

NARRATIVE RISK ASSESSMENT – PASSIVE TEMPLATE FINAL v2.0

PASSIVE LEVEL CROSSING RISK ASSESSMENT

1. LEVEL CROSSING OVERVIEW AND ENVIRONMENT

1.1 LEVEL CROSSING OVERVIEW

This is a risk assessment for Cow Creek FPS level crossing.

Crossing details	
Name	Cow Creek FPS
Type	FPS
Crossing status	Public Footpath
Overall crossing status	Open
Route name	Anglia
Engineers Line Reference	LTN1, 85m, 20ch
OS grid reference	TM052659
Number of lines crossed	2
Line speed (mph)	100
Electrification	25KVAMom
Signal box	Colchester PSB

Risk assessment details	
Name of assessor	Mike Lewis
Post	Level Crossing Manager
Date completed	12/01/2017
Next due date	12/04/2019
Email address	mike.lewis@networkrail.co.uk
Phone number	07715133092

ALCRM risk score	
Individual risk	C
Collective risk	6
FWI	0.000119624

1.2 INFORMATION SOURCES

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

Consulted	Attended site
Other	No

Stakeholder consultation and attendance notes:

Mom for phone log checks.

The reference sources used during the risk assessment included:

- Census, Other (Previous risk assessment), CCIL, GI Portal, SMIS.

1.3 ENVIRONMENT



Up side crossing approach



Down side crossing approach

The environment surrounding Cow Creek FPS level crossing consists of rural area with fields or other open land in the vicinity.

It is a public footpath level crossing which is located on Kerrys Farm Lane. There are no stations visible at the level crossing.

At Cow Creek FPS level crossing the orientation of the road/path from the north is 120°; the orientation of the railway from the north to the up line in the up direction is 210°. Low horizon can result in sun glare; sun glare is a known issue.

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

Site visit general observations:

Cow creek is also known as Cow green Level crossing.

2. LEVEL CROSSING USAGE

2.1 RAIL

The train service over Cow Creek FPS level crossing consists of passenger and freight trains. There are 92 trains per day. The highest permissible line speed of trains is 100mph. Trains are timetabled to run for 20 hours per day.

Assessor's notes:

Various speeds and lengths of trains go over Cow Creek Level crossing throughout the day.

2.2 USER CENSUS DATA

An estimated 24 hour census has been used. The census was estimated on 11/01/2017 by Mike Lewis. The census applies to 100% of the year.

The census taken on the day is as follows:

Pedestrians	3
Pedal cyclists	0
Horses / riders	0
Animals on the hoof	0

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

Vulnerable user observations:

No vulnerable users observed during RA.

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

Irregular user observations:

Ramblers have been known to use the pedestrian footpath over Cow Creek as per previous RA.

Information gathered indicates that Cow Creek FPS level crossing does not have a high number of users during the night or at dusk.

Site visit night / dusk user observations:

Very rural area no streetlights but signage is reflective.

Assessor's general census notes:

24 average given as census camera on site for 13 days.

2.3 USER CENSUS RESULTS

ALCRM calculates usage of the crossing to be 3 pedestrians and cyclists per day.

3. RISK OF USE

3.1 SIGHTING AND TRAVERSE

At Cow Creek FPS level crossing, the decision point and traverse lengths are calculated as:

	Decision point (m)	Traverse length (m)	Measured from
Up side	2.1	9.1	Stop look listen sign
Down side	2.3	9.4	Stop look listen sign

Decking is provided over the level crossing..

The traverse times are calculated as:

	Traverse time (s)
Pedestrians	7.91

The current census has not identified a high proportion of vulnerable users. Therefore, the pedestrian traverse time has not been increased.

Assessor's traverse time notes:

Traverse could be lowered if stop look listens were brought to 2m on both the up/down approaches.

Sighting was measured by the following means:

- Using Range Finder

Sighting, measured in metres, at Cow Creek FPS 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	354	893	Vegetation	Yes	NO	N/A
Up side looking toward down direction train approach	354	1197	Vegetation	Yes	NO	N/A
Down side looking toward up direction train approach	354	976	Vegetation	Yes	NO	N/A
Down side looking toward down direction train approach	354	1199	Vegetation	Yes	NO	N/A

Sighting restrictions are recorded as follows:

	Up Direction	Down Direction
Nothing; vanishing point	YES	YES
Track curvature	NO	NO
Permanent structure (building/wall etc)	NO	NO
Signage or crossing equipment	NO	NO
Vegetation	NO	NO
Bad weather on the day of visit	NO	NO
Other	NO	NO

There are no known obstructions that could make it difficult for users to see approaching trains. There are known issues with foliage, fog or other issues that might impair visibility of the crossing, crossing equipment or approaching trains.

