

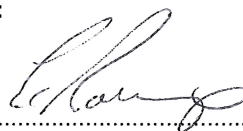
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# Level 1

## Level crossing asset management policy

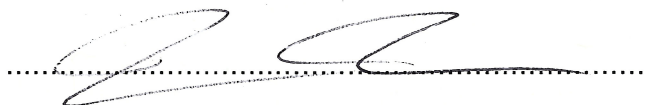
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## User information

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 non-compliance 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.

## Amendment marks

- First document amendments are presented with a single black line to the right of the affected text.
- Second document amendments are presented with a double black line to the right of the affected text.

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## Issue record

Issue	Date	Comments
1	June 2016	First issue

## Compliance

This Network Rail standard is mandatory and shall be complied with by Network Rail and its contractors if applicable from 01 April 2019.

Where it is considered not reasonably practicable<sup>1</sup> to comply with the requirements in this standard, 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 contains requirements that are designed to demonstrate compliance with legislation they shall be complied with irrespective of a project's 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 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 with legislation and/or external standards is described in the purpose of this standard.

## Reference documentation

NR/L1/XNG/100/01 Module 1 – Workbank Planning

NR/L1/XNG/100/02 Module 2 – Technology Strategy

NR/L1/XNG/100/03 Module 3 – Maintenance

NR/L1/XNG/100/04 Module 4 – Environmental and Social Performance

NR/L1/XNG/100/05 Module 5 – SEU Definition

NR/L1/XNG/100/06 Module 6 – Asset data and information

**NOTE:** The supporting modules are scheduled for publication in September and December 2016.

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Compliance with a Network Rail standard does not, of itself, confer immunity from legal obligations.

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<sup>1</sup> This can include gross proportionate project costs with the agreement of the Network Rail Assurance Panel (NRAP).

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## 1 Purpose

The purpose of this document is to specify the asset management policy for the whole of the Network Rail Level Crossing estate.

The Level Crossing asset management policy seeks to optimise the performance, risk and cost of ownership of the Level Crossing estate across all of its life cycle stages from concept to disposal to deliver minimum whole life cost.

The policy is structured around the six main subject areas and 39 sub-groups identified in the Institute of Asset Management document 'Anatomy of Asset Management':

- strategy and planning;
- asset management decision-making;
- life cycle delivery;
- asset information;
- organisation and people; and
- risk and review.

The Institute of Asset Management guidance is recognised as best practice against which Network Rail is measured by the Office of Rail and Road, 'The Regulator'.

## 2 Scope

### 2.1 General

The policy supports the two top level crossing risk event bow ties:

- Animal, vehicle, object or person on the line at risk of collision; and
- Incident on or near level crossing not involving a railway vehicle.

The policy provides guiding principles which relate to all of the controls identified in the bow-ties.

Practical examples of the application of the policy are provided in appendix A.

The policy applies to all employees and others engaged in activities connected with any aspect of a level crossing asset life cycle.

The policy applies to the whole the level crossing estate. It covers passive, e.g. footpath and user worked level crossings and active, e.g. automatic and manually controlled level crossings.

### 2.2 Responsibilities

The policy is applicable particularly to Route Level Crossing Managers and Route Asset Managers, Track Signals, Electrical Power and posts in the route accountable for lineside. It also applies to the equivalent posts in Network Rail Telecom.

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The level crossing asset policy, its associated reference documents and policy application guide, see appendix A, should be referred to when preparing Route Business plans.

## 2.3 Line of sight to asset management core principles and Network Rail objectives

All asset management interventions defined in this policy are aligned to the principles defined in the Network Rail asset management policy and to the objectives defined in the Network Rail asset management strategy, see figure 1. They:

- are based on minimising whole life, whole system costs;
- are underpinned by appropriate facts from enhanced information;
- define the most appropriate approach to asset maintenance inspection and renewal, supported by reliability, availability, maintainability and safety specifications;
- define a risk-based approach to determining intervention requirements to specify levels of reliability;
- define resilience requirements to a specified range of weather conditions, taking account of emerging knowledge of climate change; and
- define how sustainable development requirements are to be addressed.



Figure 1 – Asset Management System

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The Level Crossing asset management policy sits at stage 3 in the Network Rail asset management framework shown in figure 2, which provides line of sight between Network Rail's high level objectives and the execution of work. A review and learning feedback supports continuous improvement.



**Figure 2 – Network Rail Asset Management Framework**



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### 3 Terms and abbreviations

Term	Definition
Ellipse	System used for recording assets and scheduling maintenance

Abbreviation	Description
AHB	Automatic Half Barrier
ALARP	As low as is reasonably practicable
ALCRM	All Level Crossings Risk Model
AOCL	Automatic Open Crossing Locally monitored
AOCL+B	Automatic Open Crossing Locally monitored with Barrier
ATP	Automatic Train Protection
AWS	Automatic Warning System
C-DAS	Connected Driver Advisory System
CCS	Control, Command & Signalling
Class B	National train protection system
DRACAS	Defect recording analysis and corrective action system
ETCS	European Train Control System
MCB-OD	Manually Controlled Barrier with Obstacle Detection
MCB-CCTV	Manually Controlled Barrier with Closed Circuit Television
MSL	Miniature Stop Light
ORBIS	Offering Rail Better Information Services
RLSE	Red Light Safety Equipment
ROC	Rail Operating Centre
RoSE	Reliability of Signalling Equipment
TM	Traffic Management
TPWS	Train Protection Warning System
SICA	Signalling Infrastructure Condition Assessment
SSADS	Signalling Schemes Asset Data Store
UWC	User Worked Crossing

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## 4 Overview

### 4.1

This policy provides users with a reference to Network Rail's high level asset policy statements for level crossings.

### 4.2

The cost modelling and analysis which forms the evidence behind the policy statements are given in the supporting reference documentation.

### 4.3

The policy statements form the basis of Network Rail's CP6 Initial Industry Plan submission and subsequent Strategic Business Plan and negotiation with the Regulator.

### 4.4

This policy meets the objectives provided by Group Strategy. It is based on a safe, sustainable and improving railway with Digital Railway deployment. Perpetuation of a safe, reliable and financially sustainable railway, optimising the whole life cost within the Digital Railway strategy.

### 4.5

The Digital Railway will open up many new business, safety and technical opportunities for the level crossing estate. This is in its infancy and the issues and opportunities will be logged and developed in line with the Digital Railway programme.

### 4.6

The provision and operation of Mobile Safety Vehicles is not in the scope of this document; these should be referred to the Network Rail road fleet manager.

### 4.7

Road/Rail on/off tracking points are not considered in this document.

### 4.8

Access points for railway personnel are not considered in this document.

### 4.9

Authorised walkways are not considered in this document.

## 5 Strategy and planning

**NOTE:** This section seeks to align the key principles of the policy with line of sight to Network Rail's high level business objectives and the asset management activities to maximise the value of the level crossing estate.

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## 5.1 Philosophy of level crossing management (The vision)

### 5.1.1

Level crossings will continue to be managed as an integrated cross-asset system, building on the philosophy established in CP4/CP5. This requires close interworking of Route Level Crossing Managers, all Route asset discipline engineers, equivalent posts in Network Rail Telecoms, along with safety specialists and engineers in the Safety, Technical and Engineering central group.

The level crossing system definition is provided in appendix B. The asset subsystem and budget accountability is provided in appendix C.

### 5.1.2

For the purposes of maintenance, renewal and enhancement, Level Crossings are considered as a unique cross-asset system with cross asset accountabilities as defined in this policy.

### 5.1.3

Network Rail, in co-operation with partner agencies, will continuously seek to reduce safety risk to level crossing users in line with societal expectations. This will be complemented by sustaining and improving the convenience expected by users exercising their rights. This includes both right-of-way and rail users.

**NOTE:** *The Level Crossings Act 1983, requires the Secretary of State, when making a level crossing order to consider 'the safety and convenience of all users'.*

### 5.1.4

Network Rail will seek an equitable sharing of responsibility and cost for level crossing management.

**NOTE:** *This reflects the proposals in the Law Commission Report No.339 where the Highway Authority/Local Traffic Authority will have certain obligations in respect of the road approaches and the financial responsibility that goes with that. The statement reflects our intention to pursue implementation of the Law Commission Report.*

### 5.1.5

Network Rail will provide, renew, operate and maintain, decommission, dispose and manage any residual liabilities of its level crossings estate in compliance with relevant legislation.

### 5.1.6

Network Rail has a suite of key requirements for environmental and social performance, these cover:

- weather, including climate change, resilience;
- energy and carbon efficiency;
- supporting biodiversity and managing lineside sustainably;
- preserving natural resources;
- protecting the environment; and
- positive social impact.

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These requirements enable the railway to become more sustainable.

#### 5.1.7

Network Rail will continuously seek to improve the efficiency and effectiveness of its level crossing estate.

#### 5.1.8

All level crossings will be accessible to the broadest spectrum of society including a wide range of vulnerable users. This will be facilitated by user friendly interfaces, access, surface systems and exit provision.

#### 5.1.9

The introduction of the Digital Railway will impact level crossings; specifically increases in line speed and increases in number of trains drive risk. Where this is the case action should be taken to counter risk increases. Where there is no change to the risk profile, opportunities should be taken to reduce risk where practical and economically viable.

