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NARRATIVE RISK ASSESSMENT – PROTECTED TEMPLATE FINAL V1.0

PROTECTED LEVEL CROSSING RISK ASSESSMENT

1. LEVEL CROSSING OVERVIEW AND ENVIRONMENT

1.1 LEVEL CROSSING OVERVIEW

This is a risk assessment for NETHER POPPLETON level crossing.

Crossing details	
Name	NETHER POPPLETON
Type	AHB
Crossing status	Public Highway
Overall crossing status	Open
Route name	[redacted]
Engineers Line Reference	HAY1, 2m, 34ch
OS grid reference	SE567537
Number of lines crossed	2
Line speed (mph)	55
Electrification	No
Signal box	YORK IECC

Risk assessment details	
Name of assessor	LCM
Post	Level Crossing Manager
Date completed	04/03/2016
Next due date	04/06/2017
Email address	LNElevelcrossings@networkrail.co.uk
Phone number	[redacted]

ALCRM risk score	
Individual risk	E
Collective risk	2
FWI	0.019413235

1.2 INFORMATION SOURCES

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

Consulted	Attended site
None	None

Stakeholder consultation attendance notes:

No stakeholder at the time of visit local highway authority City Of York Council will be consulted via the road rail partnership initiative to discuss the long term strategy of this crossing

The reference sources used during the risk assessment included:

- (9 day Census, CCIL, SMIS, GI Portal

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1.3 ENVIRONMENT

[Insert images: most recent up side and down side crossing approaches]

Down side crossing approach

Upside side crossing approach

The level crossing is located on MILLFIELD LANE, NETHER POPPLETON which is a Public Highway. The road approach speed is estimated to be 31-40mph. There are no stations visible at the level crossing.

At NETHER POPPLETON the orientation of the road/path from the north is 340°; the orientation of the railway from the north to the up line in the up direction is 100°. Low horizon can result in sun glare; sun glare is a known issue.

There are planned or apparent developments near the crossing which may lead to a change or increase in use or risk.

Site visit observations:

The site of the old British Sugar factory is being developed into a residential area with approximately 1100 houses to include access points onto Millfield La & Boroughbridge Road. A new developer has now submitted planning for a residential development on the site of the old civil service sports ground. This will compromise 271 houses with access points to include Millfield Lane & Borough Bridge Road. The development has not yet started.

2. LEVEL CROSSING USAGE

2.1 RAIL

The train service over NETHER POPPLETON level crossing consists of passenger trains. There are 36 trains per day. The highest permissible line speed of trains is 55mph. Trains are timetabled to run for 16.5 hours per day.

Assessor's train service notes:

There are aspirations to re-signal and upgrade the line in 2019.,This will allow the train operating companies to increase their trains services over this line

2.2 USER CENSUS DATA

A 24 hour census was carried out on 16/01/2014 by Sky High Count on Us. The census applies to 100% of the year.

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The census taken on the day is as follows:

Cars	1910
Vans / small lorries	421
Buses	64
HGVs	94
Pedal / motor cyclists	538
Pedestrians	406
Tractors / farm vehicles	0
Horses / riders	0
Animals on the hoof	0

Available information indicates that the crossing has a high proportion of vulnerable users.

Vulnerable user observations:

Manor School is located next to the crossing as a result the crossing sees significant numbers of school children using the crossing to get to/from school twice a day in the AM and PM peak periods, high numbers of these school children are using bicycles. Regular engagement with the school takes place and a safety presentation is conducted to the new school starters every year.

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

Assessor's general census notes:

A daily average usage figure has been calculated from a 9 day census undertaken by Sky High. Even though the census was carried out in 2014 it still represents the most accurate census information.

2.3 USER CENSUS RESULTS

ALCRM calculates usage of the crossing to be 2489 road vehicles and 944 pedestrians and cyclists per day.