Actions to improve sighting have been identified.

Assessor's improving sighting and decision point notes

Off track to keep vegetation down with regular MST in place.

Assessor's general sighting and traverse notes:

Sighting is compliant but sighting and traverse could be lowered if decision points were put to the 2m point.

3.2 EVALUATION OF MITIGATIONS

3.3 CROSSING APPROACHES

The signs at Cow Creek FPS 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 not considered to be steep, slippery or present a tripping hazard to users.

Assessor's notes:

Fog can be an issue at certain times of the year.

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

Assessor's general crossing approach notes:

Rural area no lights but signs are reflective.

3.4 AT THE CROSSING – ANOTHER TRAIN COMING RISK

Trains are sometimes known to pass each other at this crossing.

3.5 INCIDENT HISTORY

A level crossing safety event has not been known to occur at Cow Creek FPS level crossing in the last twelve months.

Assessor's incident history notes:

No incidents with the FPS at Cow Creek in the last 365 days.

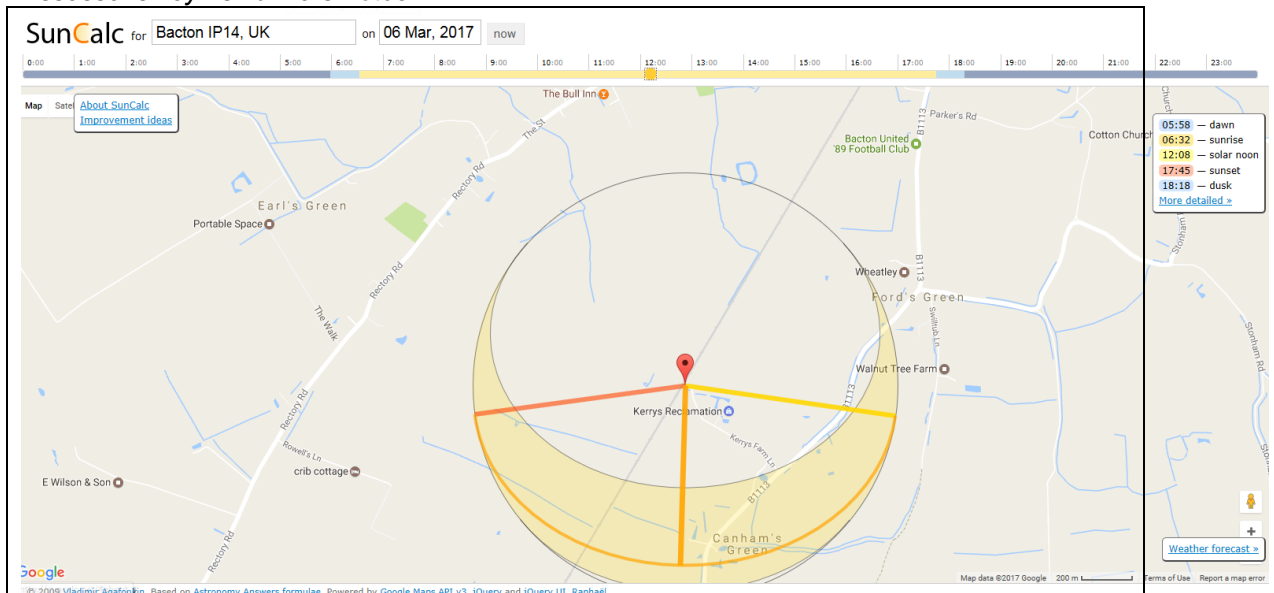
4. ALCRM CALCULATED RISK

Cow Creek FPS 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

Assessor's key risk drivers notes



Safety risk			
Compared to other crossings the safety risk for this crossing is	Individual risk		Collective risk
	C		6
	Individual risk	Individual risk	