**NOTE:** A dialogue has now been opened with Digital Railway programme on how to address the impact of Digital Railway on the level crossing policy.

### 5.2 Technical strategy

**NOTE:** This section seeks to provide high level statements around technology, products and systems the detail of which will be contained within the Technology Strategy module.

#### 5.2.1

Equipment and systems provided for level crossing protection shall be compatible with and exploit the opportunities afforded by the implementation of the Digital Railway.

#### 5.2.2

Network Rail shall seek to invest in research to improve its understanding of level crossing management, including research into user behaviours, trends in safety management, along with technology and engineering opportunities.

#### 5.2.3

Network Rail, in conjunction with its supply chain, shall develop solutions to respond to the reported findings of research.

#### 5.2.4

Network Rail shall continue to pursue improvements to the level crossing estate through introduction of new/novel technologies, processes and techniques based on defined product requirements and specifications.

**NOTE:** Products should be fit for purpose, legally compliant and approved for use on the railway network. Where new products are considered they should follow the Network Rail product approval process.

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### 5.2.5

Solutions shall be developed in response to recommendations from reports of the investigations into incidents at level crossings

### 5.2.6

Network Rail shall seek provision of an off rail facility for test and evaluation of new/novel level crossing methods of protection and technology including hardware, software and communications systems.

### 5.2.7

Asset system degradation modes shall be specified that enable predict and prevent strategies to be employed, to improve safety and performance.

### 5.2.8

Degradation modes shall take account of the anticipated automation of many functions and the remoteness of staff from many sites.

### 5.2.9

A strategy of further adoption of means to monitor level crossing performance and report deviations outside of set parameters, in real time shall be pursued.

### 5.2.10

Based on suitable whole life cost assessment, environmentally sustainable materials shall be the preferred option for construction and maintenance of level crossing systems.

### 5.2.11

Equipment/systems shall be specified to be capable of being powered from renewable energy sources where appropriate.

### 5.2.12

Equipment/systems requiring fixed power supplies shall be specified with 110v a.c. supply. Fixed power supplies shall be specified with self-monitoring and failure reporting functions.

### 5.2.13

Climate change and resilience to adverse weather conditions shall be taken account of in level crossing systems specification and implementation.

### 5.2.14

Systems shall be specified appropriate to the anticipated high reliability, availability and safety required during their life.

**NOTE:** *Product specific targets are given in the Technology Strategy.*

### 5.2.15

Telephones are considered to be a weak method of protection. Methods shall be developed to reduce telephones to a secondary or fall back protection solution.

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## 5.3 Demand

### 5.3.1

It is anticipated that level crossing protection will continue to be required so long as right of way/railway interfaces exist, notwithstanding every effort being made to seek closure opportunities.

### 5.3.2

Network Rail shall continue to pursue reduction of safety risk through crossing closure with extinguishment or diversion of legal rights. When diverting rights, care shall be taken not to adversely affect risk at other locations.

### 5.3.3

Network Rail shall make appropriate provision for safe traverse of the railway taking into account all aspects of system safety including users and the workforce required for its operation and maintenance.

### 5.3.4

Work shall continue with stakeholders to introduce more flexible arrangements for protection allowing technical systems to be more closely tailored to the users' needs.

### 5.3.5

Greater engagement shall be sought with the European Rail Agency, as the body which specifies the European Train Control System (ETCS)/European Rail Traffic Management System (ERTMS), to gain improvements in these systems relating to level crossings and the train control interface.

**NOTE:** *Principal engagement will be led by the central level crossing engineering team.*

### 5.3.6

Network Rail shall identify opportunities to close, renew or upgrade Level Crossings as a result of the deployment of European Train Control system/European Rail Traffic Management System, or the consolidation of control centres.

### 5.3.7

Opportunities shall be pursued to:

- a) review and reduce the need for human supervision of level crossings as part of the introduction of railway traffic management systems; and
- b) reduce, or at least not increase, the level crossing supervision workload per workstation in consolidated control centres as geographic areas of control become larger.

### 5.3.8

Opportunities shall be taken to improve and implement automated means to monitor level crossing use and report deviations outside of set parameters, in real time.

### 5.3.9

Network Rail shall seek to provide means to monitor level crossing user behaviour and automatically report deviations/offences.

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### 5.3.10

Network Rail shall seek to increase automation in the operation of level crossings.

## 5.4 Strategic planning

### 5.4.1

Network Rail shall anticipate and prepare for changes to the ways in which users interact with level crossings as societal expectations and behaviours evolve.

**NOTE:** *Autonomous road vehicles and wearable technology are two examples of ways in which users interactions with level crossings might change.*

### 5.4.2

Network Rail shall continue to lobby for the implementation of beneficial aspects of the Law Commission Report.

**NOTE:** *Ref. Law Commission Report No.339.*

### 5.4.3

It is possible, that assets will not be owned by the railway administration but that level crossing provision will be obtained as a service, either as part of a wider train operations service provision or a standalone service interfaced to train operations.

## 5.5 Asset management plans

### 5.5.1

Network Rail shall develop system management plans for each of its level crossings at every location. This shall include a vision for possible improvements along with asset performance and life requirements.

**NOTE:** *The asset management plan will be a statement of how it is intended to manage the level crossing asset systems through their life; e.g. the annual maintenance plan that is agreed with Delivery Units for maintenance activity or renewal and safety led plans for change to level crossings developed by the LCM/RLCM.*

### 5.5.2

All level crossings including those without active warning/protection systems shall be included in asset management planning.

### 5.5.3

Asset management plans shall be developed in accordance with Institute of Asset Management best practice.

### 5.5.4

Plans shall define the required life, safety and operational performance, and anticipated changes/alterations of the assets.

### 5.5.5

Asset management plans shall include any deficiency which requires investment expenditure.

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### 5.5.6

Asset management plans shall be referenced to safety risk assessment of the method of protection and to the asset performance risk assessment, giving consideration to any anticipated rise or fall in road, rail or user traffic.

### 5.5.7

All assets shall be registered in the maintenance scheduling system, Ellipse.

### 5.5.8

Generic maintenance specifications shall be provided for all level crossing assets. Priority shall be given to maintenance requirements for features contributing to the safe operation of the crossing.

### 5.5.9

Asset management plans shall specify the assurance requirements for the asset.

## 6 Asset management decision making

**NOTE:** This section considers the approach to decision making over the main level crossing life cycles stages: creation, operation, maintenance, decommissioning, disposal and renewal.

### 6.1 Capital investment decision making

#### 6.1.1

Level crossings shall be provided, operated and maintained consistent with the lowest whole life cost objective.

#### 6.1.2

Where level crossings remain, physical asset provision shall be minimised consistent with provision of a safe and convenient means of crossing the railway.

#### 6.1.3

Level crossing renewals shall take the signalling system and the potential impact on signal positions into account.

#### 6.1.4

Business plans shall make provision for the funding of any new products deployed and any specific training for discrete projects.

### 6.2 Operations and maintenance decision making

#### 6.2.1

Level crossing functions shall be automated where feasible and financially viable as determined by a cost benefit analysis without adversely impacting safety.

#### 6.2.2

Maintenance operational expenditure shall be minimised through selection of equipment/systems which facilitate lowest whole life cost.



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### 6.2.3

Remote system health monitoring and diagnostics shall be specified where justified. This shall be based on availability of staff to manage degraded mode working and to attend to faults and failures.

**NOTE:** *Product specific requirements will be specified in the Technology Strategy module.*

## 6.3 Life cycle cost and value optimisation

All renewal and other project work remits shall specify 'lowest whole life cost' objectives for all level crossing works including passive crossings such as footpath and user worked crossings.

## 6.4 Resourcing strategy and optimisation

### 6.4.1

Network Rail shall manage its workforce so that sufficient competent staff are available to provide, operate and maintain its level crossing estate.

### 6.4.2

The workforce will require skills commensurate with provision, operation, maintenance and disposal of systems using novel, by today's reference, technologies. There will be a high degree of automation, especially of routine repetitive tasks.

### 6.4.3

Skills shall complement the requirement for whole-life engineering.

### 6.4.4

Skills relevant to high reliability, high availability systems might need to be refreshed outside of the normal practice of direct application. This may be through use of simulation and other techniques.

### 6.4.5

Skills might need to be aligned with service provision instead of asset ownership.

**NOTE:** *Some multi-skilling will be appropriate and there will be cost involved. The training organisation will need to know what level of training activity that they need to undertake. A good asset management plan should state assumptions about the volume of training required.*

## 6.5 Access outage strategy

### 6.5.1

Access to the railway and highway closure is becoming increasingly difficult and costly for engineering activity. Systems shall be specified that minimise the need for engineering access.

### 6.5.2

Where engineering access is required, systems shall be sufficiently resilient to allow requests for access to be given within reasonable timescales.

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### 6.5.3

All works at level crossings shall be subject to risk assessment and management to control the risk to workforce to as low as reasonably practical, including where necessary obtaining closure of road and /or rail operations.

### 6.5.4

Efficiency shall be achieved through co-ordination of activities around level crossings to gain best value from road and rail closures.

## 6.6 Aging assets strategy

### 6.6.1

Network Rail shall manage its legacy assets so that the feasibility of life extension is understood and full renewal planned accordingly.

### 6.6.2

Staff competence shall be sustained, through on the job and formal training, so that asset systems can be sustained to the end of their planned life.

