[redacted]
By email: [redacted]

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Freedom of Information
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8th June 2018

Dear [redacted]

Information request
Reference number: **FOI2018/00644**

Thank you for your email of 25th May 2018, in which you have requested the following information:

> *'I would be grateful if you could please provide me with the Level Crossing Risk Assessment for Arbroath.'*

I have processed your request under the terms of the Freedom of Information Act 2000 (FOIA) and I can confirm that we hold the information you requested. Please see attached a copy of the Risk Assessment for Arbroath Level Crossing.

I have withheld the name, phone number and email address of a member of staff from this document, under section 40(2) of the FOIA. This exemption allows us to withhold information in circumstances where its disclosure would breach the data protection principles set out at s.35 of the Data Protection Act 2018 and Article 5 of the General Data Protection Regulations. In this instance disclosure would breach the first principle that mandates that data must be processed fairly and lawfully. Here a member of staff's name, phone number and email address would clearly make them identifiable and since they would have had no expectation that their personal details would be publicly disclosed through the FOIA, I am satisfied that to do so would be an unfair processing of their personal information.

If you have any enquiries about this response, please contact me in the first instance at FOI@networkrail.co.uk or on 01908 782405. Details of your appeal rights are below.

Please remember to quote the reference number at the top of this letter in all future communications.

Yours sincerely

Claire Duncan
Information Officer

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If you are not content with the outcome of the internal review, you have the right to apply directly to the Information Commissioner for a decision. The Information Commissioner can be contacted at:

Information Commissioner's Office
Wycliffe House
Water Lane
Wilmslow
Cheshire SK9 5AF

NARRATIVE RISK ASSESSMENT – PROTECTED TEMPLATE FINAL v2.0

PROTECTED LEVEL CROSSING RISK ASSESSMENT

1. LEVEL CROSSING OVERVIEW AND ENVIRONMENT

1.1 LEVEL CROSSING OVERVIEW

This is a risk assessment for ARBROATH level crossing.

Crossing details	
Name	ARBROATH
Type	MCB/MB
Crossing status	Public Highway
Overall crossing status	Open
Route name	Scotland
Engineers Line Reference	ECN3, 16m, 60ch
OS grid reference	NO639412
Number of lines crossed	2
Line speed (mph)	20
Electrification	No
Signal box	Arbroath

Risk assessment details	
Name of assessor	[redacted]
Post	Level Crossing Manager
Date completed	08/03/2018
Next due date	08/06/2020
Email address	[redacted]
Phone number	[redacted]

ALCRM risk score	
Individual risk	F
Collective risk	4
FWI	0.001135894

1.2 INFORMATION SOURCES

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

Consulted	Attended site
Signaller	Yes
Local Authority	No
Crossing Users	Yes

Stakeholder consultation attendance notes:

During the risk assessment the Level Crossing Manager discussed with the signaller usage of the crossing and obtained information on the amount and types of trains using the crossing and the procedure for lowering and opening the barriers.

The Local Authority were contacted regarding planning applications in the area of the level crossing and confirmed there were none that would affect the level crossing.

Crossing Users were spoken with regarding their use of the crossing. Most stated they were going to a nearby supermarket for their shopping or lunch. They further stated that they did not use a pedestrian bridge next to the crossing because of the high amount of steps, preferring to use the flat crossing.

The reference sources used during the risk assessment included:

- Signal Box Occurrence log
- Signaller (Provided Train Running Information)
- Level Crossing Incident Spread Sheet
- Crossing Users
- Local Authority Community Wardens

1.3 ENVIRONMENT

Up side crossing approach

Down side crossing approach

Arbroath Wellgate level crossing is located on Wellgate which is a Public Highway. The road approach speed is 30mph. Arbroath Station can be seen from the level crossing in the Up direction.

There is access for pedestrians to a Supermarket near to the crossing on the upside.

