropriate Section Manager where any reprioritisations are recommended in accordance with clause 5.

#### 5 Review Process

The IME shall organise a meeting on their area to review the level crossing inspection process, defect management and rectification.

This meeting shall take place quarterly and include as a minimum the IME, SM[OT] and LCMs. The MPC shall attend as required.

The meeting shall include:

- 1. a review of the inspection frequencies:
  - a. extended from baseline and changes in ALCRM;
  - b. opportunities to change inspection frequencies.
- 2. a review of the defect rectification including:
  - a. prioritisation of defects;
  - b. reprioritisation of defects.
- 3. a review of any Level Crossings where renewal may be more beneficial than continued repair;
- 4. any issues around scheduling of inspections;
- 5. any issues around level crossing asset condition or safety.

The meeting shall review any approved variations to level crossing inspection frequency for adequacy annually.

A record of attendees and meeting minutes shall be retained as a record of the meeting.

An assurance process shall be applied to check:

- 1. the quality of level crossing asset inspections;
- 2. that the level crossing asset inspection frequencies in Ellipse are correct;
- 3. the quality of level crossing defect repair; and
- 4. level crossing defect rectification timescales.

The assurance process described in NR/L2/XNG/19608/Mod01 may be used.

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#### Appendix A - Level Crossing Inspection Intervals

Level Crossing Type	ALCRM risk category	Normal Frequency	Maximum Frequency		
Public Road Crossing – Non Interlocked	Red	7 Weeks (49 days)	3 Months (91 days)		
(e.g., AHBC / AOCL / ABCL / OC)	Amber / Double Amber	4 Months (119 days)	6 Months (182 days)		
Public Road Crossings - Interlocked (e.g., MCB, MCB – OD, TMO, MG)	All	4 Months (119 days)	6 Months (182 days)		
User Worked Crossings – all variants, including MSL	All	4 Months (119 days)	6 Months (182 days)		
Footpath / Bridleways – all variants, including MSL	All	4 Months (119 days)	6 Months (182 days)		
Sleeping Dog	All (Green) 12 Months (364 days)		nths ays)		
Mothballed, Temporarily Closed Crossings	As per crossing type				

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#### Appendix B – Level Crossing inspection checklist and type selection

		-			-					-	-			-	-
	Crossing Type	AHBC	ABCL	AOCL+B	AOCL	AOCR	MCB – All Types	MG	UWC	ő	OMT	FP & BW	Barrow	Sleeping Dog	AFBCL
LXi01	Road Arrangements	1	1	~	~	~	~	~	~	~	1	~			~
LXi02	Road Signals	1	1	1	1	1	1	1			<b>✓</b>				1
LXi03	Booms / Barriers	1	~	1			1		1		<b>√</b>				1
LXi04	Manned Gates							~			1				
LXi05	Telephone Systems	~	~	~	~	~	~	~	~	~	~	~	~		~
LXi06	Road Signals & Signs, MSL / MWL								*			~	~		
LXi07	Road Signs – AHBC, ABCL & AOCL+B	~	*	~											
LXi08	Road Signs – AOCL / AOCR				~	1									1
LXi09	Road Signs – MCB All Types						1				1				
LXi10	Road Signs – Manned Gates							1							
LXi11	Road signs – Open Crossings									~					
LXi12	Road Signs – UWC								~						
LXi13	Road Signs – Footpath & Bridleway											~			
LXi14	Road signs – Station Barrow												1		
LXi15	Rail Signs – AHBC/MSL/MWL/ AOCR	1				1			1			~			
LXi16	Rail Signs – Traincrew										1				
LXi17	Rail Signs – AOCL/AOCL+B/ ABCL/OC		~	~	~					~					~
LXi18	Whistle Boards	1							✓			~	1		
LXi19	Barrier Crossings operation inc. AHBC, ABCL & AOCL+B	*	~	~											~
LXi20	Open Crossings - Operation inc. AOCL & AOCR				~	-									

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	Crossing Type	AHBC	ABCL	AOCL+B	AOCL	AOCR	MCB – All Types	MG	UWC	oc	OMT	FP & BW	Barrow	Sleeping Dog	AFBCL
LXi21	MCB Operation – All						~								
LXi22	Manned Gates Operation							~							
LXi23	Gates / Barriers Operation (inc. POGO)								~			~	1		
LXi24	Traincrew Operated										~				
LXi25	Station Barrow Operation												~		
LXi26	Sleeping Dog													~	
LXi27	Crossings on Mothballed Lines	~	~	1	~	1	1	~	~	✓		1	~		1
LXi28	Surface Systems	1	1	1	1	1	~	1	1	1	✓	1	1	✓	1



#### Standard and control document briefing note

Ref: NR/L2/XNG/19608	Issue: 8		
Title: Inspection of Level Crossing Systems			
Publication date: 04 September 2021	Compliance Date: 04 September 2022		
Standard/Control Document Owner: Head of Level Crossings Safety			
Technical lead/contact for briefings: Susie Walker, Engineer (	Level Crossings) Tel: 07515 625370		
<ul> <li>Purpose: This business process forms part of the Level Crossing Inspection and Maintenance Control for managing the high-level risks: <ul> <li>a) vehicle, person or animal on the line at risk of collision;</li> <li>b) incident on or near Level Crossing not involving a railway vehicle.</li> </ul> </li> <li>Failure to adhere with this document could lead to a loss of safety around the level crossing system.</li> </ul>	<ul> <li>Scope: This business process defines the requirements on Route Level Crossing teams and Infrastructure Maintenance Delivery teams for inspection of all level crossing assets on Network Rail managed infrastructure. It includes: <ul> <li>a) defining the level crossing inspection intervals and programming inspections;</li> <li>b) planning and preparing for level crossing inspections;</li> <li>c) undertaking level crossing inspections; and</li> <li>d) completing level crossing inspections and recording defects.</li> </ul> </li> <li>It does not apply to authorised walking routes, road rail access points or track access points that cross the railway unless they are classified as a staff crossing with white lights.</li> </ul>		

#### Overview of change

The key changes are:

- Amendment of inspection frequencies which are either increased or decreased depending on crossing type and ALCRM rating;
- The introduction of a risk assessment which can be used to extend the inspection frequency to a specified maximum; and
- Transfer of requirements relating to defect management and prioritisation to the newly created NR/L2/XNG/202.

The purpose of the standard has been amended so the focus is on managing risk at Level Crossings.

The standard has been completely reformatted with changes to layout and terminology to reflect current practices. There have been minor amendments to the process and a number of amendments to other requirements, including requirements which have been removed or included.

#### Detail of change

Section (NR/L2/SIG/1960 8 issue 7)	<u>Section</u> (NR/L2/XNG/19608 issue 8)	Summary of changes
All	All	There have been significant changes to the layout, formatting and terminology used in the standard to reflect current expectations and practices.
1 Purpose	1 Purpose	The purpose has been revised to reflect that the standard provides a method of managing risk instead of a process for achieving compliance.
2 Scope	2 Scope	Reference to managing defect repairs has been removed, this is part of the new NR/L2/XNG/202.
2 Scope	2 Scope	Reference to assurance requirements has been removed, reference is now made in section 5.
Figure 1	4 Figure Process flowchart	The flowchart has been reformatted, reference to defect management has been moved to NR/L2/XNG/202 and roles have been removed from this process flowchart for clarity.
Table 1 Key to process flow chart	n/a	This table has been removed, process sub-tasks A-R are now presented as clauses 4.1- 4.7.
Table 1 sub task 1	4.1 Inspection frequencies	Previously no extension to inspection frequencies has been permitted. New issue permits inspection frequencies to be extended if a site specific risk assessment is carried out (this is included as form NR/L2/XNG/19608/F02).
Table 1 sub-task A	4.1 Inspection frequencies	Inspection of crossings which use sighting distance as the main risk mitigation measured uring the vegetation growing season is

		now a red requirement (previously amber). The growing season is now specified.	
Table 1 sub-task A	n/a	Requirement relating to non-standard inspection frequencies has been removed.	
Table 1 sub task B,C (C1 and C2)	4.2 Preparing for the inspection	Requirement to have a safe system of work has been added.	
Table 1 sub task B,C (C1 and C2)	4.2 Preparing for the inspection	Amber requirement introduced to state the LCM shall take a list of outstanding defects, site safety documentation and tools. T requirement to take a mobile device has been removed.	
Table 1 sub task D (D1 and D2)	4.3 Conducting the inspection	Reference to taking 'level crossing inspection checklists' removed.	
Table 1 sub task D, E	n/a	All references to defect management and repair have been moved to NR/L2/XNG/202.	
n/a	4.4 Raising defects	Requirements have been added with regard to inspecting existing defects.	
n/a	4.5 3 <sup>rd</sup> Party defects	Requirements for managing 3rd party defects have been added including reference to the MPC.	
n/a	4.6 Repairing defects	Requirement for appointing a watchman has been added.	
Table 1 sub ask G, I (I1 and I2)	4.7 Completing the inspection	Completion of inspection records has been simplified. Removed ref to TEF 3243. Reference to repeated defects removed.	
Table 1 sub task L (L1 and L2)	4.7 Completing the inspection	Requirement to retain copies of inspection documentation removed and the process has been simplified.	
Table 1 sub task O,P, Q	n/a	Requirement relating to defect prioritisation and management moved to NR/L2/XNG/202.	
Table 1 sub task R	5	Further guidance is given as to what the review meeting should include.	
Table 4	Appendix A	Inspection intervals amended.	
Table 2	Appendix B	AFBCL has been added to the LXi matrix.	
Table 3	n/a	Table 3 - Marks for completing inspection checklists has been removed.	
4 RACI	n/a	The RACI matrix has been removed.	
Table 6	n/a	Process assurance questions have been removed.	
Appendix A, B, C and D	n/a	All assurance appendices have been removed. The process assurance documents have been moved to NR/L2/19608/Mod01.	
Table 7	n/a	This table has been removed and included in NR/L2/XNG/202.	

#### Reasons for change

The inspection frequencies have been amended according to level crossing type and ACLRM rating and a risk assessment to extend inspection frequencies has been added. This will result in inspection frequencies which are better aligned to the risk and degradation of the level crossing. It also means that RLCMs and LCMs will be able to use their knowledge and experience of individual level crossings to adapt the inspection regime accordingly.

The requirements relating to defect prioritisation and management have been moved to the new NR/L2/XNG/202 in order to separate the process of inspection from the engineering requirements associated with defects.

The standard has been reformatted and updated to increase ease of use and ensure the terminology used is up to date.

Affected documents:			
Reference	Impact		
NR/L2/SIG/19608 ISSUE 7	Superseded		
NR/L2/XNG/19608/MOD01 ISSUE 1	New		
NR/L2/SIG/19608/F01 ISSUE 1	Superseded		
NR/L2/XNG/19608/F02 ISSUE 1	New	244	
			Δ44

#### **Briefing requirements:**

#### Will Briefing Management System be used to deliver the briefing to posts listed below? No

Technical briefings are given to those who have specific responsibilities within this standard/control document.

Awareness briefings are given to those who might be affected by the content but have no specific responsibilities within the standard/control document.

Details of the briefing arrangements are included in the associated briefing programme.

All posts identified for briefing must be as described in OrgPlus.

Roles are directly briefed and do not cascade briefings.

<b>Briefing</b> (A-Awareness/ T-Technical)	Post	Function	Responsible for cascade briefing? Y/N
Т	Route Level Crossing Manager	Regions	Y
Т	Level Crossing Manager	Regions	Ν
Т	Operations Risk Advisor	Regions	Y
Т	Infrastructure Maintenance Engineer	Regions	Y
А	Infrastructure Maintenance Protection Co-ordinator	Regions	Ν
Т	Track Maintenance Engineer	Regions	Y
Т	Section Manager [Off Track]	Regions	Ν
Т	Section Planner [Off Track]	Regions	Ν
Т	Signal & Telecoms Maintenance Engineer	Regions	Y
Т	Section Manager [Track]	Regions	Ν
Т	Section Manager [Signalling]	Regions	Ν
А	Section Planner [Signalling]	Regions	Ν
<b>Briefing</b> (A-Awareness/ T-Technical)	Role	Functio	on
Т	Regional Engineer (Signalling) or equivalent	Regior	IS
Т	Regional Engineer (Track) or equivalent	Regior	IS

**NOTE:** Contractors are responsible for arranging and undertaking their own Technical and Awareness Briefings in accordance with their own processes and procedures.

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# Level 2

# **Business Process**

# Prioritisation of Level Crossing Defects

### Approvals

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36

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#### **User information**

This Network Rail standard contains colour-coding according to the following Red– Amber–Green classification.

Red requirements - no variations permitted

- Red requirements are to be complied with and achieved at all times.
- Red requirements are presented in a red box.
- Red requirements are monitored for compliance.
- Non-compliances will be investigated and corrective actions enforced.

Amber requirements – variations permitted subject to approved risk analysis and mitigation

- Amber requirements are to be complied with unless an approved variation is in place.
- Amber requirements are presented with an amber sidebar.
- Amber requirements are monitored for compliance.
- Variations can only be approved through the national variations process.
- Non-approved variations will be investigated and corrective actions enforced.
   Green guidance to be used unless alternative solutions are followed
- Guidance should be followed unless an alternative solution produces a better result.
- Guidance is presented with a dotted green sidebar.
- Guidance is not monitored for compliance.
- Alternative solutions should be documented to demonstrate effective control.

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#### Compliance

This Network Rail standard/control document is mandatory and shall be complied with by Network Rail Limited and its contractors if applicable from 4<sup>th</sup> September 2022.

Where it is considered not reasonably practicable<sup>1</sup> to comply with the requirements in this standard/control document, permission to comply with a specified alternative should be sought in accordance with the Network Rail standards and controls process, or with the Railway Group Standards Code if applicable.

If this standard/control document contains requirements that are designed to demonstrate compliance with legislation they shall be complied with irrespective of a project's Governance for Railway Investment Projects (GRIP) stage or Project Acceleration in a Controlled Environment (PACE) phase. In all other circumstances, projects that have formally completed GRIP Stage 3 (Option Selection) or PACE strategic development & project selection phase may continue to comply with any relevant Network Rail standards/control documents that were current when GRIP Stage 3 or PACE phase 1 was completed.

**NOTE 1:** Legislation includes National Technical Specification Notices (NTSNs)

**NOTE 2:** The relationship of this standard/control document with legislation and/or external standards is described in the purpose of this standard.

#### Disclaimer

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<sup>&</sup>lt;sup>1</sup> This can include gross proportionate project costs with the agreement of the Network Rail Assurance Panel (NRAP).

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#### Issue record

Issue	Date	Comments
1	4th September 2021	First Issue

#### **Reference documentation**

NR/L2/XNG/19608	Inspection of Level Crossing Systems
NR/L2/OTK/5100	Boundary measure manual
NR/SP/ELP/27021	Electric track equipment layout for DC electrified
	lines

#### Legislation

This standard/control document has been reviewed to confirm it complies with the following legislation:

Health and Safety at Work Act 1974 (HASAWA) Level Crossings Act 1983 Level Crossings Regulations 1997 Management of Health and Safety at Work Regulations 1999

Compliance with this standard/control document does not, on its own, provide compliance with the legislation listed.

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#### 1 Purpose

This business process enables consistent defect prioritisation which is aligned to the risk of the defect.

#### 2 Scope

This business process sets requirements for prioritising level crossing defects that are identified during the inspection process specified in NR/L2/XNG/19608.

It applies to all engineering maintenance personnel and level crossing managers.

Defects which are within the level crossing boundary but are not part of the level crossing system are out of scope.

#### 3 Terms and abbreviations

Terms and abbreviations used in this document are described in Table 1 and Table 2 respectively.

Term	Definition	
3rd Party Defect	Defect which is not the responsibility of Network Rail to resolve. Third parties could include the local council or neighbouring landowners.	
Cill and Edge Beams	These are kerbs or edgings used to support the cess, 6 foot or outer panels.	
Defect	An unacceptable asset condition which may lead to a degradation of safety or reliability.	
Gapped	A gap considered a hazard (e.g. cycles, pram wheels, etc.). This is a 10mm gap anywhere on the crossing deck, excluding the flangeway gaps.	
Integrated Control Centre (ICC)	The organisation delegated with monitoring of infrastructure faults and allocation of fault teams.	
Prioritisation	Identifying the severity of a defect in accordance with Network Rail standards and therefore how quickly re- inspection, mitigating action or resolution is required.	
Watchman	Individual appointed to manage immediate risk associated with a defect. They do not need specific competency but should understand the consequence of the defect they are protecting (e.g. rapid response, LCM, Track, Signalling technician or level crossing attendant).	
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### Table 1 Terms

Abbreviation	Description
ESR	Emergency Speed Restriction
FP	Footpath
ICC	Integrated Control Centre
LCM	Level Crossing Manager
MCB	Manually Controlled Barriers
MCB-OD	Manually Controlled Barriers with Obstacle Detector
MPC	Maintenance Protection Co-ordinator
MSL	Miniature Stop Light
RLCM	Route Level Crossing Manager (or equivalent role)
RAM	Route Asset Manager (or equivalent role)
TME	Track Maintenance Engineer
TSR	Temporary Speed Restriction
UWC	User Worked Crossing
WAIF	Work Arising Identification Form

**Table 2 Abbreviations** 

#### 4 Defect Management

The signaller shall be informed immediately for all defects which could affect the safety of the line, or where defects may impact on level crossing users' safety and appropriate action taken.

Defects with priority defect codes SC, SI and M0 shall be reported as a fault to the Integrated Control Centre (ICC).

For each defect identified, the action tables in clause 6 shall be used to:

- assign a priority defect code for rectification which reflects the risk detailed within the tables; and
- mandate the action required to be taken by the LCM/delivery unit to rectify the defect.

**NOTE:** For defects that pose a hazard to trains, vehicles or pedestrians and where both a temporary and permanent priority defect code is given the highest defect priority codes.

A higher priority than those specified in clause 6 should be used if there are good safety or performance reasons identified by the LCM.

Table 3 provides the rectification timescales associated with each defect priority code.

Where possible the LCM shall repair minor defects, which are identified as part of the level crossing inspection provided:

- a) it is safe to do so;
- b) they are competent; and
- c) it does not contravene Street Works Act (1991) legislation.

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If a defect is not listed in the action tables in clause 6, the LCM shall assign a defect priority code and rectification action by taking into account the risk associated to the safety of the line and the level crossing user.

All defects identified shall be entered into Ellipse as per the requirements of NR/L2/XNG/19608.

The LCM shall take ownership of all 3rd party defects identified as part of level crossing inspection activities and raise a WAIF against the level crossing asset in Ellipse.

The LCM shall liaise with the MPC where escalation is required.

It is important that clear information is captured when recording defects either in Ellipse or in fault reports. Wherever practical, photographs should be taken of defects and attached to fault reports or forwarded to the manager responsible for the defect.

Priority Defect Code	Timescale	Priority Defect Code	Timescale
SC	Within 36 hours	M3	Within 13 weeks
SI	Within 7 days	M6	Within 26 weeks
MO	Within 14 days	M12	Within 52 weeks
M1	Within 4 weeks	M24	Within 104 weeks
M2	Within 8 weeks	MX	Non-actionable defect

## Table 3 Priority defect codes and timescales

## **5** Reprioritisation of Defects

Defects with a red RAG category shall be completed in accordance with the actions table and shall not be reprioritised.

Amber defects may only be re-prioritised with agreement from the LCM.

The LCM shall review outstanding defects on their inspection and recommend reprioritisation where appropriate.

Green defects should be completed in accordance with the actions table unless the appropriate Section Manager agrees a reprioritisation. In this case they shall perform suitable assessment of the defect and document any risk and mitigations associated.

**NOTE:** Where a defect is reprioritised for a sixth time in a row, the appropriate maintenance engineer should provide authorisation in accordance with Ellipse management standards.

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## 6 Defect Actions Table

## 6.1 Cattle cum trespass guards

	Action Lovel Crossing Manager / Delivery	Priority defect code	
Condition	Unit	Temporary repair	Permanent repair
One or more sections of the guards are missing or one or more guards damaged and ineffective.	Where users of the crossing pose a trespass or animal incursion risk, arrange for or apply a temporary repair. Consider closing crossing to passage of livestock or placing Watchman until temporary repair completed.	SC	M6
Any number of guards damaged but effective.	Permanent repair.	-	M6
Less than 1m 'step over' distance between adjacent sets of guards, including where trespass guards do not extend to fence line.	Where users of the crossing pose a trespass risk, arrange for a temporary repair. Consider additional risk when DC lines are present. Consider closing crossing to passage of livestock or placing Watchman until repair completed.	-	SI
Trespass guards installed incorrectly, e.g. less than 2.6m long, less than 35mm apart.	Arrange for trespass guards to be installed to standard.	-	M24
DC Rail too close to crossing surface as per NR/SP/ELP/27021 Conductor rail guard not present, in an unacceptable condition or less than 300mm from trespass guard.	Permanent Repair.	-	M24

Table 4 Cattle cum trespass guards

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## 6.2 Defect associated with crossing surface

	Action Level Crossing Manager / Delivery	Priority Defect Code	
Condition	Unit	Temporary repair	Permanent repair
All Crossing Types			
Panel(s) rocking – all crossing types. OR broken nibs even if no panel movement.	If the defect poses a hazard to trains, vehicles or pedestrians, decide if an emergency crossing closure is required or if a Watchman needs to be appointed to monitor the degradation. Where defect cannot be repaired immediately LCM to decide on any further mitigation (e.g. ESR).	SC	SI
Panels not gapped correctly (all crossing types).	If the hazard poses a risk to vehicles or pedestrians, arrange for temporary (or permanent) repair. Note: Arrange for Watchman if temporary repair cannot be completed. Re-check monthly for effectiveness of temporary repair until permanent repair has been completed.	SC	M12
Surface condition degraded.	<ul> <li>Where the defect poses risk to users or is likely to cause panel failure before next scheduled inspection. LCM to decide on mitigation as appropriate (e.g. close crossing to public, impose ESR etc).</li> <li>Perform or arrange for temporary repair.</li> <li>Note: Arrange for Watchman if temporary repair cannot be completed. Re-check monthly for effectiveness of temporary repair until permanent repair has been completed.</li> </ul>	SC	M12
	Where the defects pose no risk to users and is not likely to cause panel failure before next scheduled inspection.	-	MX
Evidence of grounding (e.g. evidence of scoring to the crossing deck or on approach).	LCM to arrange level and gradient survey with TME.	-	M12
Panels sitting proud (10mm+) of cill beams - all crossing types.	Where the defect poses a risk to users arrange for temporary repair.	SC	M12
At MCB-OD crossings fitted with lower lidar vegetation is growing at or is likely to grow to 150mm within the detection area. OR Obstructions present within the detection area.	Remove or arrange for removal of vegetation / obstruction within the detection area.	-	SI

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	Action Level Creasing Manager / Delivery	Priority Defect Code		
Condition	Unit	Temporary repair	Permanent repair	
Bowmac / Polysafe Brid	ging Systems			
Missing or displaced rubbers - all crossing types.	LCM to decide on mitigation (e.g. close crossing to public, impose ESR with full time Watchman etc).	-	SC	
Damaged, mixed - incorrectrubbers.	Re-check monthly. If degradation worsens action as 'Missing or displaced rubbers'.	M1	M4	
Timber Decks – see all	Timber Decks – see all crossing types			
Anti-slip surface damaged, missing or worn.	Where surface is ineffective and there is a skid / slip risk. LCM to decide on mitigation (e.g. appoint watchman to warn crossing users or close crossing to public).	SC	МЗ	
Becoming defective surface, showing signs of degradation.	Permanent repair.	-	M24	
Rotted, broken, Deck or bearers.	Permanent repair.	-	SC	

## Table 5 Defect associated with crossing surface

### 6.3 Defect associated with end restraints

	Action Lovel Creasing Manager / Delivery	Priority Defect Code	
Condition	Condition Action Level Crossing Manager / Delivery	Temporary repair	Permanent repair
End restraint missing or loose.	If there are gaps in panels or gap between end restraint and panel, treat as a gapped panel defect.	SC	SI

Table 6 Defect associated with end restraints

## 6.4 Four foot deflector plates/chain guards/tie bars

	Action Level Creasing Menager ( Delivery	Priority Defect Code		
Condition	Unit	Temporary repair	Permanent repair	
Loose - standalone deflector plate.	Apply temporary or permanent repair if there is potential for the plate to make contact with train (eg, re-tighten or remove ramp).	SC	M12	
Missing or damaged deflector plate.	Install temporary deflector plate or apply temporary repair.	M3	M12	
Tie bars loose or broken.	Report defective tie bar.	-	SC	

## Table 7 Four foot deflector plates / chain guards / tie bars

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## 6.5 Surface condition including public road approach

	Action Lovel Crossing Manager / Delivery	Priority Defect Code	
Condition Condition Level Crossing Manager / Derivery		Temporary repair	Permanent repair
Potholes > 150mm diameter AND > 40mm deep within Stop Line to Stop Line.	Temporary repair required.	SC	M6
Potholes < 150mm diameter and < or > 40mm deep within Stop Line to Stop Line.	Permanent repair.	-	M6
Potholes - all sizes – between stop line and 50m on approach.	Permanent repair (by third party) in line with their policy <i>Note: Notify responsible third party within 7</i> <i>days</i> .	-	МХ
Surface Weer, procks in	Within Stop Lines.	-	M12
surface wear, cracks in tarmac or anti- skid/glare.	Outside Stop Lines – Permanent repair (by third party) in line with their policy. Note: Notify responsible third party within 7 days.	-	МХ

## Table 8 Surface condition including public road approach

## 6.6 Edge beams/cill beams

	Action Loval Crossing Manager / Delivery	Priority Defect Code	
Condition	Unit	Temporary repair	Permanent repair
Moving - all crossing types.	Where an immediate risk to rail, road or pedestrian users exists or likely to exist by time of next inspection, decide if an emergency crossing closure or if a Watchman is needed.	SC	M6
Damaged / Degrading (wear & tear).	Permanent repair.	-	M12

## Table 9 Edge beams / cill beams

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## 6.7 Fencing

		Priority Defect Code	
Condition	Action Level Crossing Manager / Delivery Unit	Temporary repair	Permanent repair
Incomplete or damaged fencing within immediate level crossing area.	If railway is accessible, temporary or permanent rectification required. If a temporary repair cannot be carried out LCM to decide on mitigation method e.g. signaller to caution trains or appoint Watchman. Permanent repair rectification within 13 weeks unless adjacent land use allows extended timescale as NR/L2/OTK/5100.	SC	МЗ
	If railway is not accessible permanent repair rectification within 13 weeks unless adjacent land use allows extended timescale as NR/L2/OTK/5100.	-	МЗ

#### **Table 10 Fencing**

## 6.8 Gates & Stiles all types

	Action Lovel Creasing Manager ( Delivery	Priority Defect Code	
Condition	Unit	Temporary repair	Permanent repair
Gates not secured/locked (if required) or gate catch missing / ineffective (at UWC).	Where an immediate risk to rail, road or pedestrian users exists LCM to decide on mitigation methods e.g. emergency crossing closure or Watchman.	SC	SI
Wicket gates / stiles / gates - other defects that impact upon their operation.	Where an immediate risk to users exists or is likely to exist by time of next inspection temporary (or permanent) rectification required.	SC	M6

## Table 11 Gates & Stiles all types

## 6.9 Sighting distances

Where required as primary mitigation at crossings

	Action Lovel Crossing Manager / Delivery	Priority Defect Code	
Condition	Unit	Temporary repair	Permanent repair
Sighting not achievable due to encroachment by vegetation.	Until rectification carried out, LCM to decide on mitigation method e.g. imposing ESR/TSR to suit available sighting or emergency crossing closure.	-	SC
Sighting distance likely to become obscured by vegetation by next inspection.	Rectification required before sighting is likely to become obscured.	-	M3
Sighting not achievable due to other obstruction either within or outside NR boundary.	If immediate rectification not achievable, the LCM to decide mitigation (e.g. imposing ESR/ TSR to improve sighting time, emergency crossing closure).	SC	M3

## Table 12 Sighting distances

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## 6.10 Road markings and studs

	Action Lovel Crossing Manager / Delivery	Priority Defect Code	
Condition	Unit	Temporary repair	Permanent repair
Studs, reflectors or LEDs missing or defective.	Temporary or permanent repair.	МЗ	МЗ
Stop Line Missing.	Temporary or permanent repair.	SC	M6
Road markings erased or indistinct (at least 70% of material for each individual road marking remains).	Permanent repair.	-	M6

## Table 13 Road marking and studs

## 6.11 Roadway, pedestrian walkways or bridleways

	Action Lovel Crossing Menager ( Delivery	Priority Defect Code	
Condition Condition Level Crossing Manager / Delivery		Temporary repair	Permanent repair
Incorrect width on level crossing (all types).	RLCM and RAM[T] to agree an action plan to manage the defect.	M3	M24
Flangeway gaps <60mm wide and signs of flange contact present.	Inform signaller to caution trains until rectification is complete.	-	SC
Flangeway gaps <60mm wide and signs of flange contact not present.	Permanent repair.	-	МЗ
Flangeway depths <50mm deep on direct loading systems and <55mm deep on bridging systems and signs of flange contact present.	Inform signaller to caution trains until rectification is complete.	-	SC
	If flangeway is blocked with mud and it is clear that the risk to trains is negligible, then the rectification timescales may be extended to 7 days and trains may continue to be signalled normally.	-	SI
Flangeway depths <50mm deep on direct loading systems and <55mm deep on bridging systems and signs of flange contact not present.	Permanent repair.	-	M3

Table 14 Roadway, pedestrian walkways or bridleways

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## 6.12 Audible warning not functioning correctly

		Priority Defect Code	
Condition	Action Level Crossing Manager / Delivery Unit	Temporary repair	Permanent repair
Single audible warning device not working.	Arrange for S&T technicians to implement permanent repair.	-	SI
All audible warning devices not working.	Permanent repair. LCM to make judgement if mitigation is needed depending on crossing type and location e.g. proximity to station and usage.	-	SC
Another Train Coming Warning not working.	Arrange for S&T technicians to implement permanent repair. LCM to make judgement if mitigation is needed depending on location e.g. proximity to station and likelihood of trains crossing. Note: Mitigations could include asking the signaller to regulate trains to prevent 2 trains approaching the crossing at the same time.	-	SC
Sound muffled / Incorrect Sound.	Arrange for S&T technicians to implement permanent repair. LCM to make judgement if mitigation is needed depending on crossing type and location e.g. proximity to station and usage.	_	SI

## Table 15 Audible warning not functioning correctly

## 6.13 Level crossing barriers

	Action Lovel Creasing Manager/Delivery	Priority Defect Code	
Condition	Condition Action Level Crossing Manager/Delivery Unit		Permanent repair
Barrier operation			
Any barrier not lowering.	Look for any single obvious defect or Obstruction affecting the mechanism. Inform the Signaller to treat the level crossing as defective. Arrange for S&T technicians to attend and implement permanent repair.	-	SC
Excessive lowering time on automatic crossing.	Inform the Signaller who will take action to maintain the safety of the line. Arrange for S&T technicians to attend and implement permanent repair.	-	SC
Excessive lowering time on controlled crossing (eg MCB).	Arrange for S&T technicians to attend and implement permanent repair.	-	SI
Barrier not raising at all.	Arrange for S&T technicians to attend and implement permanent repair.	-	SC
Any barrier lowering too fast (all crossing types).	Arrange for S&T technicians to attend and implement permanent repair.	-	SI
No damping of barrier.	Arrange for S&T technicians to attend and implement permanent repair.	-	МЗ

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	Action Lovel Creasing Manager/Delivery	Priority Defect Code		
Condition	Unit	Temporary repair	Permanent repair	
Level crossingpedestal shock absorber worn.	Arrange for S&T technicians to attend and implement permanent repair.	-	МЗ	
Barrier slow in raising.	Arrange for S&T technicians to attend and implement permanent repair.	-	SI	
Barrier hunting.	Arrange for S&T technicians to attend and implement permanent repair.	-	МЗ	
Barrier Boom				
Obvious severe structural damage.	Arrange for S&T technicians to attend immediately. LCM to decide if mitigation is needed e.g. remain on site, place a Watchman or request Signaller to caution trains.	-	SC	
Stay wire snapped / missing / snagging.	Arrange for S&T technicians to attend and implement permanent repair.	-	SI	
Stay wire sagging.	Arrange for S&T technicians to attend and implement permanent repair.	-	МЗ	
Minor structural damage.	Arrange for S&T technicians to attend and implement temporary or permanent repair.	-	М3	
Barrier Boom light out, missing or incorrectly aligned.	Arrange for S&T technicians to attend and implement permanent repair.	-	SC	
Boom light loose.	Arrange for S&T technicians to attend and implement permanent repair.	-	МЗ	
Boom retro reflective marking defective.	Arrange for S&T technicians to attend and implement permanent repair.	-	М3	
Barrier length incorrect.	Arrange for S&T technicians to attend and implement permanent repair.	-	M3	
Barrier boom proving ineffective or strapped out.	Arrange for S&T technicians to attend and implement permanent repair.	-	M3	
Gap between barrier tip >65mm.	Arrange for S&T technicians to attend site. LCM to decide if mitigation is needed to reduce risk of persons or animals entering the level crossing whilst the barriers are lowered (e.g. remain on site, place a Watchman or request Signaller to caution trains).	-	SI	
Barrier Skirt				
Skirts hitting the road.	Arrange for S&T technicians to attend and implement permanent repair.	-	M3	
Strut / dropper missing non-consecutive in skirt.	Arrange for S&T technicians to attend and implement permanent repair.	-	М3	
2-3 Consecutive Struts / droppers missing in	Where not in the walkway, arrange for S&T technicians to attend and implement permanent repair.	-	SI	
, aroppers missing in skirt.	Where in the walkway, arrange for S&T technicians to attend and implement permanent repair.	-	SC	

Ref: NR/L2/XNG/20	
lssue:	1
Date:	04 September 2021
Compliance date:	04 September 2022

	Action Level Oreceing Menergy/Delivery	Priority Defect Code	
Condition Action Level Crossing Manager/Delivery Unit		Temporary repair	Permanent repair
>3 Consecutive Struts / droppers missing in skirt.	Arrange for S&T technicians to attend and implement permanent repair.	-	SC
Significant damage to skirt e.g. vehicle damage, bottom rail in effective or in complete.	Arrange for S&T technicians to attend and implement permanent repair.	SC	МЗ
Skirt where fitted not folding.	Arrange for S&T technicians to attend and implement permanent repair.	-	SI
Skirt to Pedestal coupling damaged or in effective.	Arrange for S&T technicians to attend and implement permanent repair.	-	М3

## Table 16 Level crossing barriers

## 6.14 Level crossing telephones

	Action Level Creasing Manager/Delivery	Priority De	fect Code
Condition	Unit	Temporary repair	Permanent repair
UWC phone not functional / missing / line poor quality.	Notify Signaller to take appropriate action as necessary, e.g. caution trains.	-	SC
Public phones at any crossing other than MCB not functional / missing / line poor quality.	LCM to decide on mitigation needed until rectification. Either place Watchman or notify Signaller to caution trains.	-	SC
Public where fitted to an MCB not functional / missing / line poor quality.	Arrange for S&T technicians to attend and implement permanent repair.	-	SI
Telephone incorrectly labelled.	Arrange for S&T technicians to attend and implement permanent repair.	SC	M3

## Table 17 Level crossing telephones

## 6.15 Road traffic light signals

	Action Level Crossing Manager/Delivery		Defect Code	
Condition	Unit	Temporary repair	Permanent repair	
Road traffic light signals incorrectly aligned however still visible at the required sighting point.	Arrange for S&T technicians to attend and implement permanent repair.	-	M3	
Road traffic light signals incorrectly aligned and the alignment ineffective.	Notify Signaller. LCM to decide if mitigation is needed e.g. request Signaller to caution trains, block the line, emergency road closure.	-	SC	

Ref:	NR/L2/XNG/202	
Issue:	1	
Date:	04 September 2021	
Compliance date:	04 September 2022	

Road traffic light signals not functioning correctly.	Notify Signaller. Any more than one light out on either approach to the crossing trains to be cautioned.	-	SC
Road traffic light signal reflectorised border is incomplete, or not clearly visible.	Arrange for S&T technicians to attend and implement permanent repair.	-	M3
Road light assembly is damaged, or backboard is faded.	Arrange for S&T technicians to attend and implement permanent repair.	-	МЗ
Road light assembly is in adequately secured.	Arrange for S&T technicians to attend and implement permanent repair.	-	SI
Road traffic light signal hood is obscuring the aspect.	Arrange for S&T technicians to attend and implement permanent repair.	-	SC
Road traffic light signal incorrect hood, damaged or missing hood and is not obscuring the aspect.	Arrange for S&T technicians to attend and implement permanent repair.	-	SI

## Table 18 Road traffic light signals

## 6.16 Signs

	Action Level Crossing Manager/Delivery	Priority Defect Code	
Condition Action Level Crossing Manager/Delivery Unit		Temporary repair	Permanent repair
Whistle board missing, obscured, dirty, vandalised or incorrectly aligned.	Where Whistle board may not be clearly visible to drivers, inform signaller to caution trains.	SC	SI
Signage which is Network Rails responsibility to maintain is missing, obscured, dirty, vandalised or incorrectly aligned.	LCM to decide on any mitigation needed (e.g. imposing ESR/ TSR to improve sighting time, emergency crossing closure).	SC	SI
Road Traffic signage which is <u>not</u> Network Rails responsibility to maintain is missing, obscured, dirty, vandalised or incorrectly aligned i.e. Highways Signage.	Where Lineside sign or 784.1 sign is found to be missing or obscured, trains shall be cautioned as per the rule book until the defect is rectified.	-	SC
	Inform the local authority / highways agency and arrange for the issue with the signage to be resolved. Note LCM to escalate with local authority / highways agency where issues with signage are not being dealt with promptly.	-	SI

Table 19 Signs

Ref:	NR/L2/XNG/202	
Issue:	1	
Date:	04 September 2021	
Compliance date:	04 September 2022	

## 6.17 Various

	Action Level Crossing Manager/Delivery	Priority Defect Code	
Condition Condition		Temporary repair	Permanent repair
Automatic Crossing Sequence too short leading to reduced warning.	Inform the Signaller who will take action to maintain the safety of the line. Arrange for S&T technicians to attend and implement permanent repair.	-	SC
Any MSL light units not working.	Notify Signaller to take appropriate action.	-	SC
Wicket gates not locked (if signaller controlled locking fitted).	Notify Signaller to caution trains unless LCM remains on site or Watchman is placed.	-	SC
Crossing equipment encroaching on the footpath / carriageway.	Arrange for S&T technicians to attend and implement permanent repair.	-	SC
Crossing equipment encroaching on the railway structure gauge.	Notify Signaller to take appropriate action.	-	SC
Damaged or ineffective power operated gate opener where fitted.	Arrange for S&T technicians to attend and implement permanent repair.	-	SI

## Table 20 Various

Page 19 of 19



#### Standard and control document briefing note

ef: NR/L2/XNG/202 Issue: 1		Issue: 1		
Title: Prioritisation of Level Crossing Defects				
Publication date: 04 September 2021	Compliance Date: 04 Sep	tember 2022		
Standard/Control Document Owner: Head of Level Crossings	Safety			
Technical lead/contact for briefings: Susie Walker, Engineer [	Level Crossings]	Tel:		
Purpose: This business process enables consistent defect prioritisation which is aligned to the risk of the defect.Scope: This business process sets requirement level crossing defects that are identified during process specified in NR/L2/XNG/19608.		cess sets requirements for prioritising are identified during the inspection 2/XNG/19608.		
	It applies to all engineering crossing managers.	g mainten ance personnel and level		
	Defects which are within th part of the level crossings	ne level crossing boundary but are not system are out of scope.		