### 6.6.3

A programme of phased retirement shall be implemented for populations of obsolete equipment to retain a continuing supply of serviceable spare parts suitable to maintain remaining systems.

### 6.6.4

Support contracts with original equipment manufacturers and/or technical support specialists and repairers shall be arranged.

## 7 Life cycle delivery

**NOTE:** This section seeks to control the asset management activities and associated risk across the life cycle stages of the level crossing asset system.

### 7.1 Technical standards and legislation

#### 7.1.1

Network Rail shall provide, renew, operate and maintain the level crossing estate in compliance with relevant legislation.

#### 7.1.2

Recognising that some legislation has different significance for Network Rail since its transfer to the public sector, a strategic programme of compliance will be required. Specifically the Equality Act of 2010 requires accessibility to be made available to users with defined protected characteristics. Those particularly applicable to level crossings are; disability (including physical, cognitive, hearing, sight), age (related disabilities), pregnancy and maternity (related disabilities).

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### 7.1.3

Technical Standards for Interoperability shall be reviewed to establish their application to level crossings along with other emerging legislation which requires evaluation and proposals for compliance.

### 7.1.4

Level crossing systems shall be designed and provided to be compatible with other railway systems including interoperable rolling stock and other infrastructure sub-systems.

### 7.1.5

Network Rail shall, in respect of employees and non-employees, provide, operate and maintain its level crossings in compliance with sections 2(1) and 3 of the Health and Safety at Work Act 1974.

**NOTE:** *The Health and Safety at Work Act 1974:*

*Section 2(1) It shall be the duty of every employer to ensure, so far as is reasonably practicable, the health, safety and welfare at work of all his employees.*

*Section (3) It shall be the duty of every employer to conduct his undertaking in such a way as to ensure, so far as is reasonably practicable, that persons not in his employment who may be affected thereby are not thereby exposed to risks to their health or safety.*

### 7.1.6

Level crossings shall provide a safe and convenient method of crossing the railway compatible with societal expectations

### 7.1.7

Level crossings shall, where feasible and financially viable, be compatible with future railway, highway and other Right-of-Way users.

## 7.2 Asset creation and acquisition

### 7.2.1

Reasonable opportunity to improve safety and reduce or eliminate risk should be taken and included in all initial project remits, plans and development, irrespective of the projects predicted impact on Level Crossing risk.

**NOTE:** *The definition of 'reasonable opportunity' in the context of level crossings is currently an open point. A definition will be developed by the WG and included in the next issue of this policy.*

### 7.2.2

Minimise the amount of assets provided consistent with provision of a safe and convenient means of crossing the railway.

### 7.2.3

New AHB crossings shall only be provided on the network where there is a business case to do so and risk can be demonstrated as ALARP.

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#### 7.2.4

New level crossings shall only be introduced onto the network in exceptional circumstances with sign off by the Route Managing Director.

### 7.3 System engineering

#### 7.3.1

Level crossings shall continue to be managed as a system, building on the philosophy established in CP4/CP5.

#### 7.3.2

This shall include adopting best practices from the fields of systems thinking and systems engineering to provide systems which incorporate ergonomic and technical factors.

### 7.4 Configuration management

#### 7.4.1

Network Rail shall maintain records defining the configuration of each of its level crossings. This is already in place for crossings with active warning systems and shall be progressively implemented across the rest of the estate.

**NOTE:** This might require the development of an enhanced decision support tool through the ORBIS programme.

#### 7.4.2

Configuration data systems shall be combined with other asset data and records relating to risk, use and safety incidents.

### 7.5 Maintenance delivery

#### 7.5.1

Level crossings shall be proactively maintained. They shall be risk assessed and inspected at specified regular intervals based on risk and usage.

#### 7.5.2

Variable maintenance regimes may be applied based on asset and route criticality to include reactive corrective maintenance, preventative maintenance (time based, condition based and usage based), and predictive maintenance including inspection, testing and monitoring.

**NOTE:** See the Maintenance module for application detail.

#### 7.5.3

Remote condition monitoring (RCM) should be applied, where a business case can be made, to enable failures to be detected / predicted in sufficient time for corrective action to be taken before safety and / or performance issues arise.

**NOTE:** See the Technology Strategy module for detail.

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#### 7.5.4

The degradation characteristics of level crossing assets shall continue to be established through controlled trial with limited or no preventative maintenance.

**NOTE:** Risk should continue to be monitored and managed to be ALARP throughout the controlled trial.

#### 7.5.5

Maintenance intervention techniques which improve efficiency while sustaining/improving safety shall be adopted. This may include risk based and reliability centred maintenance processes.

#### 7.5.6

The management of certain types of assets which require work not linked to the condition of the overall level crossing system shall continue through a minor works programme.

**NOTE:** This will address such items as relay servicing, and testing/replacement of cables.

### 7.6 Reliability engineering and root cause analysis

#### 7.6.1

Network Rail shall provide asset systems with reliability, availability and maintainability aligned to the high performance expected of a 24/7 transport system for both rail and right of way users.

#### 7.6.2

Systems and tools to assess level crossings shall align with industry DRACAS requirements for Command and Control; see GE/RT8106, as applicable.

#### 7.6.3

Network Rail shall provide asset systems with degradation modes that enable predict and prevent strategies to be employed.

#### 7.6.4

Network Rail shall provide active warning/protection systems with intrinsic system health monitoring which are capable of diagnosing and reporting any non-compliant operation or drift towards/outside of acceptable limits.

#### 7.6.5

Existing level crossing designs shall be critically evaluated using hazard identification and Failure Mode and Effects Analysis (FMEA) techniques.

#### 7.6.6

The reliability of Level Crossing equipment shall be reviewed regularly. Suppliers shall be challenged on their performance.

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## 7.7 Asset operations

### 7.7.1

Users shall be assisted by active systems which present a consistent experience to support the decision to cross.

**NOTE:** *Safe and convenient passage across the railway should not be entirely dependent on direct visual or audible evidence of approaching trains.*

### 7.7.2

The workforce will require skills commensurate with operation of systems using novel, by today's reference, technologies. There will be a high degree of automation, especially of routine repetitive tasks.

### 7.7.3

Network rail shall seek to move to continuous monitoring of level crossing use. This shall include monitoring of behaviour and volume of users to allow real time intervention to be made in the event of operation or use deviating from defined parameters.

### 7.7.4

Means to monitor level crossing user behaviour and automatically report deviations/offences shall continue to be implemented across the level crossing estate.

### 7.7.5

Proactive education and awareness campaigns shall continue to be carried out to improve public users understanding of level crossings

### 7.7.6

Education and awareness campaigns for users shall be carried out in conjunction with any changes to methods of protection or operation.

### 7.7.7

Level Crossing Managers shall engage with all level crossing stakeholders for all types of level crossing.

**NOTE:** *Stakeholders include local businesses in the vicinity of level crossings.*

### 7.7.8

Local level crossing managers shall engage with Authorised Users at Private level crossings to maintain and improve the users' understanding of appropriate methods of use.

### 7.7.9

Network Rail shall recognise and support reduction in the environmental impact of level crossing operation in line with its wider environmental policies.

### 7.7.10

Level crossings shall be operated and maintained using environmentally friendly processes and techniques that consider the broad environmental landscape. This

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includes the environmental impact of rights of way users, along with railway users and neighbours.

## 7.8 Resource management

### 7.8.1

Holistic management will improve efficiency by avoiding duplication of effort by various stakeholders. Safety will be improved by clear definition of responsibilities within the system.

### 7.8.2

The workforce will require skills commensurate with provision, operation, maintenance and disposal of systems using novel, by today's reference, technologies. There will be a high degree of automation, especially of routine repetitive tasks.

## 7.9 Failure management and rapid response

### 7.9.1

Failures shall be reported and recorded into operational failure recording systems. Failure management systems shall be used to manage remedial actions to completion.

### 7.9.2

Competent staff shall be maintained to attend to faults and failures either as part of a rapid response assignment or where practical through planned attendance.

### 7.9.3

The provision and location of rapid response staff shall be reviewed regularly for alignment with business needs and as the level crossing estate is modernised. This shall include both operational and technical staff.

## 7.10 Incident response

### 7.10.1

Incident response shall be based around risk assessment of reported defects.

**NOTE 1:** Procedures developed under the Business Critical Rules programme will pre-define a wide range of possible defects, give direction on the minimum action required and provide information on the timescale for full rectification to be achieved.

**NOTE 2:** Existing standards are to be followed until Business Critical Rules programme procedures are issued.

### 7.10.2

A fault management system exists to record and manage reported defects.

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## 7.11 Asset rationalisation and disposal

### 7.11.1

To reduce risk at level crossings, Network Rail shall seek to introduce a Level Crossing Plan for each crossing. This would provide early identification of possible candidates for closure or down grade of rights.

Network Rail should make provision to prepare Level Crossing Plans ready for when the law is changed.

**NOTE:** The Level Crossing Plan is referred to in the Law Commission Report No339. It is intended to take the place of a Level Crossing Legal Order. It will include assignment of responsibilities for management of the level crossing, between the railway administration and local traffic authority and other bodies. E.g., it might detail who will carry out education campaigns, any special users needs to be addressed, it should include a forward view of land use and road changes likely in the area etc.

