

APPENDIX 3

Network Rail narrative risk assessment Buriton footpath crossing

NARRATIVE RISK ASSESSMENT

BURITON FOOTPATH CROSSING



1. LEVEL CROSSING OVERVIEW AND ENVIRONMENT

1.1 LEVEL CROSSING OVERVIEW

This is a risk assessment for Buriton level crossing.

Crossing details	
Name	Buriton
Type	FPW
Crossing status	Public Footpath
Overall crossing status	Open
Route name	Wessex
Engineers Line Reference	WPH1, 57m, 27ch
OS grid reference	SU737199
Number of lines crossed	2
Line speed (mph)	85
Electrification	3 rd Rail
Signal box	Petersfield

Risk assessment details	
Name of assessor	Kathy Welch
Post	Level Crossing Manager
Date completed	18/06/2013
Next due date	18/09/2015
Email address	kathryn.welch@networkrail.co.uk
Phone number	07713228340

ALCRM risk score	
Individual risk	C
Collective risk	4
FWI	0.001187168

1.2 INFORMATION SOURCES

The reference sources used during the risk assessment included:

- Camera census,
- SMIS
- South West Trains

1.3 ENVIRONMENT



Up side crossing approach



Down side crossing approach

Buriton is a public footpath level crossing.

The environment surrounding the level crossing consists of the village Buriton on the downside side of the line. Directly adjacent to the crossing is a children's playground and tennis courts, which the approach leads through in order to reach the crossing.

At Buriton level crossing the orientation of the road/path from the north is 60°; the orientation of the railway from the north to the up line in the up direction is 150°. Low horizon can result in sun glare; **sun glare is a known issue.**

There are known issues with foliage, fog or other issues that might impair visibility of the crossing, crossing equipment or approaching trains.

Plans to expand the playground are currently being drawn up the local Parish Council. This is under consultation (Aug 2014). Plans include re-siting the playground closer to the railway.

2. LEVEL CROSSING USAGE

2.1 RAIL

The train service over Buriton level crossing consists of passenger and freight trains. There are 132 trains per day. The highest permissible line speed of trains is 85mph. Trains are timetabled to run for 20 hours per day.

2.2 USER CENSUS DATA

A 21 day census was carried out on in October 2013 using motion sensor camera. A daily average is shown below.

	Total Adults	Children	Unaccompanied Children
Mon 7th Oct	2		4
Tues 8th Oct	9		
Wed 9th Oct	12		
Thurs 10th Oct	10		
Fri 11th Oct	15	4	3
Sat 12th Oct	23	1	1
Sun 13th Oct	8		
Mon 14th Oct	5		
Tues 15th Oct	9		
Wed 16th Oct	6		
Thurs 17th Oct	10	5	
Fri 18th Oct	25	4	
Sat 19th Oct	10	2	
Sun 20th Oct	7		
Mon 21st Oct	9		
Tues 22nd Oct	13		
Wed 23rd Oct	6		
Thurs 24th Oct	31	6	1
Fri 25th Oct	19	3	
Sat 26th Oct	13	4	
Sun 27th Oct	13		

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

Vulnerable user observations:

The crossing is adjacent to playing fields & junior school. The census recorded unaccompanied children. However, this is not felt to be a higher than average number.

Available information indicates that the crossing has a high number of irregular users.

Irregular user observations:

The crossing is situated in the South Downs National Park. It is assumed the crossing has a high number of irregular users following footpath trails to the surrounding countryside and the nearby Queen Elizabeth Country park.