#### Overview of change

Requirements relating to defect management and prioritisation have been transferred from NR/L2/SIG/19608 version 7 to this newly created standard.

There have also been amendments to the requirements, including requirements around reprioritisation of defects, management of 3<sup>rd</sup> party defects, updating of defect priority codes and amendments to the defect actions.

#### Detail of change

<u>Section</u> (NR/L2/SIG/19608 issue 7)	<u>Section</u> (NR/L2/XNG/202 issue 1)	Summary of changes	
n/a	Scope	Guidance is given to state that defects are limited to those in the level crossing boundary.	
Table 7	4 Defect management	A new red requirement is provided that the signaller shall be informed immediately for all defects which could affect the safety of the line.	
Table 1 sub-task D, E	4 Defect management	<ul> <li>A requirement has been added about management of 3rd party defects</li> <li>A requirement has been added with regard to action to take if the defect is not listed</li> <li>A requirement has been added which permits the use of a higher priority if required</li> <li>A guidance note has been added with regard to capturing data about defects.</li> </ul>	
Table 5	4 Defect management Table 3	New priorities defect codes have been added and there has been a minor amendment to an existing priority code	
n/a	5 Reprioritisation of Defects	Provides guidance on reprioritising defects	
Table 7	6 Defect Actions Table	<ul> <li>The table has been split into individual tables categorised by defect category</li> <li>A RAG status has been applied to all defects depending on their criticality</li> <li>Duplicated defects have been removed by removing reference to specific crossing types where possible</li> <li>There have been some minor changes to wording around condition and action descriptions</li> <li>New defects have been added</li> <li>The risk priority for some defects has been amended</li> <li>The layout of the table has been updated</li> </ul>	

#### Reasons for change

The requirements relating to defect prioritisation and management have been moved to this standard in order to separate the process of inspection from the engineering requirements associated with defects.

The defect priorities have been updated as previously they were considered to be too prescriptive and not risk based. This has led to too many defects in the work bank which could not possibly be actioned in time.

The standard has been reformatted and updated to increase ease of use and ensure the terminology used is up to date.

Affected documents:		
Reference	Impact	
NR/L2/XNG/202 ISSUE 1	New	266

Briefing requ	uirements:		
Will Briefing	Management System be used to deliver the briefing to posts I	isted below? No	
Technical brief	ings are given to those who have specific responsibilities within this standa	ard/controldocument.	
Awareness brie document.	efings are given to those who might be affected by the content but have no	specific responsibilities with	in the standard/control
Details of the b	riefing arrangements are included in the associated briefing programme.		
All posts identi	fied for briefing must be as described in OrgPlus.		
Roles are direc	tly briefed and do not cascade briefings.		
<b>Briefing</b> (A-Awareness/ T-Technical)	Post	Function	Responsible for cascade briefing? Y/N
Т	Route Level Crossing Manager	Regions	Y
Т	Operations Risk Advisor	Regions	Y
Т	Level Crossing Manager	Regions	N
Т	Section Manager [Off Track]	Regions	N
Т	Section Planner [Off Track]	Regions	N
А	Route Control Manager	Regions	Y

**NOTE:** Contractors are responsible for arranging and undertaking their own Technical and Awareness Briefings in accordance with their own processes and procedures.

# JP8



## PROTECTED LEVEL CROSSING RISK ASSESSMENT



## **Anglia Route**

## Level Crossing Narrative Risk Assessment

## **Milton Fen AHB Crossing**

## Planned 4<sup>th</sup> December 2021







#### **1. LEVEL CROSSING OVERVIEW AND ENVIRONMENT**

#### 1.1 LEVEL CROSSING OVERVIEW

This is a risk assessment for Milton Fen level crossing.

Crossing Details		
Name	Milton Fen	
Туре	АНВ	
Crossing status	Public Highway	
Overall crossing status	Open	
Route name	ANGLIA	
Engineers Line Reference	BGK – 59m 10ch	
OS grid reference	TL485624	
Number of lines crossed	2	
Line speed (mph)	75 MPH	
Electrification	No DC provided but OHLE present.	
Signal box	Cambridge	

Risk Assessment Details		
Name of assessor	Andrew Waling	
Post	Level Crossing Manager.	
Date completed	04-12-2021	
Next due date	05-03-2023	
Email address and rew. waling @ network rail.co.uk		
Phone number	07860500842	

ALCRM Risk Score		
Risk per traverse risk	D	
Collective risk	2	
FWI	0.013098895	

## For Safety performance (Fatality weighted injuries (FWI), this crossing is ranked 8th in Anglia route and 19th nationally compared to other AHB's

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### Reason for Risk Assessment

Network Rail has a responsibility and legal duty under the Health and Safety at Work Act 1974 for the health, safety, and welfare of its employees and for protecting others against risk.

Network Rail also has a legal responsibility under the Management of Health and Safety at Work Regulations 1999. Section 3 focuses on the requirement for suitable and sufficient assessments of risk to health and safety of employees and others in connection with their undertaking.

#### 1.2 INFORMATION SOURCES

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

Consulted	Attended site
LOMS, MOMS,BTP and signallers.	No
Crossing users and local residents.	Yes
Police (BTP/Home Office Force)	No

#### Stakeholder consultation and attendance notes:

All of the above were contacted with regards to this risk assessment and none attended the site meeting apart from local residents and dog walkers that were using the crossing on the day of the data collection. The rest were either contacted via email or telephone after the site meeting.

The reference sources used during the risk assessment included:

- CCIL
- Census Counter
- Geo-RINM
- SMIS
- Other Data Sources: Google maps, Bing maps, hazard directory and sectional appendix.

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#### **1.3 ENVIRONMENT**



The level crossing is located on Fen Road. The road approach speed is estimated to be Less than 30mph.

It is a Public Highway level crossing.

At Milton Fen level crossing the orientation of the road/path from the north is 130°; the orientation of the railway from the north to the up line in the up direction is 220°.

#### Sun glare

LCG13 assessing sun glare at public road level crossings has been completed and records risk as Tolerable with detailed sun glare risk assessment not needed

Impact of low sun on the crossing

Below is the output from the Sun Calc 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.

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.





Longest Day June 21st.



Shortest Day December 21<sup>st</sup>.



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

#### Site Visit General Observations:

Milton Fen AHB is situated on the outskirts of the village of Milton on fen road which is a semi-rural location on a single-track road with passing places along the way.

Fen road is a dead-end road that leads to the river Cam and Baits Bite Lock which is a popular place for people to attend especially during lunchtime hours and weekends during the summer months.

No new known developments within the vicinity of the crossing, this has been checked with South Cambridgeshire District Planning Department and Network Rail Town Planning.

Sun glare could be an issue on the approach to the crossing from the North during the summer months, but the crossing is fitted with LED wig wags that mitigate against this.

#### 2. LEVEL CROSSING USAGE

#### 2.1 RAIL

The train service over Milton Fen level crossing consists of Passenger and Freight trains. There are 186 trains per day. The highest permissible line speed of trains is 75 mph. Trains are timetabled to run for 19 hours per day.

#### Assessor's notes:

As stated, above, trains are timetabled to run for 19 hours per day, but lines are open 24 hours a day 365 days a year including Bank Holidays (UK only) and may receive additional freight, passenger or engineering trains which often vary in length, these are non-time tabled trains which do run from time to time and are mainly for engineering, rail head treatment and track recording purposes.

#### 2.2 USER CENSUS DATA

A 24-hour census was carried out on 06-06-2018 by TRACSIS. The census applies to 100% of the year.

The census taken on the day is as follows:

Cars / car-based vans / quad bikes	63
Large vans / small lorries / large 4x4s	12
Buses / coaches	0
HGVs	3
Tractors / large farm vehicles	2
Pedal / motor cyclists	154

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Pedestrians	227
Horse riders	0
Animal herders	0

#### Assessor's general census notes:

A full 9-day was undertaken by TRACSIS on the 6/6/18 and the average worked out from that data gathered.

Available information indicates that the crossing has a high proportion of vulnerable users.

#### Vulnerable user observations:

Pushchair users, elderly pedestrian users, joggers using crossing (may be less aware of barriers especially depending on what side of the road they are on) this is only 5% of the total use but vulnerable usage has been applied

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

#### Irregular user observations:

No known irregular users as it mostly local people from the village of Milton that use the crossing.

#### Site visit night / dusk user observations:

From the census data there is no night-time usage but a 1% has been applied to this risk assessment as this cannot be discounted.

#### 2.3 USER CENSUS RESULTS

ALCRM calculates the usage of the crossing to be 80 road vehicles and 381 pedestrians and cyclists per day.

#### Notes on daily, annual, seasonal usage:

The crossing is used on a daily basis by the few residents that live over the crossing in the lock keepers' cottages and is a regular route for both pedestrians and cyclists that leads along the river Cam eastwards to Water-beach or westwards to Cambridge.

As already stated above in this risk assessment, the crossing is used more during the summer months especially during weekends and bank holidays as people head to the nearby Baits Bite Lock.

#### 3. RISK OF USE

#### 3.1 CROSSING APPROACHES

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The road approach speed for vehicles on the up side of the crossing is Less than 30mph and the approach speed on the down side of the crossing is Less than 30mph.

None of the approach roads to Milton Fen level crossing are assessed as being long and straight. There are prominent features on the approach to the level crossing that could distract drivers.

#### Site visit observations:

On the approach to Milton Fen AHB crossing there are 4x RLT signals and these are visible on the approach to the crossing form both directions as follows:

Upside nearside approach = 124mtrs Upside offside approach = 123mtrs Downside nearside approach = 218mtrs Downside offside approach = 98mtrs

Also, there is a house on downside approach next to crossing that could distract a driver, track entrance to field next to crossing on UP side could be used by tractors at certain times of year - depending on the length of the vehicle; turning into this could cause blocking back on the crossing but never known to occur. Both approaches are narrow as this is a single-track road with passing places on both sides. Fields used for farming nearby, the use of these will change seasonally and therefore the amount of farm vehicles (tractors, trailers, combines etc), will change depending on the season.

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:

Mud on crossing from tractors mainly during the winter especially from October-November when the farmers are harvesting sugar beet, this also involves quite a few articulated lorry's using the crossing to collect the sugar beet from the nearby fields.

Ice during the winter months can cause an issue as this road is not on a regular gritting route.

Fog at certain times in the year, approach roads are narrow, uneven and roadside vegetation can cause an issue if not regularly cut back.

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 down side is easily sufficient - a vehicle would have surplus time to react if the crossing is activated

#### Assessor's general crossing approach notes:

House on downside approach next to crossing that could distract a driver. Track entrance to field next to crossing on UP side could be used by tractors at certain times of year? depending on the length of the vehicle; turning into this could cause blocking back on the crossing but this has never been known to occur. **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:





Crossing sits on a humped profile but has passed the SIN109 inspection and at the time of writing this risk assessment there has been new tarmac approaches on both sides of the level crossing.

#### 3.3 AT THE CROSSING – BLOCKING BACK

The road layout at or close to the crossing does not result in identified incidents of traffic queuing over the crossing. Blocking back risk is known to occur Never known to occur.

No incidents of blocking back are recorded.

There are no identified issues with the road layout, parked cars or other features that could stop traffic. In addition, the road is not a known diversionary route.

#### Assessor's notes:

Road is a no through road. Possibility for blocking back due to an entrance to a field on the UP nearside approach, but never known to have occurred.

#### 3.4 AT THE CROSSING – ANOTHER TRAIN COMING RISK

Trains are known to occasionally pass each other at this crossing.

#### Assessor's another train coming notes:

Trains are sometimes known to pass at the crossing, if train frequencies increases then the chance of another train coming will increase, and the risk that a user may choose to cross after seeing a train pass over the crossing in one direction, without realising another train could be coming in the other direction is a possibility. Upgrade to a full barrier crossing would help mitigate against this.

#### 3.5 INCIDENT HISTORY

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

#### Assessor's incident history notes:

**Sep 13, 2021 -** Milton Fen At 21:05 hours Cambridge SSM advises of crossing misuse at Milton Fen AHB level crossing. The Driver of 1K93 reported a cyclist zig zagged past the barriers and over the crossing. Driver only applied service brake and was okay to continue. Not declared a near miss and no emergency brake applied. Cambridge MOM checked crossing - no issues at 22:45 hours. Cause: Deliberate misuse/User error. **Apr 28, 2021 -** Milton Fen At 09:49 hours a member of the public reported that one of the barriers of Milton Fen AHB level crossing had been knocked off. Road traffics lights were working, and trains cautioned. Signal protecting down road CA229 signal and Up road CA230 signal. Cambridge MOM took Level crossing on local control and managed to clear road traffic at 10:17 hours. There was no sign of the vehicle involved Normal running given at 11:32 hours following completion of repairs. MOM watched several trains pass over the crossing. Cause: Deliberate misuse/user error.

**Apr 7, 2021 -** Milton Fen At 06:02 hours the driver of 1N41 05:57 Cambridge to Birmingham New Street reported that the train had struck a person on the Down Main line at Milton Fen AHB Level Crossing, between Cambridge North and Water-beach. Both lines were blocked, Emergency services and Network Rail staff attended at 06:20 hours. Services were suspended between Cambridge and Ely, with replacement transport provided in the form of coaches.

#### Historical

Feb 17, 2019 - LC Misuse - 1G59 14:25 Stansted Airport - Ely observed a stationary car in the middle of Milton Fen AHB level crossing with the barriers in the lowered position. No Near miss and no EBA.

07-Oct-16 NRV- road vehicle suspected to have knocked off Level Crossing barrier at Milton Fen AHB.
29-Jul-06 Barriers struck by road vehicle
10-Mar-07 1T10 reported a near miss with car
09-Dec-07 Car crossed in front of 2T70.

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#### 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:

LED wig wags have been fitted at Milton Fen AHB and due to the incidents, that have been reported at the crossing there is a more visible BTP presence which has been noted by local residents and crossing users. Again, as already mentioned above in this risk assessment, upgrade of the crossing from a half barrier to a full barrier would help mitigate against this.

#### 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	39s	Yes	No
Down line	39s	Yes	No

#### Assessor's notes and observations on strike in times:

The strike in times are adequate for this type of crossing and do not seem to be excessive. The LCM timed the strike in times when undertaking the data collection for this risk assessment and they are as follows, for a train to arrive at the crossing on the up road the strike in time was 29 seconds and for a train to arrive at the crossing on the down road the strike in time was 32 seconds.





#### 4. ALCRM CALCULATED RISK

#### Milton Fen level crossing ALCRM results.

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

- Distracted / forced by dog (loss of control), Road traffic accident, Second train coming
- Does not observe lights/barriers, Slips, trips, falls or snagged on crossing
- Unaware of crossing, slow moving / short warning, train unexpected
- Blocking back, Late braking, Incorrect use (e.g. non-adherence with level crossing road traffic light signals)
- Stuck or grounded on crossing, Fails to observe level crossing, Parked on level crossing
- Stranded / failed on crossing, Sunlight obscures crossing/lights or view up / down track
- Turns onto the railway, Poor crossing visibility,
- Failure to detect approaching train, lights / barriers or obstacle detection equipment fails to operate

	Risk per Traverse (Letter)	Collective Risk (Number)
is:	D	2
	Risk per Traverse (FWI)	Collective Risk (FWI)
Cars / car-based vans / quad bikes	0.00000012	0.000284598
Large vans / small lorries / large 4x4s	0.00000012	0.000054209
Buses / Coaches		0
HGVs	0.00000003	0.0000283
Tractors / large farm vehicles		0.000001887
Pedal / motor cyclists		0.005113702
Pedestrians		0.007537729
Horse Riders	0.00000091	0
Animal Herders		0
Vehicles user in pedestrian mode		0
Train Passengers	0	0.00002348
Train Staff	0.00000001	0.000086674
Derailment Risk		0.000014919
Weighted Average (Users)	0.00000077	
Total Risk		0.013098895
	Average Consequence	0.777747248
	Collision Frequency	0.016842098

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## 5. OPTION ASSESSMENT AND CONCLUSIONS

#### 5.1 OPTIONS EVALUATED

The options evaluated to mitigate the risks at Milton Fen crossing include:

Option	Term	Risk per Traverse	Collective Risk	FWI	FWI Difference	Cost	Benefit Cost Ratio	Status	Comments
Upgrade to MCB-OD/CCTV	Traffic Change Option	F	5	.000785897	012312998	£3,500,000	0.13	ACCEPT.	Natural Upgrade to MCB-OD could be considered here – would need to consider crossing redesign.
Close via overbridge	Long Term	М	13	Θ	013098895	£8,000,000	0.12	RECOMMENDED REJECT.	Closure via a bridge may prove difficult due to the current location of the level crossing but should this be viable the design would have to be of maximum height which may increase the cost.
Standing red man.	Traffic Change Option	D	2	.012837216	000261679	£25,000	0.57	ACCEPT.	Having the extra flashing pedestrian sign could help alert pedestrians even more than just the LED lights and Audible Alarms currently at this crossing.

OFFICIAL

Safety campaign	Short Term	D	2	.012968055	00013084	£500	N/A	Accept/ongoing.	This can be undertaken by the Level crossing manager on his regular inspection and can be supported by the BTP.
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#### 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**

Assessor's notes:

Milton Fen is a half barrier Level crossing with 4 RTL's located on Fen Road which is a Public Highway approximately ½ mile from the village of Milton, the crossing is fitted with spoken warnings of a train approaching and should another train approach on the other line at the same time this also gives a verbal speaking warning of 'another train coming' and an increase in the yodels.

Milton is a large village 2 ½ miles north of the city of Cambridge and Fen Road where the level crossing is located is a single-track road which is the sole access to the river Cam and 'Bates Bite Lock' which proves to be a popular destination for people during the lunchtime hours and at weekends, there are a few dwellings and the road approach speed is estimated to be less than or equal to 30mph.

Fen Road has passing places on both sides of the road and there are no stations visible from the level crossing itself.

Milton Fen AHB crossing is situated between Ely station and Cambridge North station with direct services into both London Liverpool Street and London Kings Cross stations, the maximum permissible line speed is 75MPH and the line is open 24 hours a day 365 days a year including bank holidays (UK) only.

There are no immediate planned or apparent developments at present near the crossing which may lead to a change or increase in use or risk to the level crossing but there is a project looking at a leisure facility/rowing lake that could close 3 crossings (see map in additional photos).

The crossing is situated between farmland either side of the crossing which can be accessed by the approach. The approach to this level crossing can be prone to slight flooding due to poor drainage and the condition of the road, since the last risk assessment was undertaken the approaches to the level crossing have been re surfaced and new road markings throughout.

#### Options Considered: -

#### Closure via Overbridge -

Will totally mitigate all risk at the crossing may well be difficult to achieve as there is a homeowner nearby which may increase the cost further if this was to be taken forward regarding building a bridge. Optioneering panel held on the 18-11-20, this option was rejected as not reasonably practicable. At the last optioneering meeting held on the 02.02.22 this option was rejected due to the cost being disproportionate to safety benefit.

#### Upgrade to MCB-OD -

This option mitigates most of the risk at the level crossing the only concern is the downtime of the level crossing because this year there has been no misuse at this crossing but MCB's are possibly prone to misuse due to the length of time it closes the road for. Optioneering Meeting of 29/8/18 – In CP6 Plan for Upgrade. This option is part of the Cambridge re-signal/relocking project and at present is being taken forward by them to be completed in CP6. Optioneering panel held on the 18-11-20, This option was accepted and the S+T RAM to complete possibly by December 2023. At the optioneering meeting held on the 02.02.22 this option was accepted as part of the Cambridge C3R project.

#### Installation of flashing pedestrian signs -

Having the extra flashing pedestrian sign could help alert pedestrians even more than just the LED lights and Audible Alarms currently at this crossing. Optioneering Meeting of 29/8/18 – Accepted. These may be installed as part of the MCB-OD upgrade due to the amount of pedestrian use. Optioneering panel held on the 18-11-20, This option was accepted and the S+T RAM to complete with the above project. At the optioneering meeting held on the 02.02.22 this option was accepted and will be added once the crossing has been upgraded to a full barrier crossing, this will involve liaising with the C3R project team.





**Safety Campaign –** this is an ongoing requirement and is completed every time the Level Crossing Manager is at the crossing; this crossing is used predominantly by pedestrians and cyclists. Optioneering panel held on the 18-11-20, This option was accepted and for the LCM to complete when visiting the crossing. At the optioneering meeting held on the 02.02.22 this option was accepted as ongoing by the LCM.

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## ANNEX A – ADDITIONAL PHOTOGRAPHS



#### Surrounding area of the crossing.







#### Ariel view of the crossing.



#### Sectional appendix.







#### Possible Sports complex which would close 3 crossings.

#### Cambridge panel 'A'.







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





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

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Hazard	Control
<ul> <li>Hazard</li> <li>known high level of use during darkness</li> <li>increased likelihood of misuse, e.g. crossing is at station</li> <li>free wicket gates might result in user error</li> <li>high volume of unfamiliar users, e.g. irregular visitors / ramblers, equestrians</li> <li>complacency leading to high levels of indiscipline, e.g. users are known to rely on knowledge of timetable</li> <li>high level of use by vulnerable people</li> <li>where telephones are provided i.e. bridleways, users experience a long waiting time due to: <ul> <li>long signal section (Signaller unaware of exact train location)</li> <li>high train frequency</li> </ul> </li> <li>insufficient or excessive strike in times at MSL crossings</li> <li>unsuitable crossing type for location, train service, line speed and</li> </ul>	<ul> <li>Control</li> <li>re-design of crossing approach so that users arrive at the crossing as close to a 90° angle as possible</li> <li>installing lighting sources</li> <li>engaging with signalling engineers to optimise strike in times</li> <li>providing decking or improving crossing surface, e.g. holdfast, strail, non-slip surface</li> <li>providing cyclist dismount signs and / or chicanes</li> <li>straightening of crossing deck</li> </ul>
<ul> <li>unsuitable crossing type for location, train service, line speed and user groups</li> <li>high usage by cyclists</li> <li>degree of skew over crossing increases traverse time and users' exposure to trains</li> <li>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</li> </ul>	





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



### 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	Proba	ability	FWI/traverse		
Ranking	Upper	Upper Lower		Lower	
А	1 in 1	1 in 500000	1	0.000002	
В	1 in 500000	1 in 2500000	0.000002	0.0000004	
С	1 in 2500000	1 in 12500000	0.0000004	0.0000008	
D	1 in 12500000	1 in 62500000	0.0000008	0.00000016	
E	1 in 62500000	1 in 125000000	0.00000016	0.00000008	
F	1 in 125000000	1 in 250000000	0.00000008	0.00000004	
G	1 in 250000000	1 in 500000000	0.00000004	0.00000002	
Н	1 in 500000000	1 in 100000000	0.00000002	0.00000001	
I	1 in 100000000	1 in 200000000	0.00000001	0.000000005	
J	1 in 200000000	1 in 500000000	0.000000005	0.000000002	
К	1 in 500000000	1 in 10000000000	0.000000002	0.000000001	
L	1 in 1000000000	Greater than 0	0.000000001	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	0.05000000	0.01000000	
3	0.01000000	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	0.00005000	
10	0.00005000	0.000001000	
11	0.000001000	0.00000500	
12	0.0000005	0	
13	0.00E+00	0.00E+00	



PROTECTED LEVEL CROSSING RISK ASSESSMENT



Anglia Route Level Crossing Narrative Risk Assessment Dimmock's Cote AHB Planned 4<sup>th</sup> April 2022







# **1. LEVEL CROSSING OVERVIEW AND ENVIRONMENT**

# **1.1 LEVEL CROSSING OVERVIEW**

This is a risk assessment for Dimmock's Cote AHB level crossing.

Crossing Details				
Name	Dimmock's Cote AHB			
Туре	АНВ			
Crossing status	Public Highway			
Overall crossing status	Open			
Route name	Anglia			
Engineers Line Reference	BGK – 66m 25ch			
OS grid reference	TL526731			
Number of lines crossed	2			
Line speed (mph)	75MPH			
Electrification	OHL			
Signal box	Cambridge			

Risk Assessment Details				
Name of assessor	Andrew Waling			
Post	Level Crossing Manager.			
Date completed	04-04-2022			
Next due date	04-07-2023			
Email address	andrew.waling@networkrail.co.uk			
Phone number	07860500842			

ALCRM Risk Score			
Risk per traverse risk	E		
Collective risk	2		
FWI	0.043227849		





### **1.2 INFORMATION SOURCES**

# **Reason for Risk Assessment**

Network Rail has a responsibility and legal duty under the Health and Safety at Work Act 1974 for the health, safety and welfare of its employees and for protecting others against risk.

Network Rail also has a legal responsibility under the Management of Health and Safety at Work Regulations 1999. Section 3 focuses on the requirement for suitable and sufficient assessments of risk to health and safety of employees and others in connection with their undertaking.

Network Rail is committed to reducing the risk on the railway and has identified that one of its greatest public risks is at level crossings. This is where the railway has a direct interface with other elements e.g. vehicles and/or pedestrians. Network Rail is working to reduce this risk to as low as is reasonably practicable.

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

Consulted	Attended site
LOMS, MOMS and Cambridge Panel 'A' signaller.	Νο
Crossing users and local resident.	No
Local Business	No
Police (BTP/Home Office Force)	No
Local Resident	No

### Stakeholder consultation and attendance notes:

None of the above attended the site meeting but all have been contacted since either via email or telephone and their thoughts/recommendations have been noted within this Narrative Risk Assessment.

The reference sources used during the risk assessment included:

- CCIL
- Census Counter
- Geo-RINM
- SMIS
- East Cambs District Council
- Network Rail Town Planning





### **1.3 ENVIRONMENT**



The level crossing is located on A1123. The road approach speed is estimated to be Greater than 50mph.

It is a Public Highway level crossing.

At Dimmock's Cote AHB level crossing the orientation of the road/path from the north is 120°; the orientation of the railway from the north to the up line in the up direction is 200°.

### Sun glare

LCG13 assessing sun glare at public road level crossings has been completed and records risk as Tolerable with detailed sun glare risk assessment not needed

### Impact of low sun on the crossing

Below is the output from the Sun Calc 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.

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).





Longest Day June 21<sup>st</sup>.



Shortest Day December 21<sup>st</sup>.







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

### Site Visit General Observations:

The crossing is located on the main line with trains running from Ely to Cambridge. The line is dual track with trains operating in both directions during normal service operation. The line speed in both directions is 75mph. Dimmock's Cote AHB is located between Ely and Waterbeach Railway Stations. No known new developments within the vicinity of the crossing, this has been checked with East Cambridgeshire County Council and Network Rail Town Planning.



# 2.1 RAIL

The train service over Dimmock's Cote AHB level crossing consists of Passenger and Freight trains. There are 188 trains per day. The highest permissible line speed of trains is 75 mph. Trains are timetabled to run for 19 hours per day.

#### Sectional appendix extract.

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Passive Level Crossing Risk Assessment Template v3.0 [October 2020]







### Assessor's notes:

As stated above trains are timetabled to run for 19 hours per day, but lines are open 24 hours a day and may receive additional freight, passenger or engineering trains which often vary in length, these are non-time tabled trains which do run from time to time and are mainly for engineering, rail head treatment and track recording purposes.

The sectional appendix shows X35 either side of Dimmock's Cote AHB, this is a requirement for trains travelling in the wrong direction can only travel at a maximum of 35MPH over the crossing.

















2.2 USER CENSUS DATA

A 24-hour census was carried out on 06-06-2018 by TRACSIS. The census applies to 100% of the year.



The census taken on the day is as follows:

Cars / car-based vans / quad bikes	5,326
Large vans / small lorries / large 4x4s	1,181
Buses / coaches	9
HGVs	634
Tractors / large farm vehicles	41
Pedal / motor cyclists	113
Pedestrians	1
Horse riders	0
Animal herders	0

## Assessor's general census notes:

A weekday average used from a 9-day census for a project between 02/06/2018 to 10/06/2018. This crossing sees a high number of vehicles on a daily basis, but the data shows very little pedestrian usage, this is due to the location of the crossing being in a very rural location with no public footpaths on either approach.

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

### Vulnerable user observations:

Main double track road in rural location and from the data gathered from the 9-day census no vulnerable users were recorded using Dimmock's Cote AHB crossing.

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





#### Irregular user observations:

No known irregular users but the 'Fish and Duck' mariner is located over the crossing on the upside and is approximately ½ mile Parallel to the track so this may see irregular users but from data gathered this is not deemed to be high.

#### Site visit night / dusk user observations:

No usage was recorded during the 9-day census so a 1% has been used as a mitigation.

#### 2.3 USER CENSUS RESULTS

ALCRM calculates the usage of the crossing to be 7,191 road vehicles and 114 pedestrians and cyclists per day.

#### Notes on daily, annual, seasonal usage:

Dimmock's Cote AHB is located in a rural location and is double track with a national speed limit over it, it sees a high number of road vehicles on a daily basis but very little pedestrian usage, this is a standard patter throughout the year but during the months of July, August and September the crossing is used by more agricultural vehicles due to the harvest.

# 3. RISK OF USE

### 3.1 CROSSING APPROACHES

The road approach speed for vehicles on the upside of the crossing is Greater than 50mph and the approach speed on the downside of the crossing is Greater than 50mph.

Both of the approach roads to Dimmock's Cote AHB level crossing are 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 crossing sits on a slight hump and vehicles approach the crossing at more than 50MPH, access turnings to farms and houses are on both the up and down sides, mud on the road can cause splash back onto signs which may make the signs dirty and hard to read.

During the winter months this crossing regularly gritted by the highways department and should the A10 Ely to Cambridge Road be shut then the road that Dimmock's Cote AHB is located on will become the diversion route.

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 can be an issue at certain times of the year but this has been mitigated by the fitment of LED lights in all of the RTL's, also, 3rd party foliage from the residential property on the downside approach could obscure the sighting for the ZO wig wag board making it harder for vehicles to see when the crossing is activated, this has never been an issue as the resident keeps it cut back regularly throughout the year.

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





### Assessor's general crossing approach notes:

Both approaches to Dimmock's Cote AHB are of tarmac design and are long, and as already stated above in this Narrative Risk Assessment vehicles approach from both sides at more than 50MPH, also, the tarmac is anti-skid for approximately 80mtrs on both approaches.

# 3.2 AT THE CROSSING – GROUNDING RISK

The visual evaluation of the vertical profile of the road indicates that it does not create a risk of vehicles grounding on the crossing.

#### Assessor's notes:

Even though the crossing sits on a humped profile this has still passed the SIN109 inspection report with no further work required.

There is no risk of grounding signs on either approach leading up to the crossing and no visible signs of grounding on the crossing panels themselves nor the tarmac.

### 3.3 AT THE CROSSING – BLOCKING BACK

The road layout at or close to the crossing does not result in identified incidents of traffic queuing over the crossing. Blocking back risk is Never known to occur.

No incidents of blocking back are recorded.

There are no identified issues with the road layout, parked cars or other features that could stop traffic. In addition, the road is a known diversionary route.

#### Assessor's notes:

House on downside approach of the level crossing on the left-hand side which could cause blocking back but this has never known to occur but cannot be discounted.

As stated above in this document, if the main A10 Ely to Cambridge Road is shut then this road is a diversion route which will see double the amount of traffic passing over Dimmock's Cote AHB.

### 3.4 AT THE CROSSING – ANOTHER TRAIN COMING RISK

Trains are known to occasionally pass each other at this crossing.

### Assessor's another train coming notes:

As stated above, trains are occasionally known to pass each other at this crossing, if the train frequencies increase then the chance of a second train coming will increase.

### 3.5 INCIDENT HISTORY

A level crossing safety event has been known to occur at Dimmock's Cote AHB level crossing in the last twelve months.

### Assessor's incident history notes:

**Nov 19**, 2021, Dimmock's Cote AHB Anglia From a distance the Driver observed LC lights and barriers working and saw a car accelerate and pass over the crossing before they were down. Vehicle essentially went through a red road light. LC misuse - user error.

HISTORIC: -





Sep 1, 2017 NRV/LC Misuse/TSBS - RV removed barrier at Dimmock's Cote LC, 1T02 07:14 London King's Cross - Kings Lynn struck displaced barrier. Dec 22, 2017 LC Near Miss - 1T07, ET, (15:54 Kings Lynn - London King's Cross) reported a near miss with a vehicle after a RTA at Dimmock's Cote AHB

#### Red light violations / barrier weaving

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

Measures have been taken to mitigate deliberate misuse.

#### Assessor's incorrect use notes:

Led wig wags have been fitted to all the RTLs at this crossing but should the crossing be either closed or upgraded to a full barrier crossing this would mitigate against vehicles misusing the crossing.

#### 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	39s	Yes	No
Down line	39s	Yes	No

### Assessor's notes and observations on strike in times:

During the data collection for this Narrative Risk Assessment for this level crossing the Level crossing Manager timed the 'strike in times' for Dimmock's Cote AHB and these are as follows: 36 seconds for a train on the upside and 37 seconds for a train on the downside, these times are adequate with this type of crossing.





# 4. ALCRM CALCULATED RISK

### Dimmock's Cote AHB level crossing ALCRM results.

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

- Distracted / forced by dog (loss of control), Road traffic accident, Second train coming
- Does not observe lights/barriers, Slips, trips, falls or snagged on crossing
- Unaware of crossing, Blocking back, Late braking, Turns onto the railway
- Railway cause: slow moving / short warning, train unexpected, Stuck or grounded on crossing
- Incorrect use (e.g. non-adherence with level crossing road traffic light signals)
- Sunlight obscures crossing/lights or view up / down track, Poor crossing visibility
- Railway cause: failure to detect approaching train, lights / barriers or obstacle detection equipment fails to operate, signaller or other workforce, train driver

	Risk per Traverse (Letter)	Collective Risk (Number)	
is:	E	2	
	Risk per Traverse (FWI)	Collective Risk (FWI)	
Cars / car-based vans / quad bikes	0.00000012	0.025397218	
Large vans / small lorries / large 4x4s	0.00000013	0.00563164	
Buses / Coaches		0.00008961	
HGVs	0.00000003	0.000631275	
Tractors / large farm vehicles		0.000040824	
Pedal / motor cyclists		0.006213343	
Pedestrians		0.000054985	
Horse Riders	0.00000151	0	
Animal Herders		0	
Vehicles user in pedestrian mode		0	
Train Passengers	0.00000003	0.000239326	
Train Staff	0.00000009	0.00059404	
Derailment Risk		0.004416235	
Weighted Average (Users)	0.00000014		
Total Risk		0.043227849	
	Average Consequence	0.592570409	
	Collision Frequency	0.072949726	

# 5. OPTION ASSESSMENT AND CONCLUSIONS

# 5.1 OPTIONS EVALUATED

The options evaluated to mitigate the risks at Dimmock's Cote AHB crossing include:

Option	Term	Risk per Traverse	Collective Risk	FWI	FWI Difference	Cost	Benefit Cost Ratio	Status	Comments
Close via overbridge	Long Term	М	13	0	043227849	£10,000,000	0.23	RECOMMENDED Reject.	A bridge would need to cater for use by pedestrians with push chairs etc. and possibly for horses and accommodate maximum height overheads, which would mean that the cost is relatively high. Making it an equestrian bridge would also increase the cost.
Install ANPR cameras	Traffic Change Option	E	2	.039346688	003881161	£136,000	0.53	Reject.	Preferred option if MCBOD does not proceed – passes CBA and whilst poor behaviour is not prevalent here would be an effective behaviour modifier
Upgrade to MCB-OD	Long Term	I	4	.002079546	041148303	£3,500,000	0.37	Accept.	Natural Upgrade to MCB-OD could be considered here – would need to

									consider crossing redesign but it is in CP6 plan for March 2022 as at time of writing this.
VAS	Traffic Change Option	E	2	.0420635	001164349	£30,000	0.47	Accept.	These are electric signs that are activated when a vehicle approaches the crossing.
Safety campaign	Short Term	E	2	.042839733	000388116	£500	N/A	Accept.	This is ongoing by the Level Crossing Manager with the support of the BTP.

# 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**

Assessor's notes:

Dimmock's Cote is an AHB crossing with two half-width barriers (penguin pedestals) and four RTLs, it has antiskid tarmac on both road approaches and is monitored from Cambridge signal box.

The crossing is located on the A1123 Newmarket Road southeast of Stretham village near Ely on the Public Highway which has a road speed limit of 60MPH in both directions. The railway is supplied by 25k overhead line wires which are present at the crossing and deemed 'live' at all times.

The crossing is located between the Ely station and Waterbeach station with direct services into both London Liverpool Street and London Kings Cross stations, the maximum permissible line speed is 75MPH on both roads and the line is open 24 hours a day 365 days a year including bank holidays (UK) only.

The Crossing has a high vehicular usage and a frequent and relatively fast train service which passes over it daily. Pedestrian usage is minimal mainly due to the crossing's location although on occasions the nearby marina facilities may increase this should those using the facilities wish to go for a walk in the surrounding area. There is a house on the right (downside perspective) next to the crossing; the driveway is 25m from the crossing so could provide an occasional source of blocking back (no evidence from surveys) although it is a left turn after passing over the crossing.

There is also a layby just before the crossing on the left, this crossing falls in the Flood zone territory which means there is a chance that the crossing could flood due to its location, and that it is located by two rivers close by but again this has never been known to happen.

Dimmock's Cote AHB crossing falls within the Ely Area Capacity Enhancement (EACE) as the original plan was to build an overbridge over the crossing and apply for full closure but due to the potential cost and size of project this would have to be a joint venture with the highway's agency.

Dimmock's Cote AHB has now been accepted for an upgrade to an full barrier manually controlled with obstacle detection (MCB-OD) as part of the Cambridge C3R project.

## Options to be considered: -

**Closure by overbridge/Under-pass:** - This would be the obvious preferred option but in all likelihood is probably unlikely unless the local Council and Highways Authority decide upon a major highways improvement scheme here or it is considered as part of an extension of the latest Ely development project.

In any event this would in all likelihood require a major highway redesign and probable land/residence purchases and possibly multiple bridging arrangements. It is unlikely that a diversionary route could be achieved in a singular capacity with just a Railway Bridge which probably makes this option untenable despite potentially a fairly positive CBA. It could still be worthwhile investigating whether the council and HA have any long-term plans for a major road bridge scheme here given the potential positive CBA for closure for the crossing as an AHB.

An Underpass would be the more expensive option due to the need to solve possible flooding issues; an over-bridge might be more feasible, however there is a house close to the crossing with driveway access 25m from the crossing therefore property purchase may be required. This is likely to increase the cost, although bridges on Optioneering meeting held on the 18/12/19 this was considered as part of the Cambridge re signalling project due to take place in CP6. At the last optioneering meeting held on the 10/03/21 this option was rejected due to cost being disproportionate to safety benefit. At the optioneering meeting held on the 6th July 2022 this option was rejected due to the cost being disproportionate to safety benefit.

**Upgrade to MCB-OD:** - This option passes a CBA and is in the Route Signalling CP6 plan for March 2022 as at time of this Assessment. Possible issue with barrier down times and education will be required here to make users aware of the crossing type change. Optioneering meeting held on the 18/12/19 this was agreed and is due to be completed in CP6. At the last optioneering meeting held on the 10/03/21 this option was accepted and passed to the





S&T Ram team. This should hopefully be delivered by December 2023. At the optioneering meeting held on the 6th July 2022 this option was accepted as it is now part of the Cambridge C3R Project.