3. RISK OF USE

3.1 CROSSING APPROACHES

The road approach speed is 30mph but actual vehicle approach speed is estimated to be 31-40mph. One or more of the approach roads to NETHER POPPLETON level crossing are assessed as being long and straight. There are prominent features on the approach to or on the far side of the level crossing that could distract drivers.

Site visit observations:

There are road junctions on the up side and down side approach to the crossing within 300 metres. In addition there is also a roundabout serving access on the A1237 ring road on the up side approx., 500 metres away which see's substantially increased traffic in the AM/PM peak periods. This can see vehicles queuing back to the crossing on occasions.

The road surface, including gradient if present, is unlikely to impact on the ability of a vehicle to stop behind the stop line.

There are no known issues with ice, mud, loose material or flood water. In addition, there are no known issues with foliage or fog.

Assessor's notes:

Because of the orientation of the crossing in the winter months users moving over the crossing north to south (upside approach) can experience severe low winter sun between 10am – 2pm this is exasperated further by sun reflection of the surface when it is wet this

carries the risk of reducing the users time to react to a crossing activation, with visibility of the RTL's. A separate sun glare risk assessment (LCG13) was undertaken to identify the risk and recommend mitigations. The sun glare is deemed critical on the up side approach as the sun disk is in full view of the approaching drivers and compounded during wet weather with sun reflection off the road surface. The main mitigations recommended:

- Suitable matt road surface
- Enhanced barrier boom features
- Modified/supplementary advanced signage
- Rumble strips
- Active road car warning system

The above mitigations are proposed to be implemented as a planning condition of the large housing developments proposed on Mill Field Lane.

At the estimated road speed, the visibility of level crossing signage and equipment is considered to provide road users with surplus time to react if the crossing is activated on the down side approach where it is long and straight and adequate time to react on the up side approach where the approach is on a tight left hand approach bend .

3.2 AT THE CROSSING – GROUNDING RISK

The visual evaluation of the vertical profile of the road indicates that it does not create a risk of vehicles grounding on the crossing. Risk of grounding signs have not been provided at the crossing.

3.3 AT THE CROSSING – BLOCKING BACK

The road layout at or close to the crossing does not result in identified incidents of traffic queuing over the crossing. No incidents of blocking back are recorded and there are identified issues with the road layout, parked cars or other features that could stop traffic. In addition, the road is not a known diversionary route.

Assessor's notes:

While there are no recorded incidents of blocking back over the crossing in the AM & PM peak traffic flow periods the risk is increased due to the locations of the junctions and roundabout on both sides

3.4 AT THE CROSSING – ANOTHER TRAIN COMING RISK

The likelihood of a second train approaching is currently rare at this crossing

3.5 MISUSE

Misuse has not been known to occur at NETHER POPPLETON crossing in the last twelve months.

Assessor's Misuse notes:

While events of misuse have not been reported in the last twelvemonths the chance of a user misusing the crossing is still high due to the nature of the crossing, as such red light enforcement cameras have now been installed at this crossing and will also measure misuse.

Red light violations / barrier weaving

The chance of a vehicle user deliberately misusing the crossing is estimated as average. Measures have been taken to mitigate deliberate misuse.

Assessor's notes:

Red light enforcement cameras have been installed on both approaches to the crossing. In addition regular safety engagement visits are undertaken at the nearby Manor Academy.

3.6 THE CROSSING – STRIKE IN TIMES

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Strike in times

	Designed strike in time (Obtainable from RAM)	Does the observed strike in time conform to the designed strike in time?	Is the observed barrier down time excessive?
Up line	Not less than 27 seconds	Yes	No
Down line	Not less than 27 seconds	Yes	No

Assessor's notes and observations on strike in times:

The barrier down times and strike can exceed 27 seconds on the up side if the train has been cautioned prior to approaching the crossing and the last signal protecting Skelton Jn.