### 7.11.2

Rationalisation of assets shall be considered as part of any proposal for renewal. It shall also be considered where other works which might affect level crossings are proposed along a line of route.

### 7.11.3

Network Rail shall continue to engage with interested parties and statutory bodies in pursuit of its safety and convenience obligations.

**NOTE:** These include the Institute of Public Rights of Way Officers and Local Authorities.

### 7.11.4

Network Rail shall seek to provide clearer accountabilities around asset ownership and greater standardisation of level crossing types.

### 7.11.5

Network Rail shall move towards selecting the most appropriate risk control measures on a site by site basis based on the unique attributes of each site.

**NOTE:** This is to deliver the most appropriate intervention based on usage, convenience, tolerable hazard, reputational risk and best whole life cycle costing (WLCC). It is a move away from the specified types of crossing defined by equipment type or method of protection.

## 8 Asset data and information

**NOTE 1:** This section focusses on the quality, quantity and adequacy of asset data and information to enable effective management of the level crossing asset system.

**NOTE 2:** This clause is for now an open point subject to further review by the working group. The policy for level crossing asset data and information will be developed and aligned with the Network Rail asset data and information policy. It will be issued as a module of this policy.

### 8.1 Asset information strategy

Network Rail shall develop further its capability to monitor level crossing use and report deviations outside of set parameters, in real time.

### 8.2 Asset knowledge standards

Network Rail, through its ORBIS Programme, is developing and improving an asset information specification for level crossing data.



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## 8.3 Asset information systems

### 8.3.1

Further work shall be undertaken to integrate the information systems which support management of the level crossing estate.

### 8.3.2

To support decision making an integrated decision support information data base shall be developed as a central repository of level crossing asset condition, performance, configuration, usage, convenience and risk profile information.

### 8.3.3

As data systems become available, locally held data shall be migrated into corporate systems.

### 8.3.4

Network Rail shall provide resource to maintain, develop and improve these systems.

## 8.4 Asset data and knowledge

### 8.4.1

Network Rail shall develop and enhance measures for its asset data. These shall be designed to be consistent with a modern digitally enabled railway and with its licence and regulatory conditions.

### 8.4.2

Asset data shall be subject to data quality audit intended to identify shortcomings in the accuracy and currency of data held in systems.

### 8.4.3

For CP6 Network Rail shall define a broader set of measures for level crossings. In addition to risk and safety hazards, they shall include usage census, convenience and reputational risk, as well as workforce safety, health and wellbeing.

### 8.4.4

Annual targets shall be set for the agreed measures. They shall be monitored to demonstrate compliance to the level crossing asset policy.

## 9 Organisation and people

**NOTE:** This section considers the organisational structures, roles and responsibilities and contractual relationships to support the effective management of the level crossing asset system.

### 9.1 Contract and supplier management

#### 9.1.1

Network Rail has well established supply chain management processes and systems. These shall continue to be developed and adapted to enable compliance with emerging legislation and European Directives.

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### 9.1.2

Where practical, benefits shall be secured from establishing pan-Route contracts.

**NOTE:** *These contracts should cover CAPEX and OPEX (support/repair) activities.*

### 9.1.3

Supplier capability shall be considered. Investment Projects led critical resource management and other proposed delivery mechanisms shall make provision for providing this key activity.

## 9.2 Asset management and leadership

### 9.2.1

Network Rail shall adopt asset management best practice as exemplified by the Institute of Asset Management standards and codes of practice.

### 9.2.2

Professional leadership of level crossing management shall be focussed through the Director of Safety, Technical and Engineering.

This shall be discharged through the Chief Health and Safety Officer, for safety and risk, and the Chief Engineer for technical matters.

### 9.2.3

The Head of Passenger and Public Safety Strategy is responsible for provision of level crossing safety policy and safety leadership.

### 9.2.4

The Head of Level Crossings Engineering is responsible for provision of level crossing asset policy, engineering standards and technical leadership.

### 9.2.5

Level crossing management in the operational management units (Routes) shall be focused through the Route Level Crossing Managers for overall responsibility. They shall be supported by Route Asset Managers, who hold responsibility for safe and efficient management of the asset sub systems.

**NOTE 1:** *Routes that do not have Route Level Crossing Managers should allocate these responsibilities to a suitably competent person.*

**NOTE 2:** *This clause is for now an open point subject to further review by the working group.*

## 9.3 Organisational structure and culture

### 9.3.1

Network Rail shall provide an organisation structure and capability focussed on management of level crossings as a system.

### 9.3.2

Leadership and management effort shall be focussed on developing a culture which recognises the importance of level crossings as a key part of the railway system. The stakeholders in management of level crossings shall be encouraged to co-operate to

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provide the high performance in every aspect of management to deliver the safety and convenience demanded by all users.

## 9.4 Competence and behaviour

### 9.4.1

The level crossing estate is increasing in importance to the safe and effective operation of the wider railway system.

The competence requirements for management of and work on level crossings shall be regularly reviewed and refreshed.

### 9.4.2

The competence and capability of Level Crossing Managers to monitor and collect level crossing data on condition and performance shall be developed.

### 9.4.3

The MyWork App tool shall be further developed to better enable the collection of level crossing condition and performance data.

### 9.4.4

Level Crossing Managers within devolved Routes shall be enabled to make asset management decisions on level crossings within resignalling schemes and other intervention opportunities, informed by whole life cost-based considerations.

**NOTE:** This clause is for now an open point subject to further review by the working group.

## 10 Risk and review

**NOTE:** This section considers the core activities to identify, analyse and manage risk, the mechanism to provide assurance that objectives are being delivered and continuous improvement is enabled.

### 10.1 Criticality, risk assessment and management

#### 10.1.1

At the point of any significant intervention, all level crossings shall be subject to suitable and sufficient risk assessment. The potential for closure shall be assessed.

**NOTE:** The definitions of 'significant intervention' and 'suitable and sufficient' in the context of level crossings is currently an open point. A definition will be developed by the WG and included in the next issue of this policy.

#### 10.1.2

Risk at level crossings can be broadly categorised as risk to safety of users and risk to the business of railway operations.

#### 10.1.3

All level crossings shall be reviewed on a regular basis using the ALCRM tool for risk assessment and the AXIAT tool to assess the business case for closure.

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#### **10.1.4**

Additional tools shall be developed to measure the different attributes of level crossings including reputational risk, convenience and census.

#### **10.1.5**

Tools for the management of level crossings shall be established on corporate Information Technology platforms, with access for users according to their needs.

#### **10.1.6**

The content of risk assessment guidance and codes of practice shall be regularly reviewed and updated to take account of changes in user behaviour, operational use, technology change, business needs and society expectations.

#### **10.1.7**

Risk management practices shall be reviewed to provide assurance that all risks identified are considered and actions taken are recorded.

### **10.2 Contingency planning and resilience analysis**

#### **10.2.1**

Methods to enable the safe and effective means of separating users shall be available and reliable.

#### **10.2.2**

It follows that the means to deliver safe and effective passage shall not be prone to catastrophic failure whether that be because of natural causes or failure of technical systems.

#### **10.2.3**

Level crossings shall incorporate predictable degradation modes and make provision for continued safe operation in the event of partial failure.

### **10.3 Weather and climate change**

#### **10.3.1**

Level crossings shall be suitable for use in all reasonably foreseeable climatic and weather conditions experienced on the railway network.

#### **10.3.2**

Level crossings shall be specified to continue to provide safe and effective means of protection for up to a one in 150 year weather event.

#### **10.3.3**

Level crossing specification shall make provision for the effects of climate change likely to be experienced during the life of the asset being specified.

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## 10.4 Asset and systems performance and health monitoring

### 10.4.1

Asset systems shall be specified to have inbuilt monitoring of system health and condition.

**NOTE:** See the Technology Strategy module for detail.

### 10.4.2

Asset system performance shall be specified to align with business needs. This shall include having available a selection of products from which to choose according to route section requirements.

## 10.5 Assets and systems change management

### 10.5.1

Level crossing assets shall be subject to configuration management.

### 10.5.2

Systems shall be established to hold configuration data along with processes to manage configuration change, where these do not already exist.

## 10.6 Management review, audit and assurance

### 10.6.1

Management review of level crossings shall be undertaken in line with Network Rail's corporate Safety Management System.

### 10.6.2

Level crossing management shall be subject to local management surveillance and review of work quality and compliance.

### 10.6.3

Audits of process compliance shall be carried out on process associated with the management of level crossings.

### 10.6.4

Verification checks shall be carried out on asset systems to confirm quality and compliance.

### 10.6.5

Competence of staff carrying out tasks related to level crossings shall be subject to surveillance by their manager in line with the skills assessment scheme.

### 10.6.6

Tasks and activities which contribute to the safe provision and operation of level crossings shall have defined and assessed competence associated with the task/activity.

**NOTE:** Skills Assessment System (SAS) is considered sufficient for some tasks.

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## **10.7 Accounting practices**

### **10.7.1**

The costs associated with level crossing provision, operation, maintenance and disposal shall be treated in accordance with accounting rules compliant with law and agreed with the Office of Rail and Road.

### **10.7.2**

The cost of level crossing provision, operation, maintenance and disposal falls into two categories. Operational expenditure normally includes all of that cost associated with day to day activity to sustain the level crossing. Capital expenditure is that cost associated with providing or more often renewing all of a substantial portion of the asset. Capital expenditure normally requires an asset to be created; this might include intellectual property and is not limited to physical provision.