**Install ANPR cameras:** - Preferred option if MCB/OD does not proceed or is delayed – passes CBA and whilst poor behaviour is not prevalent here would be an effective solution to encourage good continuous behaviour by road users. Optioneering meeting held on the 18/12/19 this was accepted and is in the S&T RAM work bank. At the last optioneering meeting held on the 10/03/21 this option was put on hold pending the upgrade to an MCB-OD. At the optioneering meeting held on the 6th July 2022 this option was rejected as the crossing is due to be upgraded to a MCB-OD crossing.

VAS: - These are electric signs that are activated when a vehicle approaches the Level Crossing giving the river a visible warning of the level crossing ahead. At the last optioneering meeting held on the 10/03/21 this option was accepted and passed to the sponsor. At the optioneering meeting held on the 6th July 2022 this option was accepted and passed to the sponsor to deliver.

**Safety campaign: -** This will be undertaken by the LCM on his visits to the crossing and will probably be accompanied by the BTP if required. This is ongoing with the LCM with the support of the BTP.



# ANNEX A – ADDITIONAL PHOTOGRAPHS



# Cambridge panel 'A'









Passive Level Crossing Risk Assessment Template v3.0 [October 2020]



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





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





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





	Hazard	Control		
Pedestrian and road vehicle collision risk	Examples include:	Controls can 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	providing separate pedestrian gates		
	same time	clearly defining the footpath; renew markings		
	• the position of pedestrian gate forces / encourages pedestrian	positioning pedestrian gates on the same side of the crossing		
	users to traverse diagonally across the roadway	<ul> <li>improving footpath crossing surface so it is devoid of potholes, excessive flangeway gaps and is evenly laid.</li> </ul>		
	<ul> <li>road / footpath inadequately separated; footpath not clearly defined</li> </ul>	<ul> <li>improving crossing surface, e.g. holdfast, strail, non-slip surface</li> </ul>		
	<ul> <li>condition of footpath surface increases the likelihood of users slipping / tripping into the path of vehicles</li> </ul>			
	Examples include:	Controls can include:		
	<ul> <li>skewed crossing with large flangeway gaps results in cyclist,</li> </ul>	improving fence lines		
	mobility scooter, pushchair or wheelchair user being unseated	reducing flangeway gaps and straightening where possible		
Personal injury	<ul> <li>condition of footpath surface increases the likelihood of users slipping / tripping</li> </ul>	<ul> <li>providing decking or improving crossing surface, e.g. holdfast, strail, non-slip surface</li> </ul>		
	degraded gate mechanism or level crossing equipment	straighten / realign gate posts		
	barrier mechanism unguarded / inadequately protected	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	Proba	ability	FWI/traverse		
Ranking	Upper	Lower	Upper	Lower	
А	1 in 1	1 in 500000	1	0.000002	
В	1 in 500000	1 in 2500000	0.000002	0.0000004	
С	1 in 2500000	1 in 12500000	0.0000004	0.0000008	
D	1 in 12500000	1 in 62500000	0.0000008	0.00000016	
E	1 in 62500000	1 in 125000000	0.00000016	0.00000008	
F	1 in 125000000	1 in 250000000	0.00000008	0.00000004	
G	1 in 250000000	1 in 500000000	0.00000004	0.00000002	
Н	1 in 500000000	1 in 100000000	0.00000002	0.00000001	
I	1 in 100000000	1 in 200000000	0.00000001	0.000000005	
J	1 in 200000000	1 in 500000000	0.000000005	0.000000002	
К	1 in 500000000	1 in 10000000000	0.000000002	0.000000001	
L	1 in 1000000000	Greater than 0	0.000000001	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	0.05000000	0.01000000
3	0.01000000	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	0.00005000	0.000001000
11	0.000001000	0.00000500
12	0.0000005	0
13	0.00E+00	0.00E+00



NARRATIVE RISK ASSESSMENT - PROTECTED TEMPLATE FINAL v2.0

# PROTECTED LEVEL CROSSING RISK ASSESSMENT

### 1. LEVEL CROSSING OVERVIEW AND ENVIRONMENT

### 1.1 LEVEL CROSSING OVERVIEW

This is a risk assessment for Six Mile Bottom level crossing.

Crossing details			
Name	Six Mile Bottom		
Туре	AHB		
Crossing status	Public Highway		
Overall crossing status	Open		
Route name	Anglia		
Engineers Line Reference	CCH, 7m, 65ch		
OS grid reference	tl576576		
Number of lines crossed	1		
Line speed (mph)	60		
Electrification	No		
Signal box	Cambridge		

Risk assessment details			
Name of assessor	Brendan Lister		
Post	Level Crossing Manager		
Date completed	15/12/2020		
Next due date	16/03/2023		
Email address	brendan.lister@networkrail.co.uk		
Phone number	07973524610		

ALCRM risk score			
Individual risk	Н		
Collective risk	4		
FWI	0.012247386		

### **1.2 INFORMATION SOURCES**

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

Consulted	Attended site
None	None

The reference sources used during the risk assessment included:

• SMIS, GI Portal, Census, Other (TRUST for train information, Sectional Appendix, DST)

Engineers Renewal Date	31/03/2018
SICA Renewal Date	08/09/2029

For Safety performance (Fatality weighted injuries (FWI)), this crossing is ranked 31st in Anglia route and 83rd nationally compared to all other AHB





# Upside crossing approach



# Downside crossing approach



The level crossing is located on A1304 which is a Public Highway. The road approach speed is estimated to be 31-40mph. There are no stations visible at the level crossing

At Six Mile Bottom the orientation of the road/path from the north is 210°; the orientation of the railway from the north to the up line in the up direction is 250°. Low horizon can result in sun glare; sun glare is a known issue.

### Northbound approach.

There is one potential issue with low sun when approaching the crossing northbound:

1. In the winter, the setting sun would shine towards the RTLs, potentially washing them out. The vehicle approach speed is quite high however there are trees and buildings south of the crossing to reduce the impact of this and there is no gradient. The crossing has LED type RTLs, to mitigate the impact of this problem.

### Southbound approach.

There is one potential issue with low sun when approaching the crossing southbound:

 In the winter, the setting sun would be straight behind the crossing, potentially causing glare. The vehicle approach speed is quite high however there are trees and buildings south of the crossing to reduce the impact of this and there is no gradient. The crossing has an anti-slip/anti-glare road surface; this has, however, partially worn off.

### 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.

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).



Longest Day

Shortest Day

LGC 13 assessing sun glare at public road level crossings has been completed and has recorded the risk as Non-urgent requires work at certain times of the year. This crossing requires work to be completed such as VAS and/or modified advance warning signage.

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



# 2. LEVEL CROSSING USAGE

### 2.1 RAIL

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

Assessor's train service notes:

The train service is relatively low, but the Train Operating Company is looking to increase the service. Trains are timetabled to run for 17 hours per day, but lines are open 24 hours a day and may receive additional freight, passenger or engineering trains.

### 2.2 USER CENSUS DATA

A 24-hour census was carried out on 15/01/2020 by a barrier downtime Project. The census applies to 100% of the year.

The census taken on the day is as follows:

Cars	8891
Vans / small lorries	1042
Buses	28
HGVs	402
Pedal / motor cyclists	28
Pedestrians	9
Tractors / farm vehicles	5
Horses / riders	0
Animals on the hoof	0

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

Vulnerable user observations:

None recorded

Available information indicates that the crossing has a high number of irregular users.

Irregular user observations:

Nonlocals could attend the local Newmarket Racecourse on race days Diversion route if A11 or A14 is shut

Assessor's general census notes:

The census is based on a full 9-day census, but the figures used are a weekday average between 11/01/20 to 19/01/20.

A barrier downtime census showed that the barriers are down an average of 1minute and 22 seconds per hour, with the longest hour downtime was 2minutes

## 2.3 USER CENSUS RESULTS

ALCRM calculates usage of the crossing to be 10368 road vehicles and 37 pedestrians and cyclists per day.



## 3. RISK OF USE

### **3.1 CROSSING APPROACHES**

The road approach speed is estimated to be 31-40mph. One or more of the approach roads to Six Mile Bottom level crossing are assessed as being long and straight. There are prominent features on the approach to or on the far side of the level crossing that could distract drivers.

Site visit observations:

Houses close to the crossing, also a shop about 180m from the crossing. Road junctions within 250m and traffic calming. Potential blocking back at houses on both approaches but the barrier downtime census showed that there was no blocking back over the crossing. Speed limit over the crossing is 40mph and the census recorded the average speed 85th percentile as 39mph

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 no known issues with ice, mud, loose material or flood water. In addition, there are known issues with foliage or fog. These known issues might impair visibility of the crossing or crossing equipment, including signage. They might also affect the ability of a vehicle to stop behind the stop line.

### Assessor's notes:

Fog could be an issue at certain times in the year. Foliage can obscure wig wags (maintain)

At the estimated road speed, the visibility of level crossing signage and equipment is considered to provide road users with 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 not create a risk of vehicles grounding on the crossing. Risk of grounding signs have not been provided at the crossing.

Assessor's notes:

The crossing has a relatively flat profile

# 3.3 AT THE CROSSING – BLOCKING BACK

Assessor's notes:

Road junctions, houses and a shop, traffic calming nearby. If an accident occurs on the A11 or A14 the crossing could be used as a diversionary route

## 3.4 AT THE CROSSING – ANOTHER TRAIN COMING RISK

The likelihood of a second train approaching does not exist at this crossing as it is a singletrack line


### 3.5 INCIDENT HISTORY

A level crossing safety event has been known to occur at Six Mile Bottom crossing in the last twelve months.

#### Assessor's incident history notes:

03/02/2020 LC Misuse - Driver of 2W19 13:47 Cambridge - Ipswich reported a car travelling over Six Mile bottom LC as he approached. No near miss or EBA.

Older than 12 months

23 Nov 2019 LC Misuse - 2W23 15:47 Cambridge - Ipswich reported a Land Rover doing a u turn on Six Mile Bottom AHBC LC. No near miss or EBA.

25 Oct 2019 LC Near Miss - 2W16 with a 4x4 within the lowered barriers at Six Mile Bottom AHB level crossing.

Nov 19, 2018 RIF / LC Misuse - Car jumped the red lights at Six Mile Bottom (AHBC) LC struck and removed the Up side barrier.

Older than 12 months

Dec 14, 2017 LC Misuse - at Six Mile Bottom Crossing a vehicle zigzagged around the barriers as they were lowering

08-Apr-16 LC Near Miss - 2W10 10:20 Ipswich – Cambridge near miss with a car at Six Mile Bottom AHB level crossing.

# Red light violations / barrier weaving

The chance of a vehicle user deliberately misusing the crossing is estimated as average Measures have been taken to mitigate deliberate misuse.

Assessor's notes:

LED Wigwags, yellow box on the crossing, Anti-trespass guards

03/02/2020 LC Misuse - Driver of 2W19 13:47 Cambridge - Ipswich reported a car travelling over Six Mile bottom LC as he approached. No near miss or EBA.

Older than 12 months

23 Nov 2019 LC Misuse - 2W23 15:47 Cambridge - Ipswich reported a Land Rover doing a u turn on Six Mile Bottom AHBC LC. No near miss or EBA.

25 Oct 2019 LC Near Miss - 2W16 with a 4x4 within the lowered barriers at Six Mile Bottom AHB level crossing.

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Dec 14, 2017 LC Misuse - at Six Mile Bottom Crossing a vehicle zigzagged around the barriers as they were lowering

08-Apr-16 LC Near Miss - 2W10 10:20 Ipswich – Cambridge near miss with a car at Six Mile Bottom AHB level crossing.

# 3.6 THE CROSSING – STRIKE IN TIMES

Strike in times

	Designed strike in time (Obtainable from RAM)	Does the observed strike in time conform to the designed strike in time?	Is the observed barrier down time excessive?
Up line	38 Seconds	Yes	No
Down line	33 Seconds	Yes	No

Assessor's notes and observations on strike in times:

The timings taken are comparable to the designed strike in times



## 4. ALCRM CALCULATED RISK

#### Six Mile Bottom level crossing ALCRM results

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

- Sun glare
- Large number users
- High skew crossing, therefore long traverse distance and time

Safety risk				
Compared to other	Individual risk		Collective risk	
crossings the safety risk for this crossing is	Н		4	
	Individual risk (fraction)	Individual risk (numeric)		
Car	1 in 968054	0.00001033	0 007823416	
Van / small larrias	1 in 90785	0.000001005	0.007020410	
	1 in 106226	0.000011015	0.000910002	
HGV Due	1 in 74057	0.000009405	0.000110525	
Bus	1 in 74057	0.000013503	0.00008116	
I ractor / farm vehicle	1 in 1322	0.000756142	0.000001449	
Cyclist / Motor cyclist	1 in 53174	0.000018806	0.000384397	
Pedestrian	1 in 53174	0.000018806	0.000123556	
				Derailment contribution
Passengers			0.000748159	96.82260432
Staff			0.002124889	3.800936605
Total			0.012247386	6.574075985
Collision frequencies	Train / user	User equipment	Other	
Vehicle	0.018253432	0.283176111	0	
Pedestrian	0.000618686	0	0.000724817	
Collision risk	Train / user	User equipment	Other	
Vehicle	0.008866386	0	0	
Pedestrian	0.000492326	0	0.000015627	



# 5. OPTION ASSESSMENT AND CONCLUSIONS

# 5.1 OPTIONS EVALUATED

The options evaluated to mitigate the risks at Six Mile Bottom crossing include:

Option	Term <sup>1</sup>	ALCRM risk score	ALCRM FWI	Safety Benefit	Cost	Benefit Cost Ratio	Status	Comments
Closure via overbridge	Long Term	M13	0.000000000	0.012247386	10,000,000	0.04	Rejected – Cost Disproportionat e to Safety Benefit	This would be a long-term option and given the amount of usage it would benefit network rail massively but is unlikely to happen at this location.
Upgrade to MCB- OD	Long Term	K6	0.000324637	0.011922749	3,500,000	0.14	Accepted – Completed by end of CP6	This option was considered under the Cambridge relocking project and is being taken forward to be upgraded in this project. There would be increased barrier down time and possibly this would lead to an increase into incidents at the crossing, such as barrier strikes, increased incidences of vehicles running the red lights.
Red light safety enforcement camera	Long Term	H4	0.010997653	0.001249733	136,000	0.31	Rejected – due to MCB-OD being progressed	As the road that the crossing is situated on leads directly from the A11, some of the traffic are travelling greater than the speed limit and may run the red lights.



Yellow backing boards	Short Term	H4	0.012122413	0.000124973	1,000	N/A	Accepted	Yellow backing boards would help a lot here along with the traffic calming it may reduce the misuse of the crossing.
VAS	Long Term	H4	0.011872466	0.000374920	7,000	0.75	Accepted but only on the upside approach	VAS positioned on the A11 approach would alert the drivers when they are travelling from the A11 towards the crossing as they are generally travelling faster than the speed limit and VAS would warn the drivers to the approaching crossing.
Replace Holdfast decking with Strail decking	Long Term	H4	0.011997440	0.000249946	50,000	0.43	Accepted	We have had plenty of issues with the decking here and what lies beneath the deck. I have capex proposed for this to have a new deck as the current holdfast is in a terrible state and is very close if not past life expectancy. I would strongly recommend that we install a new deck here.
Safety Campaign	Short Term	H4	0.012122413	0.000124973	500	N/A	Ongoing	The LCM with the help of the BTP if required to undertake safety campaigns whilst at the crossing and also their presence would deter any incidents at the crossing.



# NOTES

Network Rail always evaluates the need for short<sup>1</sup> 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. <sup>1</sup> Includes interim

CBA gives an indication of overall business benefit. It is used to support, not override, structured expert judgement when deciding which option(s) to progress. CBA might not be needed in all cases, e.g. standard maintenance tasks or low-cost solutions (less than £5k).

The following CBA criteria are used as a support to decision making:

- a. benefit to cost ratio is  $\geq$  1: positive safety and business benefit established;
- 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; and
- c. benefit to cost ratio is between 0.49 and 0.0: weak safety and business benefit established.



#### 5.2 CONCLUSIONS

The crossing is located in Six Mile Bottom on the A1304 London Road. The road is urban, giving access to the A11 for the village of Six Mile Bottom and Newmarket further afield.

The line speed over the crossing is 60 mph. The train service is moderate at approximately one train per hour per direction on a weekday, giving a total of 34 trains per day. The line is not electrified.

There are footways marked across the crossing, but they do not continue along the normal roadway as there are no pavements to meet up with. The footways are long due to the skew of the crossing such that the crossing time is likely to be greater than the warning time provided by the normal crossing sequence. At the time of the site visit, the surface on the Upside footway was found to be poor and this has been reported to the Network Rail project team.

The road is fairly straight approaching the crossing. The road has a speed limit of 40mph, although observed vehicles were travelling faster.

The road approach is orientated south west to north east, indicating that low sun could be problem at sometimes.

There are several turnings into driveways which could occasionally cause blocking back of traffic over the crossing.

The approach to the crossing from the north east can be seen that the road is a straight on the approach. The road has a speed limit of 40mph.

The crossing is visible in the intermediate and close road approaches, there is a right turn into Ardross Court at 65m, a turning into a convenience store at 110m, and a junction with Brinkley road at 165m north east of the crossing. These, together with several turnings into driveways could occasionally cause blocking back of traffic over the crossing. The profile of the crossing is level with a slight gradient from the downside.

# **Options Considered**

# Upgrade to MCB-OD

This option was considered under the Cambridge relocking project and is being taken forward to be upgraded in this project. There would be increased barrier down time and possibly this would lead to an increase into incidents at the crossing, such as barrier strikes, increased incidences of vehicles running the red lights. This option does not a have a positive CBA. Optioneering meeting held on 14/03/18, this option was not discounted but the S+T RAM to explore.

Optioneering meeting held on 20/11/19, Accepted – this option will be progressed by the S+T RAM

# Closure via overbridge

This would be a long term option and given the amount of usage it would benefit network rail massively but is unlikely to happen at this location. Optioneering meeting held on 14/03/18. Rejected – Cost disproportionate to safety benefit Optioneering meeting held on 20/11/19, Rejected – Cost disproportionate to safety benefit

#### Red light safety enforcement camera

As the road that the crossing is situated on leads directly from the A11, some of the traffic are travelling greater than the speed limit and may run the red lights. This option's CBA is on the borders of being a positive value. Optioneering meeting held on 14/03/18, Accepted Optioneering meeting held on 20/11/19, Accepted – the S+T RAM to place in their work bank for CP6



# Replace Holdfast decking with Strail decking

We have had plenty of issues with the decking here and what lies beneath the deck. I have capex proposed for this to have a new deck as the current holdfast is in a terrible state and is very close if not past life expectancy. I would strongly recommend that we install a new deck here. Optioneering meeting held on 14/03/18, Accepted - due to crossing surface not to standard for a high skew crossing, to be completed in CP6 with agreement from Track RAM. Optioneering meeting held on 20/11/19, Accepted - due to crossing surface not to standard for a high skew crossing, to be completed in CP6 with agreement from Track RAM.

# Yellow backing boards

Yellow backing boards would help a lot here along with the traffic calming it may reduce the misuse of the crossing. This option has a positive CBA. Optioneering meeting held on 14/03/18, Rejected – due to existing signs clearly visible as you approach the crossing. Optioneering meeting held on 20/11/19, Rejected – due to existing signs clearly visible as you approach the crossing and installing VAS

# VAS

VAS positioned on the A11 approach would alert the drivers when they are travelling from the A11 towards the crossing as they are generally travelling faster than the speed limit and VAS would warn the drivers to the approaching crossing. The CBA is not positive. Optioneering meeting held on 14/03/18, Rejected – approved RLSE equipment Optioneering meeting held on 20/11/19, Accepted due to the high approach speed, S+T RAM to place in their work bank.

# Safety Campaign

The LCM with the help of the BTP if required to undertake safety campaigns whilst at the crossing and also their presence would deter any incidents at the crossing. Optioneering meeting held on 20/11/19, Accepted, the LCM will continue to do this when on site.

# **Options Completed**

# 9-day census

The RLCM to package together other crossings that require an up to date census to reduce the cost of the census. The present census is from 2013. Optioneering meeting held on 20/11/19, Accepted the Route and the RLCM to organise.

# Led wig wags

There is an issue with low sun at this location and the wig-wags have already got extended sun hoods, so I would recommend this as this crossing has high usage day and night and I feel this would be a great benefit for the safety of the users and network rail. This option has a positive CBA. Optioneering meeting held on 14/03/18, Accepted – planned for CP6 Optioneering meeting held on 20/11/19, Accepted – planned for CP6 by S+T RAM





# Location of the crossing



# Surrounding area of the crossing



Ariel view





Upside sighting for up direction trains approaching



Upside sighting for down direction trains approaching





Downside sighting for up direction trains approaching



Downside sighting for down direction trains approaching





Across the crossing



# Across the crossing



LOR Seq. Line of Route	Description		ELR	Route	Last Updated
EA1530 002 Coldham Lane	In to Haughley Jn		CCH	Anglia	19/11/2016
Location	Mileage M Ch	Running lines & speed restrictions		Signalling & R	emarks
		08D 60		TCB Cambridge S RA8	B (CA)
Fulbourn LC (AHBC)	4 36				
Home Farm LC FPS)	5 31				
Hicks LC (UWC)	5 38				
Six Mile Bottom LC (AHBC)	7 65				
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 platform - 94m (102 yds) Down platform - 103m (111 ydr	;)
DULLINGHAM Dullingham (DH) SB Dullingham LC (MCG)	10 54 10 54 10 56			TB Dullingham Si	3 (DH)
Single line	11 09	60 08D			

# Sectional Appendix



# Cambridge Signal Box Panel B





Crossing location on the signalling panel



# Examples of signage at the crossing and the new LED Wigwags



## 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	<ul> <li>Examples at the crossing include:</li> <li>fast and / or long and straight roads; inability to stop</li> <li>proximity of junctions; distraction, blocking back</li> <li>sweeping road approaches, parked cars hinder identification of level crossing ahead</li> <li>level crossing equipment and road traffic light signals are not conspicuous or optimally positioned; orientation / sun glare, insufficient light output, misalignment of the carriageway over the crossing</li> <li>there is a risk of grounding and / or the severity of the gradient might adversely affect a vehicle's ability to negotiate the crossing</li> <li>insufficient or excessive strike in times increase the likelihood of driver error / violations</li> <li>high chance of a second train coming</li> <li>crossing type is unsuitable for location, train service, line speed and / or user groups</li> <li>Additional examples include:</li> <li>Signaller unsighted to road vehicle; bleaching of CCTV image, blind spots</li> <li>barriers or gates not fully interlocked with signalling system and / or no approach locking (opportunity for human error - raise barriers / open dates with train approaching)</li> </ul>	<ul> <li>Controls can include:</li> <li>vehicle activated signs, advance warning signs; countdown markers, risk of grounding signs, provision of emergency telephones</li> <li>liaising with highways authority regarding traffic restrictions; speed limits, restricting direction of traffic</li> <li>engaging with signalling engineers to optimise strike in times</li> <li>enhanced 'another train coming' signs</li> <li>road traffic light signal and boom lighting LED upgrade, extended hoods, repaint backboards, reflectorised markings</li> <li>upgrading of asset to a higher form of protection</li> <li>improving camera equipment / Signaller's view of crossing, e.g. install colour monitor</li> <li>signalling interlocking upgrade and / or barrier inhibition</li> </ul>
Pedestrian and train collision risk	<ul> <li>Examples include:</li> <li>high chance of a second train coming</li> <li>increased likelihood of user error, e.g. crossing is at station</li> <li>free wicket gates are known to result in user error or encourage misadventure</li> <li>crossing type is unsuitable for location, train service, line speed and user groups</li> </ul>	<ul> <li>Controls can include:</li> <li>spoken 'another train coming' audible warning</li> <li>providing red standing man sign</li> <li>maximise sighting lines of approaching trains</li> <li>enhanced 'another train coming' signage</li> <li>providing tactile paving and / or pedestrian stop lines</li> <li>interlocking (or locking where Crossing Attendant provided) of wicket</li> </ul>



	Hazard	Control
	<ul> <li>schools, local amenities or other attractions are known to contribute towards user error</li> <li>Additional examples include:</li> <li>Signaller unsighted to user; bleaching of CCTV image, blind spots</li> <li>barriers or gates not fully interlocked with signalling system and / or no approach locking (opportunity for human error - raise barriers / open gates with train approaching)</li> </ul>	<ul> <li>gates</li> <li>upgrading of asset to a higher form of protection</li> <li>improving camera equipment / Signaller's view of crossing, e.g. reposition on-site camera equipment</li> <li>signalling interlocking upgrade and / or barrier inhibition</li> </ul>
Pedestrian and road vehicle collision risk	<ul> <li>Examples include:</li> <li>road / footpath inadequately separated; footpath not clearly defined, narrow carriageway restricts width of footpath, footpath width unsuitable for all user groups, e.g. heavily used, high volume of encumbered users</li> <li>condition of footpath surface increases the likelihood of users diverting from the designated footpath or slipping / tripping into the carriageway</li> </ul>	<ul> <li>Controls can include:</li> <li>clearly define the footpath; renew markings, install tactile paving and / or widen where possible</li> <li>improving footpath crossing surface so it is devoid of potholes, excessive flangeway gaps and is evenly laid</li> <li>removing redundant footpath markings that do not align with public footpaths</li> <li>road speed controls, vehicle activated signs, advance warning signs</li> </ul>
Personal injury	<ul> <li>Examples include:</li> <li>barrier mechanism unguarded / inadequately protected</li> <li>foreseeable likelihood of pedestrians standing beneath barrier during lowering sequence</li> <li>skewed crossing with large flangeway gaps results in cyclist, mobility scooter, pushchair or wheelchair user being unseated</li> </ul>	<ul> <li>Controls can include:</li> <li>fully guarding barrier mechanisms</li> <li>improving fence lines</li> <li>marking pedestrian stop lines, introducing tactile paving</li> <li>reducing flangeway gaps and straightening where possible</li> </ul>



#### **ANNEX C – ALCRM RISK SCORE EXPLANATION**

ALCRM provides an estimate of both the individual and collective risks at a level crossing.

The individual and collective risk is expressed in Fatalities and Weighted Injuries (FWI). The following values help to explain this:

- **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

#### **INDIVIDUAL RISK**

This is the annualised probability of fatality to a 'regular user'. *NOTE: A regular user is taken as a person making a daily return trip over the crossing; assumed 500 traverses per year.* 

Individual risk:

- Applies only to crossing users. It is not used for train staff and passengers
- Does not increase with the number of users.
- Is presented as a simplified ranking:
  - Allocates individual risk into rankings A to M
     (A is highest, L is lowest, and M is 'zero risk' e.g. temporary closed, dormant or crossings on mothballed lines)
  - Allows comparison of individual risk to average users across any crossings on the network

Individual Risk Ranking	Upper Value (Probability)	Lower Value (Probability)	Upper Value (FWI)	Lower Value (FW)
А	1 in 1	Greater than 1 in 1,000	1	0.001000000
В	1 in 1,000	1 in 5,000	0.001000000	0.000200000
С	1 in 5,000	1 in 25,000	0.000200000	0.000040000
D	1 in 25,000	1 in 125,000	0.000040000	0.000008000
E	1 in 125,000	1 in 250,000	0.000008000	0.000004000
F	1 in 250,000	1 in 500,000	0.000004000	0.000002000
G	1 in 500,000	1 in 1,000,000	0.00002000	0.000001000
Н	1 in 1,000,000	1 in 2,000,000	0.000001000	0.00000500
I	1 in 2,000,000	1 in 4,000,000	0.00000500	0.00000250
J	1 in 4,000,000	1 in 10,000,000	0.00000250	0.000000100
К	1 in 10,000,000	1 in 20,000,000	0.00000100	0.00000050
L	Less than 1 in 20,000,000	Greater than 0	0.00000050	Greater than 0
Μ	0	0	0	0



# **COLLECTIVE RISK**

This is the total 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:
  - Allocates collective risk into rankings 1 to 13
     (1 is highest, 12 is lowest, and 13 is 'zero risk' e.g. temporary closed,
    - dormant or crossings on mothballed lines)
  - o Can easily compare collective risk between any two crossings on the network

Collective Risk Ranking	Upper Value (FWI)	Lower Value (FW)
1	Theoretically infinite	Greater than 5.00E-02
2	0.05000000	0.01000000
3	0.01000000	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	0.00000500
12	0.0000005	0
13	0.00E+00	0.00E+00



# 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	
Туре	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	К	
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:

alked 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**



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



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).

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# 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 21<sup>st</sup> & shortest day December 21<sup>st</sup>) 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:

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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

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# 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 colouisted asfety risk for this processing	Risk per Traverse (Letter)	Collective Risk (Number)	
is:	К	7	
	Risk per Traverse (FWI)	Collective Risk (FWI)	
Cars / car-based vans / quad bikes	0	0.000039043	
Large vans / small lorries / large 4x4s	U	0.000005381	
Buses / Coaches		0	
HGVs	0	0.000000424	
Tractors / large farm vehicles		0.00000062	
Pedal / motor cyclists		0.000006784	
Pedestrians		0.000010505	
Horse Riders	0	0	
Animal Herders		0	
Vehicles user in pedestrian mode		0	
Train Passengers	0	0.000000171	
Train Staff	0	0.000001065	
Derailment Risk		0.00000932	
Weighted Average (Users)	0		
Total Risk		0.000064368	
	Average Consequence	0.484803329	
	Collision Frequency	0.000132771	

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# 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	К	7	0.000063733	0.00000635	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

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								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	К	7	0.000063733	0.00000635	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	К	7	0.000063733	0.00000635	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



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Up side looking at trains travelling in the up direction



Up side looking at trains travelling in the down direction



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Down side looking across crossing:



Down side looking at trains travelling in the up direction



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





	Hazard	Control				
	<ul> <li>long signal section (Signaller unaware of exact train location)</li> </ul>					
	- high train frequency					
	<ul> <li>insufficient or excessive strike in times at MSL crossings</li> </ul>					
	high chance of a second train coming					
	<ul> <li>high line speed and / or high frequency of trains</li> </ul>					
	<ul> <li>unsuitable crossing type for location, train service, line speed and vehicle types</li> </ul>					
	Examples include:	Controls can include:				
	<ul> <li>insufficient sighting and / or train warning</li> </ul>	<ul> <li>optimising the position of equipment and / or signs</li> </ul>				
	<ul> <li>ineffective whistle boards; warning inaudible, insufficient warning time provided known high upage between 22:00 and 07:00.</li> </ul>	removing redundant and / conflicting signs				
	<ul> <li>high chance of a second train coming</li> </ul>	<ul> <li>upgrading of asset to a higher form of protection</li> </ul>				
Dedectrien	<ul> <li>high line speed and / or high frequency of trains</li> </ul>	• optimising sighting lines, e.g. de-vegetation programme, repositioning of equipment or removal of redundant railway assets				
and train	<ul> <li>level crossing equipment and signage is not conspicuous or optimally positioned</li> </ul>	• implementing train speed restriction or providing crossing attendant				
collision risk	opumally positioned	<ul> <li>providing enhanced user-based warning system, e.g. MSL</li> </ul>				
	<ul> <li>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</li> </ul>	<ul> <li>engaging with stakeholders / authorised users to reinforce safe crossing protocol, legal responsibilities and promote collaborative working</li> </ul>				
	<ul> <li>instructions for safe use might be misunderstood e.g. signage clutter detracts from key messages, conflicting information given</li> </ul>	<ul> <li>installing guide fencing and / or handrails to encourage users to look for approaching trains, read signage or cross at the designed decision point</li> </ul>				
	• surface condition or lack of decking contribute to slip trip risk	•				




Hazard	Control
<ul> <li>known high level of use during darkness</li> <li>increased likelihood of misuse, e.g. crossing is at station</li> </ul>	<ul> <li>re-design of crossing approach so that users arrive at the crossing as close to a 90° angle as possible</li> </ul>
<ul> <li>increased likelihood of misuse, e.g. crossing is at station</li> <li>free wicket gates might result in user error</li> <li>high volume of unfamiliar users, e.g. irregular visitors / ramblers, equestrians</li> <li>complacency leading to high levels of indiscipline, e.g. users are known to rely on knowledge of timetable</li> <li>high level of use by vulnerable people</li> <li>where telephones are provided i.e. bridleways, users experience a long waiting time due to: <ul> <li>long signal section (Signaller unaware of exact train location)</li> <li>high train frequency</li> </ul> </li> <li>insufficient or excessive strike in times at MSL crossings</li> <li>unsuitable crossing type for location, train service, line speed and user groups</li> <li>high usage by cyclists</li> <li>degree of skew over crossing increases traverse time and users' exposure to trains</li> <li>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</li> </ul>	<ul> <li>close to a 90° angle as possible</li> <li>installing lighting sources</li> <li>engaging with signalling engineers to optimise strike in times</li> <li>providing decking or improving crossing surface, e.g. holdfast, strail, non-slip surface</li> <li>providing cyclist dismount signs and / or chicanes</li> <li>straightening of crossing deck</li> </ul>



	Hazard	Control
Pedestrian and road vehicle collision risk	Examples include:	Controls can include:
	a single gate is provided for pedestrian and vehicle users where	providing separate pedestrian gates
	same time	clearly defining the footpath; renew markings
	the position of pedestrian gate forces / encourages pedestrian	positioning pedestrian gates on the same side of the crossing
	users to traverse diagonally across the roadway	• improving footpath crossing surface so it is devoid of potholes,
	<ul> <li>road / footpath inadequately separated; footpath not clearly defined</li> </ul>	improving crossing surface, o g heldfact strail pap slip surface
	<ul> <li>condition of footpath surface increases the likelihood of users slipping / tripping into the path of vehicles</li> </ul>	• Improving crossing surface, e.g. holdrast, strail, hon-sip surface
	Examples include:	Controls can include:
	<ul> <li>skewed crossing with large flangeway gaps results in cyclist,</li> </ul>	improving fence lines
Personal injury	mobility scooler, pushchair or wheelchair user being unseated	reducing flangeway gaps and straightening where possible
	<ul> <li>condition of rootpath surface increases the likelihood of users slipping / tripping</li> </ul>	• providing decking or improving crossing surface, e.g. holdfast, strail,
	degraded gate mechanism or level crossing equipment	straighten / realign gate posts
	barrier mechanism unguarded / inadequately protected	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	Probability		FWI/traverse	
Ranking	Upper	Lower	Upper	Lower
А	1 in 1	1 in 500000	1	0.000002
В	1 in 500000	1 in 2500000	0.000002	0.0000004
С	1 in 2500000	1 in 12500000	0.0000004	0.0000008
D	1 in 12500000	1 in 62500000	0.0000008	0.00000016
E	1 in 62500000	1 in 125000000	0.00000016	0.00000008
F	1 in 125000000	1 in 250000000	0.00000008	0.00000004
G	1 in 250000000	1 in 50000000	0.00000004	0.00000002
H	1 in 50000000	1 in 100000000	0.00000002	0.00000001
I	1 in 100000000	1 in 200000000	0.00000001	0.000000005
J	1 in 200000000	1 in 500000000	0.000000005	0.000000002
К	1 in 500000000	1 in 10000000000	0.000000002	0.000000001
L	1 in 1000000000	Greater than 0	0.000000001	Greater than 0
М	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	0.05000000	0.01000000
3	0.01000000	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	0.00005000	0.000001000
11	0.000001000	0.00000500
12	0.0000005	0
13	0.00E+00	0.00E+00



## PROTECTED LEVEL CROSSING RISK ASSESSMENT

## **1. LEVEL CROSSING OVERVIEW AND ENVIRONMENT**

### 1.1 LEVEL CROSSING OVERVIEW

This is a risk assessment for Croxton AHB level crossing.

Crossing Details			
Name	Croxton AHB		
Туре	АНВ		
Crossing status	Public Highway		
Overall crossing status	Open		
Route name	ANGLIA		
Engineers Line Reference	ETN – 96m 46ch		
OS grid reference	TL902868		
Number of lines crossed	2		
Line speed (mph)	40 (TSR)		
Electrification	No electrification present		
Signal box	Cambridge PSB – Thetford workstation		

Risk Assessment Details			
Name of assessor	Darren Lincoln		
Post	LCM		
Date completed	25-10-2021		
Next due date	24-01-2023		
Email address	darren.lincoln@networkrail.co.uk		
Phone number         07824411923			

ALCRM Risk Score		
Risk per traverse risk	G	
Collective risk	3	
FWI	0.006874084	



### **1.2 INFORMATION SOURCES**

The reference sources used during the risk assessment included:

- Census Counter
- SMIS

### **1.3 ENVIRONMENT**

### **Approach Photos**



Up side crossing approach



Down side crossing approach

The level crossing is located on A1075. The road approach speed is estimated to be Greater than 50mph. It is a Public Highway level crossing.





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At Croxton AHB level crossing the orientation of the road/path from the north is 205°; the orientation of the railway from the north to the up line in the up direction is 260°. Crossing is in the top 100 of crossings at risk of sun glare list.

### Impact of low sun on the crossing

Below is the output from the Sun Calc application, which shows the lines of sunrise and sunset angles at two times of year (longest day June 21<sup>st</sup> & shortest day December 21<sup>st</sup>) when low sun would align with the rail approaches and might impact on the sighting.

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).





Shortest day

There are planned or apparent developments near the crossing which may lead to a change or increase in use or risk.

### Site Visit General Observations:

## 2.1 RAIL

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The train service over Croxton AHB level crossing consists of Passenger and Freight trains. There are 66 trains per day. The highest permissible line speed of trains is 40 mph. Trains are timetabled to run for 17.5 hours per day.

#### Assessor's notes:

Trains are timetabled to run for 17.5 hours per day, but lines are open 24 hours a day and may receive additional
freight, passenger, or engineering trains
2.2 USER CENSUS DATA

A 24-hour census was carried out on 27-05-2015 by Intelligent Data Collection Limited. The census applies to 100% of the year.

The census taken on the day is as follows:

Cars / car-based vans / quad bikes	4616
Large vans / small lorries / large 4x4s	996
Buses / coaches	45
HGVs	218
Tractors / large farm vehicles	6
Pedal / motor cyclists	79
Pedestrians	0
Horse riders	0
Animal herders	0

### Assessor's general census notes:

Census data taken from a daily average of a 14-day census carried out by Intelligent Data Collection Limited between 27/07/2015 to 11/08/2015

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





#### Vulnerable user observations:

No evidence of a higher than usual number of vulnerable people using the crossing

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

#### Irregular user observations:

No evidence of a high number of irregular users

#### 2.3 USER CENSUS RESULTS

ALCRM calculates the usage of the crossing to be 5881 road vehicles and 79 pedestrians and cyclists per day.

### 3. RISK OF USE

### 3.1 CROSSING APPROACHES

The road approach speed for vehicles on the up side of the crossing is Greater than 50mph and the approach speed on the down side of the crossing is Greater than 50mph.

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



side crossing approach (reverse view)

Down side crossing approach (reverse view)

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:

Mud from field entrances/exits at certain times of year

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At the estimated road speed, the visibility of level crossing signage and equipment on the up side is easily sufficient on the down side approach and is adequate on the up side approach 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 down side is adequate, the visibility should be sufficient for a vehicle to be able to react in time 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 not create a risk of vehicles grounding on the crossing.