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

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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

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NETHER POPPLETON ***level crossing ALCRM results***

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

- Large number users

Safety risk				
Compared to other crossings the safety risk for this crossing is	**Individual risk**		**Collective risk**	
	E		**2**	
	Individual risk (fraction)	**Individual risk (numeric)**		
Car	1 in 737463	0.000001356	0.002733514	
Van / small lorries	1 in 127893	0.000007819	0.000592697	
HGV	1 in 128040	0.00000781	0.000064392	
Bus	1 in 486144	0.000002057	0.000024448	
Tractor / farm vehicle	0	0	0	
Cyclist / Motor cyclist	1 in 36141	0.000027669	0.012240249	
Pedestrian	1 in 36141	0.000027669	0.009331675	
				Derailment contribution
Passengers			0.000114308	87.0435093
Staff			0.000932835	1.189222285
Total			0.026034118	0.424792098
Collision frequencies	**Train / user**	**User equipment**	**Other**	
Vehicle	0.008460951	0.126755332	0	
Pedestrian	0.025999563	0	0.020921745	
Collision risk	**Train / user**	**User equipment**	**Other**	
Vehicle	0.003415051	0	0	
Pedestrian	0.021111645	0	0.000460278	

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5. OPTION ASSESSMENT AND CONCLUSIONS

5.1 OPTIONS EVALUATED

The options evaluated to mitigate the risks at NETHER POPPLETON crossing include:

Option	Term[1]	ALCRM risk score	ALCRM FWI	Safety Benefit	Cost	Benefit Cost Ratio	Status	Comments
Closure (New link road)	Long Term	0	0.0		N/A	N/A	COMPLETE	Possibility of a new access route from the A1237 or A59 which would require a new junction. A new EA compliant bridge would be required at the sight of the closed crossing. Minimum £5m for the bridge plus road building and land purchase costs. This option is feasible with co-operation of the local highways authority but the cost would be prohibitive compared to other options.
Renew as MCB-CCTV	Long Term	I4	1.97E-03		N/A	N/A	COMPLETE	Renewal of this crossing is scoped as part of the HAY1 re-signalling scheme due for completion 2019. This MCB type would offer the benefit of signaller line clear observation which would be beneficial to the high levels of pedestrian and vulnerable users which use this crossing.
Renew as MCB-OD	Long Term	I4	1.97E-03		N/A	N/A	COMPLETE	Renewal of this crossing is scoped as part of the HAY1

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								re-signalling scheme due for completion 2019. However due to the environment of this crossing and user type operational disruption would be a major concern due to the obstacle detection activating due to misuse. If MCB-CCTV is not considered a solution to design MCB-OD + CCTV hybrid could be considered.. This would enable the crossing to be monitored by CCTV at peak AM/PM periods thus reducing operational disruptions
Matt Road surface treatment, rumble strips, enhanced barrier boom features.	Long Term	TBC	TBC	N/A	N/A	N/A	COMPLETE	The crossing suffers from low winter sun glare on the up side approach which is compounded during the wet weather with sun reflection off the road surface. The mitigations detailed will improve the driver's awareness and help with better visibility.

NOTES
Network Rail always evaluates the need for short[1] 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

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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.

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5.2 CONCLUSIONS

Assessor's notes:

The current asset as it stands is of good repair and works acceptably within its current operation mode.

Sun glare is a problem here during the winter months for drivers over the crossing north to south. The axis and sun position put the sun right in the middle of the crossing at the southern end between 10 am 12pm which is made worse if it has been raining with sun reflection. So form of remedial work would be recommended out to alleviate this issue for users. A full sun glare risk assessment (LCG13) for this crossing has been carried out and the options for mitigations are detailed above in 5.1.

Taking into consideration the environment and how it has significantly been developed over the last few years and a school relocating next to the crossing this has contributed significantly to increased vehicle and pedestrian usage over this crossing. More importantly are the increased number of school children using the crossing. As it currently stands the crossing is in need of upgrading to a fully protected type of crossing to cope with the current demands placed upon it by users.