## **11 Stakeholder relations**

### **11.1.1**

Stakeholders shall be identified. Stakeholder management plans shall be agreed for each stakeholder group

### **11.1.2**

Stakeholder management shall include formal and informal consultation.

### **11.1.3**

Education and awareness campaigns shall be undertaken to improve stakeholder understanding of level crossings.

### **11.1.4**

Network Rail shall develop formal agreements with its statutory stakeholders to report according to their obligations.

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## Appendix A Policy Application Guide

### A.1 General

#### A.1.1

The Route Level Crossing Manager should consult with and advise all of the Route Asset Managers, including the equivalent posts in Network Rail Telecoms, on requirements for investment in level crossings.

#### A.1.2

The Route Level Crossing Manager should maintain a register of level crossing issues requiring capital investment expenditure.

#### A.1.3

Where right of way users request improvements, particularly private users, Level Crossing Managers should consult the Liabilities team in order that maximum advantage for Network Rail is gained from any improvement. Examples are farmers requesting a gate to be widened for larger machinery etc.

#### A.1.4

Road traffic in Britain is increasing at a rate of approximately 4% per annum. Provision should be made to enhance the protection at active crossings to counter the traffic increase.

#### A.1.5

Local authorities progress road improvement schemes in line with their priorities; where these are in the vicinity of level crossings, provision should be made to contribute to road enhancements where this can provide a demonstrable risk reduction to Network Rail.

**NOTE:** *It is often the case that working with local authorities is the most effective means of improving the vertical profile of the level crossing surface.*

#### A.1.6

Local level crossing managers should work with local authorities to understand the impact of planning development on level crossing risk and seek contribution towards risk reductions if required.

### A.2 Digital Railway

**NOTE:** *As the Digital Railway programme develops we will better understand the technical opportunities for risk reduction. The detail will be provided in the Technology Strategy module.*

#### A.2.1

The introduction of the Digital Railway will have an impact on level crossings; both line speed and number of trains are key risk drivers.

#### A.2.2

Provision should be made for crossings on early adopter sites (routes/areas) for digital railway should make provision to change level crossings in order to exploit the

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benefits from DR when that is deployed. This is particularly applicable to the early (CP6) deployments of DR.

### A.2.3

Digital railway will enable the consolidation of operational control from a small number of operating centres. This will require level crossings to be remotely supervised or automated.

### A.2.4

Opportunities will be presented by digital railway implementation that allows enforcement of Authorised User rights.

### A.2.5

Improved degraded mode operation, where Temporary Speed Restrictions are designed in specific to the level crossing, should be embedded in the system to avoid extensive distances of cautioning.

### A.2.6

'Locally monitored' level crossings can be a problem in a cab signalled area; provision should be made to modify these.

### A.2.7

The digital railway (ETCS) will have intrinsic capability to operate all lines bi-directional. Level crossings will need to be able to accommodate train arrivals in both directions.

### A.2.8

The digital railway will be capable of enforced pantograph dropping; this might present an opportunity to reduce costs by avoiding provision of overhead line equipment under bridges or over level crossings (enforced coasting).

## A.3 Research and development

### A.3.1

To continue to lead level crossing performance Network Rail should invest in academic research. Provision should be made to sponsor relevant research in human factors, asset management and technology. Routes should make provision for this including managing the outcomes through to deployment readiness.

**NOTE:** Refer to the Workbank Planning module to cover provision for research and innovation including evaluation facilities to bring to deployment readiness.

### A.3.2

Allowance should be made to provide for facilities to develop and evaluate new technologies. This should provide for physical facilities and costs of support dormant capability to undertake the tests and ergonomic performance.

**NOTE:** The roads sector maintains a register of 2000+ people to call upon for evaluation/trials of new technology, paid on 'as required' basis.



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## A.4 Through life cycle management

### A.4.1

- Many modern electronic and other systems require specialist support; provision should be made to enter into contracts for this.

### A.4.2

- Risk based maintenance should be adopted for all new asset systems. Existing asset systems might benefit from risk based maintenance techniques being applied.

## A.5 Closure

### A.5.1

- Routes should continue to pursue closure of level crossings as a risk elimination measure. This might be by progressing closure of individual crossings or by seeking a group of closures via a Transport and Works Act Order.

**NOTE:** As piloted by Anglia Route, Orders under the Transport and Works Act 1992 (the TWA) can authorise guided transport schemes and certain other types of infrastructure project in England and Wales including the closure or alteration of roads and footpaths.

### A.5.2

- Where outright closure is not possible, reasonable diversion of rights should be considered, especially if there are a number of crossings in close proximity.

### A.5.3

- Provision of a bridge is often economically justified when several crossings can be closed in the same area. Availability of upfront funding is often the constraint on selecting a bridge as the preferred option.

### A.5.4

- Where closure cannot be achieved a down grade of rights should be pursued to allow Network Rail to focus safety improvement on a reduced number of user types.

### A.5.5

- The AXIAT model should be further developed and used to provide an indicative programme of closures.

**NOTE:** It is undetermined yet whether this should be a central or route based activity or both.

## A.6 Legal Compliance

### A.6.1

- The Equality Act 2010 now applies to Network Rail in a different way since its transfer to the public sector account.

### A.6.2

- Routes should make provision to convert stiles to mobility impaired compliant gates as they are renewed. Consideration should be given to the need for MSL or similar protection as a result of potentially slower traverse times. Level Crossing Managers

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should be consulted to determine how many footpath crossings might need to be made 'Equality Act compliant'. Making access easier for vulnerable users might incur the need to provide warning systems where the traverse time is longer for mobility impaired persons.

**NOTE 1:** Typical items to consider including are; tactile surfaces where users include sight impaired persons, provision of audible warnings where these do not exist at MSLs with hearing impaired users, alteration to AHBs where the audible warnings switch off once barriers are fully lowered. Some of these items might need to be in the Track/Off Track plans.

**NOTE 2:** The potential risk to recreational impaired users in the context of Equalities Act should be taken into account.

### A.6.3

A programme to convert all stiles to gates/barriers should be provided for.

**NOTE:** For reasons of deliverability or affordability this programme might extend beyond a single control period.

### A.6.4

Provision should be made for improving protection from moving parts in line with Provision and Use of Work Equipment Regulation 1998. Cages are available for Spec 843 machines, high risk sites should be treated in CP5. The remainder should be treated on a risk basis through CP6.

**NOTE:** Barrier caging should be provided, to determine the level of funding needed, make an assumption about the number of sites that might need to have cages fitted or have modifications made to fencing protection.

### A.6.5

The Level Crossing Plan is referred to in the Law Commission Report No339. They are intended to replace Level Crossing Legal Orders. They will include assignment of responsibilities for management of the level crossing between the railway administration, the local traffic authority and other bodies. E.g. it might detail who will carry out education campaigns, any special users needs to be addressed. It should include a forward view of land use and road changes likely in the area etc. Provision should be made to prepare Level Crossing Plans ready for when the law is changed.

### A.6.6

Level crossings and associated features, including signage, should be maintained to deter trespass.

### A.6.7

Road markings should be visible, durable and maintained. They should adhere to relevant highways regulations.

## A.7 Achieving 'ALARP'

### A.7.1

A number of investment actions are required to deliver a 'low as is reasonably practical' risk level at a number of level crossings.

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## A.7.2

Footpath and similar crossings without decks should be provided with decks over a five year period (CP6). Route Asset Managers should consult with RLCM/LCMs and other engineering disciplines to agree who should make this provision.

## A.7.3

Level crossing surfaces should be inspected and maintained at specified regular intervals, dependant on crossing user and rail traffic volumes.

## A.7.4

Decks where no lighting exists but there is lighting on the approaches should be provided with lighting. This should be delivered over a five year period

## A.7.5

Crossings protected by whistle boards should be planned for conversion to an engineered method of protection. Priority should be given to those with users during the night time quiet period (NTQP).

**NOTE:** The NTQP operates from 23:00 – 07:00. Requirements for a safety rated equivalent are proposed for development during 2016/2017. Whistle boards are recognised to be a weak method of protection, especially given the increased interest in noise pollution and the need to accommodate the needs of vulnerable people e.g. hearing impaired. A 10 year plan for whistle board replacement might be appropriate.

## A.7.6

Provision should be made to install Power Operated Gate Opener (POGO) systems where there is a history of gates left open at private user worked crossings.

**NOTE:** The convenience improvement adds to the safety and reduces the need for 'stop and caution' after reports of gates left open.

## A.7.7

Provision should be made for overlaying 'video analytic' obstacle detection at existing CCTV supervised crossings to reduce the number of 'user trapped within barrier' events.

## A.7.8

Crossing telephones are considered to be a weak method of primary protection. Provision should be made to upgrade crossings where telephones are used as the primary method of protection to alternative active protection systems, e.g. prioritising fitting high use UWCs with MSLs.

**NOTE:** Exchanging safety critical voice communications with members of the public is recognised as a weak method of protection. Telephones are prone to unreliability and incur substantial OPEX costs.

## A.7.9

Signals which protect level crossings should be fitted with Train Protection and Warning System (TPWS) where this is shown to be an effective risk reduction measure and is financially viable.