### 3.3 AT THE CROSSING – BLOCKING BACK

The road layout at or close to the crossing does not result in identified incidents of traffic queuing over the crossing. Blocking back risk is known to occur Never known to occur.

No incidents of blocking back are recorded.

There are identified issues with the road layout, parked cars or other features that could stop traffic. In addition, the road is a known diversionary route.

### Assessor's notes:

There is a number of accesses to fields on approach to this level crossing, but no evidence of blocking back during visits or census carried out by Intelligent Data Collection Limited



### 3.4 AT THE CROSSING - ANOTHER TRAIN COMING RISK

Trains are known to occasionally pass each other at this crossing.

#### 3.5 INCIDENT HISTORY

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

### Assessor's incident history notes:

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Within the last 12 months
<ul> <li>28/09/2021 - Barrier rested on top of a car at Croxton AHB LC. No barrier damage.</li> <li>15/08/2021 - Car weaved around lowered barriers</li> <li>17/11/2020 - Flat bed lorry clipped the barrier</li> </ul>
Historic data
<ul> <li>26/08/2020 - Articulated lorry smashed through YN (Up side) barrier</li> <li>13/07/2020 - RV user struck and removed barrier</li> <li>26/09/2019 - 1K77 reported a van inside the barriers at Croxton AHB level crossing facing towards the train. No near miss or EBA.</li> <li>24/06/2017 - At 11:38 hours the Cambridge Thetford signaller reported Croxton AHB's level crossing had failed, barriers went down on own accord and remained down. The Signaller received calls from member of the public calling in and reporting traffic swerving the barriers. Trains were placed at caution. British Transport Police ad-</li> </ul>
vised - Ref: 229 <b>30/12/2016</b> - Trespass- 1K83 (Greater Anglia 1540 Norwich – Cambridge) reported a youth trespasser on the line near Croxton Level Crossing. <b>32/12/2015</b> - 11-00, 00:52 Linespeed Lines Street. Nerwich: Foreign Jerry och (treiler stuck under Jewered Herrises et
<ul> <li>03/12/2015 - 1L08 09:52 Liverpool Lime Street - Norwich; Foreign lorry cab/trailer stuck under lowered barriers at Croxton LC.</li> <li>30/10/2015 - Lorry struck barriers after ignoring the warning lights at Croxton AHB LC. No barrier damage.</li> <li>06/12/2014 - Barriers failed down at Croxton AHB LC and users had been weaving around the barriers.</li> </ul>
<b>18/03/2014</b> - Barners lowered on tanker forry at Croxton AFB LC <b>18/03/2014</b> - Military slow moving road vehicle failed to report Croxton Level Crossing clear after use. <b>25/11/2013</b> - 1L05 (EMT 0647 Liverpool Lime St – Norwich) reported tractor used Croxton LC with the barriers
<b>20/09/2013</b> - 1K60 (GA 0812 Cambridge – Norwich) reported that an HGV was stuck under the upside barrier. <b>03/08/2013</b> - Car on the crossing at Croxton AHB LC as 1K55 05:37 Norwich - Cambridge passed over. NOT a
<b>27/07/2013</b> - Car very close to running line at Croxton AHB Level Crossing. <b>02/07/2013</b> - 2K85 (GA 1638 Norwich – Cambridge) reported HGV obstructing Croxton Level Crossing with low- ered barrier between cab and trailer.
<b>18/03/2013</b> - Car zig zagged barriers at Croxton AHB LC in front of 1K78 16:12 Cambridge - Norwich. Not a near miss. <b>29/08/2012</b> - Cable theft at Croxton Level Crossing
<b>25/08/2012</b> - Barriers at Croxton LC came down on car bonnet. There was no damage to the barrier booms.
Under the 14-day census carried out by Intelligent Data Collection Limited between 27/07/2015 to 11/08/2015 the following incidents occurred
Red light running - Cars = 147, Vans/Small Lorries = 32, HGVs = 9, Buses = 1 & Motor Cyclist = 3.

Under the 28-day census carried out by Intelligent Data Collection Limited the following incidents happened for zigzagging - Cars = 1.

### Red light violations / barrier weaving

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

#### 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	47	Yes	No
Down line	46	Yes	No





### 4. ALCRM CALCULATED RISK

### Croxton AHB level crossing ALCRM results.

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

- Road traffic accident
- Second train coming
- Railway cause: slow moving / short warning
- Blocking back
- Late braking
- Incorrect use (eg. non-adherence with level crossing road traffic light signals)
- Fails to observe level crossing
- Parked on level crossing
- Stranded / failed on crossing
- Sunlight obscures crossing/lights or view up / down track
- Turns onto the railway
- Poor crossing visibility

-	Risk per Traverse (Letter)	Collective Risk (Number)	
is:	G	3	
	Risk per Traverse (FWI)	Collective Risk (FWI)	
Cars / car-based vans / quad bikes	0.00000000	0.004431514	
Large vans / small lorries / large 4x4s	0.00000003	0.000956193	
Buses / Coaches		0.00009021	
HGVs	0.00000001	0.000043701	
Tractors / large farm vehicles		0.000001203	
Pedal / motor cyclists		0.001182059	
Pedestrians		0	
Horse Riders	0.00000041	0	
Animal Herders		0	
Vehicles user in pedestrian mode		0	
Train Passengers	0.00000001	0.00002791	
Train Staff	0.00000006	0.000134299	
Derailment Risk		0.000088185	
Weighted Average (Users)	0.00000003		
Total Risk		0.006874084	
	Average Consequence	0.318846687	
	Collision Frequency	0.021559215	

# 5. OPTION ASSESSMENT AND CONCLUSIONS

# 5.1 OPTIONS EVALUATED

The options evaluated to mitigate the risks at Croxton AHB crossing include:

Option	Term	Risk per Traverse	Collective Risk	FWI	FWI Difference	Cost	Benefit Cost Ratio	Status	Comments
Upgrade to MCBOD	Long Term	К	6	0.000369833	0.006504251	£3,500,000	0.08	Option accepted by optioneering panel on 11.02.22 - C3R Project	Current planned option Previously accepted by optioneering panel 18.11.20 – Planned 2023
Red Light Safety Enforcement Camera (RLSE)	Long Term	G	3	0.006670507	0.000203577	£136,000	0.21	Option accepted by optioneering panel on 11.02.22 - C3R Project	Provision of RLSE would help reduce the high amount of red violations – Previously accepted by optioneering panel 18.11.20 - Complete as part of the MCBOD upgrade
Vehicle activated signage (VAS)	Long Term	G	3	0.006670507	0.000203577	£12,000	0.24	Option accepted by optioneering panel on 11.02.22 - C3R Project	Provision of VAS that flashes up level crossing ahead warning would provide approaching road vehicles enhanced visual warning of approaching crossing. This may help decrease barrier strikes – Previously accepted by

									optioneering panel 18.11.20
Option	Term	Risk per Traverse	Collective Risk	FWI	FWI Difference	Cost	Benefit Cost Ratio	Status	Comments
Long sun hoods -	Long Term	G	3	0.006534789	0.000339295	£2400	2.27	Option rejected by optioneering panel on 11.02.22 - LED's considered suitable Sun Glare Mitigation	Given the heavy sun glare on approaches, long sun hoods fitted alongside the previously installed LED wig wags would aid visibility of road traffic signal lights (wig wags).
Renew high friction anti- skid road surface	Long Term	G	3	0.006670507	0.000203577	£25,000	0.54	As per optioneering panes comments I on 11.02.22 – Consider - liaise with HA and if no buy in then consider NWR stand alone proposal	High friction surface previously provided at this location. Given high approach speeds renewal of this surface would provide additional traction for vehicles breaking late at speed upon crossing activation - Previously accepted by optioneering panel 18.11.20
9-day traffic survey	Short term			N/A		£5000	N/A	Option accepted by optioneering panel on 11.02.22	Current survey conducted on 27-05-2015

NOTES

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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**

Assessor's notes:

Croxton AHBC is on the Ely to Norwich line at 96m 45ch, there are two railway tracks at the crossing, usual train service consists of 2 trains per hour on either track and 6 freight trains per day

The crossing located on the A1075 which is a heavily used road.

From the North West direction (down side) the road is straight until you pass over the crossing and its bends towards the right, from this direction heavy sun glare can be an issue at certain times of year.

From the South West direction (up side) the road curves approximately 200meters before crossing, given road speed and curvature vehicles approaching from this direction would have little time to react upon crossing activation this may account for the high barrier strike incident rate. Heavy sun glare can be an issue at certain times of year

Given high incident rates of barrier strikes, vehicles Zig zagging barriers and running red lights this level crossing is deemed to be high risk and a TSR (temporary speed restriction) reducing line speed from 90mph to 40mph was enforced by the ORR in 2012 to reduce the risk of a catastrophic accident.

Network Rail have has worked with the local highways department to explore possibilities of reducing the road speed, this was unsuccessful as local highways department was unwilling to reduce road speed.

An upgrade to An MCBOD crossing is planned in 2023, this will improve safety at the crossing but will not remove all issues relating to fast road approaches leading to minimal reaction times on crossing activation. Consideration should be given to vehicle activated signage and high friction road surface in order to help mitigate these issues

### **Current AHB Crossing Operation**

The crossing is fitted with two sets of road signals, one on either side of the road just in front of the barrier. Both the road signals and the boom lights are fitted with modern high intensity LED lamps.

When a train strikes in at the treadle or electronic switch, the yodel alarm will begin to sound along with the solid amber road signals illuminating for approximately 3 seconds, they then switch to the alternately flashing road signals (which continue flashing until a train has passed clear). After the red signals have been flashing for approximately 7 seconds, the boom lights will illuminate, and the barriers will begin to lower, taking around 7 seconds to reach a horizontal position. The road is then partially blocked with only the near side of the carriageway closed off. This allows a free exit to a vehicle if travelling slowly or one that the driver has ignored the warning lights

Between 15 to 20 seconds after the crossing barriers are fully lowered the train will pass over the crossing. Once the train has passed the strike out treadle, the crossing barriers will begin to rise with the road and boom lights turning off when the barrier reaches around 60degrees from horizontal.

The yodel alarms will have sounded continually from the initial amber light illuminating to the switching off the road signals. If a second train strikes in on the other line during any part of the activation, the yodel alarm with change frequency, alerting pedestrians or cyclists that another train is approaching.

Being a half barrier automatic there are risks of a drivers zigzagging around the barriers this type of misuse has been documented at this location.

Given traverse length there is a risk that pedestrians may be within stop lights when crossing activates, they also be walking along the unprotected (no barrier) side of the road which would allow free and unrestricted access to the railway line. This type of risk is reduced given the crossing location being on a country road with no pavements and very low recorded numbers of pedestrians.





#### Options to reduce or remove the above considered risks are: -

**Upgrade to MCBOD** – This option would take the crossing to the current highest level of protection and remove the possibility of a road users weaving the barriers with a train approaching. Given that barrier down times will be longer this option may promote additional red-light violations and barrier strikes *Option accepted by optioneering panel on 11.02.22 - C3R Project* 

**Red Light Safety Enforcement Camera (RLSE) –** Provision of RLSE will help reduce red light violations and barrier strikes, this option is being included as part of the MCBOD upgrade. *Option accepted by optioneering panel on 11.02.22 - C3R Project* 

**Vehicle activated signage (VAS) -** Provision of VAS that flashes up level crossing ahead warning would provide approaching road vehicles enhanced visual warning of approaching crossing. This may help decrease barrier strikes.

Option accepted by optioneering panel on 11.02.22 - C3R Project

**Long sun hoods -** Given the heavy sun glare on approaches, long sun hoods fitted alongside the previously installed LED wig wags would aid visibility of road traffic signal lights (wig wags). This option should be considered as part of the MCBOD upgrade.

Option rejected by optioneering panel on 11.02.22 - LED's considered suitable Sun Glare Mitigation

**Renew high friction anti-skid road surface -** High friction surface previously provided at this location. Given high approach speeds renewal of this surface would provide additional traction for vehicles breaking late at speed upon crossing activation.

As per optioneering panes comments I on 11.02.22 – Consider - liaise with HA and if no buy in then consider NWR standalone proposal

#### 9-day traffic survey

Current traffic survey conducted on 27-05-2015, a new traffic survey would offer up to date usage figures. *Option accepted by optioneering panel on 11.02.22* 





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





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





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



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



### 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	Proba	ability	FWI/traverse		
Ranking	Upper	Upper Lower		Lower	
А	1 in 1	1 in 500000	1	0.000002	
В	1 in 500000	1 in 2500000	0.000002	0.0000004	
С	1 in 2500000	1 in 12500000	0.0000004	0.0000008	
D	1 in 12500000	1 in 62500000	0.0000008	0.00000016	
E	1 in 62500000	1 in 125000000	0.00000016	0.00000008	
F	1 in 125000000	1 in 250000000	0.00000008	0.00000004	
G	1 in 250000000	1 in 500000000	0.00000004	0.00000002	
Н	1 in 500000000	1 in 100000000	0.00000002	0.00000001	
I	1 in 100000000	1 in 200000000	0.00000001	0.000000005	
J	1 in 200000000	1 in 500000000	0.000000005	0.000000002	
К	1 in 500000000	1 in 10000000000	0.000000002	0.000000001	
L	1 in 1000000000	Greater than 0	0.000000001	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	0.05000000	0.01000000
3	0.01000000	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	0.00005000
10	0.00005000	0.000001000
11	0.000001000	0.00000500
12	0.000005	0
13	0.00E+00	0.00E+00



PROTECTED LEVEL CROSSING RISK ASSESSMENT



Anglia Route Level Crossing Narrative Risk Assessment Waterbeach AHB Crossing Planned 9<sup>th</sup> December 2021



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### 1. LEVEL CROSSING OVERVIEW AND ENVIRONMENT

### 1.1 LEVEL CROSSING OVERVIEW

This is a risk assessment for Waterbeach level crossing.

Crossing Details			
Name	Waterbeach		
Туре	АНВ		
Crossing status	Public Highway		
Overall crossing status	Open		
Route name	ANGLIA		
Engineers Line Reference	BGK – 61m 01ch		
OS grid reference	TL500649		
Number of lines crossed	2		
Line speed (mph)	75MPH		
Electrification	No DC provided but OHLE present.		
Signal box	Cambridge		

Risk Assessment Details		
Name of assessor	Andrew Waling	
Post	Level crossing manager.	
Date completed	09-12-2021	
Next due date	10-03-2023	
Email address	andrew.waling@networkrail.co.uk	
Phone number	07860500842	

ALCRM Risk Score		
Risk per traverse risk	D	
Collective risk	2	
FWI	0.042106949	

For Safety performance (Fatality weighted injuries (FWI), this crossing is ranked 2nd in Anglia route and 2nd nationally compared to other AHB.

This crossing has accumulated £115,284,14 in delay costs within the last 4 years.



### **1.2 INFORMATION SOURCES**

### **Reason for Risk Assessment**

Network Rail has a responsibility and legal duty under the Health and Safety at Work Act 1974 for the health, safety, and welfare of its employees and for protecting others against risk.

Network Rail also has a legal responsibility under the Management of Health and Safety at Work Regulations 1999. Section 3 focuses on the requirement for suitable and sufficient assessments of risk to health and safety of employees and others in connection with their undertaking.

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

Consulted	Attended site
LOMS, MOMS and signallers	No
level crossing users.	No
Police (BTP/Home Office Force)	No
Local Resident	No

#### Stakeholder consultation and attendance notes:

All of the above were contacted with regards to this risk assessment and none attended the site meeting apart from local residents and dog walkers that were using the crossing on the day of the data collection. The rest were either contacted via email or telephone after the site meeting.

The reference sources used during the risk assessment included:

- CCIL
- Census Counter
- Geo-RINM
- SMIS
- Other Data Sources: Google maps, Bing maps, hazard directory, sectional appendix.

### 1.3 ENVIRONMENT



Upside crossing approach.

Downside crossing approach.

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The level crossing is located on Clayhythe Rd. 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.

At Waterbeach level crossing the orientation of the road/path from the north is 140°; the orientation of the railway from the north to the up line in the up direction is 210°.

### Sun Glare

LCG13 assessing sun glare at public road level crossings has been completed and records risk as Tolerable with detailed sun glare risk assessment not needed

### Impact of low sun on the crossing

Below is the output from the Sun Calc 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.

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).

### Longest Day 21<sup>st</sup> June.



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Shortest Day 21<sup>st</sup> December.

There are planned or apparent developments near the crossing which may lead to a change or increase in use or risk.

### Site Visit General Observations:

The approach to the upside is long and straight, whereas the downside is not. There are junctions on both sides of the crossing, on the downside approach there is both left and right turns into housing estates. On the upside approach there is a left-hand turn into the station car park and there are both left and right hand turns into depots very close to the crossing and there is field access.

Sun glare could be an issue during the winter months when the low sun is rising, this is mitigated by having all LED lights installed in the wig wag boards on both sides.

There is a proposed development on the east side of Waterbeach village (this is on the old Waterbeach barracks area) approx, half a mile away, this would increase the usage of the station and the crossing, but this could be mitigated with the station being moved to a different location, this is something that is being put forward and fully supported by Network Rail.

At the time of writing this risk assessment no confirmation of a new station has been confirmed but the Level Crossing Manager is in regular contact with Network Rail Town Planning and South Cambs District Council.

# 2. LEVEL CROSSING USAGE

### 2.1 RAIL

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The train service over Waterbeach level crossing consists of Passenger and Freight trains. There are 188 trains per day. The highest permissible line speed of trains is 75 mph. Trains are timetabled to run for 19 hours per day.

#### Assessor's notes:

As stated, above trains are timetabled to run for 19 hours per day, but lines are open 24 hours a day and may receive additional freight, passenger or engineering trains which often vary in length, these are non-time tabled trains which do run from time to time and are mainly for engineering, rail head treatment and track recording purposes. **2.2 USER CENSUS DATA** 

A 24-hour census was carried out on 06-06-2018 by TRACSIS. The census applies to 100% of the year.

The census taken on the day is as follows:

Cars / car-based vans / quad bikes	4,785
Large vans / small lorries / large 4x4s	593
Buses / coaches	10
HGVs	62
Tractors / large farm vehicles	8
Pedal / motor cyclists	345
Pedestrians	595
Horse riders	0
Animal herders	0

#### Assessor's general census notes:

The census is a weekday average from a 9-day census by TRACSIS for a Network Rail project. Dated 06/06/2018.

Available information indicates that the crossing has a high proportion of vulnerable users.



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### Vulnerable user observations:

Location next to a station means the elderly, pushchair users; children, dog walkers and cyclists could all use the crossing to access the station.

Taking the above into account with vulnerable users being witnessed using Waterbeach AHB crossing a 50% extra on the traverse time has been added to this risk assessment.

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

#### Irregular user observations:

No known irregular users as its mostly local people and regular commuters but this cannot be discounted.

### 2.3 USER CENSUS RESULTS

ALCRM calculates the usage of the crossing to be 5,458 road vehicles and 940 pedestrians and cyclists per day.

#### Notes on daily, annual, seasonal usage:

As stated above in this risk assessment, the crossing has a high daily usage of both vehicles and pedestrian's usage and this pattern does not seem to change through the year as it is a continuous regular flow of local through traffic and daily commuters.

The Level Crossing can become busy should the main Cambridge to Ely A10 road be closed as this road will be used as a diversion route, should this happen a MOM will be deployed to watch over the crossing until the diversion has finished.

### 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.

Both approach roads to Waterbeach level crossing are assessed as being long and straight. There are prominent features on the approach to the level crossing that could distract drivers.

#### Site visit observations:

On the approach to Waterbeach AHB crossing there are 4x RLT signals and these are visible on the approach to the crossing form both directions as follows:

Upside nearside approach = 237 Upside offside approach = 102 Downside nearside approach = 140 Downside offside approach = 80

The approach to the upside is long and straight, whereas the downside is not.

There are junctions on both sides of the crossing, on the downside approach there is both left and right turns into housing estates. On the upside approach there is a left-hand turn into the station car park and there are both left and right hand turns into depots very close to the crossing and there is field access.

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:

Foliage can obscure signs if not regularly cut back, this is usually undertaken by Cambridgeshire highways department or the Level Crossing Manager on his regular visits to the crossing. Fog and bad weather at certain times in the year can impede the visibility of the crossing but this has been mitigated by the installation of LED lights in the wig wags. The road is on a regular route for gritting during the winter months and the responsibility of applying.

At the estimated road speed, the visibility of level crossing signage and equipment on the upside is adequate - the visibility should be sufficient for a vehicle to be able to react in time if the crossing is activated

At the estimated road speed, the visibility of level crossing signage and equipment on the downside is adequate - the visibility should be sufficient for a vehicle to be able to react in time if the crossing is activated

#### Assessor's general crossing approach notes:

The approach to the upside is long and straight, whereas the downside is not. There are junctions on both sides of the crossing, on the downside approach there is both left and right turns into housing estates. On the upside approach there is a left-hand turn into the station car park and there are both left and right hand turns into depots very close to the crossing and there is field access.

#### 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 sits on slight humped profile but has passed the SIN 109 inspection. There are no signs of grounding on the crossing itself but there are Risk of Grounding signs on both road approaches.

### 3.3 AT THE CROSSING – BLOCKING BACK

The road layout at or close to the crossing does result in identified incidents of traffic queuing over the crossing. Blocking back risk is known to occur Occasionally (less than 25% of activations).

No incidents of blocking back have been recorded.

There are identified issues with the road layout, parked cars or other features that could stop traffic. In addition, the road is a known diversionary route.

### Assessor's notes:

There are junctions on both sides of the crossing, on the downside approach there is both left and right turns into housing estates. On the upside approach there is a left-hand turn into the station car park and there are both left and right hand turns into depots very close to the crossing and also there is field access. Previous accident on the A10 meant that the traffic was diverted through Waterbeach and over the crossing, whilst this happened a MOM was deployed to the crossing

#### 3.4 AT THE CROSSING – ANOTHER TRAIN COMING RISK

Trains are known to occasionally pass each other at this crossing.

### Assessor's another train coming notes:





Trains are occasionally known to pass each other at this crossing. If train frequency increases so will the potential of trains passing. The risk is a user may cross after one train has passed without realising another train is coming in the other direction – this is mitigated by spoken Another Train Coming warnings

### 3.5 INCIDENT HISTORY

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

#### Assessor's incident history notes:

**Aug 28, 2021** Waterbeach At 08:34 hours the driver of 1T13 07:44 Kings Lynn/London King's Cross reported a near miss at Waterbeach AHB station level crossing with a teenage girl. The person traversed the crossing in front of the train as it was approaching the station. The person then boarded the rear coach. The driver was fit to continue. Driver also confirmed that emergency brakes were not applied. Cambridge MOM checked all signage and all clear and in place. Operation of crossing working correctly.

**Aug 1, 2021** Waterbeach Cambridge SSM reported a crossing misuse at Waterbeach with a male between 25-30 years old crossing from the down to the up road in front of 1K74, the male walked between the barriers. The driver did not have time to apply the emergency brake and had not classed it as a near miss and was happy to continue. Cambridge MOM examined the crossing, and everything was working correctly.

#### 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:

LED wig wags, CCTV and the installation of RLSE at Waterbeach AHB have been installed to mitigate against deliberate misuse, also the BTP do regular visits to the crossing with the Level Crossing Manager normally during both the morning and evening peak times to understand how people use the crossing and if they are doing so in a safe and correct manner.

### 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	29s	Yes	No	
Down line	29s	Yes	No	

#### Assessor's notes and observations on strike in times:

The above strike in times seem adequate for this type of crossing, the average time for a non-stopping train to arrive at the crossing once the barrier sequence has started is between 28s-29s and for a stopping train the average time is 41s, these have been timed on site by the Level Crossing Manager.

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### 4. ALCRM CALCULATED RISK

### Waterbeach level crossing ALCRM results.

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

- Distracted / forced by dog (loss of control), Road traffic accident, Second train coming
- Does not observe lights/barriers, Slips, trips, falls or snagged on crossing
- Unaware of crossing, slow moving / short warning, train unexpected
- Blocking back, Late braking, Incorrect use (e.g. non-adherence with level crossing road traffic light signals)
- Stuck or grounded on crossing, Fails to observe level crossing, Parked on level crossing
- Stranded / failed on crossing, Turns onto the railway, Poor crossing visibility
- Failure to detect approaching train, lights / barriers or obstacle detection equipment fails to operate
- signaller or other workforce, train driver

	Risk per Traverse (Letter)	Collective Risk (Number)	
is:	D	2	
	Risk per Traverse (FWI)	Collective Risk (FWI)	
Cars / car-based vans / quad bikes	0.00000006	0.011200071	
Large vans / small lorries / large 4x4s	0.00000000	0.001388013	
Buses / Coaches		0.000004887	
HGVs	0.00000001	0.000030302	
Tractors / large farm vehicles		0.00000391	
Pedal / motor cyclists		0.010311313	
Pedestrians		0.017783279	
Horse Riders	0.00000082	0	
Animal Herders		0	
Vehicles user in pedestrian mode		0	
Train Passengers	0.00000001	0.000073936	
Train Staff	0.00000006	0.000389886	
Derailment Risk		0.000921351	
Weighted Average (Users)	0.00000017		
Total Risk		0.042106949	
	Average Consequence	0.630800818	
	Collision Frequency	0.066751577	

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# 5. OPTION ASSESSMENT AND CONCLUSIONS

# 5.1 OPTIONS EVALUATED

The options evaluated to mitigate the risks at Waterbeach crossing include:

Option	Term	Risk per Traverse	Collective Risk	FWI	FWI Difference	Cost	Benefit Cost Ratio	Status	Comments
Close via diversion and overbridge	Long Term	М	13	0	042106949	£50,000,000	0.05	RECOMMENDED REJECT.	A bridge would have to be of maximum height which would mean that the cost is relatively high. A diversion route could link up to the existing busy and congested main Cambridge to Ely A10 road.
Safety campaign.	Short Term	D	2	.046225509	.00411856	£500	N/A	ACCEPT.	This can be undertaken by the Level crossing manager on his regular inspection and can be supported by the BTP.
Upgrade to MCB-OD	Long Term	Н	4	.002514793	039592156	£3,500,000	0.36	ACCEPT.	Natural Upgrade to MCB-OD could be considered here - would need to consider crossing redesign.

Waterbeach LX Narrative Risk Assessment

# 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**

Assessor's notes:

Waterbeach AHB is a half barrier level crossing with 4 RTL's located next to Waterbeach railway station in the village of Waterbeach 6 miles north of the city of Cambridge.

The crossing is located between the Ely station and Cambridge North station with direct services into both London Liverpool Street and London Kings Cross stations, the maximum permissible line speed is 75MPH and the line is open 24 hours a day 365 days a year including bank holidays (UK) only.

The crossing is controlled by Cambridge panel 'A' signal box and this is manned at all times.

The crossing is located on the on Clayhithe Road which is a Public Highway, and the road approach speed is estimated to be 31-40mph.

The level crossing is located at a station which means all types of users use the crossing including vulnerable users, these are classed as people who are elderly, adults with push chairs, unaccompanied children and people who are in wheelchairs, also being in-between a staggered platform makes it an even more vulnerable crossing during peak times especially.

Because of the location of the level crossing, sun glare can be an issue during the winter months when the low sun is rising, this is mitigated by having all LED lights installed in the wig wag boards on both sides.

Due to Waterbeach AHB crossing being a highly used crossing any option would be highly needed to reduce the risk at the level crossing, other mitigations are already in place and these are flashing pedestrian signs, LED wigwags, yellow box on crossing, CCTV (downloadable), audible alarms that stay on until barriers raise, spoken warning of another train coming and red-light safety enhancement cameras, (RLSE)

At present there is a planning application to re-locate the station near to the proposed development of the old Waterbeach barracks of possibly 6500 new homes and all ancillary infrastructure, i.e., schools, shops, businesses, etc, there is a Network Rail project team already working with the developers and regular conversations are undertaken by themselves and the Level Crossing Manager.

# Options to be considered:

**Closure via diversion and overbridge -** This option would close a total of 3 crossings and divert traffic from the village and would be a better option than an overbridge in situ of the level crossing, when the main A10 Ely to Cambridge to road is closed this option should be considered as a separate project involving the developers of Waterbeach barracks. The CBA shows a cost of £50,000,000 (which is only an approx. cost) but still does not give a positive one. See plan in the additional photos. At the optioneering meeting held on the 18-11-20, this option was rejected until further developments on the Waterbeach new town. At the optioneering meeting held on the 02.02.22 this option was rejected as it would require 3<sup>rd</sup> party funding.

**Upgrade to MCB-OD**- Reduces the risk at the level crossing quite considerably and looking at the CBA score, I feel that this would make it a good option to proceed with in the near future. Waterbeach should be looked at as one of the highest risk level crossing due to its already high misuse amount and the calculated increased risk due to the Waterbeach development an upgrade to reduce the risk at this crossing will be definitely needed, a deliberate misuse occurred when a road vehicle was parked on the level crossing after the crossing was activated (attempted suicide), MCB-OD would have prevented this. At the Optioneering meeting on 18-11-20, this was accepted in CP6 planned for December 2023. At the optioneering meeting held on the 02.02.22 this was accepted and will be delivered by the Cambridge C3R project.

**Safety campaign-** This is an ongoing option, the Level Crossing Manager in collaboration with the British Transport Police who regularly do patrols during the peak usage times.





# Added options: -

Close via footbridge - At the optioneering meeting held on the 02.02.22 this option was added and accepted, this would be a GRP footbridge with a cost of £800,000, this would require a feasibility study to be undertake to ascertain it suitability for this location.

# Past options already implemented:

Full Spoken Another Train Coming Audible Warning Flashing Pedestrian Signs Red Light Safety Enforcement Cameras CCTV (downloadable) LED wig wags

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# ANNEX A – ADDITIONAL PHOTOGRAPHS

**Additional Photographs** 

Upside across crossing.



#### Downside across crossing.









Surrounding area of the crossing.







Ariel view of the crossing.



Cambridge panel 'A' signal box.







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





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





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





	Hazard	Control
	Examples include:	Controls can include:
	a single gate is provided for pedestrian and vehicle users where	providing separate pedestrian gates
Dedectrion	same time	clearly defining the footpath; renew markings
and road	<ul> <li>the position of pedestrian gate forces / encourages pedestrian users to traverse diagonally across the roadway</li> <li>road / footpath inadequately separated; footpath not clearly defined</li> </ul>	positioning pedestrian gates on the same side of the crossing
vehicle collision risk		• improving footpath crossing surface so it is devoid of potholes,
		• improving crossing surface, e.g. holdfast strail non-slip surface
	<ul> <li>condition of footpath surface increases the likelihood of users slipping / tripping into the path of vehicles</li> </ul>	
	Examples include:	Controls can include:
	<ul> <li>skewed crossing with large flangeway gaps results in cyclist,</li> </ul>	improving fence lines
	mobility scooler, pushchair or wheelchair user being unsealed	reducing flangeway gaps and straightening where possible
Personal injury	<ul> <li>condition of footpath surface increases the likelihood of users slipping / tripping</li> </ul>	<ul> <li>providing decking or improving crossing surface, e.g. holdfast, strail, pop-slip surface</li> </ul>
	degraded gate mechanism or level crossing equipment	straighten / realign gate posts
	barrier mechanism unguarded / inadequately protected	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	Probability		FWI/traverse	
Ranking	Upper	Lower	Upper	Lower
А	1 in 1	1 in 500000	1	0.000002
В	1 in 500000	1 in 2500000	0.000002	0.0000004
С	1 in 2500000	1 in 12500000	0.0000004	0.0000008
D	1 in 12500000	1 in 62500000	0.0000008	0.00000016
E	1 in 62500000	1 in 125000000	0.00000016	0.00000008
F	1 in 125000000	1 in 250000000	0.00000008	0.00000004
G	1 in 250000000	1 in 500000000	0.00000004	0.00000002
Н	1 in 50000000	1 in 100000000	0.00000002	0.00000001
I	1 in 100000000	1 in 200000000	0.00000001	0.000000005
J	1 in 200000000	1 in 500000000	0.000000005	0.000000002
К	1 in 500000000	1 in 10000000000	0.000000002	0.000000001
L	1 in 1000000000	Greater than 0	0.000000001	Greater than 0
М	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	0.05000000	0.01000000
3	0.01000000	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	0.00005000	0.000001000
11	0.000001000	0.00000500
12	0.0000005	0
13	0.00E+00	0.00E+00



PROTECTED LEVEL CROSSING RISK ASSESSMENT



Anglia Route Level Crossing Narrative Risk Assessment Meldreth Road AHB Planned 9<sup>th</sup> May 2022







# **1. LEVEL CROSSING OVERVIEW AND ENVIRONMENT**

# 1.1 LEVEL CROSSING OVERVIEW

This is a risk assessment for Meldreth Road AHB level crossing.

Crossing Details		
Name	Meldreth Road AHB	
Туре	АНВ	
Crossing status	Public Highway	
Overall crossing status	Open	
Route name	Anglia	
Engineers Line Reference	SBR – 49m 37ch	
OS grid reference	TL388477	
Number of lines crossed	2	
Line speed (mph)	90	
Electrification	No DC provided but OHLE present.	
Signal box	Cambridge PSB	

Risk Assessment Details	
Name of assessor Andrew Waling	
Post	Level Crossing Manager.
Date completed	09-05-2022
Next due date	08-08-2023
Email address andrew.waling@networkrail.co.uk	
Phone number         07860500842	

ALCRM Risk Score	
Risk per traverse risk	D
Collective risk	2
FWI	0.017870966





# **1.2 INFORMATION SOURCES**

# **Reason for Risk Assessment**

Network Rail has a responsibility and legal duty under the Health and Safety at Work Act 1974 for the health, safety and welfare of its employees and for protecting others against risk.

Network Rail also has a legal responsibility under the Management of Health and Safety at Work Regulations 1999. Section 3 focuses on the requirement for suitable and sufficient assessments of risk to health and safety of employees and others in connection with their undertaking.

Network Rail is committed to reducing the risk on the railway and has identified that one of its greatest public risks is at level crossings. This is where the railway has a direct interface with other elements e.g., vehicles and/or pedestrians. Network Rail is working to reduce this risk to as low as is reasonably practicable.

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

Consulted	Attended site
LOMS, MOMS and signaller.	No
Crossing users and some local residents.	No
Police (BTP/Home Office Force)	No
Local Resident	No

# Stakeholder consultation and attendance notes:

None of the above attended the site meeting for this Narrative Risk Assessment but al have been contacted either via telephone or email and their thoughts/recommendations have been noted within this document.

The reference sources used during the risk assessment included:

- CCIL
- Census Counter
- Geo-RINM
- SMIS
- Other Data Sources: Google maps, Bing maps, hazard directory and sectional appendix.
- South Cambs District Council
- Network Rail Town Planning





#### **1.3 ENVIRONMENT**



The road approach speed is estimated to be 30 to 40mph.

It is a Public Highway level crossing.

At Meldreth Road AHB level crossing the orientation of the road/path from the north is 65°; the orientation of the railway from the north to the up line in the up direction is 210°.

#### Sun glare

LCG13 assessing sun glare at public road level crossings has been completed and records risk as Tolerable with detailed sun glare risk assessment not needed

#### Impact of low sun on the crossing

Below is the output from the Sun Calc application, which shows the lines of sunrise and sunset angles at two times of year (longest day June 21<sup>st</sup> & shortest day December 21<sup>st</sup>) when low sun would align with the rail approaches and might impact on the sighting.

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).



Longest Day June 21st.



Shortest Day December 21<sup>st</sup>.





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

#### Site Visit General Observations:

There are no planned or apparent developments near the crossing which may lead to a change or increase in use or risk, this has been checked with South Cambs District Council and Network Rail Town Planning.

The crossing is located on Meldreth Road southwest of the village of Shepreth providing access to the village of Meldreth. The line-speed over the line is 90 mph in the Up direction and 65mph in the Down Direction. The train frequency is 217 trains per day, the line is also electrified, and this is deemed as live at all times.

There are local residential homes and various gateways near the crossing on both sides of the crossing and no yellow lines on floor near level crossing so cars could park on the road near the level crossing. Risk of grounding signage is on both sides of the crossing but not necessarily required as crossing is relatively flat.

Foliage can be an issue on the approach if not regularly cut back and also, fog and sun glare can affect users at certain times of the year.

In the satellite view of the crossing below there are a few features that could cause issues which need to be considered within this risk assessment.

- The skew of the crossing relative to the road increasing the chance of vehicles weaving around the barriers.
- Long pedestrian walkways due to the skew of the crossing.
- Residents near to the crossing giving rise to the chance of blocking back.
- The absence of pavements either side of the crossing and narrow footways.
- Significant use of cyclists and motorcycles.



#### 2.1 RAIL



The train service over Meldreth Road AHB level crossing consists of Passenger and Empty Coaching Stock and Freight trains. There are 217 trains per day. The highest permissible line speed of trains is 90 mph. Trains are timetabled to run for 20 hours per day.

#### Assessor's notes:

As stated above trains are timetabled to run for 20 hours per day, but lines are open 24 hours a day and may receive additional freight, passenger or engineering trains which often vary in length, these are non-time tabled trains which do run from time to time and are mainly for engineering, rail head treatment and track recording purposes.



2.2 USER CENSUS



A 24 hour census was carried out on 11-05-2013 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	1,352
Large vans / small lorries / large 4x4s	147
Buses / coaches	9
HGVs	37
Tractors / large farm vehicles	0
Pedal / motor cyclists	62

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Pedestrians	25
Horse riders	0
Animal herders	0

#### Assessor's general census notes:

Full 24hr census used, this was done for a project by Count on us in 2013 between 11/05/13 to 19/05/13

Available information indicates that the crossing has a high proportion of vulnerable users.

#### Vulnerable user observations:

Vulnerable usage not previously noted at this crossing, but recently more vulnerable users have been identified using this crossing, this could be because of the current coronavirus epidemic.

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

#### Irregular user observations:

No known irregular users but approximately 300 metres over the crossing on the downside is Shepreth 'L' nature reserve, so it could be possible for irregular users.

# 2.3 USER CENSUS RESULTS

ALCRM calculates the usage of the crossing to be 1,545 road vehicles and 87 pedestrians and cyclists per day.

#### Notes on daily, annual, seasonal usage:

Meldreth Road AHB sees a regular daily usage by both vehicles and pedestrians, this pattern is continuous throughout the year.

• the usage of the crossing is moderate for road vehicles (29% of crossings have higher levels of use)

• the use by pedestrian and cyclists is moderate (36% of crossings have higher levels of use)

• the train frequency is high compared to other AHB crossings (only 10% of crossings have a higher level of use).

# 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.

Both of the approach roads to Meldreth Road AHB level crossing are assessed as being long and straight. There are prominent features on the approach to the level crossing that could distract drivers.



#### Site visit observations:

From the west: - The speed limit on the approach to the crossing is the national speed limit (60mph) but there is a speed reduction to 30mph just before the crossing. The 85th percentile road approach speed is 45 mph indicating a moderate to high road approach speed. The measurement point is generally sited at the distant signage where the posted speed limit is still 60mph. The actual speed over the crossing may be lower.

For vehicles traversing the crossing there is a right hand turn into a residence, which could be a source of blocking back although no blocking back was noted during the nine-day traffic census.

The road approach is orientated southwest to northeast at the crossing but there is background shielding to the crossing in the form of vegetation, which will limit the effects of low sun. Indeed, vegetation is beginning to impair the view of the near side RTL (Downside).