3. RISK OF USE

3.1 SIGHTING AND TRAVERSE

Assessor's traverse time notes:

- As a guide, a walking speed of 1.189 metres per second (m/s) is used where the surface is level and close to rail level.
- The recommended decision point for a footpath crossing stands at 2metres.
- The length of traverse is then calculated from this point until 2 metres past the nearest running rail, which is the recognised position of safety.
- At Buriton, this gives a crossing traverse length of 9 metres.
- 9 metres divided by a walking speed of 1.189 m/s equals 7.57 seconds.
- A further one second is added to take into account the step tp to 2m on the downside and the ballast box.
- The line speed at Buriton is 85mph on both lines.
- Therefore the required sighting distance is 326 metres

Sighting, measured in metres, at Buriton level crossing is recorded as:

All distances are recorded in metres	Minimum sighting distance required	Measured sighting distance	Sighting distance measured to	Is sighting compliant?	If deficient, is sighting distance mitigated?	Notes on deficient sighting time mitigations
Up side looking toward up direction train approach	326	329	Speed board	Yes	N/A	N/A
Up side looking toward down direction train approach	326	220	Vegetation	No	Yes	Whistle boards
Down side looking toward up direction train approach	326	363	Bridge	Yes	N/A	N/A
Down side looking toward down direction train approach	326	159	Whistle boards	No	Yes	Whistle boards

3.2 EVALUATION OF MITIGATIONS

Buriton level crossing is provided with whistle boards.

	Line Speed	Distance to whistle board*	Whistle board warning provided (s)	Is the whistle board warning < or > traverse ? (s)	Whistle board compliance with 400m maximum (m)	Is the train horn clearly audible at the crossing?	Comments on audibility and whistle board position
Up line	85	316	7.45	-1.12	N/A		Whistle boards are placed at 316m on the up line. Optimum distance should be 366m, however this is not reasonably practicable as this would site whistle boards inside a tunnel
Down line	85	366	8.53	- 4.00000 0000000 09E-02	N/A		

The percentage of users who use the crossing during the night time quiet period, between 2300 and 0700, is estimated as 2%, who are generally thought to be dog walkers using the crossing before 0700.

The night time quiet period refers to a blanket ban on the sounding of train horns during the night, i.e. 2300 to 0700 hours, unless a person is seen at the level crossing. This means that, should the driver not use the horn, the protection provided by the whistle boards is reduced during this time and the location of the approaching train is purely by sight.

At Buriton the sighting is deficient looking in the down direction for approaching trains. Therefore, on sighting alone, it is calculated users do not have enough time to cross.

3.3 CROSSING APPROACHES

The approach to the crossing is via kissing gates on both sides of the crossing. There is also an extra gate on the down side of the crossing leading from the playground. The signs at Buriton level crossing are located on the direct route a user would take over the level crossing, they are positioned so that they are clearly visible to users taking a direct route over the level crossing. The visibility of the signs is reduced at night or at dusk.

The approaches to the crossing within the boundary fence are considered to be steep, slippery or present a tripping hazard to users.

The decking is made up of three types of surface – a rubber panel, a timber panel and a ballast box in the middle of the crossing. The crossing is set at a slight skew to take into account the offset gates. Trespass guards are in situ in both directions.

There are no adjacent sources of light or noise that could affect a users' ability to see or hear approaching trains.

3.4 AT THE CROSSING – ANOTHER TRAIN COMING RISK

Trains sometimes pass each other at this crossing. This is known to increase the chances of incident, where users step out behind the back of a passing train into the path of a train on the opposite line, which has been unsighted.

3.5 MISUSE

There have been various reports of misuse over the last ten years including the following.

In 2006 there were reports of children throwing stones from the crossing i.e. ballast and that the gates had been wedged open. In 2008 a member of the public used the crossing to access the track and in 2010 a train driver reported children playing near the crossing.

Unreported incidents include children putting traffic cones on the track, a dog being killed and children being stopped from retrieving it, tourists sitting down in the middle of the track to have their photograph taken and a man and small child picnicking on the steps of the crossing less than 2 metres from the running rail.

4. ALCRM CALCULATED RISK

ALCRM provides an estimate of both the individual and collective risks at a level crossing.