**NOTE:** Further guidance on this will, based on the study of the central Principles team in this area be provided in the Technology Strategy module

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### A.7.10

The vertical profile of the crossing should be managed to avoid the risk of grounding by road or farmers vehicles.

## A.8 Enforcement of Network Rail obligations

### A.8.1

A number of crossings exist where the rights are 'footpath' only but which are used by horse-riders, motorcyclists etc. These level crossings should be identified and gates provided that deter non-authorized users, e.g. gates with a portal to enforce dismounting etc.

**NOTE:** Consideration should be given to potential non-compliance to the Equalities Act.

### A.8.2

Having accurate robust data about the use of level crossings is key to good decision making. Provision should be made to introduce automated census gathering and reporting capability.

### A.8.3

Provision should be made in Operational Expenditure budgets to address legal issues arising from proposed changes at level crossings. Examples are the need to contest objections to closure proposals, re-siting listed equipment and buildings.

## A.9 Safety upgrades

**NOTE:** Refer to the Technology Strategy module for further detail on high level technology requirements.

### A.9.1

Often when a level crossing renewal is planned, the risk assessment prior to commencement of design identifies that an upgrade to the method of protection is required, e.g. replacement of an AHB with a MCB-OD or similar. Provision should be made in Business Plans for a percentage of these upgrades even where the specific sites have not been identified.

### A.9.2

Where the risk at a passive level crossing is assessed as no longer tolerable, the preferred enhancement should be MSL with user worked gates/barriers.

**NOTE:** For example, where the distance a user needs to see to confirm if it is safe to cross is excessive or beyond the physical ability of the user.

### A.9.3

Passive level crossings on high speed lines should be either closed or fitted with train detection / warning systems. High line speed should be considered as above 100mph.

### A.9.4

LED road traffic lights should be fitted at all public road level crossings.

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### A.9.5

AOCLs should be eliminated either by conversion to AOCL+B or renewal to another crossing type.

### A.9.6

When AOCL or AOCL+B crossings require renewal, they should be upgraded to ABCL, replaced by a modern barrier type crossing, or if justified, to MCB-OD.

### A.9.7

AHB + is likely to become one of a number of alternative methods of protection to become available for CP6. Provision should be made to upgrade a number of AHB crossings as a safety risk reduction.

### A.9.8

AHBs should not be renewed 'like for like' as AHBs where they are adjacent to stations, in sight of stations and / or near to schools.

### A.9.9

Subject to a suitable and sufficient risk assessment, AHBs may be renewed like for like, upgraded to AHB+, or, if justified upgraded to MCB-OD.

### A.9.10

MCB-CCTV crossings may be renewed like for like subject to a suitable and sufficient risk assessment

### A.9.11

New full barrier crossings should normally be MCB-OD.

**NOTE:** *It is accepted that this might not always be possible. Refer to the Technology Strategy module for further detail.*

### A.9.12

Crossings on routes where control is to be consolidated to a Route Operating Centre should normally be converted to MCB-OD.

### A.9.13

Provision should be made for crossings fitted with 50 watt halogen road traffic light signals to be upgraded to LED units.

### A.9.14

To address the risk to sight impaired users, provision should be made to alter AHB level crossings where the audible warning devices cease sounding once barriers are lowered to continue to sound until barriers raise.

### A.9.15

To address the risk to sight impaired users at MSL crossings, audible warnings should be retrospectively fitted.

**NOTE:** *Priority should be given to those with identified sight impaired users.*

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#### A.9.16

A solution is under development for a universal locking mechanism for pedestrian gates. Provision should be made for a programme of introduction of gate locking at pedestrian crossings with wicket gates with high use and where particular risks exist, e.g. nearby schools, or at station platform ends.

#### A.9.17

Provision should be made to upgrade decks at foot path crossings to a coloured surface which denotes the area where users are at risk.

**NOTE:** See RSSB Research Report T984. Approximately 3000 crossings might be affected nationally.

#### A.9.18

Provision should be made to upgrade decks to anti-slip surface where appropriate.

#### A.9.19

Line and road side signs should be inspected during basic visual track inspections and maintained in a legible condition.

#### A.9.20

Provision should be made to address inadequate/poor sighting at vehicular user worked crossings, e.g. by provision of MSLs or similar.

**NOTE:** See Jetty Avenue RAIB Report.

#### A.9.21

RLSE is now available. Provision should be made to fit RLSE retrospectively at sites where there is perceived or actual observed road user non-compliance with level crossing road traffic lights.

#### A.9.22

To quantify the achievable risk reduction, the effectiveness of RLSE cameras should be assessed through a benchmarking exercise at a sample of level crossings

#### A.9.23

‘Standing Red Person’ pedestrian signals assist with enforcing pedestrian behaviour. Provision should be made for wider use of the ‘Standing Red Man’ signal at level crossings, particularly at automatic crossings and those with significant pedestrian use.

#### A.9.24

Provision should be made to install active ATC signs at level crossings where trains are expected to arrive in close proximity from different directions.

**NOTE:** ‘Another Train Coming’ (ATC) active signs were withdrawn from level crossings as the technology was considered to introduce risk of injury from high voltages. LED technology presents the opportunity to re-introduce active ATC signs.

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#### **A.9.25**

Research reports direct improvement in signage at level crossings. Provision should be made for general improvements and for work likely to arise from revision of the Private Crossings (Signs and Barriers) Regulations 1996.

#### **A.9.26**

Where overhead line equipment exists, provision of over-height vehicle detection should be considered. 'Cow bells' are difficult to maintain and not effective from within a vehicle cab. Photo cell devices with illuminating signs might provide an effective solution.

#### **A.9.27**

A sliding power operated gate system is being piloted in LNE Route. This has advantages where space is constrained and offers a lower cost solution at some lightly used public road crossings. Provision should be made to adopt sliding power operated gates at selected crossings where conversion to full barriers is problematic.

#### **A.9.28**

Open crossings represent a risk, particularly AOCLs. These level crossings should be planned to have barriers fitted based on risk.

#### **A.9.29**

Train crew operated level crossings on public roads should be considered for alteration to avoid the need for operation by non-Network Rail staff.

#### **A.9.30**

Station foot crossings and barrow crossings should be evaluated. Where alternative means to cross the railway are available, closure/diversion should be considered.

#### **A.9.31**

Level Crossing Managers should work with TOCs to seek closure of station barrow level crossings. If closure is not possible, risk should be reduced by providing an improved method of protection. .

**NOTE:** A contribution from the TOC should be sought.

#### **A.9.32**

A programme of works should be established to identify and close, or provide an improved method of protection where closure is not possible, level crossings where trains are operationally stationary over the level crossing. These should be eliminated in CP6.

#### **A.9.33**

User worked (hand pumped) barriers should be considered for upgrade to power operation, e.g. power operated gates or barriers.

#### **A.9.34**

Wig-Wag road traffic light signals provide a contribution to safety at public road crossings. Consideration should be given to adding road traffic light signals to all public road crossings based on risk. This is especially beneficial for workforce safety.



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### A.9.35

Hand worked gates on public roads should be prioritised for conversion to power operated, gates or barriers based on risk from road traffic.

### A.9.36

MSL protected crossings on public roads should be prioritised for replacement by a more suitable form of protection

**NOTE:** See Naas Level Crossing Accident Investigation Report, March 1979.

### A.9.37

All level crossing development should include an option for providing physical segregation of pedestrians from road vehicles. This should apply to any project which has not yet completed GRIP stage-gate 2.

### A.9.38

'Flange-way filler' strips should be fitted to all level crossings which have a significant skew and where there is a significant use by cyclists.

## A.10 Efficiency

**NOTE:** Refer to the Technology Strategy module for further detail on high level technology requirements.

### A.10.1

Programmable Logic Controllers are being offered by a number of suppliers. Consideration should be given to making an efficiency allowance for these coming on stream in CP6.

**NOTE:** Savings are likely in capital expenditure and improved reliability/availability. Refer to the Technology Strategy module for detail.

### A.10.2

Processor-based control systems for use in level crossings to replace electro-mechanical relays should continue to be developed. When available, they should be introduced.

### A.10.3

When upgrading level crossings in an interlocking area, consideration should be given to include adjacent crossings where possible in a package of works to be bundled to achieve efficiencies in delivery.

### A.10.4

Level crossing inspections are currently subject to some overlap between discipline engineers and Level Crossing Managers. It is likely that some efficiency will emerge once the Business Critical Rules work has completed.

### A.10.5

Efficiency is likely as a result of deployment modular level crossing solutions provided that the requirements can be standardised.



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#### A.10.6

The use of relays for level crossing control systems should not normally be considered after April 2019 as there should be a complete suite of affordable alternative technologies available and fully approved for use by that date.

#### A.10.7

Axle counters are the preferred technology for train detection for level crossings on electrified lines.

**NOTE:** Refer to the Technology Strategy module for application detail.

#### A.10.8

Suppliers to the barrier machine market are seeking to provide improved quality and performance with new machines. Some efficiency can be expected as a result of their deployment.

**NOTE:** Improvements are expected in reliability and availability.

#### A.10.9

Drivers crossing illumination should be considered for conversion to an LED solution.

**NOTE:** This should improve reliability and reduce power consumption..

#### A.10.10

It is anticipated that a 'standard' pedestrian gate complete with posts and fittings will be developed for use during CP6. This should provide a whole life cost reduced solution for pedestrian gate replacements.