From the east: - Although the road is slightly curved on this approach, it is possible to see the crossing at the distant signage. Vegetation is beginning to impinge on the offside RTL. The road has a speed limit of 30mph and the 85th percentile road approach is 33.1 mph indicating a moderate road approach speed.

There are also no turnings or intersections near to the crossing that are likely to give rise to blocking back. The road approach is orientated north-east to south-west at the crossing but there is background shielding to the crossing in the form of vegetation, which will limit the effects of low sun.

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:

Foliage can be an issue if not regularly cut back. Fog, ice, mud can be issues at certain times of the year and sun glare. During the winter months Meldreth Road AHB is on a regular gritting route.



#### Upside across crossing.





#### Downside across crossing.



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 not create a risk of vehicles grounding on the crossing.

#### Assessor's notes:

Risk of grounding sign is on both sides of the crossing but not required as crossing is relatively flat and has passed the SIN109 inspection.

# 3.3 AT THE CROSSING – BLOCKING BACK

The road layout at or close to the crossing does not result in identified incidents of traffic queuing over the crossing. Blocking back risk is known to occur Never known to occur.

No incidents of blocking back are recorded.

There are identified issues with the road layout, parked cars or other features that could stop traffic. In addition, the road is a known diversionary route.

#### Assessor's notes:



Blocking back has never known to occur at this crossing but there are right turns into local residential homes near the crossing on both sides that could cause blocking back. There are also no yellow lines on floor near level crossing so cars could park on the road near the level crossing which can also cause blocking back.

# 3.4 AT THE CROSSING – ANOTHER TRAIN COMING RISK

Trains are known to occasionally pass each other at this crossing.

#### Assessor's another train coming notes:

As stated above, trains are occasionally known to pass each other, if the train frequencies increase then the chance of a second train coming will increase.

Due to the timetable at this crossing another train passing at the same time is a very high likely hood. This section of line has a standard timetable pattern from Shepreth Branch JN to Royston. These services mostly two forms of formations which consist of four and eight car units. As for the freight side there's a small number on this section of line measuring 400mtrs long but doesn't take into account any extra which are planned outside the trust system on a daily basis.

#### 3.5 INCIDENT HISTORY

A level crossing safety event has been known to occur at Meldreth Road AHB level crossing in the last twelve months.

#### Assessor's incident history notes:

Nov 5, 2021, SMIS4314599 Meldreth Road AHB At 09:47 hours the driver of 2C21 09:27 Cambridge. London King's Cross, reported a near miss at Meldreth Road AHB level crossing, between Meldreth and Shepreth with a member of the public. The person ran onto the crossing, the driver sounded the horn and the person stepped back clear. The driver did not apply the emergency brake stating that there was no time due to the proximity, the driver was fit to continue.

#### Red light violations / barrier weaving

The chance of a vehicle user deliberately misusing the crossing is estimated as About average.

Measures have been taken to mitigate deliberate misuse.

#### Assessor's incorrect use notes:

LED Wig Wags have been fitted to all of the RTL's.

#### 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	52s	Yes	No
Down line	52s	Yes	No



#### Assessor's notes and observations on strike in times:

Strike in times comply with standards and do not seem excessive – if there is a speed restriction within the crossing then the strike in times will be greater.

# 4. ALCRM CALCULATED RISK

#### Meldreth Road AHB level crossing ALCRM results.

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

- Distracted / forced by dog (loss of control), Does not observe lights/barriers
- Slips, trips, falls or snagged on crossing, Unaware of crossing
- Railway cause: slow moving / short warning, Train unexpected
- Blocking back, Late braking, Incorrect use (eg. non-adherence with level crossing road traffic light signals)
- Stuck or grounded on crossing, Fails to observe level crossing, Parked on level crossing
- Road traffic accident, Second train coming, Stranded / failed on crossing
- Sunlight obscures crossing/lights or view up / down track, Turns onto the railway
- Poor crossing visibility
- Railway cause: failure to detect approaching train, lights / barriers or obstacle detection equipment fails to
  operate, signaller or other workforce, train driver





	Risk per Traverse (Letter)	Collective Risk (Number)	
is:	D	2	
	Risk per Traverse (FWI)	Collective Risk (FWI)	
Cars / car-based vans / quad bikes	0.00000010	0.009560228	
Large vans / small lorries / large 4x4s	0.00000019	0.001039463	
Buses / Coaches		0.000013289	
HGVs	0.00000004	0.000054631	
Tractors / large farm vehicles		0	
Pedal / motor cyclists		0.003981931	
Pedestrians		0.001605617	
Horse Riders	0.00000176	0	
Animal Herders		0	
Vehicles user in pedestrian mode		0	
Train Passengers	0.00000001	0.000064415	
Train Staff	0.00000003	0.000211033	
Derailment Risk		0.00134036	
Weighted Average (Users)	0.00000027		
Total Risk		0.017870966	
	Average Consequence	0.653003045	
	Collision Frequency	0.027367355	



# 5. OPTION ASSESSMENT AND CONCLUSIONS

# 5.1 OPTIONS EVALUATED

The options evaluated to mitigate the risks at Meldreth Road AHB crossing include:

Option	Term	Risk per Traverse	Collective Risk	FWI	FWI Difference	Cost	Benefit Cost Ratio	BCR with GDF	Status	Comments
Safety campaign	Short Term	D	2	.01770566	000165306	£500	N/A		Accept/ongoing	This would be carried out by the Level Crossing Manager on his regular inspections to the site and will be supported by the BTP.
Close via diversion and overbridge	Long Term	М	13	0	017870966	£50,000,000	0.02	0.05	RECOMMENDED Reject.	The diversion route could link up to the existing A10 road
Install ANPR cameras	Traffic Change Option	D	2	.016217906	00165306	£136,000	0.12	0.3	Reject.	Preferred option if MCBOD/CCTV does not proceed – passes CBA and whilst poor behaviour is not prevalent here would be an effective behaviour modifier
Standing Red man	Traffic Change Option	D	2	.017540354	000330612	£25,000	0.62	1.55	Reject.	Dog Walkers and other crossing users would get a warning at head height
Close via over bridge	Long Term	M	13	0	017870966	£10,000,000	0.12	0.3	Reject.	A bridge would need to cater for use by pedestrians with push chairs etc. and possibly for horses and accommodate maximum height overheads, which would mean that the cost is relatively high.
Upgrade to MCB- OD/CCTV	Long Term	Н	4	.001084697	016786269	£3,500,000	0.17	0.425	Accept.	Natural Upgrade to MCB-OD could be considered here – would need to consider crossing redesign

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**

Assessor's notes:

Meldreth Road is an AHB crossing with two half-width barriers and four RTL on the Cambridge to London Kings Cross Line. It is monitored from Cambridge signal box and is located on Meldreth Road southwest of the village of Shepreth in the county of Cambridgeshire, providing access to the village of Meldreth. The crossing is on the direct main road between the villages of Meldreth and Shepreth, there is an alternative route along the busy and congested A10 and would involve a detour of up to 8km so whilst this is possible it may be unpalatable in terms of crossing usage.

Trains are time tabled to run for 20 hours a day and mainly consist of passenger and some freight, but trains can run up to 24 hours a day, 7 days a week including bank holidays (UK only), these non-timetabled trains can be engineering trains or on track plant and can run in any direction on any line.

At the level crossing there are overhead line wires which are 16ft-6" high and carry a live current of 25KVH, these are live at all times

On the downside there is a nature reserve approximately 300 metres from the crossing which is used frequently by local people and especially dog walkers, most of them would have to cross over Meldreth Road AHB either on foot or by bicycle but since the start of the coronavirus pandemic footfall has risen over the crossing mainly by local people taking exercise.

#### Options to be considered: -

**Closure by any means – By Diversionary Route** would normally be the preferred option and in reality, this could be achieved from an alternative route along the busy and congested A10, but this may involve a detour of up to 8km. On this basis, it may not be considered feasible to close the crossing without an alternative means of crossing the railway at the site of the current crossing. Therefore, this option would be very difficult to achieve. **By Bridge or Under-Pass** - There are residences either side of the road at the crossing, which would make a bridge technically difficult and expensive. There is also a significant skew, which would require a longer bridge increasing the potential cost. There are dykes in the vicinity of the crossing on the Upside. The potential for flooding would have to be considered in the design. Hence the costs of an underpass are considered to be higher than for a bridge. Again, this option looks difficult to achieve.

**Closure by By-Pass - There** is potential to divert Meldreth Road to Barrington Road and cross the railway at Shepreth station (now an MCB-CCTV Crossing). This option requires the construction of about 800m of new undesignated road and there may need to be an additional footbridge to maintain pedestrian access along Meldreth Road. Bus routes that currently pass down Meldreth Road would have to be diverted past the station and down the new road. Overall cost would be difficult to quantify and may need to be considered as part of a major highways project/if at all after conversion of Shepreth Station crossing. There may also be objections to the construction of the road and the re-routing of traffic. At the optioneering meeting held on the 12/02/20 these was rejected due to cost being disproportionate to benefit. At the last optioneering meeting held on the 05<sup>th of</sup> May 2021 these options were rejected due to the cost being disproportionate to safety benefit. **At the optioneering meeting held on the 30<sup>th</sup> of May 2021** these options were rejected due to the cost being disproportionate to safety benefit.

**Upgrade to MCB-OD/CCTV** - It is not clear if an MCB-OD is feasible in this location due to proximity to the MERLIN radio telescope and it may not be possible to get a licence. It is understood that Meldreth Road lies just inside the 6.5km contour and that even if the scanner is directed away from the MERLIN radio telescope, there is theoretical potential for interference within 6.5km. Possible barrier down times would need to be considered if this type of option were to be taken forward. It may again as per Shepreth Station Crossing; be a better option to consider converting to MCB-CCTV or putting forward for AHB+ trial site possibly. At the last optioneering meeting held on the 12/02/20 this was accepted subject to feasibility. At the optioneering meeting held on the 05<sup>th of</sup> May 2021, this option was rejected due to the upgrading of current crossing to a CCTV crossing. **At the optioneering meeting held on the 20<sup>th</sup> of July 2022, this option was accepted as it is due to be completed late 2024.** 





**Install ANPR cameras -** Preferred option if MCB/OD does not proceed or is delayed – passes CBA and whilst poor behaviour is not prevalent here would be an effective solution to encourage good continuous behaviour by road users. At the optioneering meeting held on the 12/02/20 this was rejected but will be revisited depending on census results. At the last optioneering meeting held on the 05th of May 2021, this option was put on hold depending the outcome of a new census. At the optioneering meeting held on the 20th of July 2022, this option was rejected as the crossing is due to be upgraded to a MCB-CCTV crossing.

**Standing Red Man-** Not really a high level of pedestrian usage recorded here but could be considered as an effective mitigation at this location. At the optioneering meeting held on the 12/02/20 this was accepted and passed over to the sponsor. At the last optioneering meeting held on the 05th of May 2021, this option was put on hold depending the outcome of a new census. At the optioneering meeting held on the 20th of July 2022, this option was rejected as the crossing is due to be upgraded to a MCB-CCTV crossing.

Safety campaign- This is ongoing by the level crossing manager on his regular visits and is supported by the BTP.

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# ANNEX A – ADDITIONAL PHOTOGRAPHS



# Additional satellite view of the crossing.



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Cambridge panel 'A'.







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





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





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





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



# 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	Proba	ability	FWI/traverse		
Ranking	Upper	Lower	Upper	Lower	
А	1 in 1	1 in 500000	1	0.000002	
В	1 in 500000	1 in 2500000	0.000002	0.0000004	
С	1 in 2500000	1 in 12500000	0.0000004	0.0000008	
D	1 in 12500000	1 in 62500000	0.0000008	0.00000016	
E	1 in 62500000	1 in 125000000	0.00000016	0.00000008	
F	1 in 125000000	1 in 250000000	0.00000008	0.00000004	
G	1 in 250000000	1 in 500000000	0.00000004	0.00000002	
Н	1 in 500000000	1 in 100000000	0.00000002	0.00000001	
I	1 in 100000000	1 in 200000000	0.00000001	0.000000005	
J	1 in 200000000	1 in 500000000	0.000000005	0.000000002	
К	1 in 500000000	1 in 10000000000	0.000000002	0.000000001	
L	1 in 1000000000	Greater than 0	0.000000001	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	0.05000000	0.01000000
3	0.01000000	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	0.00005000	0.000001000
11	0.000001000	0.00000500
12	0.0000005	0
13	0.00E+00	0.00E+00

# JP9
**TRANSPORT AND WORKS ACT 1992** 

TRANSPORT AND WORKS (INQUIRIES PROCEDURE) RULES 2004

THE NETWORK RAIL (CAMBRIDGE RE-SIGNALLING) ORDER

**PROOF OF EVIDENCE – LEVEL CROSSINGS** 

LIST OF INCIDENTS

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Date	Incident Details
28/07/2006	The driver of 0Z55 reported that a tractor and Trailor went over Milton Fen AHB crossing as he approached and took the down side barrier arm off.
26/01/2007	At 14:43 hours the driver of 1T60 reported seeing a person on the foot crossing at Milton Fen Level Crossing while the barriers were down.
10/03/2007	At 16:38 driver of 1T10 reported a near miss with a red Ford Fiesta at Milton Fen Crossing.
09/12/2007	At 23:15 hours the driver of 2T70 22:26 Kings Lynn - Kings Cross reported that a car had gone across Milton Fen automatic half barrier level crossing in front of the train.
01/10/2009	Vandalism - object struck on crossing.
29/11/2009	Vandalism - object struck on crossing.
19/06/2010	2 children were reported to be on the track Water beach side of Milton Fen Crossing. There were both wearing hooded clothing.
29/06/2010	2 people trackside near crossing.
17/04/2011	Four Horses on the line at the crossing.
06/06/2011	Suicidal individual.
31/05/2012	Vandalism - object struck on crossing - signalling troughing lid.
01/07/2012	<b>DELIBERATE ACT FATALIT</b> Y - At 1405 hours the driver of 1N57, (Cross Country 1325 Stansted Airport – Birmingham New Street, formed by unit 170397) reported that the train had struck a person on the Down Main line at Milton Fen AHB level crossing, at 59m 10ch, between Cambridge and Water beach. BTP report: Male was voluntarily in patient who was on home

	leave. Person had previous suicide attempts and prolonged depression. Coroner's verdict - Suicide whilst suffering from a depressive illness.
12/12/2014	4 horses on line.
07/10/2016	Road vehicle suspected to have knocked off Level Crossing barrier at Milton Fen AHB Level Crossing.
06/01/2017	Trespass - BTP advised that a member of public reported 2 persons walking along the railway in the Milton Fen level crossing area.
17/02/2019	At 15:24 hours the Driver of 1G59 14:25 Stansted Airport - Ely observed a stationary car in the middle of Milton Fen AHB level crossing with the barriers in the lowered position. The driver slowed the train down & sounded up, the car then subsequently moved.
11/12/2020	LC Misuse - Cyclist crossed over Milton Fen AHB LC in front of 1K72.
07/04/2021	At 06:02 hours the driver of 1N41 05:57 Cambridge – Birmingham New Street, reported that the train had struck a person on the Down Main line at Milton Fen AHB Level Crossing, between Cambridge North and Water beach. The BT Police reported at 07:23 hours that having obtained a statement from the driver, they had deemed the incident as non-suspicious. BTP HAVE DEEMED THIS INCIDENT A SUSPECTED SUICIDE AFTER APPLYING THE OVENSTONE CRITERIA: BEHAVIOUR DEMONSTRATED SUICIDAL INTENT AS THE MALE PLACED HIMSELF IN THE PATH OF AN ONCOMING TRAIN OF HIS OWN VOLITION. THE DRIVER OF A GREATER ANGLIA SERVICE REPORTS APPROACHING THE LOCATION WHERE THE CROSSING BARRIERS APPEARED TO BE IN THE DOWN POSITION WHEN THEY SAW A MALE WALK ON TO THE TRACKS AND IN TO THE PATH OF THE TRAIN. THE DRIVER APPLIED THE BRAKES AND SOUNDED THE HORN, THE MALE STARTED TO RUN IN FRONT OF THE TRAIN BUT THE DRIVER COULD NOT AVOID STRIKING THE MALE. THE MALE STARTED TO RUN IN FRONT OF THE TRAIN BUT THE DRIVER COULD NOT AVOID STRIKING THE MALE. THE DRIVER WAS UNSURE IF THE MALE WAS MAKING A DELIBERATE ACT OR ATTEMPTING TO CROSS BEFORE THE TRAIN CAME THROUGH. NOK REPORTED DECEASED MISSING AFTER THE EVENT AND SAW THE INCIDENT ON MEDIA PRIOR TO BEING CONTACTED BY BTP.
08/04/2021	At 09:49 hours a member of the public reported that one of the barriers of Milton Fen AHB level crossing had been knocked off. There was no sign of the vehicle involved.

13/09/2021	At 21:05 hours Cambridge SSM advises of crossing misuse at Milton Fen AHB level crossing. The Driver of 1K93 reported a cyclist zig zagged past the barriers and over the crossing.
12/04/2022	At 18:55 hours Cambridge SSM reported to the WA TRC crossing misuse where a driver of a slow moving vehicle requested to cross Milton Fen AHB level crossing and failed to call back.

Date	Incident Details
01/02/2005	A road user advised signaller at Cambridge that due to sun shining in his eyes he had hit the barrier at Dimmock's Cote causing damage to barrier arm.
14/03/2005	Vehicle struck barriers.
26/03/2005	1K88 had a near miss with a car at Dimmock's Cote LC.
31/08/2005	Lorry struck and knocked off the up side barrier at Dimmock's Cote LC.
28/11/2006	A white van has damaged Dimmock's Cote LC AHB's barriers.
28/04/2008	Tractor struck and knocked off the down side barrier boom at Dimmock's Cote LC.
19/09/2009	Lorry knocked off 1 barrier arm at Dimmock's Cote level crossing.
05/02/2010	RTA at Dimmock's Cote LC. One of the barriers knocked off by a road vehicle.
18/11/2011	Person arrested at Dimmock's cote LC.
23/07/2012	LC Misuse - Car weaved around barriers at Dimmock's Cote LC damaging them in the process.
13/08/2012	Lorry Stuck Under Level Crossing Barrier at Dimmock's Cote level crossing.
31/10/2012	LC Misuse - 1T97 20:37 Kings Lynn - Kings Cross reported car zig zagged around barriers at Dimmock's Cote LC.
06/08/2013	LC Misuse - RV weaved around Dimmock's Cote AHB LC barriers in front of 2T88 22:28 Kings Lynn - Kings Cross.
26/10/2013	Level crossing misuse - 1T53 (FCC 0656 Kings Lynn – Kings Cross) reported a female inside the lowered barriers at Dimmock's Cote AHB LC.

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	I ractor struck and knocked on the Up side barrier boom at Dimmock's Cote LC.
15/05/2017	Deliberate Act Fatality - At 06:00 hours the driver of 1H83 05:19 King's Lynn – London Liverpool Street, reported observing a oody lying in the six foot on the Ely side of Dimmock's Cote AHB level crossing, between Water beach and Ely. A BTP Inspector arrived on site at 07:35 hours and reported that, having reviewed the evidence, they had deemed the incident a non-suspicious deliberate act. Behaviour demonstrated suicidal intent as the female placed herself in the path of an oncoming train of her own volition.
01/09/2017	At 08:20 hours the Shift Signaller Manager at Cambridge PSB reported that a road vehicle had struck and removed the Up side barrier at Dimmock's Cote level crossing between Water Beach and Ely.
19/11/2021	LC Misuse - 5G61 reported a driver cross Dimmock's Cote AHBC as the barriers were lowering.

Date	Incident Details
25/04/2005	Trespassers (2 youths) on the line at Six Mile Bottom AHB LC.
14/10/2013	NRV - Barriers came down between cab/trailer at Six Mile Bottom LC.
07/07/2015	Unknown RV struck barriers at Six Mile Bottom AHB LC which caused damage.
08/04/2016	At 11:35 hours the driver of 2W10 10:20 Ipswich – Cambridge, reported a near miss at Six Mile Bottom AHB level crossing, on the Single line between Dullingham and Cambridge, with a car which crossed over in front of the approaching train.
14/12/2017	At 1109 a NR MOS reported while at Six Mile Bottom Crossing a vehicle (details supplied) zigzagged around the barriers as they were lowering. The vehicle went to a vets near the crossing. The BTP were advised.
25/10/2019	At 14:30 hours the Driver of 2W16 13:20 Ipswich - Cambridge reported a 4x4 vehicle stopped inside the barriers as he was passing over Six Mile Bottom AHB level crossing. The driver was shaken but was OK to continue to Cambridge. The Greater Anglia TOC log recorded the incident as a near miss. Next service was cautioned through. Vehicle had departed scene and normal running given at 14:53 hours.
23/11/2019	The Driver of 2W23 15:47 Cambridge - Ipswich reported a Land Rover doing a u turn on Six Mile Bottom AHBC level crossing.
03/02/2020	At 15:02 hours reports of crossing misuse at Six Mile Bottom. The Driver of 2W19 13:47 Cambridge - Ipswich reported a car travelling over the crossing while the train was on approach.

Date	Incident Details
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03/02/2020	At 15:02 hours reports of crossing misuse at Six Mile Bottom. The Driver of 2W19 13:47 Cambridge - Ipswich reported a car travelling over the crossing while the train was on approach.

Date	Incident Details
09/01/2005	Member of Public got his foot stuck in a cattlegrid at Dullingham level crossing.
26/10/2006	07:43 Cambridge - Ipswich had been standing at platform when 3 passengers jumped the gates to enable them to board the service.
16/11/2009	Dullingham - 2W19 was delayed due to a car failing on Dullingham Level Crossing.
02/06/2012	LC Misuse - Dullingham Crossing Keeper reported that as he was closing the gates for a train a car deliberately drove at the gate he was closing.
28/07/2016	At 2330 hours, a seemingly intoxicated road vehicle driver was reported to have struck and damaged the gates at Dullingham Level Crossing deliberately. The person was also shouting at the Level Crossing Attendant. A Mobile Operations Manager was advised and asked to attend. Cambridge police were advised under reference number CC2603/2017/0532. The Mobile Operations Manager was advised and departed to attended at 2351 hours but the person had departed. The Level Crossing gate sustained damage to the gate interlocking meaning it could not be locked and protecting signals were held at danger.
26/03/2017	At 11:41 it was reported that the driver of 2W15 (11:12 Cambridge - Ipswich) reported that A passenger had crossed the crossing in front of his train at Dullingham, This was a manned gate crossing. Signaller did not see it happen as was watching the train. The gates were closed to traffic at the time of the incident. No emergency brake applied. Cambridge MOM advised. BTP REF: 216 The driver reportedly told the TOC this was close to a near miss and NOT a near miss Dullingham signaller advised everything was in order at the crossing itself.
18/03/2018	Dullingham signaller reported that at 0914 a youth asked the signaller what time the next train was due signaller advised the youth but then it was announced over the station speakers that the platform had changed the youth then run off the end of the platform jumped over the closed gates to get to the other platform. Signaller reported this to the BTP.
22/11/2020	Member of Public got his foot stuck in a cattlegrid at Dullingham level crossing.

Date	Incident Details
09/02/2005	At 1715 a call was received via the Network rail helpline alleging that at 1830 Croxton barriers had come down on a bus, which then had to reverse.
22/02/2005	1K81 reported to Thetford a bus on the Up Side of the crossing was making contact with barrier arm.
17/06/2005	At 02:27 a report was received that Croxton level crossing barriers were damaged. The Down side arm was fractured, the crossing was not able to be operated normally. This incident was reported to British Transport Police.
26/08/2005	At 15:55 hours the driver of 1K70 12:13 Camb - Horwell Lane, reported to the signalman at Thetford that as his train went across Croxton automatic half barrier level crossing there was a lorry stuck under the up side barriers. British Transport Police advised of the incident.
05/10/2005	At 16:50 hours the barriers at Croxton automatic half barriers had failed with indication in the signal box at Thetford for five or six minutes. The Thetford signaller reported that the police had contacted him advising him that a farm lorry (no details obtained) had made contact with the barriers.
13/10/2005	At 09:27 hours the signalman at Thetford reported that an unknown car had zig zagged around the barriers at Croxton automatic half barriers level crossing
13/10/2005	At 09:27 hours the Signaller at Thetford reported that a road traffic user had rang from Croxton A.H.B. Saying that he had misjudged the stopping distance with regards to the crossing and he's lorry had come to a stand with the drivers cab within the barriers.
01/12/2005	At 09:28 hours the driver of 1K60 08:14 Cambridge - Norwich, reported that a lorry was stuck under the barrier at Croxton automatic half barriers level crossing. The signaller at Thetford was contacted and cautioned trains.
26/03/2006	At 16:22 hours the conductor of 1K78 15:38 Cambridge - Norwich reported to the signaller at Thetford when passing over Croxton level crossing at line speed noticed a blue Mondeo car with the barriers on the bonnet.

14/07/2006	White Van had failed to stop, the barrier has landed on the roof, then the van has reversed which has caught the barrier arm against a raised part above the cab which has caused the damage.
13/09/2006	Driver of train 1M33 reported that there was a car with its bonnet under the barrier. Anglia Television team on site at the time. The driver details were White Van, Reg VF55 TZK. At 1827hrs an Audi estate car reg number Y591TKE zig zag'd past the white van around the lowered barriers.
28/09/2006	At 16:20 the Thetford signaller reported that a lorry had struck the downside barrier at Croxton level crossing.
09/11/2006	At 08:01 A member of public reported that the barriers at Croxton had come down very quick on top of a lorry.
16/01/2007	Lorry knocked off the Upside barrier at Croxton AHB LC.
18/06/2007	1K73 was cautioned through Croxton LC where a 4x4 was stationary on the crossing.
18/06/2007	1M19 suffered a near miss with a car on which misused Croxton Level Crossing.
21/09/2007	1K76 reported a lorry stuck under one of the barriers at Croxton LC.
19/10/2007	Report received at 07:36 that there had been a road traffic accident at Croxton Level Crossing and the car involved had damaged fencing - not barriers at crossing. FMS reports 2 concrete posts and some fencing require replacing.
19/12/2007	Report received at 08:32 from Norfolk Police (ref. 88) that a member of public had reported that crossing at Croxton was damaged.
29/01/2008	Road vehicle struck boom at Croxton AHB LC.
13/06/2008	Trespasser at Croxton LC.
02/04/2009	Car struck barrier.
22/07/2009	Barrier on foreign vehicle - left hand drive view obscured.

17/09/2009	Barriers lowered onto lorry at Croxton LC. Lorry parked too close to the barriers.
0000101100	One triad to have the lowering of the herristic of Priver of an admitted his arrest
08/10/2009	Car thed to beat the lowering of the barriers at Croxton LC. Driver of car admitted his error.
09/10/2009	Signaller reported barrier coming down on lorry at the Croxton Level Crossing.
14/12/2009	Croxton Automatic Half Barrier had been struck by a lorry.
30/03/2010	Lorry attempted to beat the lowering barriers at Croxton level crossing.
21/04/2010	Van became stuck under the level crossing barriers at Croxton LC after ignoring the warning lights.
06/04/2011	Car nearly struck barrier at Croxton level crossing.
18/05/2011	RV wrong side of the white line edging forward with train passing over Croxton LC.
06/10/2011	RV ignored barriers and crossed claiming that they did not come down at Croxton LC.
25/08/2012	LC Misuse - Barriers at Croxton LC came down on car bonnet.
29/08/2012	Cable Theft at Croxton LC.
18/03/2013	LC Misuse - Car zig zagged barriers at Croxton AHB LC in front of 1K78.
28/06/2013	Trespasser at Croxton LC.
02/07/2013	2K85 (GA 1638 Norwich – Cambridge) reported HGV obstructing Croxton Level Crossing with lowered barrier between cab and trailer.
27/07/2013	Car very close to running line at Croxton AHB Level Crossing.
03/08/2013	Car on the crossing at Croxton AHB LC as 1K55 05:37 Norwich – Cambridge.

20/09/2013	1K60 (GA 0812 Cambridge – Norwich) reported that a HGV was stuck under the upside barrier of Croxton AHB Level Crossing.
25/11/2013	1L05 (EMT 0647 Liverpool Lime St – Norwich) reported tractor used Croxton LC with the barriers lowering.
18/03/2014	Military slow moving road vehicle failed to report Croxton Level Crossing clear after use.
29/07/2014	Barriers lowered on tanker lorry at Croxton AHB LC.
06/12/2014	Barriers failed down at Croxton AHB LC and users had been weaving around the barriers.
03/12/2015	1L08 09:52 Liverpool Lime Street - Norwich; Foreign lorry cab/trailer stuck under lowered barriers at Croxton LC.
02/02/2016	The Driver working 1L14 1552 Liverpool Lime Street to Norwich reported that a member of the public had shone a laser into his eyes whilst the service passed through Croxton Level Crossing (AHBC-X). BTP were advised.
23/03/2016	Trespass - 2K55 06:05 Cambridge - Norwich adult walking in the 4ft on the approach to Croxton level crossing.
30/12/2016	Trespass - 1K83 (Greater Anglia 1540 Norwich – Cambridge) reported a youth trespasser on the line near Croxton Level Crossing.
01/03/2017	Lorry under and struck by lowering barriers at Croxton Level Crossing.
24/06/2017	RV's swerving around failed barriers at Croxton AHB's level crossing.
10/02/2018	1K78 (16:10 Cambridge - Norwich) reported that he was on the Down Line and the Up side barrier at Croxton AHB was between the cab and the trailer of a lorry.
26/09/2019	1K77 reported a van inside the barriers at Croxton AHB level crossing facing towards the train.
13/07/2020	RV user struck and removed barrier at Croxton AHB level crossing.
26/08/2020	At 12:17 hours the Cambridge Shift Signaller Manager advised a member of the public had driven through Croxton AHBC level crossing, between Thetford and Harling Road, whilst the barriers were in the lowered position, destroying the Up side boom in

	the process. S&T advise member of public didn't see barriers and just drove through the YN (Up-side) barrier in an articulated
	lorry.
17/11/2020	Flat-bed lorry clipped the barrier at Croxton LC and damaged the barrier.
15/08/2021	Car weaved around lowered barriers at Croxton AHB LC as 2K78 approached.
28/09/2021	Barrier rested on top of a car at Croxton AHB LC.
31/03/2022	Truck stuck under Upside barrier at Croxton AHB LC.
07/06/2022	Prison van struck and damaged a barrier at Croxton AHB LC.
06/11/2022	Car struck the barrier at Croxton LC AHB.
15/11/2022	Van struck the barrier as it was lowering at Croxton AHB LC.
26/11/2022	White transit van struck and damaged the barrier at Croxton AHB LC.

Date	Incident Details
19/01/2005	The Driver of 1L14 reported that as he approached Waterbeach AHB a person walked throught the barriers. The driver had to make a full emergency brake application. Britsh Transport Police advised.
22/04/2006	At 22:30 hours the driver of 1L31 17:52 Liverpool Lime Street - Cambridge, reported a near miss at Waterbeach automatic half barrier level crossing with a cyclist who avoided the lowered barriers and crossed in front of the train.
28/07/2006	At 21:20 hours the driver of 1K92 21:12 Cambridge – Norwich, reported a near miss at Waterbeach level crossing with trespassers. The people had alighted from a train on the Down Platform and were crossing behind the train as 1K92 approached on the Up Line.
10/10/2006	At 09:11 hours the driver of 1N37 08:21 Stansted Airport – Birmingham New Street, reported a near miss at Waterbeach automatic half barrier level crossing with a white van crossing in front of the train. The driver made an emergency brake application. The Network Rail mobile operations manager from Cambridge attended and reported on arrival that road traffic on the crossing was very congested due to road traffic accidents on nearby trunk roads. To avoid an incident with traffic backing-up on the crossing, Waterbeach automatic half barrier was placed under local control at 10:20 hours.
17/01/2007	At 20:24 the Cambridge power signal box shift signal manager reported 1T73 noticed a female on foot over Waterbeach Level crossing as his train approached
08/08/2007	At 06:30 hours the driver of 2H90 reported a level crossing misuse at Waterbeach. The driver reported that on the approach he observer that the crossing was closed for road traffic, but a pedestrian walked across the level crossing in front of his train.
07/03/2008	Driver of 1T99 05:45 London Kings Cross to Kngs Lynn reported two customers for his service wrong side of barriers, and they then walked round last coach of service on up line to join it.
02/05/2008	At 16:14 hours the Shift Signaller Manager at Cambridge reported that road vehicles were stopping on the crossing at Waterbeach automatic half barrier level crossing, due to an accident on the A14 which caused traffic to be diverted and build up over the crossing.

23/12/2009	At 09:26 Waterbeach Level Crossing had failed as a result of a vehicle striking and damaging 2 barriers. British Transport Police had been informed and attended site REF:108
20/08/2010	Waterbeach AHB - 1T57 reported a girl crossing the track in front of his train.
06/06/2011	Level Crossing Incident - Barriers landed on lorry at Waterbeach LC
18/09/2011	1T76 18:28 Kings Lynn – King's Cross, near miss at Waterbeach AHB level crossing with a person who crossed immediately in front of the train
18/02/2013	Level crossing misuse - two youths ran across Waterbeach Level Crossing as the gates were closing
10/05/2013	Level crossing misuse - 1T54 (FCC 0725 Kings Lynn – Kings cross) reported a person had walked across Waterbeach Level Crossing to catch the train.
12/09/2013	Level crossing misuse - 1K82 (GA 1812 Cambridge – Norwich) reported a near miss at Waterbeach AHB Level Crossing with a person riding a bicycle.
23/10/2013	Level crossing misuse - Female pedestrian seen weaving around the lowered barriers at Waterbeach Level Crossing.
07/03/2014	LCMNM - Near Miss: 2K85 16:38 Norwich – Cambridge with a person who crossed over Waterbeach LC.
10/08/2014	LC near miss - 1N67 (Cross Country 1825 Stansted Airport – Birmingham New Street) reported a near miss at Waterbeach station AHB LC with a person
28/03/2015	LC Near Miss - 1T19 08:54 King's Lynn – London King's Cross; with a person who crossed over Waterbeach AHB LC.
02/05/2015	At 14:58 hours, a young boy contacted the signaller via the telephones system at Waterbeach Level Crossing asking what time the next train was due. When advised that the next train was in 40 minutes the Member of the Public advised they would trespass in response.
25/05/2015	LC misuse- person ducked under lowering barriers at Waterbeach Level Crossing.

25/05/2015	LC Misuse - 1K77 12:40 Norwich – Cambridge witnessed a person cross over Waterbeach Station AHB LC in front of the train
10/07/2015	LC Near Miss - 1T03 04:55 Kings Lynn - Kings Cross with a person on Waterbeach AHB LC.
14/07/2015	LC Misuse - Person on bike with 2 year old crossed over Waterbeach LC as the barriers had been lowering.
10/08/2016	LC misuse- suicidal person was reported on or around Waterbeach Level Crossing.
03/09/2016	LC Misuse - Person walked across Waterbeach AHB level crossing as 1T19 08:54 Kings Lynn - Kings Cross approached
03/10/2016	LC Misuse - 1K80 17:12 Cambridge - Norwich; cyclist weaved around Waterbeach AHB level crossing.
22/10/2016	LC Near miss- 1N53 (Cross Country 1127 Stansted Airport – Birmingham NS) reported a near miss at Waterbeach AHB LC with an elderly male pedestrain
27/10/2016	LC misuse- 1K77 (GA 1240 Norwich – Cambridge) reported 3 males had used Waterbeach Level Crossing with the train approaching.
08/11/2016	LC misuse- 1T09 (GoVia 0610 Kings Lynn – Kings Cross) reported seeing three males run across Waterbeach LC with barriers lowered.
06/01/2017	LC Misuse - 1T04; person crossed over Waterbeach AHB LC as train approached platform.
27/01/2017	LC misuse- 1K59 (Greater Anglia 0633 Norwich – Cambridge) reported a cyclist weaved around the lowered barriers at Waterbeach LC.
02/06/2017	LC Near Miss - 1T19 (08:57 Kings Lynn – London King's Cross)- reported a near miss with at pedestrian at Waterbeach Station LC.
21/03/2018	LC Near Miss – 1T39 (13:54 Kings Lynn - Kings Cross) reported a near miss with an elderly couple at Waterbeach L/C
29/03/2018	At 17:45 hours the driver of 1T11 17:10 Downham Market - London King's Cross, formed by unit 387115, reported to have struck a vehicle on the Up Main line at Waterbeach (AHB) Level Crossing - deliberate act- attempted suicide

27/12/2018	LC Misuse - Person on bicycle crossed Waterbeach level crossing with 1T69 21.44 King's Lynn - King's Cross in the platform.
08/04/2019	LC Misuse - Two member of public misused the crossing to gain access to train at Waterbeach Level Crossing.
25/05/2019	LC Near Miss - 1T57 18:44 King's Lynn – King's Cross with a person running over Waterbeach AHB LC.
05/08/2019	LC Misuse - Driver 1K96 reported person jumped over the barriers at Waterbeach level crossing.
19/01/2020	LC Near Miss - 1T63 20:43 Kings Lynn – King's Cross with a person crossing over Waterbeach AHB LC. EBA applied. (WA).
26/07/2020	LC Misuse - The driver of 1K85 reported a person on a bike crossed in front of the approaching train at Waterbeach Level Crossing.
01/08/2021	LC Misuse - Male crossed in front of 1K74 at Waterbeach Crossing.
28/08/2021	LC Near Miss - 1T13 07:44 Kings Lynn – London King's Cross with a teenage girl crossing Waterbeach AHB station level crossing.
26/03/2022	LC Misuse - Person ran in front of 1T26 at Waterbeach AHB level crossing.

Date	Incident Details
10/08/2006	2C12 near miss with pedestrians at Meldreth LC.
07/02/2007	Down side boom knocked off Meldreth AHB Crossing by unknown vehicle.
08/10/2008	1T67 reported that a MOP misused the crossing at Meldreth.
15/08/2009	Lorry stops fouling down line at Meldreth LC.
24/02/2011	1C64 13:15 Cambridge – London King's Cross near Miss Meldreth AHB Crossing.
08/05/2013	LC Misuse - 1C05 09:15 Kings Cross - Cambridge witnessed person pushing council machine around lowered barriers at Meldreth Road AHB LC.
02/09/2013	TSBS - 2C78 17:55 Cambridge - Kings Cross ran over ballast placed on the rail head at No.23 LC Meldreth. No damage to train.
05/09/2013	Non-Rail vehicles- 2C66 (FCC 1155 Cambridge – Kings Cross) reported that a Van was slightly obstructing the down side of Meldreth Road LC.
16/12/2018	LC Misuse - Car zig - zagged around the lowered barriers at Meldreth Road AHB level crossing as 2C20 11:02 Kings Cross - Cambridge approached.
05/11/2021	LC Near Miss - 2C21 09:27 Cambridge – London King's Cross with a person crossing Meldreth Road AHB LC.