	(fraction)	(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 18418	0.000054294	0.000118905	
				Derailment contribution
Passengers			0	0
Staff			0.00000072	0
Total			0.000119624	0
Collision frequencies	Train / user	User equipment	Other	
Vehicle	0	0	0	
Pedestrian	0.000143964	0.000026304	0.000072051	
Collision risk	Train / user	User equipment	Other	
Vehicle	0	0	0	
Pedestrian	0.000116899	0.000000421	0.000001585	

5. OPTION ASSESSMENT AND CONCLUSIONS

5.1 OPTIONS EVALUATED

The options evaluated to mitigate the risks at Cow Creek FPS crossing include:

Option	Term ¹	ALCRM risk score	ALCRM FWI	Safety Benefit	Cost	Benefit Cost Ratio	Status	Comments
Closure via diversion	Long term	M13	0.0	0.000119624	50.000	0.40	Complete in ALCRM	Should be investigated as would benefit other crossing closures in the vicinity.
Add MSL overlay	Long term	D7	8.4288E-5	0.000035336	120.000	0.01	Complete in ALCRM	High costs and low cost benefit ratio. This site is not compatible with an MSL overlay due to signals and a track crossover within the strike in area.
Gate to gate enhancement	Long term	C6	1.07662E-4	0.000011962	20.000	0.02	Complete in ALCRM	If closure wasn't possible then a gate to gate enhancement should be considered.
Intergrated MSL	Long Term	D7	8.4288E-5	0.000035336	650000	0.01	Complete in ALCRM	High costs and low cost benefit ratio, means the cost of delivering this upgrade is disproportionate to the safety benefit received.

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:

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

5.2 CONCLUSIONS

Assessor's notes:

Cow Creek Public Footpath Crossing is located in the village of Bacton Postcode: IP144HL Anglia and it's also on the main Norwich to London line (LTN1) at 85 miles 20 chains

To gain access to Cow creek level crossing you turn off Finningham road onto Kerry's farm lane to traverse the crossing you go over the wooden stiles up to the decision point which is marked with the stop look listen signs there are other signs but they relate to the user work crossing which is adjacent to the public footpath

The crossing decks are different the up road is a holdfast rubber deck but the down road has a wooden sleeper deck with non-slip attached once over you exit the wooden stiles and onto the open field footpath

Options

Close via diversion

I talked to a local farmer recently and he informed me that there used to be a underpass between Bacton and Cow creek and was closed off in the 1980's due to bomb threats at the current time he informed me it was big enough to get very large farm machinery through if this could be reopened you possibly could close three crossings in the area Cow creek FPS UWCT, Bacton FPS, and Fords green FPS but this would need consultations with the public and the authorised users.

Add MSL Overlay

An MSL overlay is not thought to be suitable at this location due to the track crossover and the signals in the area.

Gate to gate enhancement

By having a full gate to gate enhancement i.e. new stiles with fenced type1 walkways with tactile paving for the decision points new rubber deck on the down road by completing this it would separate the Uwct side.

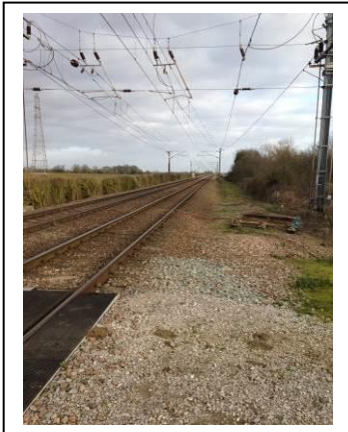
Intergrated MSL

By adding full MSL onto Cow creek FPS this would give the users a visual and audible indication on when to cross this would also benefit the UWC side which is adjacent.

Conclusion

The underpass should be investigated as this would benefit numerous crossings in the area that could be closed off but if this is not possible then at least a gate to gate enhancement should be considered and separate the UWCT side.

ANNEX A – ADDITIONAL PHOTOGRAPHS



Upside towards up approach train



Upside towards down approach train



Downside towards up approach train



Downside towards down approach train



Upside across crossing



Downside across crossing

ANNEX B – HAZARD IDENTIFICATION AND RISK CONTROLS

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

	Hazard	Control
Road vehicle and train collision risk	<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 user error, 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

ANNEX C – ALCRM RISK SCORE EXPLANATION

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

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

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

INDIVIDUAL RISK

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

Individual risk:

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

Individual Risk Ranking	Upper Value (Probability)	Lower Value (Probability)	Upper Value (FWI)	Lower Value (FW)
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