#### A.10.11

To reduce spares holdings and standardise specifications, gates and fencing design and installation should be reviewed to produce a limited common set of product types.

#### A.10.12

Loss of use of a level crossing results in loss of safety and performance implications. Provision should be made to enhance power supply provision.

**NOTE:** See the RAIB Butterswood Investigation Report and ORR guidance on level crossing power supply resilience; Level Crossings: A guide for Managers, Designers and Operators

#### A.10.13

A number of improvements to barrier machine quality and performance are being progressed. Provision should be made to retrofit improved products to alleviate performance and safety issues.

#### A.10.14

Electro-mechanical treadles have known reliability issues. A campaign change to alternative methods of train detection for level crossing strike-in should be undertaken.

**NOTE:** Axle counters are available and an axle counter derived electronic treadle would be a modest development.

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### A.10.15

The RADAR used in obstacle detection equipment is likely to become obsolete during CP5/CP6. Provision should be made to re-equip obstacle detection level crossings with a modern equivalent solution.

### A.10.16

Where practical, telephones should be reduced to a secondary method of protection or eliminated if possible. Efficiency will be achieved through a reduction in the number of telephones.

### A.10.17

Boom gates have known reliability issues; consideration should be given to replacing them with alternative methods of protection, especially where failure rates are high and spares availability limited.

### A.10.18

Vehicle parking space assists the safety and efficiency of staff attending a level crossing to undertake inspection, maintenance, or for the siting of Mobile Safety Vehicles for enforcement activity. Provision for this vehicle space should be made with priority being given to AHB level crossings.

## A.11 Competence

The introduction of new technology in the level crossing field will result in a demand for training of technical staff. Provision should be made for refresher training through the asset life cycle. As equipment systems become more reliable provision should be made for more simulator based training.

**NOTE:** Routes should nominate individuals/teams requiring training. Training hardware and the preparation of training material should be provided by the initial implementation project.

## A.12 Leadership and management

### A.12.1

Engagement with other bodies, e.g. European Rail Agency, to protect GB railway interests and achieve acceptable outcomes in European legislation will incur costs. Allowance should be made to provide for these costs.

### A.12.2

Engagement with the Department for Transport and other stakeholders concerning the implementation of The Law Commission report will require funding provision. Routes should make a provision for this.

### A.12.3

Provision should be made for the management of 'systems' to facilitate the management of level crossings, e.g. ownership of ALCRM, My Work App and Ellipse (part of), FMS (part of), SINCS (part of).

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#### **A.12.4**

- Provision should be made for the move towards more simulation based training.
- Possible requirements include training facilities at Depots to allow refresh of skills frequently with minimal impact to operational productivity.

#### **A.12.5**

- Provision should be made for sustaining skills required to support obsolete systems and equipment, e.g. mechanical level crossings systems pending the retirement of these systems.

#### **A.12.6**

- Provision should be made for awareness and training campaigns to improve user understanding and behaviour at level crossings.

#### **A.12.7**

- IT services support will be required to maintain systems, e.g. ALCRM, My Work App, Ellipse upgrade, etc. Provision should be made for these activities.

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## Appendix B

### Level crossing system definition

Subsystem	Description	Boundary
<b>Signalling Assets</b>		
Signals	A number of level crossing types are interlocked with the signalling system, these include MCG, MCB and some AHBCs.	<p>The stop signals protecting the level crossing will be considered as part of the level crossing system</p> <p>The associated distant signals will be considered as part of the Signalling system.</p>
Train detection	Automatic crossings are triggered using train detection systems including track circuits, treadles, axle counters and predictors.	<p>If the level crossing is isolated (has no interfaces with other Signalling equipment) then all the train detection associated with the level crossing is to be considered as part of the level crossing system.</p> <p>If the level crossing is not isolated then only the train detection equipment at the level crossing is to be considered as part of the level crossing system with the rest being the Signalling system.</p> <p>If the level crossing is not isolated and is being closed a review will be required to define what needs to be retained for the Signalling system and what is required to be removed or altered.</p>
Control systems	Controlled and automatic crossings need a safety critical control system so that the correct warnings are given to the road user and operate the barriers.	All of the control system at the crossing is to be considered as part of the Level crossing system.

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<b>Subsystem</b>	<b>Description</b>	<b>Boundary</b>
Panel indications and monitors	Where the signaller monitors the crossing then, depending on type, there may be controls, failure indications and CCTV monitors combined into the signaller's control system.	This is to be considered as part of the level crossing system up to the Network Termination Point and/or transmission system at the panel/monitor end.
Barriers	Lifting barriers are provided at controlled crossings and some automatic crossings. Depending on the type of crossing the barrier may have a "skirt" to prevent animals entering the crossing area.	These are to be considered as part of the level crossing system.
Road traffic lights	The standard road traffic light consists of a triangular arrangement with an amber road light at the bottom and two red road lights which flash alternately to indicate that all vehicles (including emergency vehicles) must stop.	These are to be considered as part of the level crossing system.
Pedestrian warning lights	Where there are a large number of Pedestrian users a red "standing man" indication may be provided adjacent to the pavement.	These are to be considered as part of the level crossing system.
Audible warnings	Crossings with lifting barriers, automatic crossings and some MWL / MSL crossings have an audible warning for pedestrians which may include an urgent tone or spoken message if a second train is approaching.	These are to be considered as part of the level crossing system.
CCTV crossing cameras	Where the signaller needs to monitor the crossing from a distance and check that the crossing is not obstructed, a pair of CCTV cameras are provided.	This is to be considered as part of the level crossing system up to the Network Termination Point and or transmission system at the CCTV camera end.

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<b>Subsystem</b>	<b>Description</b>	<b>Boundary</b>
Data loggers and monitors	To check the system is working correctly and enable wrong side failure allegations to be investigated, automatic crossings are generally equipped with a data logger recording the actions of the control system.	This is to be considered as part of the level crossing system when located with and connected to the level crossing equipment.
Locations / REBs / ARs	Where the control and other associated equipment is housed, including relays, batteries, power equipment, cable terminations, etc.	<p>If the level crossing is isolated then all locations/REBs/ARs associated with the level crossing are to be considered as part of the level crossing system.</p> <p>If the level crossing is not isolated then only the locations/REBs/ARs at the crossing will be considered as part of the level crossing system. All others out with the level crossing are part of the Signalling system.</p>
Local and main cables	Used to interconnect the equipment so that it is powered at the correct time.	<p>If the level crossing is isolated then all cables associated with the crossing are to be considered as part of the level crossing system.</p> <p>If the level crossing is not isolated then only the cables at the crossing will be considered as part of the level crossing system. All others out with the level crossing are part of the Signalling system.</p> <p>If the level crossing is not isolated and is being closed, a review will be required to define what needs to be retained or removed for the Signalling system.</p>

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Subsystem	Description	Boundary
<b>Track Assets</b>		
Surface	Crossing surface is the vehicle or pedestrian surface from the boundary fence, or other agreed point on the approach to the crossing, to the edge of the crossing decking system.	This is to be considered as part of the level crossing system.
Deck	The deck provides a roadway or walking surface across the line. It can be manufactured from a number of materials and rests partly on the track. This is between the approach surface on each side of the crossing across all tracks, cesses, 6' and 10' spaces.	This is to be considered as part of the level crossing system.
Track	<p>The track supports the deck (roadway) but can also be damaged by vehicles</p> <p>The track geometry through a crossing has to take account of level crossing standards to prevent grounding of vehicles.</p> <p>This may mean that the optimal track geometry may not be possible.</p>	This is to be considered as part of the track system, but the implications of the track geometry have to be taken account of by track and the level crossing system.
Drainage	<p>Both track drainage and management of water on decking</p> <p>Drainage between the boundary fences is the responsibility of the off track section.</p> <p>Liaison is required between the Off Track and the owners of land outside the boundary fence whose drainage could affect the operational railway.</p>	This is to be considered as part of the off track system.

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<b>Subsystem</b>	<b>Description</b>	<b>Boundary</b>
Road markings	The road markings within the railway boundary fence including stop lines, yellow box markings, etc. which are provided to the required standards and as defined for each site in the crossing order.	These are to be considered as part of the level crossing system.
Trespass guards	Angled wood or similar to deter pedestrians and animals leaving the sides of the deck and accessing the railway.  Provided as a minimum of 2.6m stepping distance from any crossing surface or deck edge.	These are to be considered as part of the level crossing system.
Fencing	Fences at the railway boundary and the side of the deck to prevent pedestrian access onto the railway.	Only fencing required in addition to the normal line of the boundary will be considered as part of the level crossing system.
Rail signage	Warning signs for train drivers including speed restriction signs.	These are to be considered as part of the level crossing system.
Crossing signage	Signs placed at the crossing to provide information to the user.	These are to be considered as part of the level crossing system.
Gates and stiles	Vehicle, pedestrian, bridleway gates and stiles provided for the access to a Level crossing.	Any provided for the access to a level crossing are to be considered as part of the Level crossing system.
Vegetation	Clearance of line side vegetation to enable crossing users to see approaching trains where the user has to make a decision on whether it is safe to cross.	Vegetation control over a defined area, to allow the safe working of the level crossing, is to be considered as part of the level crossing system.
<b>Electrification and Plant assets</b>		
CCTV lifting equipment	Wire rope and winch mechanisms for raising/lowering of CCTV cameras for maintenance.	This is to be considered as part of the level crossing system.