LIST OF INCIDENTS

# JP10

## **TRANSPORT AND WORKS ACT 1992**

## TRANSPORT AND WORKS (INQUIRIES PROCEDURE) RULES 2004

# THE NETWORK RAIL (CAMBRIDGE RE-SIGNALLING) ORDER

# STATEMENT OF CASE

## 20 January 2023

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## **GLOSSARY OF TERMS**

Term/Acronym	Meaning
1992 Act	The Transport and Works Act 1992
2006 Rules	The Transport and Works (Applications and Objections Procedure) (England and Wales) Rules 2006
Application	The application for the Order
АНВ	Automatic Half Barrier
ALCRM	All Level Crossing Risk Model
CCC	Cambridgeshire County Council
СРСА	Cambridgeshire and Peterborough Combined Authority
DNO	Distribution Network Operator
EIA	Environmental Impact Assessment
Estate	J Cole (Kilverstone Estate) – Gary Jon Bowman: The Right Honourable Patrick Vavasseur Fourth Baron Fisher of Kilverstone and Mills & Reeve Trust Corporation Limited
FOC	Freight Operating Company
FWI	Fatality and Weighted Injury score

GCSPS	Greater Cambridge Shared Planning Service		
GPDO	Town and Country Planning (General Permitted Development) (England) Order 2015		
HSWA	Health and Safety at Works etc. Act 1974		
Inquiries Rules	The Transport and Works (Inquiries Procedure) Rules 2004 (S.I. 2004 No. 2018)		
LCM	Level Crossing Manager		
LoD	Limits of deviation		
МСВ	Manually-Controlled Barrier		
MCB-CCTV	Manually Controlled Barrier monitored by CCTV		
MCB-OD	Manually Controlled Barrier monitored by obstacle detection		
MGH	Manned Gate Barrier		
NCC	Norfolk County Council		
Network	Rail infrastructure network of Great Britain		
NPPF	National Planning Policy Framework (NPPF) 2021		
NPS	National Policy Statement for National Networks		
NR	Network Rail Infrastructure Limited		
NRA	Narrative Risk Assessment		
NSIP	Nationally Significant Infrastructure Project		
OD	Obstacle Detection		
Order	The Network Rail (Cambridge Re-Signalling) Order 202[x]		
ORR	Office of Rail and Road		
Project	The proposed re-signalling of the Cambridge 'interlock' area and the upgrade of the relevant level crossings		
REB	Relocatable Equipment Building		
ROGS	Railways and Other Guided Transport Systems (Safety) Regulations 2006		
RPT	Risk Per Traverse		
SICA	Signalling Infrastructure Condition Assessment		

SMS	Safety Management System
ТОС	Train Operating Company

### 1 INTRODUCTION

- 1.1 On 5 August 2022 Network Rail Infrastructure Limited (NR) submitted an application (Application) to the Secretary of State for Transport to make the Network Rail (Cambridge Re-Signalling) Order (Order). The Application was made under sections 1 and 5 of the Transport and Works Act 1992 (1992 Act) [APP18].
- 1.1 NR proposes the re-signalling of the Cambridge station interlocking area and the upgrade of a number of level crossings (**Project**). The overall objective of the Project is to renew the life expired signalling assets in the Cambridge 'interlocking' area and the replacement of the mechanical signalling system, constructed during the 1980s, with a modern digital signalling system managed from a centralised location, namely the Power Signal Box at Cambridge Station. If the Project were not to be implemented, there would be a risk of poor asset reliability and reduced capacity on the relevant sections of railway in the event that routes or assets are out of use because of signalling failures.
- 1.2 All works to be carried out in relation to the Project will either be the subject of separate applications for planning permission and/or prior approval to the relevant local planning authority or will be carried out as permitted development under Class A of Part 8 and Part 18 of Schedule 2 to the Town and Country Planning (General Permitted Development) (England) Order 2015 (GPDO) [APP22].
- 1.3 As a result, no part of the works is proposed to be authorised by the Order and the Application does not include a request for deemed planning permission under section 90(2A) of the Town and Country Planning Act 1990 (**1990 Act**). Rather, the Order, if made, would authorise various incidental matters in order to enable the Project to proceed. In particular, the Order would authorise the compulsory acquisition and temporary use of land and the stopping up of streets required in connection with the Project.
- 1.4 The Application was submitted in accordance with the Transport and Works (Applications and Objections Procedure) (England and Wales) Rules 2006 (S.I. 2006 No. 1466) (2006 Rules) [APP23] and has been the subject of publicity and notices in accordance with the 2006 Rules.
- 1.5 The Transport and Works (Inquiries Procedure) Rules 2004 (S.I. 2004 No. 2018) (Inquiries Rules) [APP25] require NR to provide a Statement of Case and this document is NR's Statement of Case for the purpose of the Application. It contains full particulars of the case NR intends to make at Inquiry in support of the Application. The statement is to be served under Rule 7 of the Inquiry Rules.

## Structure of the Statement of Case

- 1.6 The Statement of Case is arranged as follows:
  - a) Section 1 describes the Project;
  - b) Section 2 describes the Applicant;
  - c) Section 3 describes the Application documents;
  - d) Section 4 describes the context of the Application;
  - e) Section 5 provides an overview of the consent routes to obtain planning permissions to authorise the works and the relevant national, regional and local policies relating to the Project;

- f) Section 6 describes the strategy for acquisition of land and rights required to deliver the Project;
- g) Section 7 describes the proposed level crossings upgrades;
- h) Section 8 describes consultations undertaken in relation to the Project;
- i) Section 9 summarises the funding for the Project;
- j) Section 10 describes how the Project will be delivered, the key milestones and parties involved; and
- k) Section 11 summarises the objections and representations.
- 1.7 Appendix A contains a list of the documents which NR intends to refer to or submit in evidence at the Inquiry. Appendix B is the notice required by Rule 7(2)(b) of the Inquiries Rules containing details of the locations and times at which the documents will be available for public inspection prior to the opening of the inquiry.
- 1.8 In this Statement of Case, reference numbers for the documents that have been included in the list in Appendix A are given in square brackets and in bold.

## **Project overview**

- 1.9 The Cambridge interlocking infrastructure was commissioned in 1982 and is approaching the end of its reliable life. In railway signalling terminology, an 'interlocking' is an arrangement of signal apparatus that prevents conflicting rail movements through an arrangement of tracks such as junctions or crossings. An interlocking is designed so that it is impossible to display a signal to proceed unless the route to be used is proven to be safe.
- 1.10 The Cambridge interlocking has a number of obsolete components as well as severe wire degradation and so a renewal is required. Within the Cambridge interlocking area, the existing Dullingham, Chippenham Junction and Bury St Edmunds Signal Boxes, that form part of the signalling system, are all mechanical signal boxes (involving traditional entrance and exit signal box control panels) that are now considered to have reached the end of their useful lives.
- 1.11 The Project aims to extend the life of the existing interlocking system by a further 35 years and to improve the reliability and performance of the signalling system in the Cambridge area.
- 1.12 The Project will involve the following works:
  - a) the decommissioning of the Dullingham, Chippenham Junction and Bury St Edmunds signal boxes; the existing mechanical signal boxes will be decommissioned and replaced with a modern, digital Visual Display Unit workstation located at Cambridge Station;
  - b) the upgrade of the signalling power supply in the area including the installation of relocatable equipment buildings (**REB**) and a power supply along the route;
  - c) the upgrade of the existing telecoms network to a modern fixed telecommunications fibre optic network where required;
  - d) the renewal of the signalling at Chippenham Junction; and
  - e) re-locking, and thereby extending the life of, six adjacent interlock areas. A re-lock involves changing the interlocking sequence of the signalling system so that a signalling lever move

that was previously not possible is made possible (or vice versa) without changing what each signalling lever actually does.

- 1.13 In addition, the Project will provide for the upgrade of seven level crossings and the installation of REBs and ancillary works as further set out in in section 7 of this Statement. The upgrade of the level crossings will provide both safety and cost benefits when undertaken as part of the Project.
- 1.14 The full outcomes of the risk assessment for each level crossing and the proposed upgrades are described in detail in section 7 of this Statement. In summary, all seven of the level crossings scored highly in terms of risk on the ALCRM assessment with the preferred renewal option at each being either a full-barrier solution, with a Manually Controlled Barrier with Closed Circuit Television (MCB-CCTV), or a Manually Controlled Barrier monitored by Obstacle Detection (MCB-OD). The upgrade will improve the Fatality and Weighted Injury Score (FWI)<sup>1</sup> for each crossing and NR Anglia Route overall due to the total combined effects of the proposed upgrades. In addition, the upgrade will enable compliance with the Office of Rail and Road's (ORR) requirement to improve safety by moving away from automatic half-barrier crossings. Some elements of the works at these level crossings will take place outside of NR's existing operational boundary and land ownership.
- 1.15 The upgrades will also improve the pedestrian environment (increased footway size and the introduction of tactile threshold paving) at each of the level crossings in line with the ORR Guidance.
- 1.16 In addition, the Project has identified programme and cost benefits of undertaking the above level crossings upgrades, as follows:
  - a) combined signalling upgrade as part of the wider Project reducing capital cost through increased engineering and construction synergies;
  - b) single source of agreed funding for the above; and
  - c) reduced impacts on train services, the surrounding road network and wider environment in terms of undertaking the proposed construction and signalling works (i.e. reduced need to undertake line or road closures at later dates).
- 1.17 The wider benefits of the Project include:
  - a) renewal of existing assets to enable safe operation of the railway;
  - b) improved reliability of the signalling infrastructure;
  - c) improved performance of the signalling infrastructure;
  - improved Fatality and Weighted Inquiry scores in compliance with ORR requirements, improving safety by moving away from automatic half barrier crossings at the relevant level crossings;

<sup>&</sup>lt;sup>1</sup> FWI is detailed as a numerical value measuring Safety Performance or Safety Risk at a crossing (e.g.: a fatality is weighted numerically as 1, each major injury is weighted as 0.1 of a fatality and each minor injury is weighted as 0.005 of a fatality). It gives a numerical view of the level or risk associated with level crossings and the statistics likelihood of a person, vehicle etc being struck, killed or injured by a train at that particular crossing. ALCRM collates this information from the Level Crossing Manager's (LCM) data collection and draws on this information entered to calculate the FWI.

- e) improved maintainability of the signalling infrastructure;
- f) enhanced safety of the railway;
- g) reduced operational cost; and
- h) an enabler for future projects.

## 2 THE APPLICANT

- 2.1 NR owns and operates the rail infrastructure network of Great Britain (**Network**), and its purpose is to deliver a safe, reliable and efficient railway for Great Britain.
- 2.2 NR is primarily responsible for the operation, maintenance, repair and renewal of track, stations, signalling and electrical control equipment. Train services on the Network are operated by Train Operating Companies and Freight Operating Companies (**TOCs** and **FOCs**) to which NR, as facility owner, grants rights to use the Network in the form of track, station and depot access contacts approved by the ORR.
- 2.3 The activities of NR as the Network operator are regulated by the ORR by means of a Network Licence granted under section 8 of the Railways Act 1993 [APP19]. The Network Licence requires NR to secure the renewal and replacement of the Network, and the improvement, enhancement and development of the Network, in each case in accordance with best practice, and in a timely, economic and efficient manner so as to satisfy the reasonable requirements of persons providing service relating to railways and funders in respect of the quality and capability of the Network.
- 2.4 As the infrastructure manager, NR is also under a duty as regards the safety of the network, principally under the Railways and Other Guided Transport Systems (Safety) Regulations 2006 (ROGS) [APP20]. The ROGS implement the EU Railway Safety Directive and require that any Infrastructure Manager or railway operator on the mainline railway must maintain a Safety Management System (SMS) and hold a safety certificate or authorisation indicating that the SMS has been accepted by the relevant safety authority, before being allowed to operate. The ROGs are EU-derived domestic legislation which continue to have effect in accordance with section 2 of the European Union (Withdrawal) Act 2018 [APP21].

## 3 THE APPLICATION DOCUMENTS

- 3.1 The Application comprises the formal application and those documents required by 2006 Rules to support it, namely:
  - a) Draft Order [APP1];
  - b) Explanatory Memorandum [APP2];
  - c) Statement of Aims [APP3];
  - d) Report summarising consultations undertaken [APP4];
  - e) Declaration of the Status of the Applicant [APP5];
  - f) Funding Statement [APP6];
  - g) List of consents, permissions or licences under other enactments [APP7];

- h) Waiver direction given by the Secretary of State under rule 18 of the 2006 Rules [APP8];
- i) Land Plans [APP9];
- j) Book of Reference [APP10].
- 3.2 The provisions of the draft Order **[APP1]** are based on the Transport and Works (Model Clauses for Railways and Tramways) Order 2006 (S.I. 2006 No. 1954) **[APP24]**. Each article in the Order is explained in the Explanatory Memorandum **[APP2]**. This includes explanations of where it has been necessary to depart from the Model Clauses (for example with additional or amended provisions).

## 4 CONTEXT OF THE APPLICATION

- 4.1 Part 1 of the 1992 Act provides that orders may be made by the Secretary of State relating to, or to matters ancillary to, the construction or operation of railways and other guided transport systems. Orders made under the 1992 Act may authorise a range of matters including the compulsory acquisition and temporary use of land, and the creation or extinguishment of rights over land.
- 4.2 The proposed Network Rail (Cambridge Re-Signalling) Order forms one part of the consent strategy for the delivery of the Project, which includes applications for planning permissions under the 1990 Act and the use of permitted development rights under the GPDO.
- 4.3 The consents strategy for the Project, and the role of the Order within it, is summarised in Table 1 below:

Table 1: Summary of the conse	enting regimes for the Project
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REGIME	WORKS/MATTERS AUTHORISED
The Order	<ul> <li>Stopping up of streets in connection with the works required to construct and operate the Project.</li> </ul>
	<ul> <li>Acquisition of land, and rights over land, and to use land temporarily in connection with the works required to construct and operate the Project.</li> </ul>
	Together referred to as the <b>Order Scheme</b> .
Planning Permission	Planning permission under the 1990 Act granted by the relevant local planning authorities in relation to the installation of full barrier solutions and REBs, including any works and operations incidental or ancillary to such works.
Permitted Development	The works which include the installation of full barrier solutions and REBs and are located within NR's land ownership and operational boundary or within the Limits of Deviation set out in the relevant Railway Acts (as further outlined in section 5 of this Statement of Case).

4.4 All works required for the Project, including the installation of REBs, will be permitted by separate planning permissions and/or through the GPDO, with the applications/notifications

being submitted to the relevant local planning authorities as shown in Table 2 below. Where NR is able to rely on permitted development rights without the need to submit a prior approval application to the local planning authority, it nevertheless, out of courtesy, submits a voluntary prior notification to the authority notifying it of the details of the proposed works and intention to rely on the relevant permitted development right.

4.5 These applications will be decided, where applicable, by the local planning authorities in accordance with statutory procedures and national and local planning policies.

Level Crossing Works Area	Relevant Local Authority	Proposed Works	Proposed Consenting Route
Croxton	Breckland Council	Installation of full barrier solution, REB and ancillary works	Application for express planning permission via the 1990 Act.
Meldreth	South Cambridgeshire District Council	Installation of full barrier solution, REB and ancillary works.	Application for express planning permission via the 1990 Act.
Foxton (Hauxton)	South Cambridgeshire District Council	Installation of REB.	Application for express planning permission via the 1990 Act.
Milton Fen	South Cambridgeshire District Council	Installation of full barrier solution, REB and ancillary works.	Prior Notification (Class A of Part 8 and 18 of GPDO (not requiring Prior Approval) Temporary works areas outside of NR ownership would be consented via Part 4, Class A of the GPDO.
Six Mile Bottom	South Cambridgeshire District Council	Installation of full barrier solution, REB and ancillary works.	Prior Notification (Class A of Part 8 and Part 18 of the GPDO) (not requiring Prior Approval). Temporary works areas outside NR's ownership would be consented via Part 4, Class A of the GPDO.
Waterbeach	South Cambridgeshire District Council	Installation of full barrier solution, REB and ancillary works.	Part 8 and Part 18 of the GPDO. Prior Notification (not Prior Approval). Temporary works areas outside of NR ownership would be consented via Part

Table 2: Planning applications and prior approvals required for the works

4, Class A of the GPDO.

Dullingham	East Cambridgeshire District Council	Installation of full barrier solution, Power Supply Point, REB and ancillary works.	Prior Notification under Class A of Part 8 and Prior Approval under Class A of Part 18 of the GPDO.
Dimmock Cote	East Cambridgeshire District Council	Installation of full barrier solution, REB and ancillary works	Prior Notification under Class A of Part 8 and Prior Approval under Class A of Part 18 of the GPDO.

- 4.6 The purpose of the Order is to provide a range of supplementary powers to facilitate delivery of the Project alongside the permissions described above. In summary the Order will:
  - a) authorise stopping-up of streets;
  - b) provide powers for the compulsory acquisition of land and rights over land; and
  - c) provide powers to use land temporarily for the purposes of constructing the works permitted by the planning permissions or under permitted development rights.

#### Proposed stoppings up of highways

- 4.7 The draft Order includes power (at article 3) to stop up streets. Schedule 1 to the Order contains a list of streets that may be stopped up.
- 4.8 This power is necessary to regularise the adopted highways boundary where new infrastructure (such as upgraded or new fencing proposed as part of the level crossings upgrades) would remove access for the public, with the maintenance liability moving from the relevant highways authorities to NR.
- 4.9 Given the limited extent of the proposed stopping up, the Order does not provide for any consultation with and/or approval of the relevant street authority. Nevertheless, both highways authorities affected by the proposals have been consulted to agree the extent of the stopping up powers included in the draft Order.
- 4.10 The Application was the subject of publicity and notices as required by the 2006 Rules under which objections to, and representations about, the proposed Order were invited to be made to the Secretary of State until 23 September 2022.
- 4.11 The Secretary of State for Transport received 30 objections and 5 representations.
- 4.12 As a consequence, and in accordance with the Inquiries Rules, the Secretary of State for Transport announced on 1 December his intention to hold a public local inquiry into the Application.

## 5 PLANNING AND POLICY CONTEXT

5.1 While the Order is for land issues only and does not include a request for deemed planning permission to authorise works, the intention of section 5 of this Statement of Case is to provide details of the relevant planning policy regime and to explain how approval is being sought for these works through the town and country planning process and the relevant development plan framework.

### **Network Rail Permitted Development rights**

5.2 As further outlined above, the majority of works comprised in the Project, can be delivered using rights enjoyed by NR as a statutory undertaker pursuant to the GPDO as set out below.

Class A of Part 8 of the GPDO

- 5.3 Part 8 of the GPDO permits "development by railway undertakers on their operational land, required in connection with the movement of traffic by rail".
- 5.4 The use of Part 8 permitted development rights is restricted to NR's existing land ownership and operational boundary and is not permitted if it consists of or includes:
  - a) the construction of a railway;
  - b) the construction or erection of a hotel, railway station or bridge; or
  - c) the construction or erection otherwise than wholly within a railway station of
    - i) an office, residential or education building, or a building used for an industrial process; or
    - ii) a car park, shop, restaurant, garage, petrol filling station or other building or structure provided under transport legislation.

Class A of Part 18 of the GPDO

- 5.5 Part 18 of the GPDO permits "development authorised by a local or private Act of Parliament" and allows NR to rely on the statutory powers set out in relevant Railway Acts that authorised the original construction of the railway.
- 5.6 Each Railway Act is accompanied by a set of parliamentary plans showing the "limits of deviation" (**LoD**) within which works can be carried out. Part 18 provides that certain types of development, which consist of or include:
  - a) the erection, construction, alteration or extension of any building, bridge, aqueduct, pier or dam;
  - b) the formation, laying out or alteration of a means of access to any highway used by vehicular traffic

do not benefit from deemed planning permission under part 18 "unless the prior approval of the appropriate authority to the detailed plans and specifications is first obtained."

5.7 Class A of Part 18 can also be relied on in circumstances where elements of works are located outside of NR's operational boundary, provided the proposed works are consistent with the nature of works set out in the relevant Railway Act and within the LoD.

Impact on Environmental Impact Assessment on the above Permitted Development rights

5.8 Paragraph 10 of Article 3 of the GPDO provides that no development is permitted under Schedule 1 or Schedule 2 of the GPDO unless the relevant local planning authority for the area has adopted a screening opinion under regulation 5 confirming that the development in question is not EIA development. However, paragraph 12(b) states that paragraph 10 does not apply to development under Class A of Part 18 so that development under Part 18 can proceed even if it is EIA development or, if prior approval under Part 18 is required, an application for prior approval can be accompanied by an Environmental Statement.

- 5.9 Screening opinion requests have been submitted to all local planning authorities affected by the Order.
- 5.10 South Cambridgeshire District Council, Cambridge City Council and Breckland Council have provided Environmental Impact Assessment (EIA) screening opinions stating that none of the works, which are proposed to be constructed by NR in reliance on permitted development rights, is subject to EIA. Accordingly, paragraph 10 of article 3 is not infringed and NR is able to rely on its permitted development rights in respect of its proposed development in the areas of those local authorities.
- 5.11 However, East Cambridgeshire District Council has provided EIA screening opinions for the Dullingham and Dimmocks Cote level crossing upgrades stating that the works in their administrative area are EIA development. The Project has therefore chosen to submit Prior Approval applications under Class A of Part 18 for works at these level crossings and the applications will be accompanied by ecological reports. This will enable East Cambridgeshire District Council to re-screen the Prior Approval applications as part of their validation process and it is anticipated that the authority will be able to conclude, in the light of the further ecological reports, that the proposed upgrade works are not EIA development requiring a full Environmental Statement.

### Current status of Planning Permissions for level crossings upgrades

- 5.12 Planning applications and prior notifications for the following level crossing upgrade works have been submitted to the relevant local planning authorities at the date of this Statement:
  - Prior Notification (Part 8 and 18 of the GPDO) (not requiring Prior Approval)) for works at Six Mile Bottom was submitted to South Cambridgeshire District Council on 8 November 2022 (ref.: 22/04960/PDNOT);
  - Prior Notification (Part 8 and 18 of the GPDO) (not requiring Prior Approval)) for works at Waterbeach level crossing was submitted to South Cambridgeshire District Council on 16 November 2022 (ref.: 22/05022/PDNOT);
  - Prior Notification (Part 8 and 18 of the GPDO) (not requiring Prior Approval)) for works at Milton Fen level crossing was submitted to South Cambridgeshire District Council on 24 November 2022 (ref.: 22/05141/PDNOT);
  - An application for full planning permission under the Town and Country Planning Act 1990 for the works at Hauxton level crossing was submitted to South Cambridgeshire District Council on 28 November 2022 (ref.: 22/05163/FUL);
  - e) An application for full planning permission under the Town and Country Planning Act 1990 for the works at Meldreth level crossing was submitted to South Cambridgeshire District Council on 1 December 2022 (ref.:22/05204/FUL);
  - An application for full planning permission under the Town and Country Planning Act 1990 for the works at Croxton level crossing was submitted to Breckland Council on 21 December 2022 (3PL/2022/1442/F).
- 5.13 Prior notifications for works at Dullingham and Dimmocks Cote were submitted to East Cambridgeshire District Council but have since been withdrawn and applications for Prior

Approval, accompanied by relevant ecological reports, as described at paragraph 5.11, will be submitted.

#### **National Policy Context**

National Planning Policy Framework (NPPF) 2021

- 5.14 At a national level the NPPF (latest version adopted in July 2021) **[APP29]** sets out the Government's overarching planning policies and how these are expected to be applied.
- 5.15 At the heart of the NPPF 2021 is a presumption in favour of sustainable development. The presumption highlights that proposals which accord with an up to date development plan should be approved without delay unless material considerations indicate otherwise.
- 5.16 The objective of sustainable development can be summarised as 'meeting the needs of the present without compromising the ability of future generations to meet their own needs' (Paragraph 7).
- 5.17 For decision-taking (Paragraph 11) this means:

"(c) approving development proposals that accord with an up-to-date development plan without delay; or

(d) where there are no relevant development plan policies, or the policies which are most important for determining the application are out-of-date, granting permission unless:

*(i) the application of policies in this Framework that protect areas or assets of particular importance provides a clear reason for refusing the development proposed; or* 

(ii) any adverse impacts of doing so would significantly and demonstrably outweigh the benefits, when assessed against the policies in this Framework taken as a whole."

- 5.18 The following sections of the NPPF 2021 are of specific relevance to the determination of applications for express plannings permissions relating to the proposed level crossing works:
  - a) Section 2: Achieving sustainable development;
  - b) Section 4: Decision making;
  - c) Section 6: Building a strong competitive economy;
  - d) Section 8: Promoting healthy and safe communities;
  - e) Section 9: Promoting sustainable transport.
- 5.19 The proposed level crossing upgrade works are considered to accord with the above sections and paragraphs of the NPPF 2021 as they will improve the reliability, performance and safety of a sustainable low carbon form of public transport, enhancing provisions for alternatives to private vehicular trips and enhancing access to economic opportunities.

#### **Relevant National Transport Policy**

5.20 Britain's railway plays an essential role in supporting and creating economic growth by enabling safe, fast, efficient movement of passengers and goods into and between major economic centres and international gateways.



- 5.21 Consistent with Government strategy, the railway industry's ambition is to increase rail's already significant contribution to the country's economic, social and environmental welfare linking people and communities in an environmentally sustainable way.
- 5.22 In 2022 the Government recognised that there is a need for radical change in transport policy. The Government White Paper (Creating growth, cutting carbon: Marking Sustainable Transport happen) (2011) [APP30] was published in January 2011. Paragraph 1.3 of the White Paper, explained that the government's vision is for "a transport system that is an engine for economic growth but one that is also greener and safer and improves quality of life in our communities." 5.4.4 Paragraph 2.2 of the paper highlighted the crucial role that sustainable transport can play in terms of enabling growth whilst also reducing carbon emissions and addressing climate change. It stated that "sustainable transport modes can enable growth, for instance by improving access to work, to shops and other services, at the same time as cutting carbon emissions and tackling climate change. Certain interventions can also make a significant contribution to public health and quality of life."

## **National Policy Statement for National Networks**

5.23 The National Policy Statement for National Networks (NPS) [APP31] was published in December 2014 and sets out the need for, and Government's policies to deliver, development of nationally significant infrastructure projects (NSIPs) on the national road and rail networks in England. Whilst the Project falls under the threshold detailed in the Planning Act 2008 (as amended), section 1.4 of the NPS states that:

"In England, this NPS may also be a material consideration in decision making any applications that fall under the Town and Country Planning Act 1990 or any successor legislation. Whether, and to what extent, this NPS is a material consideration, will be judged on a case by case basis."

- 5.24 It is therefore the case that whilst the NPS is primarily to guide and inform NSIP applications, it does have some degree of material weight in relation to the Project as the rationale supporting the proposed works is for the improvements to be delivered to parts of the national rail network, and should therefore be appraised accordingly. It is also important to understand the context of the Government's policy stance on rail infrastructure given the limited detail within the NPPF.
- 5.25 Section 2 of the NPS sets out the need for development of the national networks and details the Government's vision and strategic objectives:

"The Government will deliver national networks that meet the country's long-term needs; supporting a prosperous and competitive economy and improving overall quality of life, as part of a wider transport system. This means:

- Networks with the capacity and connectivity and resilience to support national and local economic activity and facilitate growth and create jobs.
- Networks which support and improve journey, reliability, and safety.
- Networks which support the delivery of environmental goals and the move to a low carbon economy.
- Networks which join up our communities and link effectively to each other."
- 5.26 Paragraph 2.2 explains that: "There is a critical need to improve the national networks to address road congestion and crowding on the railways to provide safe, expeditious and resilient networks that better support social and economic activity; and to provide a transport network
that is capable of stimulating and supporting economic growth. Improvements may also be required to address the impact of the national networks on quality of life and environmental factors."

- 5.27 Paragraph 2.4 goes on to mention the pressures the national networks are under, including a projected increase of 40% of journeys undertaken by rail and rail freight having the capacity to double by 2030.
- 5.28 Paragraph 2.6 states that improved transport links help to rebalance the economy.
- 5.29 Within paragraph 2.10 the NPS sets out an overarching statement that the Government concludes at a strategic level that there is a compelling need for the development of national networks.
- 5.30 The need for development of the national rail network is set out from paragraphs 2.28 2.41. These paragraphs identify the importance of the rail network as a vital part of the national transport infrastructure and for the growing demand for rail travel and future projected growth which together support the compelling need for developing the country's rail network.
- 5.31 Paragraph 2.9 presents the Government's vision for the Transport system in which railways must: "offer a safe and reliable route to work".
- 5.32 Paragraph 3.12 further provides that "It is the Government's policy, supported by legislation, to ensure that the risks of passenger and workforce accidents are reduced so far as reasonably practicable. Rail schemes should take account of this and seek to further improve safety where the opportunity exists and where there is value for money in doing so by focussing domestic efforts on the achievement of the European Common Safety Targets."
- 5.33 The Project supports and contributes to the delivery of the Government's policy for rail, as set out in the NPS.

## Local Policy Context

- 5.34 In accordance with Section 38(6) of the Planning and Compulsory Purchase Act 2004, planning applications must be determined in accordance with the statutory development plan unless 'material considerations' indicate otherwise.
- 5.35 This section provides an overview of the national and local planning policies relevant to the determination of the applications for express planning permission.
- 5.36 The works are located within a number of local authorities' administrative areas as set out in Table 3 below with the relevant local plans for each set out in turn.

Table 3: Relevant Local	Plan for each Level	Crossing Works Area
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Level Crossing Works Area	Local Authority	Local Plan
Croxton	Breckland Council	Breckland Local Plan
		Norfolk Minerals and Waste
		Local Plan – this plan is not
		considered a relevant



		consideration in relation to the proposed works
Meldreth	South Cambridgeshire District Council	South Cambridgeshire Local Plan (September 2018)
Foxton (Hauxton)		
		Cambridgeshire and
Milton Fen		Peterborough Minerals and Waste Local Plan (July 2021) –
Six Mile Bottom		this plan is not considered a
Waterbeach		relation to the proposed works.
Dullingham	East Cambridgeshire District	East Cambridgeshire Local
	Council	Plan (April 2015)
Dimmock Cote		
		Cambridgeshire and
		Peterborough Minerals and
		Waste Local Plan (July 2021) -
		this plan is not considered a
		relevant consideration in relation to the proposed works

## Breckland Local Plan 2019 [APP32]

## Principle of Development

- 5.37 Policy TR01 (Sustainable Transport Network) in the Breckland Local Plan is considered relevant to the works at Croxton level crossing.
- 5.38 This policy supports improvements to the road and rail connections both within the District and to the wider area and promotes imposed access to, and interchange between, all modes of transport to key settlements and town centres. Development must not adversely impact on the operation or safety of the strategic road network and improve accessibility to services and support the transition to a low carbon future.
- 5.39 The proposed works are considered to be in accordance with this policy as they will improve the reliability, performance and safety of a sustainable low carbon form of public transport enhancing provisions for alternatives to private vehicular trips within the district and wider region.
- 5.40 Further consideration of the Local Plan policies is set out in the Planning and Design Statement submitted to Breckland Council with the planning application for the works at Croxton level crossing **[APP39]**.

## South Cambridgeshire Local Development Plan 2018 [APP33]

5.41 The following policies in the South Cambridgeshire Local Development Plan are considered relevant to the works at Meldreth, Foxton (Hauxton), Milton Fen, Six Mile Bottom and Waterbeach level crossings:

- a) Policy S/2: Objective of the Local Plan this policy indicates that the vision of the Local Plan will be achieved by maximising the potential for journeys to be undertaken by sustainable modes of transport including walking, cycling, bus and train.
- b) Policy S/3: Presumption in favour of Sustainable Development this policy details that South Cambridgeshire District Council will take a positive approach that reflects the presumption in favour of sustainable development contained in the NPPF 2021.
- c) Policy TI/2: Planning for Sustainable Travel this policy provides that development must be located and designed to reduce the need to travel, particularly by car, and promote sustainable travel appropriate to its location.
- 5.42 The proposed works within the South Cambridgeshire District Council's administrative area are considered to accord with the local planning policies as they will improve the reliability, performance and safety of a sustainable low carbon form of public transport, enhancing provisions for alternatives to private vehicular trips within the district and wider region.
- 5.43 The following policies in the South Cambridgeshire Local Development Plan are also considered relevant to the works at Foxton (Hauxton) level crossing which is located within Green Belt:
  - a) Policy S/4: Cambridge Green Belt this policy highlights how the Green Belt will be maintained around Cambridge and provides that new development in the Green Belt will only be approved in accordance with Green Belt policy as set out within the NPPF.
  - b) Policy NH/8: Mitigating the Impact of Development in and Adjoining the Green Belt this policy seeks to protect the Green Belt from the impacts of Development and provides that any development proposals within the Green Belt must be located and designed so that they do not have an adverse effect on the rural character and openness of the Green Belt.
- 5.44 The proposed upgrade works at Foxton (Hauxton) provide vital improvements to the safety, reliability and efficiency of the railway infrastructure in the region, ensuring sustainable transport options remain well maintained and managed.
- 5.45 REBs are required to be located within close proximity to the rail infrastructure and level crossings which they serve. In the context of Foxton (Hauxton) Level Crossing, which is located within the Green Belt, the proposed infrastructure updates are similarly required to be located adjacent to the level crossing.
- 5.46 The location and layout of the proposed upgrade will not affect the openness or the character of the Green Belt. The proposed REB is set back from Hauxton Road and vegetation both to the front and rear of the REB will be retained. The design of the structure, and its olive green colour, will allow it to integrate with its surroundings. Views of the REB from the roadside will be limited given the retained vegetation, and the existing vegetation on the eastern side of the rail corridor will ensure views of the REB will be limited from neighbouring residential properties. It is likely that the REB will be viewed from the level crossing but this will be in the context of infrastructure associated with the railway and will not, therefore, impact openness.
- 5.47 The proposed level crossing upgrade is necessary and, therefore, an acceptable use within the Green Belt, and will comply with the policies in the NPPF. The proposed REB is small in scale and has limited impact on the openness of the Green Belt. Accordingly, it will not conflict with the five purposes of the Green Belt. As such, the principle of the proposed upgrade is considered to be acceptable.

5.48 Further consideration of the Local Plan policies is set out in the Planning and Design Statements submitted to South Cambridgeshire District Council with the planning applications for the works at Meldreth level crossing **[APP40]** and Foxton (Hauxton) level crossing **[APP41]**.

# East Cambridgeshire Local Plan 2015 [APP34]

- 5.49 The following policies in the East Cambridgeshire Local Plan 2015 are considered relevant to the works at Dullingham and Dimmocks Cote level crossings:
  - a) Policy GROWTH 3: Infrastructure requirements this policy sets out key infrastructure requirements relevant to growth within the district and includes 'improved rail and bus services'; and
  - b) Policy GROWTH 5: Presumption in favour of sustainable development.
- 5.50 The proposed works within the East Cambridgeshire District Council's administrative area are considered to accord with the above policies as they will improve the reliability, performance and safety of a sustainable low carbon form of public transport, enhancing provisions for alternatives to private vehicular trips within the district and wider region.

# **Transport Plans and Strategies**

Draft Cambridgeshire and Peterborough Local Transport and Connectivity Plan (May 2022) [APP35]

- 5.51 In May 2017 a Mayor was directly elected and the Cambridgeshire and Peterborough Combined Authority (**CPCA**) was formed as part of the devolution deal agreed with Central Government. The CPCA now has the strategic transport powers and is the Local Transport Authority for the Cambridgeshire and Peterborough area. The Mayor sets out the overall transport strategy for Cambridgeshire and Peterborough, called the Local Transport Plan.
- 5.52 As part of the Mayor's powers, the CPCA have produced the draft Cambridgeshire and Peterborough Local Transport and Connectivity Plan (May 2022). The goals of the plan are to provide an accessible transport system that delivers economic growth and opportunities and protects and enhances the environment to tackle climate change together.

Transport Strategy for Cambridge and South Cambridgeshire (TSCSC), 2014 [APP36]

- 5.53 This strategy supports the South Cambridgeshire Local Plan (and the Cambridge City Local Plan) and takes account of future levels of growth in the area. It details the transport infrastructure and services necessary to deliver this growth.
- 5.54 Eight objectives are set out in this strategy, as follows:
  - a) to ensure that the transport network supports the economy and acts as a catalyst for sustainable growth;
  - b) to enhance accessibility to, from and within Cambridge and South Cambridgeshire (and beyond the strategy area);
  - c) to ensure good transport links between new and existing communities, and the jobs and services people wish to access;
  - d) to prioritise sustainable alternatives to the private car in the strategy area, and reduce the impacts of congestion on sustainable modes of transport;



- e) to meet air quality objectives and carbon reduction targets, and preserve the natural environment;
- f) to ensure that changes to the transport network respect and conserve the distinctive character of the area and people's quality of life;
- g) to ensure the strategy encourages healthy and active travel, supporting improved wellbeing; and
- h) to manage the transport network effectively and efficiently.
- 5.55 Policy TSCSC 10: Improving Rails Services is considered to be relevant to the works at Meldreth, Foxton (Hauxton), Milton Fen, Six Mile Bottom and Waterbeach Level Crossings. This policy provides that the County Council will work with other authorities and the rail industry to bring forward service enhancements and new infrastructure to increase rail use, through frequency and capacity improvements and increasing the proportion of freight moved by rail in line with the Strategy approach.

## Transport Strategy for East Cambridgeshire 2016 [APP37]

5.56 Policy TSEC 10: Improving Rail Services is considered relevant to the works at the Dimmocks Cote and Dullingham level crossings. This policy provides that the County Council will work with other authorities and the rail industry to bring forward service enhancements and new infrastructure to increase rail use, through frequency and capacity improvements and by increasing the proportion of freight moved by rail in line with the Strategy approach.

Norfolk County Council Local Transport Plan 4 Strategy (July 2022) [APP38]

- 5.57 The new Local Transport Plan, covering the period 2021-2036, was adopted at the full County Council meeting on 19 July 2022. The following policies are considered relevant to the works at the Croxton level crossing:
  - a) Objective 6: Improving Transport Strategy, which provides that the County Council will aim to improve the safety of the transport network in order to reduce casualties and help people feel safe when using any mode of transport. The County Council aims to overcome the various challenges on the network and to create a network which encourages safe usage of the roads and to protect vulnerable transport users.
  - b) Policy 8, which provides that the County Council's priority will be to improve major road and rail connections between larger places in the county, and to major ports, airports and cities in the rest of the UK.

## Conclusion

- 5.58 Paragraph 7 of the NPPF 2021 states that to achieve sustainable development the planning system has three overarching objectives which are interdependent and need to be pursued in mutually supportive ways (so that opportunities can be taken to secure net gains across each of the different objectives):
  - a) an economic objective to help build a strong, responsive and competitive economy, by ensuring that sufficient land of the right types is available in the right places and at the right time to support growth, innovation and improved productivity; and by identifying and coordinating the provision of infrastructure;

- b) a social objective to support strong, vibrant and healthy communities, by ensuring that a sufficient number and range of homes can be provided to meet the needs of present and future generations; and by fostering well-designed beautiful and safe places, with accessible services and open spaces that reflect current and future needs and support communities' health, social and cultural well-being; and
- c) an environmental objective to protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.
- 5.59 In terms of economic benefits, the Project will enhance Network across all of the above administrative areas providing enhanced and safer public transport provision. It will provide the opportunity for a more sustainable, reliable, and rapid alternative form of travel versus private vehicular trips and enhance pedestrian and vehicular safety at each of the relevant level crossing works areas.
- 5.60 In terms of social benefits, the Project will support the promotion of healthy communities by providing an improved rail and pedestrian network encouraging a modal shift change from private vehicular trips. The social benefits are also considered to be strongly supported in planning terms and represent a strong material planning consideration in favour of the Project.
- 5.61 The environmental benefits of the Project is a key issue in planning terms. The support for sustainable transport schemes as set out in the NPPF 2021, needs to be weighed against other policy factors within the NPPF 2021 and the environmental impact of the Project.
- 5.62 Environmental impact is a broad term and one of the benefits of the Project is that an enhanced Network will provide clear benefits in terms of reducing CO2 and emissions associated with private vehicular trips. The full environmental impact of the Project has been assessed as part of the EIA process and in the documentation that accompanies each of the applications for express planning permissions.
- 5.63 The proposed works are considered to be in accordance with policies of the relevant local plans and the regional transport strategies/plans as they will improve the reliability, performance and safety of a sustainable low carbon form of public transport, enhancing provisions for alternatives to private vehicular trips within the district and wider region.