The development of two residential plots near to the crossing will significantly increase traffic over this crossing and increase the risk and therefore the upgrade to a full barrier crossing will be required. There are aspirations to run more trains at faster speeds which is part of a wider resignalling scheme in 2019 if this proceeds then the crossing will be upgraded then..

A longer term strategy will need to look at the closure of this crossing. If the resignalling scheme (above) does not go ahead then the next opportunity for upgrade will be when the crossing is due for renewal in 2026.

. Increased traffic impact from the two residential developments will also need to be discussed further and sufficient controls put in place at the development stage to lessen the impact on the crossing

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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	Examples at the crossing include: • fast and / or long and straight roads; inability to stop • proximity of junctions; distraction, blocking back • sweeping road approaches, parked cars hinder identification of level crossing ahead • level crossing equipment and road traffic light signals are not conspicuous or optimally positioned; orientation / sun glare, insufficient light output, misalignment of the carriageway over the crossing • there is a risk of grounding and / or the severity of the gradient might adversely affect a vehicle's ability to negotiate the crossing • insufficient or excessive strike in times increase the likelihood of driver error / misuse • high chance of a second train coming • crossing type is unsuitable for location, train service, line speed and / or user groups Additional examples include: • Signaller unsighted to road vehicle; bleaching of CCTV image, blind spots • barriers or gates not fully interlocked with signalling system and / or no approach locking (opportunity for human error - raise barriers / open gates with train approaching)	Controls can include: • vehicle activated signs, advance warning signs; countdown markers, risk of grounding signs, provision of emergency telephones • liaising with highways authority regarding traffic restrictions; speed limits, restricting direction of traffic • engaging with signalling engineers to optimise strike in times • enhanced 'another train coming' signs • road traffic light signal and boom lighting LED upgrade, extended hoods, repaint backboards, reflectorised markings • upgrading of asset to a higher form of protection • improving camera equipment / Signaller's view of crossing, e.g. install colour monitor • signalling interlocking upgrade and / or barrier inhibition
Pedestrian and train collision risk	Examples include: • high chance of a second train coming • increased likelihood of misuse, e.g. crossing is at station • free wicket gates are known to result in user error or encourage misadventure • crossing type is unsuitable for location, train service, line speed and user groups	Controls can include: • spoken 'another train coming' audible warning • providing red standing man sign • maximise sighting lines of approaching trains • enhanced 'another train coming' signage • providing tactile paving and / or pedestrian stop lines • interlocking (or locking where Crossing Attendant provided) of wicket

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	Hazard	Control
	• schools, local amenities or other attractions are known to contribute towards user error Additional examples include: • Signaller unsighted to user; bleaching of CCTV image, blind spots • barriers or gates not fully interlocked with signalling system and / or no approach locking (opportunity for human error - raise barriers / open gates with train approaching)	gates • upgrading of asset to a higher form of protection • improving camera equipment / Signaller's view of crossing, e.g. reposition on-site camera equipment • signalling interlocking upgrade and / or barrier inhibition
Pedestrian and road vehicle collision risk	Examples include: • road / footpath inadequately separated; footpath not clearly defined, narrow carriageway restricts width of footpath, footpath width unsuitable for all user groups, e.g. heavily used, high volume of encumbered users • condition of footpath surface increases the likelihood of users diverting from the designated footpath or slipping / tripping into the carriageway	Controls can include: • clearly define the footpath; renew markings, install tactile paving and / or widen where possible • improving footpath crossing surface so it is devoid of potholes, excessive flangeway gaps and is evenly laid • removing redundant footpath markings that do not align with public footpaths • road speed controls, vehicle activated signs, advance warning signs
Personal injury	Examples include: • barrier mechanism unguarded / inadequately protected • foreseeable likelihood of pedestrians standing beneath barrier during lowering sequence • skewed crossing with large flangeway gaps results in cyclist, mobility scooter, pushchair or wheelchair user being unseated	Controls can include: • fully guarding barrier mechanisms • improving fence lines • marking pedestrian stop lines, introducing tactile paving • reducing flangeway gaps and straightening where possible