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<b>Subsystem</b>	<b>Description</b>	<b>Boundary</b>
Level crossing control system power supplies	Feeds to automatic and controlled level crossings.	<p>If the level crossing is isolated then all power supplies associated with the level crossing are to be considered as part of the level crossing system.</p> <p>If the level crossing is not isolated then only the powers supplies at the level crossing will be considered as part of the level crossing system. All others out with the crossing are part of the signalling power system.</p> <p>If the level crossing is not isolated and is being closed, a review will be required to define what needs to be retained for the signalling power system and what is required to be removed or altered.</p>
Lighting	Provided at crossings to enable the signaller to identify obstructions and may also be provided so that the crossing is appropriately lit for road users.	This is to be considered as part of the level crossing system.
General electrical supplies	Power derived from the local electricity supplier for CCTV Lighting, signalling (and Crossing) power and for REB domestics.	<p>Supplies that are dedicated to the level crossing will be considered as part of the level crossing.</p> <p>Where LV supplies feed other equipment, external to the crossing these shall NOT be considered part of the level crossing system.</p>
Lighting column	Provided as a CCTV crossing to support the lighting at the required level for the illumination levels required.	This is to be considered as part of the level crossing system.

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<b>Subsystem</b>	<b>Description</b>	<b>Boundary</b>
<b>Telecoms assets</b>		
Telephones	Provided at most automatic and remotely monitored Level crossings. May also be provided at UWC.	In general only the phone units at the crossing will be considered as part of the level crossing system. For PETS all of it will be considered as part of the level crossing system.
<b>Highways Authority assets</b>		
Road signage	Warning and information signs for road users approaching the level crossing.	These are to be considered as part of the level crossing system.
<b>Buildings and Civils assets</b>		
CCTV column	Provided at a CCTV crossing to support the cameras in the correct position for the signaller to view the crossing.	This is to be considered as part of the level crossing system.

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## Appendix C

### Level crossing policy and budget accountability

Subsystem	CP5 Lead Policy	CP6 Reference policy	Budget Accountability
Signals	Signalling	Level crossing	Signalling
Train detection	Signalling	Level crossing	Signalling
Level crossing Control systems	Level crossing	Signalling	Signalling
Panel indications & monitors	Signalling	Level crossing	Signalling
Barriers	Level crossing	Signalling	Signalling
Road traffic lights	Level crossing	Signalling	Signalling
Pedestrian warning lights	Level crossing	Signalling	Signalling
Audible warnings	Level crossing	Signalling	Signalling
CCTV crossing cameras	Level crossing	Signalling	Signalling
Data loggers	Level crossing	Signalling	Signalling
Locations/ REBs/AR	Signalling	Level crossing	Signalling
Cables	Signalling	Level crossing	Signalling
Surface	Level crossing	Track	Track
Deck	Level crossing	Track	Track
Track	Track	Level crossing	Track
Drainage	Track	Level crossing	Track
Road markings	Level crossing	Track	Track
Trespass guards	Level crossing	Track	Track
Fencing	Track	Level crossing	Track
Rail signage	Track	Level crossing	Track
Gates and stiles	Level crossing	Track	Track
Vegetation	Level crossing	Off Track	Off Track
Power	Level crossing	E & P	E & P
Lighting	Level crossing	E & P	E & P
Telephones	Level crossing	Telecom	Telecom
Road signage	Level crossing	Safety	Highways Authority

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<b>Subsystem</b>	<b>CP5 Lead Policy</b>	<b>CP6 Reference policy</b>	<b>Budget Accountability</b>
Lighting base	Buildings & Civils	Buildings & Civils	Level Crossing
CCTV Column	Buildings & Civils	Level crossing	Buildings & Civils
CCTV base	Buildings & Civils	Level crossing	Buildings & Civils
REB base	Buildings & Civils	Level crossing	Buildings & Civils
Barrier Machine base	Buildings & Civils	Level crossing	Buildings & Civils
Brick-built buildings	Buildings & Civils	Level crossing	Buildings & Civils

<b>Ref:</b> NR/L1/XNG/100		<b>Issue:</b> 1					
<b>Title:</b> Level crossing asset management policy							
<b>Publication Date:</b> 03 June 2016		<b>Compliance Date:</b> 01 April 2019					
<b>Standard Owner:</b> Ed Rollings - Head of Level Crossings Engineering							
<b>Non-Compliance rep (NRNC):</b> Alex Hill							
<b>Further information contact:</b> Alex Hill		<b>Tel:</b> 07825 949760					
<p><b>Purpose:</b> The purpose of this document is to specify the asset management policy for the whole of the Network Rail Level Crossing estate.</p> <p>The Level Crossing asset management policy seeks to optimise the performance, risk and cost of ownership of the Level Crossing estate across all of its life cycle stages from concept to disposal to deliver minimum whole life cost.</p> <p>The policy is structured around the six main subject areas and 39 sub-groups identified in the Institute of Asset Management document ‘Anatomy of Asset Management’:</p> <ul style="list-style-type: none"><li>• strategy and planning;</li><li>• asset management decision-making;</li><li>• life cycle delivery;</li><li>• asset information;</li><li>• organisation and people; and</li><li>• risk and review.</li></ul> <p>The Institute of Asset Management guidance is recognised as best practice against which Network Rail is measured by the Office of Rail and Road, ‘The Regulator’.</p>		<p><b>Scope:</b> The policy supports the two top level crossing risk event bow ties:</p> <ul style="list-style-type: none"><li>• Animal, vehicle, object or person on the line at risk of collision</li><li>• Incident on or near Level Crossing not involving a railway vehicle</li></ul> <p>The policy provides guiding principles which relate to all of the controls identified in the bow-ties.</p> <p>The policy applies to all employees and others engaged in activities connected with any aspect of a level crossing asset life cycle.</p> <p>The policy applies to the whole of the level crossing estate both passive and active covering automatic, manually controlled and user operated level crossings including footpath and user worked crossings.</p>					
<p><b>What’s New/ What’s Changed and Why:</b> This is a new asset management policy standard for level crossings. Compliance date for the policy is 1<sup>st</sup> April 2019 (CP6). We wish to publish in June to establish a controlled reference for further update between June 2016 and the start of CP6.</p> <p>There remain open points in the policy which have been clearly identified and these will be considered by the working group prior to the compliance date.</p> <p>The following supporting modules are scheduled for publication in September and December 2016:</p> <ul style="list-style-type: none"><li>• NR/L1/XNG/100/01 Module 1 – Workbank Planning</li><li>• NR/L1/XNG/100/02 Module 2 – Technology Strategy</li><li>• NR/L1/XNG/100/03 Module 3 – Maintenance</li><li>• NR/L1/XNG/100/04 Module 4 – Environmental and Social Performance</li><li>• NR/L1/XNG/100/05 Module 5 – SEU Definition</li><li>• NR/L1/XNG/100/06 Module 6 – Asset data and information</li></ul>							
<p><b>Affected documents:</b></p> <table><tr><td><i>Reference</i></td><td><i>Impact</i></td></tr><tr><td>None</td><td></td></tr></table>				<i>Reference</i>	<i>Impact</i>	None	
<i>Reference</i>	<i>Impact</i>						
None							
<p><b>Briefing requirements:</b> Where Technical briefing (T) is required, the specific Post title is indicated. These posts have specific responsibilities within this standard and receive briefing as part of the Implementation Programme. For Awareness briefing (A) the Post title is not mandatory.</p>							
<b>Briefing</b> <i>(A-Awareness/ T-Technical)</i>	<b>Post</b>	<b>Team</b>	<b>Function</b>				
T	Principal Engineer (Technology)	Level Crossing Engineering	Safety, Technical and Engineering				
T	Principal Engineer (Standards)	Level Crossing Engineering	Safety, Technical and Engineering				
T	Head of Level Crossing Safety	Head of Passenger and Public Safety	Safety, Technical and Engineering				
T	Head of Passenger and Public Safety	Chief Health and Safety Officer	Safety, Technical and Engineering				
T	Head of Lineside	Chief Engineer	Safety, Technical and Engineering				
T	Head of Power Distribution HV/LV	Chief Engineer	Safety, Technical and Engineering				

## Standards Briefing Note



T	Head of Contact Systems AC/DC	Chief Engineer	Safety, Technical and Engineering
T	Head of Signals Engineering	Chief Engineer	Safety, Technical and Engineering
T	Professional Head of Telecoms	NRT	Safety, Technical and Engineering
T	Head of Data	Chief Engineer	Safety, Technical and Engineering
T	Route Asset Manager (Signalling)	DRAM	Route
T	Route Asset Manager (Off Track)	DRAM	Route
T	Route Asset Manager (Electrical Power)	DRAM	Route
T	Route Asset Performance Manager (Telecoms)	DRAM	Route
T	Dir. Route Asset Management	RMD	Route
T	Head of Route Safety Health & Environment	DRAM	Route
T	Route Level Crossing Manager	Head of Route Safety Health & Environment	Route
T	Operations Risk Advisor (Wales and Scotland)	Head of Route Safety Health & Environment	Route

*\*NOTE: Contractors are responsible for arranging and undertaking their own Technical and Awareness Briefings in accordance with their own processes and procedure*