# 6 ACQUISITION AND USE OF LAND

## Introduction

- 6.1 The Order, if made, will confer on NR the power to compulsorily acquire land, or rights over land, required to construct and operate the Project. The Order will also confer powers on NR to temporarily occupy and use land for the purposes of constructing the Project.
- 6.2 A large proportion of the works required for the Project will be undertaken on land that is currently in the freehold ownership of NR (within the existing rail corridor) and as such, no powers over that land are required to be included within the Order. However, several plots of land currently within private ownership are required for the Project, either on a permanent or temporary basis it is those plots that are proposed to be subject to powers within the Order.
- 6.3 The powers sought in the draft Order in relation to land fall into the following categories:
  - a) permanent acquisition of land;

- b) permanent acquisition of rights over land;
- c) temporary use of land for construction purposes;
- d) temporary use of land for access purposes;
- e) permanent extinguishment of rights over land; and
- f) temporary suspension of rights over land.
- 6.4 The Order, if made, will also discharge one plot of land (305) from all public or private rights of way to which it is currently subject.
- 6.5 All land over which powers are sought in the draft Order is shown on the Land Plans **[APP9]** and listed in the Book of Reference **[APP10]** that accompanied the Application.
- 6.6 The disparate nature of the plots shown on those plans, is indicative of the fact that existing land of NR will be used for the Project. All references to plots in this document are to be read in conjunction with those plans. The plots are colour-coded to denote the nature of the powers sought over them.
- 6.7 All areas of land subject to powers in the draft Order are necessary for the Project and no land will be acquired permanently, or used temporarily, unless essential to facilitate the Project. In respect of all land proposed to be subject to Order powers, NR is seeking to secure the relevant land by negotiation. As such, the powers in the Order would only be exercised where it is not possible or practicable to reach agreement.

# Relationship between the powers in the draft Order and the separate planning permissions

- 6.8 As explained above, the Order would not authorise any works required for the Project. Instead, these are to be permitted by way of separate planning permissions granted by the local planning authorities (East Cambridgeshire District Council, South Cambridgeshire District Council and Breckland Council) or by relying on planning permission granted by the GPDO (primarily under Parts 8 and 18 of Schedule 2).
- 6.9 The planning permissions would not confer any powers to acquire or use any land required for the Project that is currently in private ownership. To ensure the Project can be delivered it is therefore critical that NR has the power to compulsorily acquire land and rights, and to use land temporarily for the purposes of construction. These powers will ensure that, if NR is not able to reach agreements with the relevant landowners, the land that is required for the Project can be secured. This is one of the primary purposes for which NR is applying for the Order.
- 6.10 Additional land included in the draft Order is primarily required for temporary use for construction and access purposes. This is to facilitate works permitted by express planning permissions to be granted by the local planning authorities, as well as works proposed to be carried out as permitted development under the GPDO. For example, the Order includes temporary land for a number of temporary construction areas to facilitate works along the route of the existing railway corridor which would be carried out using permitted development rights.

# Permanent acquisition of land

6.11 A power of permanent acquisition is included in the draft in relation to land that is required for the Project's permanent structures or for other purposes on an on-going basis. Plots where such powers have been included in the draft are as set out in Table 4 below:

Purpose	Plots
These plots are needed to provide a permanent rail compound area for the placement of a Distribution Network Operator ( <b>DNO</b> ) cubicle, a relocatable equipment's building, parking and an access point to the compound, including for pedestrians.	002 and 009
The provision of permanent upgraded fencing along Meldreth Road, the provision of a new access point (gate) and permanent access along the eastern side of the railway for rail maintenance staff. A below ground turning chamber will also be installed.	003, 004 and 006
A permanent upgraded fence will be installed to prevent public access to the railway. Land parcel 007 would be located behind the upgraded fence.	005 and 007
A below ground turning chamber will be installed with upgraded fencing and permanent barrier equipment.	010
A REB will be installed. The land will also be used for cable troughing and the creation of hard-standing footpaths. Guard rails and fencing will also be installed.	101
The current title of this land parcel is unknown. It forms part of an access road that NR will require permanent access over as part of the Project. No works are proposed on this land parcel.	201
The western extent of land parcel 304 is no longer required following discussions with Cambridgeshire County Council and detailed design. The remainder of the land parcels are required for the installation of permanent barrier equipment, fencing, a below ground turning chamber and anti-trespass guards.	301 and 304
These parcels are required for the installation of a permanent level crossing road traffic light signal related to the upgraded barrier	401 and 407
These parcels are required for the installation of a permanent level crossing road traffic light signal related to the upgraded barrier.	402 and 406
These parcels are required for the installation of a permanent level crossing road traffic light signal related to the upgraded barrier and the installation of fencing to prevent public access to the railway.	603
This parcel is required for the installation of a permanent level crossing road traffic light signal related to the upgraded barrier.	604

These parcels are required for the installation of upgraded fencing and railway infrastructure.	703 and 705
These parcels are required for the installation of a permanent level crossing road traffic light signal related to the upgraded barrier and installation of fencing to preclude public access to the railway.	902 and 904
This parcel is required for a permanent railway compound that will house a REB, control and power supply apparatus as well as a second modular building containing a generator which provides an uninterrupted power supply to the railway. The area will be fenced and will allow for parking by rail maintenance staff.	906
This parcel is required for the installation of barrier equipment, upgraded fencing, below ground infrastructure and amendments to the footway that runs parallel to the highway.	908
This parcel is required for the installation of barrier equipment, upgraded fencing, below ground infrastructure and amendments to the footway that runs parallel to the highway.	910
This parcel is required for the installation of a permanent level crossing road traffic light signal related to the upgraded barrier and installation of fencing to preclude public access to the railway.	911

- 6.12 The permanent land take, as proposed in the draft Order, has been identified based on the required placement of the upgraded level crossing barrier equipment and its future maintenance requirements. As the proposed works are upgrades to existing infrastructure at existing level crossings, there are limited opportunities to locate equipment in other locations i.e. the barrier equipment and ancillary works are by definition required in each corner of a level crossing as tight to the railway as possible.
- 6.13 Publicly owned land has been prioritised for use wherever possible. Private third-party land has only been considered where no suitable alternative land is available, and discussions were undertaken with the relevant landowners through NR's property agent; Brown & Co.
- 6.14 The proposed permanent land take and the design that informs this has been optioneered through NR's GRIP process with GRIP 3 (Option Selection) and informed by "approved in principle" drawings. Further refinement of the final land take is ongoing as part of GRIP 4 (Single Option Selection) and through discussions with the relevant landowners.

## Permanent acquisition of rights over land

6.15 Powers to permanently acquire rights over land are sought in the draft Order where land does not need to be acquired outright, but rights over that land are required – for example a right of access for maintenance purposes on an on-going basis. Plots where such powers have been included in the draft Order are set out in Table 5 below:

# Table 5: Plots for permanent acquisition of rights over land at structures

Plots	Purpose
001	Permanent rights are required for pedestrian access for use by maintainers around the perimeter of the secure compound proposed on land parcel 002 to allow access to NR's fence line along the western side of the railway.
100	Permanent rights are required for pedestrian access for use by maintainers around the perimeter of the REB proposed on land parcel 101. The REB will house railway signalling, telecom and electrical assets.
300, 302, 303, 308 and 312	Permanent rights are required for pedestrian access for use by maintainers to access the level crossing signalling and scanner equipment located to the north of Station House.
306	Due to the required land take for the new barrier equipment to the west, this land parcel will allow for a permanent right of access for landowner to the rear of their property.
405	Permanent vehicular access from adopted highway to REB and surrounding compound located to the north of the railway for use by maintainers. The REB will house railway signalling, telecom and electrical assets.
900	It is proposed at land parcel 906 to install a secure compound for railway and level crossing control equipment. This will contain a REB, control and power supply apparatus as well as a second modular building containing a generator which provides an uninterrupted power supply to the railway. Land parcel 900 is required to provide permanent vehicular access from adopted highway to this compound for use by maintainers.
905	Permanent pedestrian access around exterior perimeter of the level crossing barrier equipment and to the proposed compound to be located in land parcel 906 for use by maintainers.
907	Land parcel 907 will provide pedestrian access around the perimeter of the secure compound proposed in land parcel 906.
909	Permanent rights are required for pedestrian access for use by maintainers to access the level crossing signalling and scanner equipment.

6.16 Land parcels have been selected for permanent rights based on the required placement of the upgraded level crossing barrier equipment and its future maintenance requirements. Publicly-owned land has been prioritised for use wherever possible. Private third-party land has only



been considered where no suitable alternatives to access the required infrastructure is available with discussions undertaken with the relevant landowners through NR's property agent Brown & Co.

6.17 The proposed permanent rights and the design that informs this has been optioneered through NR's GRIP process with GRIP 3 (Option Selection) Approved in Principle drawings informing this. Further refinement of the final land take and the final route for any rights is ongoing as part of GRIP 4 (Single Option Selection) and through discussions with the relevant landowner.

## Temporary use of land for construction purposes

- 6.18 Powers to use land temporarily for the purposes of construction are included in the draft order.
- 6.19 Land is required for a number of temporary worksites to facilitate the permanent works in various locations. The worksites will include, amongst other things, temporary construction areas and a car park. Plots where such powers have been included in the draft Order are set out in Table 6 below:

Plots	Purpose
300, 302, 303, 306, 308, 309, 310,	These plots are required to provide temporary vehicular and
311 and 312	pedestrian access and for use as a construction area
400, 404, 405, 408, 409, 410 and	These plots are required to provide temporary vehicular and
412	pedestrian access including construction area
602	Tis plot is required to provide a temporary construction area
700	This plot is required to provide a temporary car park
805	This plot is required to provide a temporary construction area
	and new temporary access into adopted highway
902, 903, 905, 907 and 909	These plots are required to provide a temporary vehicular
	access and a construction area

Table 6: Plots for temporary use of land for construction purpo	oses at structures
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6.20 Land parcels have been selected for use as temporary construction compounds and related accesses based on the required placement of the upgraded level crossing barrier equipment. The final construction compound areas have been informed by a Construction logistics review by NR's principal contractor Alstom and through discussions with the relevant landowners through NR's property agent: Brown & Co.

## Temporary use of land for access purposes

6.21 Powers to use land temporarily for access purposes are required to facilitate the construction of the Project. This is a 'lesser' power compared to the power of temporary possession described above and is sought over land where exclusive possession is not required during construction (e.g. for the purposes of providing a worksite) and where permanent rights are not required for the purposes of the maintenance and operation of the Project.

- 6.22 NR is taking the approach of 'separating' out these two categories of temporary powers so as to ensure that no 'greater' powers over land are sought than is absolutely necessary to facilitate construction of the Project. Plots where the power of access have been included in the draft Order are as set out in Table 7 below:
- Table 7: Plots for temporary use of land for access and oversailing purposes

Plots	Purpose
104	Temporary access for construction vehicles/contractor staff to access land parcel 101 off High Street for the installation of the REB and ancillary works.
404	Temporary access for contractor staff to access land parcel 406 and 408 off Station Road for the installation of upgraded barrier equipment and ancillary works.
411	Temporary access for construction vehicles and contractor staff to access land parcel 412 (a temporary construction compound) related to the installation of the REB and power supply point adjacent to the railway.
600	Temporary access for construction vehicles and contractor staff to access land parcel 601 (a temporary construction compound).
701 and 702	Temporary access to the temporary staff car park at Waterbeach Station (land parcel 700).
807	Temporary access for construction vehicles and contractor staff to access land parcel 805 (a temporary construction compound).
905 and 907	Temporary access for construction vehicles and contractor staff to access land parcels 903 and 906 for the period of construction.
909	Temporary access for construction vehicles and contractor staff to access the railway on the northeastern corner during construction works.

6.23 Land parcels have been selected for use as temporary access areas based on the required placement of the upgraded level crossings barrier equipment and access to the existing railway. The final construction compound areas have been informed by a construction logistics review by NR's principal contractor Alstom and through discussions with the relevant landowners through NR's property agent: Brown & Co.

## Current status of negotiations with landowners

6.24 NR's aim is to minimise the need to exercise the compulsory acquisition powers being sought in the Order. To achieve that aim it has engaged with affected landowners to negotiate by agreement the right to acquire the necessary land interests or rights. Where that has not been possible in the time available, the aim is to agree the terms of acquisition and in the case of temporary land, the purposes for which that land will be required. 6.25 A summary of the private treaty negotiations as at the date of this Statement is provided in Table 8 below.

Land	Freehold owners or reputed	Summary of private treaty negotiations
Parcel	freehold owners	
001 and 002	Thomas George Pepper and William Edward Pepper	Heads of Terms have been signed for both land parcels (dated 23 August 2022). The land purchase is targeted to be completed end of January 2023.
005,         006,           007,         009,           010,         304,           307,         308,           309,         312,           403,         700,           701,         702,           703,         704,           705         and           807	Cambridgeshire County Council	NR held a number of workshops with the County Council and agreed to reduce the extent of the proposed permanent acquisition, as well as the extent of stopping up powers to align more tightly with the final permanent works. The details of this at each relevant level crossing area are still being finalised for agreement with the County Council A response from the County Council is currently awaited on the revised proposals. In relation to the proposed temporary acquisition of car parking spaces at Waterbeach Station Car Park (land parcel 700) – the parties have agreed to enter into a lease and the associated side agreement which provides that: • no part of the land which is subject to the lease will be acquired compulsorily (notwithstanding provisions of the Order); and • the exercise by NR of the powers and rights under the Order will be subject to the terms of the agreement. The lease has been executed on behalf of both parties and will be completed simultaneously with the side agreement is with the Council for execution. Once the agreement is with the Council for NR and the subsequent completion of both documents.
100, 101 and 104	Randle Charles Roderick Feilden, Fiona Caroline Bryant and James Dougals Eden Bryant	<ul> <li>The following has been agreed with the relevant landowner on 30 September 2022:</li> <li>Heads of Terms for the acquisition of land:</li> </ul>
	· · · · · · · · · · · · · · · · · · ·	<ul> <li>Licence Agreement for temporary access during the works period; and</li> </ul>

Table 8: Summary of private treaty negotiations

		Licence Agreement for temporary access to obtain any surveys for the planning application.
300, 305, 306 and 310	Philip David Woodley and Stephanie Hannah Woodley	Updated Heads of Terms were provided to the relevant landowner on 4 January 2022. NR is awaiting a response from the landowner's solicitor.
301, 302 and 311	Evan Richard Gard	Draft Heads of Terms were sent to the landowner on 4 December 2022 but are subject to further negotiations.
400, 404 and 406	Michael Mingay	Draft Heads of Terms were sent to the landowner on 17 October 2022, but are subject to further negotiations.
405, 411 and 412	Simon Fred Boyton Taylor	Draft Heads of Terms were sent to the landowner on 1 December 2022, but are subject to further negotiations.
600 and 602	Roy William Guy and Richard Donald Oughton	Discussions with the landowners are ongoing with a view of securing the necessary land take by private agreements.
805	Trevor James Smith and Davina Helen Harvey	Licence agreements sent to the landowner on 3 October 2022 and signed on 25 October 2022.
900, 903, 904, 905, 906, 907, 908 and 909	The Kilverstone Estate	Heads of Terms were agreed in October 2022, but await the final sign off by both parties. NR have recently met with the objectors' agent to agree a way forward. NR's proposal is that a side agreement is entered into ensuring that none of the landowner's land is acquired compulsorily pursuant to the provisions of the Order, in consideration of the landowner entering into the necessary private agreements.

## **Compensation matters**

- 6.26 Landowners who have land or an interest in land acquired from them, or their land used temporarily, will be entitled to compensation, and landowners whose property is affected by the works authorised by the Order may also be entitled to compensation in certain circumstances.
- 6.27 The draft Order, at articles 5 and 6, applies Part 1 of the Compulsory Purchase Act 1965 [APP27] and the 1981 Act which, through their application, have the effect of requiring NR to pay compensation to parties that qualify under what is termed the 'Compensation Code'. The Code is a combination of statutory provisions in a number of enactments and legal precedents. The draft Order also includes specific provisions around the calculation of compensation in this context, at article 10, covering the disregard of certain interests and improvements in the value of land retained by an affected landowner.

6.28 In addition, the draft Order expressly provides for the payment of compensation to any person that suffers loss through the exercise of the powers in articles 3 (stopping up of streets), 8 (temporary use of land in connection with the development), 9 (temporary use of land for oversailing and access) and 11 (extinction or suspension of private rights of way).

## **European Convention on Human Rights**

- 6.29 The powers over land sought in the draft Order are necessary to facilitate the construction, operation and maintenance of the Project. The land requirements have been carefully considered and limited as far as possible, to ensure they are proportionate.
- 6.30 The approach to be taken when considering the compulsory acquisition of land and rights is summarised in paragraph 12 of the Department for Levelling Up, Housing and Communitices (DLUHC) July 2019 Guidance on Compulsory Purchase Process and the Crichel Down Rules [APP26], which states that compulsory purchase powers should only be given where there is "a compelling case in the public interest".
- 6.31 The Guidance makes it clear that an acquiring authority should be sure that the purposes for which it is making a compulsory purchase order sufficiently justify interfering with the human rights of those with an interest in the land affected. In making this assessment, the person seeking to acquire the land should have regard, in particular, to the provisions of Article 1 of the First Protocol to the European Convention on Human Rights and, in the case of a dwelling, Article 8 of the Convention. These are summarised and considered below.
- 6.32 Article 1 of the First Protocol to the European Convention on Human Rights states that:

"Every natural or legal person is entitled to the peaceful enjoyment of his possessions. No one shall be deprived of his possessions except in the public interest and subject to the conditions provided for by the law and by the general principles of international law.

The preceding provisions shall not, however, in any way impair the right of a State to enforce such laws as it deems necessary to control the use of property in accordance with the general interest or to secure the payment of taxes or other contributions or penalties."

- 6.33 Article 1 is a qualified right in that no one shall be deprived of his possessions "except in the public interest and subject to the conditions provided for by law".
- 6.34 Whilst occupiers and owners of land will be deprived of their property if the Order is made, this will be done in accordance with the law. By enacting the 1992 Act, the Government has determined that, subject to procedural safeguards, it can be in the public interest for individuals to be deprived of their land for railway purposes. The Order is being pursued in the public interest as required by Article 1 of the First Protocol. The public benefits associated with the Project, which would be facilitated in part by the Order, are set out earlier in this Statement. NR considers that the Order will strike a fair balance between the public interest in the implementation of the Project and those private rights which will be affected by the Order.
- 6.35 In addition, as set out above, where land, or rights over land, are authorised to be compulsorily purchased by the making of the Order, compensation will be payable. Where disputes as to the amount of compensation arise, these may be referred for independent consideration by the Upper Tribunal.
- 6.36 NR considers that there is a compelling case in the public interest for compulsory acquisition powers to be granted as part of the order. The Order, including the requirement to pay compensation, strikes a fair and proportionate balance between the private interests of affected



landowners and the public interest in securing the benefits of the project. Therefore, the interference with Convention rights is justified.

# 7 JUSTIFICATION FOR SAFETY UPGRAES AT LEVEL CROSSINGS

## Level Crossings and NR's duties

- 7.1 Level crossings not only present a risk to the individual user but where they facilitate vehicular access over the railway, they also increase the likelihood of a potentially high-risk train accident and therefore, present one of the principal public safety risks on the railway. Each level crossing presents different arrangements and risks and therefore each level crossing is considered individually.
- 7.2 Level crossing safety is a priority for the ORR, the independent safety and economic regulator for Britain's railway. It is responsible for ensuring that railway operators comply with health and safety law. The ORR have recently issued their annual safety statistics, including accidents and safety incidents to passengers, workforce and members of the public. The report provides that level crossings continue to be a major source of risk on the railway. The moving annual average for all level crossing events had worsened by 15.9% by the end of the year and fatalities at crossings worsened considerably. There was a total of seven level crossing fatalities over the year. This is three more than last year and two more than each of the preceding years<sup>2</sup>.
- 7.3 NR have an explicit legal duty under the Health and Safety at Work etc. Act 1974 (HSWA) [APP28] to, so far as reasonably practicable, not expose passengers, the public and/or workforce to risk at NR level crossings.
- 7.4 In NR's experience, the most effective way of reducing level crossing risk is to eliminate the crossing completely by closing it. Where this cannot be done, NR will look at options to make the crossing safe. 'Enhancing Level Crossing Safety'<sup>3</sup> is NR's strategy to manage the safety and reliability of level crossings in Great Britain for the next 10 years. It is aligned to the rail industry strategy 'Leading Health and Safety on Britain's Railway'<sup>4</sup> which targets improved safety at level crossings as one of its 12 key priorities.
- 7.5 To inform the justification for the safety upgrade of a level crossing Risk Assessments are undertaken by NR and updated on an ongoing basis. The frequency at which NR assesses a level crossing is dependent on the level of risk the crossing poses, but generally is undertaken at intervals of between one and three years or if any significant changes are made.

## Level Crossings Risk Assessments

- 7.6 There are three aspects to a Risk Assessment which are carried out in respect of each level crossing, namely:
  - a) On site data collection;
  - b) All Level Crossing Risk Model (ALCRM); and
  - c) Narrative Risk Assessment.
- 7.7 ALCRM is a web-based risk tool used by NR to support it in managing the risk to crossing users, passengers and rail staff by assessing the risks at each crossing and targeting those crossings

<sup>&</sup>lt;sup>2</sup> https://www.orr.gov.uk/sites/default/files/2022-08/annual-health-and-safety-report-2021-22.pdf

<sup>&</sup>lt;sup>3</sup> https://www.networkrail.co.uk/wp-content/uploads/2020/03/Enhancing-Level-Crossing-Safety-2019-2029.pdf

<sup>&</sup>lt;sup>4</sup> Fleading-health-and-safety-on-britains-railway-issue-3-november-2020.pdf (rssb.co.uk)

with the highest risk for remedial measures. The ALCRM is used to provide a consistent basis for assessing risk at each level crossing so that NR can allocate resources to the highest risk crossings.

- 7.8 The risk assessments, as set out in ALCRM, are expressed in terms of the crossings risk to individual users (the Individual Risk Per Traverse) presented as a single letter (with A being the highest risk and M being the lowest risk).
- 7.9 The Narrative Risk Assessment (**NRA**) is based on two elements:
  - a) a quantitative one (calculated risk model using ALCRM); and
  - b) a qualitative one (structured expert judgement).
- 7.10 The full set of Risk Assessments produced by SOTERA Risk Solutions (SOTERA assessments) is enclosed with this Statement [APP11 APP17]. Also enclosed [APP43 APP49] are the individual Narrative Risk Assessments for each crossing which have been produced by the Level Crossing Manager (LCM) responsible for that particular crossing.
- 7.11 NR's level crossing team supports NR's level crossing risk management process by providing a consistent methodology for assessing the safety risks to crossing users, train passengers and train staff at level crossings on NR's controlled infrastructure.
- 7.12 The focus of the Risk Assessment process is not to make the decision for the Project, but to equip stakeholders with the supporting information they need to make decisions on available options for upgrading of level crossings, which fall broadly in three categories:
  - a) closure and re-routing;
  - b) closure and bridge/underpass; and
  - c) crossing upgrade.

## AHB, MHB-OD and MHB-CCTV Crossings

- 7.13 Six of the seven level crossings for which powers are sought within the draft Order are Automatic Half Barrier (AHB) type crossings. An AHB crossing operates when an independent treadle arm located on the track is activated by being pushed down by the train wheels. This then activates the Red Traffic Lights, Yodal Alarms and half barriers located at the AHB and closes the highway, on the near side of each carriageway, to oncoming vehicles and pedestrians. When the train passes over the crossing another treadle is activated which then raises the barriers and resets the crossing back to its dormant state. This sequence of events is not interlocked with any signalling equipment and is, therefore, independent of that signalling. Therefore, once the treadle is activated, the train will pass over the crossing regardless of whether a vehicle or person may be stuck on that crossing.
- 7.14 The overall ALCRM for the entire network identifies that, while AHB crossings account for just 6% of the total estate, they hold 32% of total modelled risk, and 75% of AHB level crossings require the user to make the decision on whether it is safe to cross. AHB type crossings are, therefore, higher risk crossings compared to other types of crossings or full closures.
- 7.15 With an obstacle detection (**OD**) system, low and higher level radars scan the crossing and ensure the crossing is free from obstacles before the signalling system allows a train to pass over the crossing.



- 7.16 With a CCTV system the signaller visually checks the crossing on a CCTV monitor to ensure it is free from obstacles before pushing a "crossing clear button", which then activates the crossing.
- 7.17 Both systems are, therefore, interlocked and integrated to the signalling system thereby providing a much greater degree of protection for vehicle or pedestrian users as a train cannot pass over the crossing if it is obstructed in any way and both sides of the highway carriageway are barriered off to prevent any person or vehicle from entering the crossing.

## Proposed upgrades

- 7.18 Current ALCRM Score for each level crossing, as well as the proposed upgrades are described in Table 9.
- 7.19 It is important to also note that each level crossing and its related equipment has an estimated life expectancy. This is defined through NR's use of the Signalling Infrastructure Condition Assessment (SICA) tool. The SICA renewal dates for each level crossing are also set out in Table 9.

		Existing	SICA	ALCRN	I Score	Proposed
Name	Post Code	Level Crossing Type	Renewal Date⁵	Individual Risk Per Traverse <sup>6</sup>	Collective risk <sup>7</sup>	Level Crossing Type
Milton Fen	CB24 6AF	Automatic Half Barrier	2021	D	2	Manually Controlled Barriers monitored by Obstacle Detection ( <b>MCB-OD</b> )
Dimmock's Cote	CB6 3LJ	Automatic Half Barrier	2023	E	2	Manually Controlled Barriers monitored by Obstacle Detection

Table 9: Existing Level Crossings Type. ALCRM and Proposed Upgrade

<sup>&</sup>lt;sup>5</sup> Signalling Infrastructure Condition Assessment (SICA), namely date by which renewal of the crossing will be required as assessed by the Route Asset Management Team

<sup>&</sup>lt;sup>6</sup> The Individual Risk Per Traverse (**RPT**) indicates how dangerous a crossing is regardless of usage level. RPT makes no assumptions about a 'typical user' and expresses risk in a numerical representation of FWI/Traverse. It is basically the measure of the likelihood of being truck/killer or injured by a train every time the crossing is traversed. It is presented as a single letter A to M (A is the highest risk, L is the lowest risk and M is zero risk (e.g.: temporary closed, dormant or crossings on mothballed lines)

<sup>&</sup>lt;sup>7</sup> Allocates collective risk into rankings 1 to 13 (1 is highest, 12 is lowest and 13 is 'zero risk' e.g. temporary closed dormant or crossings on mothballed lines).

Six Mile Bottom	CB8 0UJ	Automatic Half Barrier	2029	н	4	Manually Controlled Barriers monitored by Obstacle Detection
Dullingham	CB8 9UT	Manned Gate ( <b>MGH</b> )	2023	к	7	Manually Controlled Barriers monitored by Obstacle Detection
Croxton	IP24 2RQ	Automatic Half Barrier	2025	G	3	Manually Controlled Barriers monitored by Obstacle Detection
Waterbeach	CB25 9HS	Automatic Half Barrier	2021	D	2	Manually Controlled Barriers monitored by Obstacle Detection
Meldreth	SG8 6XA	Automatic Half Barrier	2029	D	2	Manually Controlled Barrier with Closed Circuit Television ( <b>MCB-CCTV</b> )
Foxton (Hauxton Road Level Crossing)	CB22 5HJ	N/A – N	lew REB onl	y – no works	s to Foxton le	evel crossing

- 7.20 NR have considered a number of options to reduce the risk at each level crossing, which were considered at a series of workshops with the Project design team and NR Safety Review Panel. These options were largely consistent with the options put forward by the LCMs in their own individual NRAs.
- 7.21 The options considered to enhance safety at each of the level crossings are set out in detail in the relevant risk assessments [APP11 APP17] a summary of the options and the conclusions of the Risk Assessments provided below. Up to date individual NRAs are also included for each crossing [APP43 APP49] and several of these assessments have been conducted after the original SOTERA Risk Assessments were produced for this project.

#### Milton Fen

- 7.22 Milton Fen Level Crossing is currently an AHB Level Crossing and is proposed to be upgraded to an MCB-OD Level Crossing.
- 7.23 The existing crossing has an ALCRM score of D2 with the collective risk rating of 2 identifying it as a very high risk crossing.
- 7.24 The overall conclusions of both the SOTERA and LCM assessments were that the very high levels of risk at Milton Fen mean that the upgrade to MCB-OD will significantly reduce the risk at the crossing (a reduction in the ALCRM Score to F5) and is, therefore, justified.
- 7.25 The most significant risk at Milton Fen is the volume of footfall which far outweighs the vehicle numbers a full barrier solution offers total closure to vehicles and improves safety for all types of users.

#### **Dimmock's Cote**

- 7.26 Dimmocks Cote Level Crossing is currently an AHB Level Crossing and is proposed to be upgraded to an MCB-OD Level Crossing.
- 7.27 The existing crossing has an ALCRM score of E2 with the collective risk rating of 2 identifying it as an extremely high-risk crossing.
- 7.28 The option of a like for like replacement of the existing AHB Level Crossing has been considered and concluded to be not viable as it presents a very high level of risk and has a history of accidents and misuse. Furthermore, renewal of a level crossing with an ALCRM score of E2 as an AHB would be contrary to NR's strategy of upgrading higher risk AHB level crossings.
- 7.29 The overall conclusions of both the SOTERA and LCM assessments were that the extremely high levels of risk at Dimmocks Cote mean that the upgrade to MCB-OD will significantly reduce the risk at the crossing (a reduction in the ALCRM Score to I4) and is, therefore, justified.

#### **Six Mile Bottom**

- 7.30 Six Mile Bottom is an AHB Level Crossing and is proposed to be upgraded to an MCB-OD Level Crossing.
- 7.31 The existing crossing has an ALCRM score of H4 with the collective risk rating of 4 identifying is as a medium to high-risk crossing.
- 7.32 The option of a like for like replacement of the existing AHB type crossing has been considered and concluded to be not viable. Renewal of a crossing with an ALCRM score of H4 as an AHB crossing would be contrary to NR's strategy of upgrading medium/high risk AHB crossings when renewal is required.
- 7.33 The overall conclusions of both the SOTERA and LCM assessments were that the very high levels of risk at Six Mile Bottom mean that the upgrade to MCB-OD will significantly reduce the risk at the crossing (a reduction in the ALCRM Score to K6) and is, therefore, justified.

#### Dullingham

7.34 Dullingham Level Crossing is currently an MGH Level Crossing and is proposed to be upgraded to an MCB-OD Level Crossing.

- 7.35 The existing level crossing has an ALCRM score of K7 with the collective risk rating of 7 identifying it as moderate risk crossing.
- 7.36 The overall conclusions of both the SOTERA and LCM assessments were that the moderate risk levels of risk and the high operational cost of the MGH crossing type at Dullingham mean that the upgrade to MCB-OD will significantly reduce the risk to both NR members of staff and the general public (a reduction in the ALCRM Score to J6, which is an average score for a CCTV crossing) and reduce the operational cost of the crossing and is, therefore, justified.

# Croxton

- 7.37 Croxton is an AHB level crossing and is proposed to be upgraded to an MCB-OD level crossing.
- 7.38 The existing crossing has an ALCRM score of G3 with the collective risk rating of 3 identifying it as a very high-risk crossing.
- 7.39 The overall conclusions of both the SOTERA and LCM assessments were that the very high levels of risk at Croxton mean that the upgrade to MCB-OD will significantly reduce the risk at the crossing (a reduction in the ALCRM Score to K6) and is, therefore, justified. An additional benefit of providing the MCB-OD solution at this crossing is that the ORR will sanction the removal of both 40mph Temporary Speed Restriction on the Up and Down lines that have been in place since 27 August 2012 costing over 10,500 delay minutes each year. Line speed can then be restored back to its 60mph limit.

# Waterbeach

- 7.40 Waterbeach Level Crossing is currently an AHB Level Crossing and is proposed to be upgraded to an MCB-OD Level Crossing.
- 7.41 The existing crossing has an ALCRM score of D2 with the collective risk rating of 2 identifying it as an extremely high-risk crossing.
- 7.42 The option of a like for like replacement of the existing AHB crossing has been considered and concluded to be not viable as it presents a very high level of risk and has a history of accidents and misuse. Furthermore, renewal of a crossing with an ALCRM score of D2 as an AHB would be contrary to NR's strategy of upgrading higher risk AHB level crossings. The proposed upgrade is, therefore, justified.

## Meldreth

- 7.43 Meldreth Level Crossing is an AHB Level Crossing and is proposed to be upgraded to an MCB-CCTV Level Crossing.
- 7.44 The existing crossing has an ALCRM score of D2 with the collective risk rating of 2 identifying it as a very high-risk crossing.
- 7.45 There is a potential to control the Meldreth Level Crossing from Foxton gate box at little or very low operational cost. However, operationally, having the same type of crossing as Shepreth Station (also an MCB-CCTV type crossing) is more straightforward. An MCB-CCTV crossing is therefore concluded to have a slightly lower capital cost, similar operational cost, and some operational simplicity benefit from having two similar type crossings between shared protecting signals.

7.46 The overall conclusions of both the SOTERA and LCM assessments were that the very high levels of risk at Meldreth crossing mean that the upgrade to an MCB-CCTV crossing will significantly reduce the risk at the crossing (a reduction in the ALCRM Score to H4) and is, therefore, justified.

# 8 CONSULTATION ON THE PROJECT

#### **Public consultation**

- 8.1 The local community has been engaged on the Project through information in local media and information on NR's website.
- 8.2 A single round of public consultation was carried out in March 2021. Noting Government Covid restrictions in place at the time, this event was undertaken primarily using digital techniques through NR Citizen Space and the Project website.
- 8.3 The event was publicised through a number of traditional consultation methods including leaflet drops, media advertisement and information boards at relevant stations.
- 8.4 The digital approach was supplemented by more traditional methods of consultation such as offers of direct written, e-mail or telephone correspondence with the Project Stakeholder Manager.
- 8.5 Presentations to key stakeholders including the local planning and highways authorities as well as local councillors were undertaken in January/February 2021 prior to the public consultation.
- 8.6 An information event concerning the final details of the Project and the Order was held in Autumn 2022.
- 8.7 NR remains committed to ongoing consultation and engagement with interested parties. This will continue as the Order progresses through the procedures process and beyond to completion of the Project.

#### Statutory consultation

- 8.8 At the same time as the public consultation, statutory consultation in line with Schedules 5 and 6 of the 2006 Rules was also undertaken with:
  - a) any landowners (or tenants or those with rights in same) potentially affected by the Project – undertaken by NR's agent (Brown and Co) and NR Property and Liabilities teams (Eastern Region);
  - any statutory bodies such as the Environment Agency, Natural England and Historic England, as well as other statutory consultees such as the Office of Rail and Road – undertaken by NR's Portfolio and Consent Managers along with their Transport Consultant (Modelling Group) and Consent Manager and the Projects Stakeholder Manager;
  - key stakeholders such as the local planning and highways authorities undertaken by NR's Portfolio and Consent Managers along with their Transport Consultant (Modelling Group) and the Projects Stakeholder Manager; and

 d) strategic stakeholders such as MPs, Local Councillors and Parish Councils – undertaken by the Projects Stakeholder Manager and the Senior Communications Manager (Anglia).

# 9 FUNDING

As stated in the Funding Statement **[APP6]** the Project, including the Order Scheme inclusive of compensation and any acquisition of blighted land) is fully funded by the UK Government to the total estimated costs of £193.449m.

# 10 PROJECT DELIVERY

- 10.1 The £130 million contract to undertake development of the detailed design, delivery and commissioning of the Project was awarded to Alstom in February 2022.
- 10.2 Alstom will deliver the complete renewal of the signalling system for the Cambridge area to replace the existing equipment which was installed in the early 1980s and the undertake the level crossing upgrade works.
- 10.3 The following high level construction programme for the level crossing upgrade works has been produced on an assumed level of access that is to be agreed with the train and freight operators, as well as being subject to the ongoing private agreements negotiations. This logic will be further developed in line with design progressing during the detailed design stage (GRIP5).
- 10.4 The pre-commissioning stage of the works (this includes constructing the equipment ancillary works) will take place first with the commissioning stage (where the level crossing upgrades will be integrated into the wider signalling system and tested to verify project specification requirements are met) following, as set out in Table 10.

Level Crossing	Pre-commissioning	Commissioning
Meldreth	Quarter 4 2023/Quarter 1 2024	Quarter 1 2024
Milton Fen	Quarter 2 2024	Quarter 2 2024
Waterbeach	Quarter 2 2024	Quarter 2 2024
Dimmocks Cote	Quarter 2 2024	Quarter 2 2024
Croxton	Quarter 2 2024	Quarter 2 2024
Dullingham	Quarter 4 2024	Quarter 4 2024
Six Mile Bottom	Quarter 4 2024	Quarter 4 2024

# 11 OBJECTIONS AND REPRESENTATIONS

- 11.1 The Application was submitted to the Secretary of State on Friday 5 August 2022.
- 11.2 Any objections to, or other representations about, the proposals in the Application were to be sent to the Secretary of State for Transport by Friday 23 September 2022.

- 11.3 By the close of the objection period 30 letters of objection and 5 representations were received by the Secretary of State. Of the 30 objections, 5 were from 'statutory objectors' for the purposes of section 11(4) of the 1992 Act. An objection was also received from Mr Parmee and was initially treated as a statutory objection, but is no longer treated as such as described below.
- 11.4 The objections and representations are summarised in Table 12 and 13 below together with NR's comments on the same by reference to paragraphs within this Statement of Case.

## **Statutory Objectors**

11.5 Out of 30 letters of objection received in relation to the Application, five objections were received from statutory objectors whose land is proposed to be acquired compulsorily pursuant to the provisions of the Order.

## Cambridgeshire County Council

- 11.6 Cambridgeshire County Council (**CCC**) submitted a holding objection in relation to:
  - a) the extent of the stopping up powers sought within the draft Order; and
  - b) proposed temporary use of car parking spaces at Waterbeach Station Car Park.
- 11.7 Since submission of the Application, NR has held a number of workshops with CCC's highways and road safety teams (on 16 August 2022, 22 September 2022 and 18 November 2022) to discuss the extent of the stopping up powers required for the Project. More detailed design layouts in CAD drawings, topographical surveys and further details of road safety arrangements have been provided to CCC as part of these workshops and through e-mail correspondence.
- 11.8 CCC's comments have been carefully reviewed by NR, taken on board and incorporated into revised designs, which were issued to CCC for approval.
- 11.9 At the date of this Statement CCC's approval of the revised designs is still pending approval. However, provided CCC has no objections to the proposed revisions, NR will arrange for the draft Order, as well as the associated plans, to be amended accordingly.
- 11.10 In relation to the proposed temporary use of the CCC's property, known as car parking spaces at Waterbeach Station, a lease document has been agreed between NR and CCC. The lease will be accompanied by a Side Agreement (to be completed simultaneously with the lease) which will restrict exercise of the Order powers against any land of CCC which is subject to the lease.
- 11.11 At the date of this Statement the side agreement is with the Council for execution. As soon as the side agreement have been signed by the Council, NR will arrange for it to be executed on behalf of NR and completed simultaneously with the lease.