The individual and collective risk is expressed in Fatalities and Weighted Injuries (FWI). The following values help to explain this:

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

INDIVIDUAL RISK

This is the annualised probability of fatality to a 'regular user'. *NOTE: A regular user is taken as a person making a daily return trip over the crossing; assumed 500 traverses per year.*

Individual risk:

- Applies only to crossing users. It is not used for train staff and passengers
- Does not increase with the number of users.
- Is presented as a simplified ranking:
 - Allocates individual risk into rankings A to M (A is highest, L is lowest, and M is 'zero risk' e.g. temporary closed, dormant or crossings on mothballed lines)
 - Allows comparison of individual risk to average users across any crossings on the network

Individual Risk Ranking	Upper Value (Probability)	Lower Value (Probability)	Upper Value (FWI)	Lower Value (FW)
A	1 in 1	Greater than 1 in 1,000	1	0.001000000
B	1 in 1,000	1 in 5,000	0.001000000	0.000200000
C	1 in 5,000	1 in 25,000	0.000200000	0.000040000
D	1 in 25,000	1 in 125,000	0.000040000	0.000008000
E	1 in 125,000	1 in 250,000	0.000008000	0.000004000
F	1 in 250,000	1 in 500,000	0.000004000	0.000002000
G	1 in 500,000	1 in 1,000,000	0.000002000	0.000001000
H	1 in 1,000,000	1 in 2,000,000	0.000001000	0.000000500
I	1 in 2,000,000	1 in 4,000,000	0.000000500	0.000000250
J	1 in 4,000,000	1 in 10,000,000	0.000000250	0.000000100
K	1 in 10,000,000	1 in 20,000,000	0.000000100	0.000000050
L	Less than 1 in 20,000,000	Greater than 0	0.000000050	Greater than 0
M	0	0	0	0

COLLECTIVE RISK

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

Collective risk:

- Is presented as a simplified ranking:
 - Allocates collective risk into rankings 1 to 13 (1 is highest, 12 is lowest, and 13 is 'zero risk' e.g. temporary closed, dormant or crossings on mothballed lines)
 - Can easily compare collective risk between any two crossings on the network

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

Buriton level crossing ALCRM results

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

- Frequent trains
- Sun glare

Safety risk			
Compared to other crossings the safety risk for this crossing is	Individual risk		Collective risk
		C	4
	Individual risk (fraction)	Individual risk (numeric)	
Car	0	0	0
Van / small lorries	0	0	0
HGV	0	0	0
Bus	0	0	0
Tractor / farm vehicle	0	0	0
Cyclist / Motor cyclist	0	0	0
Pedestrian	1 in 12373	0.000080821	0.001179984
			Derailment contribution
Passengers			0
Staff			0.000007184
Total			0.001187168
Collision frequencies	Train / user	User equipment	Other
Vehicle	0	0	0
Pedestrian	0.001436713	0.000175357	0.000480341
Collision risk	Train / user	User equipment	Other
Vehicle	0	0	0
Pedestrian	0.001166611	0.000002806	0.000010568

5. OPTION ASSESSMENT AND CONCLUSIONS

5.1 OPTIONS EVALUATED

The options evaluated to mitigate the risks at Buriton crossing include:

Option	Term ¹	ALCRM risk score	ALCRM FWI	Safety Benefit	Cost	Benefit Cost Ratio	Status	Comments
Diversion via Railway embankment	Long Term	M13	0.001187168	0.001187168	N/A	N/A	REJECTED	Rejected by Network Rail Civil Engineers
Diversion over Third Party Land	Long Term	M13	0.001187168	0.001187168	N/A	N/A	REJECTED	Rejected as unable to purchase third party land
Extinguishment	Long Term	M13	0.001187168	0.001187168	£15 000	1.19	RECOMMENDED	This option to be pursued as the most reasonably practicable
Stepped Footbridge	Long Term	M13	0.001187168	0.001187168	£1 000 000	0.06	REJECTED	Safety and business benefit does not justify the cost of closure.

NOTES

Network Rail always evaluates the need for short¹ and long term risk control solutions. An example of level crossing risk management might be; a short term risk control of a temporary speed restriction with the long term solution being closure of the level crossing and its replacement with a bridge.

¹ Includes interim

CBA gives an indication of overall business benefit. It is used to support, not override, structured expert judgement when deciding which option(s) to progress. CBA might not be needed in all cases, e.g. standard maintenance tasks or low cost solutions (less than £5k).

The following CBA criteria are used as a support to decision making:

- benefit to cost ratio is ≥ 1 : positive safety and business benefit established;
- benefit to cost ratio is between 0.99 and 0.5: reasonable safety and business benefit established where costs are not grossly disproportionate against the safety benefit; and
- benefit to cost ratio is between 0.49 and 0.0: weak safety and business benefit established.

5.2 CONCLUSIONS

Various options have been investigated at Buriton over the last ten years.

A footbridge has been rejected as it is unfeasible. The height of the footbridge required over the railway would incur huge costs. The cost benefit analysis does not make this a reasonable safety and business case as the costs are grossly disproportionate against the safety benefit.

A diversion alongside the railway has been rejected by Network Rail's Civil Engineers who will not carry out works that have potential to cause instability to the embankment (the area has a history of landslips to railway embankments).

A diversion on third party land, considered in the past as a potential option, has now been ruled out, as the owners do not wish to sell the land needed to divert the footpath on to.

If the crossing were to be extinguished, the alternative route is considered reasonable. Network Rail do not believe that the permanent loss of this crossing would in any way impact on potential users of it as this alternative access under the railway bridge along South Lane links the land on both sides of the railway as well as connecting with the existing footpath network.

Network Rail takes a proactive approach in risk management. Closing this crossing would eliminate the very real risk of injury or fatality at a crossing that is sited in close proximity to a children's playground, has a history of misuse and has deficient sighting of trains.

Closing the crossing will not adversely affect the public and will in fact negate the need for whistle boards, which have long been a source of complaints for the residents of Buriton village.

ANNEX A – HAZARD IDENTIFICATION AND RISK CONTROLS

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

	Hazard	Control
Road vehicle and train collision risk	<p>Examples at the crossing include:</p> <ul style="list-style-type: none"> insufficient sighting and / or train warning for all vehicle types; known to be exacerbated by the driving position, e.g. tractor level crossing equipment and signage is not conspicuous or optimally positioned instructions for safe use might be misunderstood e.g. signage clutter detracts from key messages, conflicting information given high volume of unfamiliar users, e.g. irregular visitors, migrant workers known user complacency leading to high levels of indiscipline, e.g. failure to use telephone, gates left open type of vehicle unsuitable for crossing; <ul style="list-style-type: none"> large, low, slow making access or egress difficult and / or vehicle is too heavy for crossing surface risk of grounding and / or the severity of the gradient adversely affects ability to traverse poor decking panel alignment / position on skewed crossing where telephones are provided, users experience a long waiting time due to: <ul style="list-style-type: none"> long signal section (Signaller unaware of exact train location) high train frequency insufficient or excessive strike in times at MSL crossings high chance of a second train coming high line speed and / or high frequency of trains unsuitable crossing type for location, train service, line speed and vehicle types 	<p>Controls can include:</p> <ul style="list-style-type: none"> optimising the position of equipment and / or signs removing redundant and / conflicting signs engaging with signalling engineers to optimise strike in times upgrading of asset to a higher form of protection downgrading of crossing by removing vehicle access rights optimising sighting lines and / or providing enhanced user based warning system, e.g. MSL re-profiling of crossing surface engaging with stakeholders / authorised users to reinforce safe crossing protocol, legal responsibilities and promote collaborative working widening access gates and / or improving the crossing surface construction material realigning or installing additional decking panels to accommodate all vehicle types implementing train speed restriction or providing crossing attendant
Pedestrian and train collision risk	<p>Examples include:</p> <ul style="list-style-type: none"> insufficient sighting and / or train warning ineffective whistle boards; warning inaudible, insufficient warning 	<p>Controls can include:</p> <ul style="list-style-type: none"> optimising the position of equipment and / or signs removing redundant and / conflicting signs