## Norfolk County Council

- 11.12 Similarly to CCC, Norfolk County Council (**NCC**) requested further information in relation to the extent of the stopping up powers sought within the draft Order.
- 11.13 NR attended a workshop with NCC in November 2022 to discuss the extent of the stopping up powers required for the Project. NCC's comments have since been taken on board and revised designs issued to NCC for their approval.



11.14 Following the above information being provided, NCC has confirmed in writing that they are happy to remove their objection to the Order, subject to the details set out in NR's letter dated 19 January 2023. Confirmation of this has been provided by the Council to the DfT TIPU.

# Greater Cambridge Shared Planning Service

- 11.15 The Greater Cambridge Shared Planning Service's (**GCSPS**) holding objection relates to potential traffic and environmental impacts of the proposed level crossings upgrades. GCSPS has also questioned NR's planning strategy.
- 11.16 NR submitted its formal response to GCSPS's holding objection on 8 December 2022.
- 11.17 NR considers that, while powers sought in the Order and the need for planning permission are linked, the correct consent regime for consideration of the issues raised by GCSPS is through the Town and Country Planning Act 1990 regime. As part of the Town and Country Planning Act regime, NR have undertaken and provided full traffic and environmental assessments in line with the relevant local planning authorities' validation lists for consideration by GCSPS. NR will continue to work with GCSPS to address any further requests for information and as part of the statutory consultation process that accompanies applications for the planning permissions (as further outlined above).

J Cole (Kilverstone Estate) – Gary Jon Bowman: The Right Honourable Patrick Vavasseur Fourth Baron Fisher of Kilverstone and Mills & Reeve Trust Corporation Limited (**Estate**)

- 11.18 NR's property team has been liaising with the Estate and their agent in relation to an unrelated development scheme to the west of level crossing. As part of this negotiation, the parties agreed Heads of Terms which deal with, amongst other things, the proposed land take at Croxton Level Crossing sought under the Order.
- 11.19 As at the date of this Statement the Heads of Terms agreed with the Estate await final sign off by both parties. NR also recently met with the Estate to discuss removal of their objection and proposed that a side agreement is entered into to provide the Estate with the necessary comfort and restrict NR's powers to acquire any part of the Estate's land at the Croxton Level Crossing, notwithstanding provisions of the Order. As at the date of this Statement, NR is still awaiting the Estate's comments on their proposals.

## Mr Philip David Woodley

11.20 NR's property team has been liaising with Mr Woodley in relation to the proposed construction works, as well as future access to Mr Woodley's property and 1 Station Cottages. As part of this negotiation, updated Heads of Terms were provided to Mr Woodley on 4 January 2023 and, at the date of this Statement, NR is awaiting approval of the same.

## Non-statutory objectors

## Upgrade of Meldreth Level Crossing and potential traffic impacts

- 11.21 The vast majority of objections received in relation to the Application relate to the proposed upgrade of Meldreth Level Crossing from an Automatic Half Barrier Crossing to a Manually Controlled Barrier with Closed Circuit Television. Objections also raise the potential traffic impacts of the upgrade resulting from longer barrier downtimes.
- 11.22 The issues raised in the objections do not relate to the powers proposed to be authorised by the Order, but planning permissions and deemed planning permissions which will authorise



works required as part of the Project (as further outlined above). Accordingly, it is considered that these issues are more appropriately considered and dealt with through the Town and Country Planning Act 1990 process and the related statutory consultation process.

- 11.23 Nonetheless, NR acknowledges that in making the case that there is a compelling case in the public interest for the grant of powers under the Order, it will need to address the merits and benefits of the proposed level crossings upgrades.
- 11.24 Prior to the Application being submitted NR sought to provide all interested parties with further information in relation to the proposed upgrades through the public consultation exercise in March 2021 and through undertaking Traffic Modelling, which was made available through the Project website. Interested parties were also provided with further information through a Frequently Asked Questions document (also made available via the Project website), and NR wrote and spoke to individual objectors.
- 11.25 Information in relation to the potential wider environmental impacts has also been considered through the environmental assessment process, which accompanies applications for planning permission submitted in relation to the Project.
- 11.26 In terms of the potential traffic impacts of the proposed level crossing upgrade, NR has undertaken Traffic Surveys and Modelling to assess the potential impacts of the increased barrier downtimes as each level crossing on all roads, users and the surrounding highway network. Meetings were also held throughout 2021/2022 with the affected highway authorities to agree the methodology for the Traffic Modelling. Traffic Surveys were subsequently undertaken in July 2021.
- 11.27 The following documentation and assessments have been produced and provided to the affected highways authorities:
  - a) Level Crossing Study Modelling Methodology;
  - b) Level Crossing Study Local Model Validation; and
  - c) Level Crossing Study Performance Report
- 11.28 The above was also made available via the Project website.
- 11.29 The Traffic Modelling **[APP42]** was based on 'do nothing' (which assessed the scenario with no upgrade, but including future traffic demand) and 'do something' (which included the proposed upgrade to MCB-CCTV level crossing, as well as future traffic demands) scenarios against the existing situation. These scenarios were then used to assess the network performance including the average delays that may be experienced by road users. The agreed scenarios for Meldreth level crossing are shown in Table 11 below with the increased barrier downtimes shown for each scenario.

Scenario	Period – AM and PM	No. of times barrier called within period	Average Barrier Downtime (seconds)
Base Model -	AM Peak - 08:00 to 09:00	10	62
Existing Barrier Downtime	PM Peak - 16:30 to 17:30	9	62

Do-Nothing	AM Peak - 08:00 to 09:00	12	62
barrier upgrade and	PM Peak - 16:30 to 17:30	10	62
future traffic demand			
Do-Something Scenario - future	AM Peak - 08:00 to 09:00	12	169
traffic demand and	PM Peak - 16:30 to 17:30	10	169
proposed barrier upgrade			

- 11.30 For the above scenarios the modelling shows that the 'do something' scenario would result in the existing 62 second barrier downtime increasing to 169 seconds in both the AM and PM peak Downtimes would differ throughout the day depending on train timetables but these scenarios were modelled for both the AM and PM 'Peak' traffic periods to illustrate a reasonable worst case scenario.
- 11.31 Based on the above barrier downtimes and scenarios, an assessment of network performance on the road was undertaken. This showed that the average delay at Meldreth Road after the upgrade will increase as shown below:
  - a) in the AM Peak the average delay will increase from the existing figure of 63.9 seconds to 91.8 seconds (an increase of 27.9 seconds);
  - b) in the PM Peak the average delay will increase from the existing figure of 50.8 seconds to 72.3 seconds (an increase of 21.5 seconds).
- 11.32 The Traffic Modelling also shows the following impacts resulting from the proposed upgrade:
  - a) modest increases in the average and maximum queue lengths at the crossing. The highest increase is 52 metres, which is observed for the westbound direction in the AM peak. This equates to approximately 9 vehicles; and
  - b) the proposed upgrade will have a minimal impact on eastbound journey times (2 seconds) with an approximate 65 second delay to westbound traffic, which is not considered significant.
- 11.33 In summary the risk to public safety at level crossings depends on their configuration the volume of pedestrian and vehicle traffic traversing the crossing, and rail traffic and has been assessed through the Risk Assessment Method as noted above. The only way to eliminate this risk completely is to close each crossing.
- 11.34 However, as further identified above, in relation to Meldreth Level Crossing, NR consider its closure impracticable given the impact on local road networks, the distance to nearby level crossings and the related costs with greater potential environmental and social impacts.
- 11.35 NR's proposals to upgrade this level crossing therefore involves striking a balance between the convenience to local communities in being able to cross a railway and maintaining public safety in line with NR's legal requirements.
- 11.36 On balance, it is considered that the proposal will increase safety at this location and result in the least environmental and social impacts, noting that a 'Do Nothing' Scenario is not considered viable based on the existing ALCRM score (D2) at the level crossing.

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

## Alex Parmee

- 11.38 Mr Parmee submitted an objection based on the traffic and environmental impacts of the proposed upgraded barrier at Meldreth level crossing. The objection also argued that land which is proposed to be acquired permanently pursuant to the provisions of the Order (land parcel 55) is within Mr Parmee's ownership boundary.
- 11.39 At the date of receipt of Mr Parmee's objection, the extent of his interest in the Order land was unclear. Accordingly, Mr Parmee was initially treated as a statutory objector for the purposes of the Order.
- 11.40 To clarify extent of Mr Parmee's land ownership both NR and Mr Parmee submitted applications to the Land Registry with a view to settling the question of ownership. The Land Registry has subsequently confirmed that the register has been updated and the Register now shows the full extent of land parcel 55 as owned by NR.
- 11.41 Therefore, at the date of this Statement of Case, Mr Parmee does not hold any interest in the Order Land. As such, he is no longer considered to be a statutory objector. Nevertheless, NR is continuing to engage with Mr Parmee with a view to ensuring his outstanding concerns are met and his objection to the Order withdrawn.

Objecti	uo	Grounds of Objection	NR's Position
OBJ 01	E Spain	No safety case for a double barrier at Meldreth Road Level Crossing. Increased downtime will result in air pollution and inconvenience to residents, as well as speeding to get across the Level Crossing.	As outlined in paragraphs 7.43 - 7.46 and 11.21 - 11.37 of this Statement of Case
		<ul><li>Objection to the proposed Meldreth Road Level Crossing upgrade:</li><li>there have been no incidents at the existing Level Crossing in 30 years;</li></ul>	As outlined in paragraphs 7.43 - 7.46 and 11.21 - 11.37 of this Statement of Case
0BJ 02	G Goodchild	<ul> <li>the proposed changes will result in inconvenience to residents;</li> <li>there has been no proper consultation in relation to the proposed changes;</li> </ul>	
		<ul> <li>vehicles often ignore box junctions.</li> </ul>	
		Objection against the proposed Meldreth Road Level Crossing upgrade:	As outlined in paragraphs 7.43 - 7.46 and 11.21 - 11.37 of this Statement of Case
		<ul> <li>there is already a full barrier at the other crossing in Shepreth and the waiting times are unacceptable;</li> </ul>	
0BJ 03	D Smith	<ul> <li>there are no reasons for the proposed upgrade;</li> </ul>	
		<ul> <li>increased downtime is likely to result in air and noise pollution as well as frustration of drivers, cyclists and pedestrians.</li> </ul>	
		Request for information in relation to costs of the proposed works.	
OBJ	J Burn	Objection against the proposed Meldreth Road Level Crossing upgrade:	As outlined in paragraphs 7.43 - 7.46 and 11.21 - 11.37 of this Statement of Case
04		dramatic increase in waiting times;	

Table 12: Summary of objections

Objectic	uo	Grounds of Objection	NR's Position
		speeding;	
		<ul> <li>no safety justification for the proposed upgrade;</li> </ul>	
		no proper consultation	
		Objection against the proposed Meldreth Road Level Crossing upgrade:	As outlined in paragraphs 7.43 - 7.46 and 11 21 - 11 37 of this Statement of Case
		<ul> <li>excessive traffic delays already occur at Foxton (A10) and Shepreth stations;</li> </ul>	
		<ul> <li>a full barrier at the Meldreth Road (Shepreth) crossing would compound traffic flow further;</li> </ul>	
OBJ 05	M Prove	<ul> <li>traffic held up at crossing for a long duration encourages speeding.</li> </ul>	
		Explanation required:	
		1. On the table "Impact to Level Crossings" – is this chart a desktop analysis or based on real life data?	
		2. What the heading Queue length means? Also journey time and average delay.	
		Objection against the proposed Meldreth Road Level Crossing upgrade:	As outlined in paragraphs 7.43 - 7.46 and 11 21 - 11 37 of this Statement of Case
0BJ 06	H Finlayson	<ul> <li>existing crossing is safe and efficient and there are no reasons for the proposed upgrade;</li> </ul>	
		<ul> <li>the proposed crossing will significantly extend waiting times, creating additional health and safety issues;</li> </ul>	

Objecti	uo	Grounds of Objection	NR's Position
		<ul> <li>the change would cause a built up of traffic on a dangerous bend (Meldreth side) <ul> <li>risk to pedestrians in the road;</li> <li>long queues would form and would be likely to block the flow of traffic at peak times (Shepreth side).</li> </ul> </li> </ul>	
OBJ 07	B Smith	Objection against the proposed upgrade of Meldreth Road Level Crossing – there have been no accidents attributable to the type of gate at the crossing in 40 years. Proposed upgrades will lead to longer downtimes which are already long.	As outlined in paragraphs 7.43 - 7.46 and 11.21 - 11.37 of this Statement of Case
0BJ 08	T Davey	Objection against the proposed upgrade of Meldreth Road Level Crossing – whilst the risk assessment suggests that improvement should be made, there are no reported cases of near miss at the site. The length of time the double barrier is closed can be very long.	As outlined in paragraphs 7.43 - 7.46 and 11.21 - 11.37 of this Statement of Case
0BJ 09	M Lynch	Objection against the proposed Meldreth Road Level Crossing upgrade – unnecessary as there are no recorded injuries at the crossing.	As outlined in paragraphs 7.43 - 7.46 and 11.21 - 11.37 of this Statement of Case
0BJ 10	T Lynch	Objection against the proposed Meldreth Road Level Crossing upgrade. The proposed upgrade will increase journey times and is an unnecessary expense to achieve a needless safety objective. No recorded injuries at the Level Crossing.	As outlined in paragraphs 7.43 - 7.46 and 11.21 - 11.37 of this Statement of Case
OBJ 11	R Faires	<ul> <li>Objection against the proposed Meldreth Road Level Crossing upgrade:</li> <li>no proper consultation;</li> <li>no proper modelling of the impact of the proposal;</li> <li>no safety reason for the proposed LX works;</li> </ul>	As outlined in paragraphs 7.43 - 7.46 and 11.21 - 11.37 of this Statement of Case

ctic	uc	Grounds of Objection	NR's Position
		<ul> <li>significant impacts on journey times, emergency services routes and locals;</li> </ul>	
		<ul> <li>there is a requirement for NR to identify complex track and signalling layouts which may lead to the excessive warning times as experienced in Shepreth, which are expected to occur at the Meldreth road crossing.</li> </ul>	
		Objection against the proposed Meldreth Road Level Crossing upgrade:	As outlined in paragraphs 7.43 - 7.46 and 11 21 - 11 37 of this Statement of Case
	B Pankhurst	<ul> <li>the existing barriers are efficient and there have been no historic incidents since 1995;</li> </ul>	
		<ul> <li>the proposed upgrade will result in increased downtime.</li> </ul>	
		Objection against the proposed Meldreth Road Level Crossing upgrade:	As outlined in paragraphs 7.43 - 7.46 and
		<ul> <li>no reason for upgrade – Level Crossing performs well as is;</li> </ul>	
		<ul> <li>increased downtimes will lead to increased speeding;</li> </ul>	
	A Parmee (owner of 55	<ul> <li>barrier down time findings in NR's analysis are incorrect;</li> </ul>	
	Meldreth Road - directly adjoining the	<ul> <li>increased barrier downtime will make access to the objector's property more challenging;</li> </ul>	
	railway)	<ul> <li>queues will create environmental pollution;</li> </ul>	
		<ul> <li>proposals will result in the light pollution;</li> </ul>	
		<ul> <li>larger crossing and new service yard will lead to a greater number of vehicles movements throughout the night;</li> </ul>	
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Objecti	ion	Grounds of Objection	NR's Position
		<ul> <li>proposed CCTV will affect the objector's privacy;</li> </ul>	
		<ul> <li>proposed works will result in removal of well-established trees between the objector's property and the railway</li> </ul>	
		Areas which are proposed to be permanently acquired are within the objector's boundary and there has not been sufficient engagement from NR in relation to these parcels of land.	
OBJ 14	Fen Line Users Association	Objection to changing Waterbeach Level Crossing from AHB to MBC-OD: <ul> <li>increased downtime;</li> </ul>	As outlined in paragraphs 7.40 - 7.42 of this Statement of Case
		<ul> <li>modelling is inconsistent.</li> </ul>	
	J Cole (Kilverstone	Submissions:	As outlined in paragraphs 11.18 - 11.19 of this Statement of Case
	Estate) – Gary John Bowman; the Right Honourable	<ul> <li>not enough information has been provided to assess the likely impacts of the proposed Scheme on their Estate and on the farm operations carried out on the Estate;</li> </ul>	
0BJ 15	Patrick Vavasseur Fourth Baron Fisher of Kilverstone and	<ul> <li>unclear what are the likely heritage impacts of the Scheme on the pill box at Croxton Level Crossing (Norfolk Historic Environment Record 15052) – whilst outside order limits, physically within the boundary of Plot 905 and will be in close proximity to the Scheme works at Croxton;</li> </ul>	
	Mills & Reeve Trust corporation Limited	<ul> <li>Croxton LX is used by agricultural vehicles – upgraded Level Crossing will increase the average and maximum queues of traffic at the crossing and will a direct effect on the operational works of the Estate;</li> </ul>	

Objecti	uo	Grounds of Objection	NR's Position
		<ul> <li>impact on the setting of the World War II pill box w/n Plot 905 – Heritage Statement required.</li> </ul>	
		Objections:	
		<ul> <li>Compulsory acquisition of land – unclear why such a significant part needs to be acquired and how it is proportionate to the Croxton LX works that are envisaged;</li> </ul>	
		<ul> <li>Impact of the Scheme on the Estate and lack of information (as further outlined above). The Estate owners are also concerned that the Scheme works will disrupt timing when harvesting crops;</li> </ul>	
		<ul> <li>Impact of the Scheme on the setting of a heritage asset (as further outlined above).</li> </ul>	
		Objection against the proposed Meldreth Road Level Crossing upgrade:	As outlined in paragraphs 7.43 - 7.46 and 11 21 - 11 37 of this Statement of Case
OBJ	M Dodde	<ul> <li>unnecessary – no incidents at the crossing;</li> </ul>	
16		<ul> <li>increased downtime resulting in people speeding to avoid waiting;</li> </ul>	
		<ul> <li>proposed changes worse for the local residents.</li> </ul>	
		Objection against the proposed Meldreth Road Level Crossing upgrade:	As outlined in paragraphs 7.43 - 7.46 and 11.21 - 11.37 of this Statement of Case
OBJ		<ul> <li>no proper consultation or local awareness;</li> </ul>	
17		<ul> <li>flawed analysis - traffic modelling is incorrect;</li> </ul>	
		<ul> <li>minimal/nil actual risk on rail;</li> </ul>	

Objection	Gro	unds of Objection	NR's Position
		<ul> <li>increase to risk on road and to the community in emergencies;</li> </ul>	
	-	<ul> <li>reduction of rail use</li> </ul>	
	Obje	ction against the proposed Meldreth Road Level Crossing upgrade:	As outlined in paragraphs 7.43 - 7.46 and 11 21 - 11 37 of this Statement of Case
OBJ A Davi 18	<u>.</u>	<ul> <li>the Level Crossing will become more dangerous as pedestrians often climb over the barrier;</li> </ul>	
2	-	<ul> <li>people speeding to avoid long waiting times;</li> </ul>	
	-	<ul> <li>unnecessary to upgrade the crossing as there is no history of accidents.</li> </ul>	
	Sche posit	eme supported in principle, but objection on the basis of ensuring that the Council's tion is protected:	As outlined in paragraphs 11.6 - 11.11 of this Statement of Case
	-	<ul> <li>Council unable to determine the extent to which the plans impact on its assets;</li> </ul>	
OBJ Cambridge	eshire	<ul> <li>concerns that the proposed Order will negatively impact users of the public highway in terms of accessibility and safety;</li> </ul>	
		<ul> <li>land parcels 005, 006 – stopping up considered unnecessary as proposed works can be delivered through an ordinary street works permit;</li> </ul>	
	-	<ul> <li>land parcel 009 – proposed stopping up is excessive and may prejudice against the future management of the verge on the approach to the level crossing, and access to the adjacent ditch for maintenance by the adjoining private landowner;</li> </ul>	

Objecti	ion	Grounds of Objection	NR's Position	
		<ul> <li>land parcels 304, 401,402, 403, 601, 603 – proposed stopping up is immediately adjacent to the carriageway – concerns in relation to safety, visibility and access implications of the proposals;</li> </ul>		
		<ul> <li>land parcels 703 and 704 – proposed stopping up areas encroach into the pre- existing footways which present a safety and access concern.</li> </ul>		
		Council believes it necessary to seek protection of its highway assets, but remains hopeful that satisfactory amendments can be made to the draft Order. The Council is also prepared to reconsider its objections if sufficient information is provided by NR to justify that the stopping up proposals do not cause the concerns raised above.		
		Council hopes for a consistent dialogue in relation to the impact the crossing scheme may have on traffic.		
0BJ 20	Norfolk County Council	Concerns in relation to the proposed acquisition of plots 902, 908 (in part) and 909 (in part) where the plots overlap with the Highway boundary. Concerns raised with regard to stopping up and the erection of a fence or similar structure in areas of highway in 902, 908 and 909 as these are likely to diminish the available visibility from the existing agricultural accesses onto the highway, which would be detrimental to highway safety.	As outlined in paragraphs 11.12 - Error! Reference source not found. of this Statement of Case	
0BJ 21	A Mycroft	<ul> <li>Objection against the proposed upgrade of Meldreth Road Level Crossing:</li> <li>increased downtime (50-second cycle would be four minutes);</li> <li>no need to replace accident-free crossing;</li> </ul>	As outlined in paragraphs 7.43 - 7.46 and 11.21 - 11.37 of this Statement of Case	
Objection		Groun	nds of Objection	NR's Position
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		•	proposed upgrade and the associated increase in downtime will increase the risk of people trying to "jump" the crossing.	
		Object well as	tion against the proposed compulsory acquisition of the objector's land/right, as <i>i</i> s the proposed works:	As outlined in paragraphs 6.25 and 11.20 and table 8 of this Statement of Case
		•	the proposed acquisition will have a large impact on how the land is currently used (as a parking area);	
		•	new NR equipment will impede vision of entering and exiting the objector's property;	
OBJ	:	•	the objector will lose a car parking space to accommodate their neighbours right of way;	
3	P Woodley	•	increased risk of misuse of the objector's land to optimise the neighbour's parking – negative impact on relationship and mental health;	
		•	privacy concerns in relation to the new pedestrian access for maintenance of the new barriers and wigwags going through the objector's property;	
		•	privacy concerns in relation to the proposed changes to the existing right of way (private – neighbour);	
		•	risk of vandalism/theft;	
		•	disturbance from new signals which will sound for longer periods;	

Objecti	ion	Grounds of Objection	NR's Position
		<ul> <li>safety concerns – no clear plans on how the machinery, equipment and materials will be made safe whilst the work is being carried out and how the barrier machines will be secured once in place;</li> </ul>	
		<ul> <li>not enough negotiation and time to consider NR proposals;</li> </ul>	
		<ul> <li>devaluation of the objector's property.</li> </ul>	
0BJ 23	S Nash	Objection against the proposed Meldreth Road Level Crossing upgrade as it will result in an increased downtime.	As outlined in paragraphs 7.43 - 7.46 and 11.21 - 11.37 of this Statement of Case
		Objection against the proposed Meldreth Road Level Crossing upgrade:	As outlined in paragraphs 7.43 - 7.46 and 11.21 - 11.37 of this Statement of Case
0BJ 24	H Duncan	<ul> <li>changes not required – the crossing has no historical problems and is seldom used by pedestrians;</li> </ul>	
		<ul> <li>the proposed changes will cause a dangerous 'rush to cross' the crossing to avoid delays and will send traffic to minor roads and villages not designed for heavier usage.</li> </ul>	
		Objection against the proposed Meldreth Road Level Crossing upgrade:	As outlined in paragraphs 7.43 - 7.46 and
OBJ 25	Shepreth	<ul> <li>proposal will increase congestion, increase the difficulty of traffic flow and the risk of speeding;</li> </ul>	
C7		deterioration in air quality;	
		<ul> <li>risks will outweigh the minimal safety benefits;</li> </ul>	

brof R J <sub>k</sub>	ames	<ul> <li>Grounds of Objection</li> <li>conclusion that the effects on the village will be "minimal" is flawed and is based on an incorrect analysis; and</li> <li>conclusion that the effects on the village will be "minimal" is flawed and is based on an incorrect analysis; and</li> <li>the Parish Council requires consistent data specific to the Meldreth Road and Shepreth crossings to be collected, analysed and presented in a transparent and accessible manner before any final decision is made.</li> <li>Objection against the proposed upgrade of Meldreth Road Level Crossing – the proposed upgrade will increase problems with traffic in the village and will increase traffic congestion.</li> <li>Objection against the proposed Meldreth Road Level Crossing upgrade:</li> <li>increased downtime which will constitute a significant difference;</li> <li>no data provided on the impact of the changes on local traffic;</li> <li>the proposed full barrier will not provide any improvements – there are no reductions in risk;</li> <li>increased downtime is likely to result in more people speeding through the barrier.</li> </ul>	NR's Position As outlined in paragraphs 7.43 - 7.46 and 1.21 - 11.37 of this Statement of Case As outlined in paragraphs 7.43 - 7.46 and 1.21 - 11.37 of this Statement of Case
S Van de (Meldre Shepreth Foxtc Communii	e Ven eth, h and on ity Rail ship)	Partnership objects to "the continuing failure of NR to consult with members of the local community, and its reliance on inaccurate and contradictory data pertaining to Level Crossing crossing safety data, in its case for Meldreth Road Level Crossing upgrade. Request for meaningful response to concerns and challenged raised in the original consultation response submitted to C3R in 2021.	vs outlined in paragraphs 7.43 - 7.46 and 1.21 - 11.37 of this Statement of Case

Objectic	u	Grounds of Objection	NR's Position
0BJ 29	J Beckett	Concern over the proposal to replace half barrier level crossings and install full barrier level crossings. The wait time are considerably longer leaving frustrated car drivers, pedestrians and cyclists.	
		Objection against the proposed Meldreth Road Level Crossing upgrade:	As outlined in paragraphs 7.43 - 7.46 and 11.21 - 11.37 of this Statement of Case
		<ul> <li>proposed changes are unnecessary and unwanted;</li> </ul>	
		<ul> <li>locals have not been given adequate chance to object;</li> </ul>	
0BJ 30	V Davies	<ul> <li>increased down time will cause congestion on the Shepreth side of the crossing (pas houses where people already have to park on the street);</li> </ul>	
8		<ul> <li>on the Meldreth side it will cause pollution and congestion near the L-Moor nature reserve;</li> </ul>	
		<ul> <li>will make journeys "untenable";</li> </ul>	
		<ul> <li>the proposed upgrade will increase the risk of accidents (as people race to get over the crossing).</li> </ul>	
able 13:	Summary of repres	sentations	
Rep	oresentation	Grounds/comments	NR's Position

dəA	resentation	Grounds/comments	NR's Position
REP01		Objection against the proposed upgrade of Meldreth Road Level Crossing:	As outlined in paragraphs 7.43 - 7.46 and
	D Marsh		11.21 - 11.37 of this Statement of Case
		<ul> <li>the proposed upgrade is unjustifiable;</li> </ul>	

there have not been any incidents at the Level Crossing;	<ul> <li>the argument about safety of pedestrians "does not make sense" as there are no pavements on the Meldreth side of the crossing;</li> </ul>	<ul> <li>the proposal will result in an increased downtime;</li> </ul>	<ul> <li>unwelcome, costly and unnecessary change.</li> </ul>	The level crossing at Six Mile Bottom is proposed to be upgraded from a half to a full barrier solution. There is a half barrier currently installed on the south-west corner of the level crossing. Only land parcels 301 and 304 are being permanently acquired to allow for the installation of the full barrier on the south-east corner of the crossing. The remaining powers are sought on temporary basis to allow construction, with limited extent of rights being acquired permanently to allow provide permanent access for both NR and the landowners of Station House and 1 Station Cottages on the south-east corner of the crossing. The remaining powers are sought on temporary basis to allow provide permanent access for both NR and the landowners of Station House and 1 Station Cottages to maintain access
there have not bee	<ul> <li>the argument abound the pavements on the pav</li></ul>	<ul> <li>the proposal will re</li> </ul>	<ul> <li>unwelcome, costly</li> </ul>	It appears that all land out currently parked here for S for SMB suggests there v model, possibly justified (t trains to pass at once' – bu
				Little Wilbraham Bottom Parish n Council tt
				REP02

REP03	Sir and Ladv	Objection against the proposed changes to Meldreth Road Level Crossing – local residents have not been provided with sufficient notice of the proposed change, which	As outlined in paragraphs 7.43 - 7.46 and 11.21 - 11.37 of this Statement of Case
	oir and Lady D Wright	Will cause considerable inconvenience to those traveling on Meldreth Koad.	
		consultation undertaken with the local residents.	
REP04		Concerns raised in relation to the proposed changes to Meldreth Road Level Crossing at Shepreth.	As outlined in paragraphs 7.43 - 7.46 and 11.21 - 11.37 of this Statement of Case
	S Hatton	Request for evidence of the number of safety incidents recorded at the crossing.	
		Concerns about the length of time the gates will be down compared to the current set up.	
REP05		Joint representation on behalf of Cambridge City Council and South Cambridgeshire District Council.	As outlined in paragraphs 7.43 - 7.46 and 11.21 - 11.37 of this Statement of Case
		Overall the Councils support the aims of the scheme and representation submitted by way of a holding objection only.	
	Greater Cambridge Shared	The Councils make no comment on whether or not the proposed works fall within PD and reserve their position with regard to the need for planning permission/other permissions.	
	Partnership	Cambridge City Council property services team has not been consulted on the site to the south of Long Road bridge.	
		The Councils submitted representations to NR's public consultation in April 2021 and to the consultation on the EIA screening request in July 2021 and are concerned that NR has not given proper consideration to all the issues raised, which can be summarised as follows:	

•	strongly support the proposed signalling upgrades and the safety improvements to the LXs; However the principle of development should be balanced against the potential impacts of the scheme in terms of transport, access and safety, air quality and carbon emissions and other environmental impacts;
•	further assessment is required of impact of barrier down time on traffic within the locality and the wider highway network including avoiding unforeseen impacts, and the resulting potential reduction in air quality and carbon emissions;
•	further assessment is required of barrier down time and behavioural responses including additional risk taking, to ensure that improvements in rail safety should not result in a reduction in road safety;
•	consider accessibility for pedestrians, cyclists and equestrians as well as those with reduced mobility affected by the proposed LX changes;
•	further assessment of the impact of the conversion at Shepreth from half barrier to a full barrier on vehicles queuing in the village is required, including the combined impact with the existing full barrier within 500 metres on traffic;
•	consider future upgrades to ensure passive provision is provided, including at Six Mile Bottom LX;
•	diversion of the Definitive Line of the Public Footpath Waterbeach 21 should be regularised;
•	consultation with Natural England is required on the potential impact of the works at Shepreth on the L-Moor SSSI and at Dimmock's Close (East Cambridgeshire) on Cam Washes SSSI;
•	consultation with Historic England is required on the potential impact of works at Milton, Waterbeach and Little Shelford on Scheduled Ancient Monuments;

<ul> <li>the potential impact of the proposed development on protected species, listed buildings, Air Quality Management Zones, works within Flood Zones 2 and 3 should be assessed through information submitted with the appropriate consent applications.</li> <li>The Councils have not received assurance from the Highways Authority that NR's</li> </ul>
modelling and the predicted impacts set out in the Traffic Modelling Keport and a Level Crossing Study are supported. Methodology and conclusions set out in the risk assessments provided by NR are unclear. No acknowledgment has been made about the potential increase in risk from users seeking to cross before the barrier come down to avoid the longer wait times. NR required to provide satisfactory explanation of the risk assessment and the potential
NR has not provided any assessment of the potential impact on air quality or carbon emissions. NR required to provide a satisfactory response including addressing the site- specific concerns raised by ward Councillors and Parish Councillors. The site to the south of Long Road bridge is within an area covered by a TPO. NR
required to provide more information about the works in this area and an acceptable impact on protected trees. The Parish Council comment on the proposed upgrade of Meldreth Road LX – the Council is of the opinion that the proposal is under-researched and misleading and that a conclusion that will have a wide-ranging impact on the village is based on flawed data barely relevant to the LX in question. NR to provide transparent and proper analysis of site specific information for both Meldreth Road and Shepreth LXs before any final decision is taken.

## APPENDIX A

## APPLICANT'S LIST OF DOCUMENTS

The following is a list of documents which NR presently intends to refer to or put in evidence at the public inquiry. NR reserves the right to refer to further documents if and insofar as they may become relevant or necessary.

Ref.	APPLICATION DOCUMENTS
APP1	Draft Order
APP2	Explanatory Memorandum
APP3	Statement of Aims
APP4	Report summarising consultations undertaken
APP5	Declaration of the status of the Applicant
APP6	Funding statement
APP7	List of consents, permissions or licences under other enactments
APP8	Waiver direction given by the Secretary of State under rule 18 of the 2006 Rules
APP9	Land Plans
APP10	Book of Reference
	SCHEME DEVELOPMENT DOCUMENTS
APP11	Risk Assessment for Waterbeach AHB Level Crossing
APP12	Risk Assessment for Dimmocks Cote AHB Level Crossing
APP12 APP13	Risk Assessment for Dimmocks Cote AHB Level Crossing         Risk Assessment for Milton Fen AHB Level Crossing
APP12 APP13 APP14	Risk Assessment for Dimmocks Cote AHB Level Crossing         Risk Assessment for Milton Fen AHB Level Crossing         Risk Assessment for Meldreth AHB Level Crossing
APP12 APP13 APP14 APP15	Risk Assessment for Dimmocks Cote AHB Level Crossing         Risk Assessment for Milton Fen AHB Level Crossing         Risk Assessment for Meldreth AHB Level Crossing         Risk Assessment for Dullingham MCB Level Crossing
APP12         APP13         APP14         APP15         APP16	Risk Assessment for Dimmocks Cote AHB Level Crossing         Risk Assessment for Milton Fen AHB Level Crossing         Risk Assessment for Meldreth AHB Level Crossing         Risk Assessment for Dullingham MCB Level Crossing         Risk Assessment for Six Mile Bottom AHB Level Crossing
APP12         APP13         APP14         APP15         APP16         APP17	Risk Assessment for Dimmocks Cote AHB Level Crossing         Risk Assessment for Milton Fen AHB Level Crossing         Risk Assessment for Meldreth AHB Level Crossing         Risk Assessment for Dullingham MCB Level Crossing         Risk Assessment for Six Mile Bottom AHB Level Crossing         Risk Assessment for Croxton AHB Level Crossing
APP12         APP13         APP14         APP15         APP16         APP17	Risk Assessment for Dimmocks Cote AHB Level Crossing         Risk Assessment for Milton Fen AHB Level Crossing         Risk Assessment for Meldreth AHB Level Crossing         Risk Assessment for Dullingham MCB Level Crossing         Risk Assessment for Six Mile Bottom AHB Level Crossing         Risk Assessment for Croxton AHB Level Crossing         LEGISLATION AND GUIDANCE (RELEVANT EXTRACTS)
APP12         APP13         APP14         APP15         APP16         APP17         APP18	Risk Assessment for Dimmocks Cote AHB Level Crossing         Risk Assessment for Milton Fen AHB Level Crossing         Risk Assessment for Meldreth AHB Level Crossing         Risk Assessment for Dullingham MCB Level Crossing         Risk Assessment for Six Mile Bottom AHB Level Crossing         Risk Assessment for Croxton AHB Level Crossing         LEGISLATION AND GUIDANCE (RELEVANT EXTRACTS)         Transport and Works Act 1992 (Part 1 and Schedule 1)

APP20	The Railways and Other Guided Transport Systems (Safety) Regulations 2006
APP21	The European Union (Withdrawal) Act 2018 (Section 2)
APP22	Town and Country Planning (General Permitted Development) (England) Order 2015 (Part 8 and Part 18 of Schedule 2)
APP23	Transport and Works (Applications and Objections Procedure) (England and Wales) Rules 2006 (S.I. 2006 No. 1466)
APP24	Transport and Works (Model Clauses for Railways and Tramways) Order 2006 (S.I. 2006 No 1954)
APP25	Transport and Works (Inquiries Procedure) Rules 2004 (S.I. 2004 No. 2018)
APP26	Guidance on Compulsory Purchase Process and Crichel Down Rules (MHCLG, July 2019)
APP27	Compulsory Purchase Act 1965 (Part 1)
APP28	Health and Safety at Work etc. Act 1974
	NATIONAL AND LOCAL PLANNING AND TRANSPORT POLICIES AND STRATEGIES AND GUIDANCE
APP29	National Planning Policy Framework
APP30	Government White Paper (Creating growth, cutting carbon: Making Sustainable Transport happen) (2011)
APP31	National Policy Statement for National Networks
APP32	Breckland Local Plan 2019
APP33	South Cambridgeshire Local Development Plan 2018
APP34	East Cambridgeshire Local Plan 2015
APP35	Draft Cambridgeshire and Peterborough Local Transport and Connectivity Plan (May 2022)
APP36	Transport Strategy for Cambridge and South Cambridgeshire (TSCSC), 2014
APP37	Transport Strategy for East Cambridgeshire 2016
APP38	Norfolk County Council Local Transport Plan 4 Strategy (July 2022)
	OTHER

APP40	Croxton (Thetford Road), Level Crossing Upgrade – Planning, Design and Access Statement (December 2022)
APP41	Meldreth Road (Shepreth) Level Crossing Upgrade – Planning, Design and Access Statement (November 2022)
APP42	Hauxton Level Crossing Upgrade – Planning, Design and Access Statement (November 2022)
APP43	Milton Fen AHB Crossing – Level Crossing Narrative Assessment
APP44	Dimmocks Cote AHB Crossing – Level Crossing Narrative Assessment
APP45	Six Mile Bottom AHB Crossing – Narrative Risk Assessment
APP46	Dullingham MGH Crossing – Narrative Risk Assessment
APP47	Croxton AHB Crossing – Narrative Risk Assessment
APP48	Waterbeach AHB Crossing – Narrative Risk Assessment
APP49	Meldreth Road AHB Crossing – Narrative Risk Assessment

## **APPENDIX B**

## LOCATIONS WHERE DOCUMENTS MAY BE INSPECTED

As required by Rule 7 of the Transport and Works (Inquiries Procedure) Rules 2004 the documents which the Applicant intends to refer to or put in evidence at the forthcoming inquiry (as listed in Appendix A) will be available for inspection and (where practicable and subject to the payment of a reasonable charge) may be copied at the locations listed below.

These documents will be available from Monday 23 January 2023 until the date of commencement of the inquiry.

A copy of every Statement of Case served by any other party and every document served with them will also be made available at these locations once received and copied by NR.

Location	Opening times
	Monday, Tuesday and Friday – 9.30am – 7pm
Combridge Control Librory, 7 Lion Vord, Combridge	
CB2 3QD	Wednesday – 10.00am – 6pm
	Saturday – 12.00 – 4pm
Thetford Library Raymond Street Thetford IP24	Monday to Friday – 10.00am – 7.00pm
	Saturday and Sunday – 10.00am – 4.00pm