	Hazard	Control
	<p>time provided, known high usage between 23:00 and 07:00</p> <ul style="list-style-type: none"> • high chance of a second train coming • high line speed and / or high frequency of trains • level crossing equipment and signage is not conspicuous or optimally positioned • location and position of level crossing gates mean that users have their backs to approaching trains when they access the level crossing, i.e. users are initially unsighted to trains approaching from their side of the crossing • instructions for safe use might be misunderstood e.g. signage clutter detracts from key messages, conflicting information given • surface condition or lack of decking contribute to slip trip risk • known high level of use during darkness • increased likelihood of misuse, e.g. crossing is at station • free wicket gates might result in user error • high volume of unfamiliar users, e.g. irregular visitors / ramblers, equestrians • complacency leading to high levels of indiscipline, e.g. users are known to rely on knowledge of timetable • high level of use by vulnerable people • where telephones are provided i.e. bridleways, users experience a long waiting time due to: <ul style="list-style-type: none"> - long signal section (Signaller unaware of exact train location) - high train frequency • insufficient or excessive strike in times at MSL crossings • unsuitable crossing type for location, train service, line speed and user groups • high usage by cyclists • degree of skew over crossing increases traverse time and users' exposure to trains • crossing layout encourages users not to cross at the designed decision point, egress route unclear especially during darkness 	<ul style="list-style-type: none"> • upgrading of asset to a higher form of protection • optimising sighting lines, e.g. de-vegetation programme, repositioning of equipment or removal of redundant railway assets • implementing train speed restriction or providing crossing attendant • providing enhanced user based warning system, e.g. MSL • engaging with stakeholders / authorised users to reinforce safe crossing protocol, legal responsibilities and promote collaborative working • installing guide fencing and / or handrails to encourage users to look for approaching trains, read signage or cross at the designed decision point • re-design of crossing approach so that users arrive at the crossing as close to a 90° angle as possible • installing lighting sources • engaging with signalling engineers to optimise strike in times • providing decking or improving crossing surface, e.g. holdfast, strail, non-slip surface • providing cyclist dismount signs and / or chicanes • straightening of crossing deck

	Hazard	Control
	schools, local amenities or other attractions are known to contribute towards user error	
Pedestrian and road vehicle collision risk	<p>Examples include:</p> <ul style="list-style-type: none"> a single gate is provided for pedestrian and vehicle users where there is a high likelihood that both user groups will traverse at the same time the position of pedestrian gate forces / encourages pedestrian users to traverse diagonally across the roadway road / footpath inadequately separated; footpath not clearly defined condition of footpath surface increases the likelihood of users slipping / tripping into the path of vehicles 	<p>Controls can include:</p> <ul style="list-style-type: none"> providing separate pedestrian gates clearly defining the footpath; renew markings positioning pedestrian gates on the same side of the crossing improving footpath crossing surface so it is devoid of potholes, excessive flangeway gaps and is evenly laid improving crossing surface, e.g. holdfast, strail, non-slip surface
Personal injury	<p>Examples include:</p> <ul style="list-style-type: none"> skewed crossing with large flangeway gaps results in cyclist, mobility scooter, pushchair or wheelchair user being unseated condition of footpath surface increases the likelihood of users slipping / tripping degraded gate mechanism or level crossing equipment barrier mechanism unguarded / inadequately protected 	<p>Controls can include:</p> <ul style="list-style-type: none"> improving fence lines reducing flangeway gaps and straightening where possible providing decking or improving crossing surface, e.g. holdfast, strail, non-slip surface straighten / realign gate posts fully guarding barrier mechanisms