At Arbroath the orientation of the road/path from the north is 72°; the orientation of the railway from the north to the up line in the up direction is 165°. Low horizon could potentially result in sun glare at times throughout the year but this is mitigated with the provision of signage at the crossing. There are no reports of sun glare being an issue

Angus Council advise there no known planned or apparent developments near the crossing which may lead to a change or increase in use or risk.

Arbroath Signal Box overlooks the crossing giving the signaller a clear view of the crossing

2. LEVEL CROSSING USAGE

2.1 RAIL

The train service over Arbroath level crossing consists of passenger and freight trains. There are 83 trains per day. The highest permissible line speed of trains is 20mph. Trains are timetabled to run for 17.5 hours per day between 0620 and 2340

On the up line there are 41 trains daily and 42 daily trains on the downline.

There is no set time frequency for these trains, peak times are between 0620 and 0958 and between 1525 and 1951.

A number of trains on the Up line are slowing down as they approach Arbroath Station while a number of trains are accelerating as they leave the station

2.2 USER CENSUS DATA

On 08/03/2018, the Level Crossing Manager conducted a quick census at the crossing.
A quick census can be taken between 0930 and 1630 Monday to Friday. The duration is normally 30 minutes but this can be extended. During this period a count is kept of crossing usage and from that information ALCRM calculates daily usage.

The quick census taken on 08/03/2018 commenced at 10:00 and lasted 60 minutes
It applies to 100% of the year.

The census taken on the day is as follows:

Cars	8
Vans / small lorries	2
Buses	0
HGVs	0
Pedal / motor cyclists	0
Pedestrians	26
Tractors / farm vehicles	0
Horses / riders	0
Animals on the hoof	0

The Level Crossing Manager Aberdeen has spoken with some of the pedestrian users of the crossing.

Most are regular users going to a nearby Supermarket to obtain snacks or lunch.

There have been occasions during visits to the crossing when the Level Crossing Manager has witnessed elderly persons using the crossing and people using prams.

These persons would also be seen by the signaller at Arbroath signal box who would not activate the crossing until it was clear and safe to do so.

2.3 USER CENSUS RESULTS

ALCRM calculates usage of the crossing to be 135 road vehicles and 351 pedestrians and cyclists per day.

3. RISK OF USE

3.1 CROSSING APPROACHES

The road approach speed is 30mph. None of the approach roads to Arbroath level crossing are assessed as being long and straight.

The view of the crossing approaching from John Street on the upside is impeded by a high wall, the road bends left into Wellgate. There is signage on the John Street approach warning motorists that they are approaching a level crossing.

The road surface on the downside is cobbled and on a gradient. This could impact on the ability of a vehicle to stop behind the stop line during wet weather.

There are known issues with foliage which can obscure the signallers view of the downside approach road (Wellgate). Routine inspections of the crossing by the Level Crossing Manager identify any foliage issues and these are passed to the Offtrack organisation to be addressed.

The visibility of level crossing signage and equipment is considered by the Level Crossing Manager to provide road users with surplus time to react if the crossing is activated

3.2 AT THE CROSSING – GROUNDING RISK

The visual evaluation of the vertical profile of the road indicates that it does not create a risk of vehicles grounding on the crossing. The crossing surface is a Strail rubber surface with tarmac approaches on both up and down sides. The crossing is level within the network rail boundary.

3.3 AT THE CROSSING – BLOCKING BACK

The road layout is such that there are no known issues of blocking back at this crossing

3.4 AT THE CROSSING – ANOTHER TRAIN COMING RISK

Trains are occasionally known to pass each other at this crossing. This is a double line section of track where, on occasions, trains on the down line from Arbroath will pass trains travelling to Arbroath on the up line. As the crossing is situated at a manned signal box, the signaller would maintain the barriers in the lowered position until both lines were clear

3.5 INCIDENT HISTORY

On 20/05/17 10 youths jumped the barrier when it was in the lowered position. This was reported to the British Transport Police.

Following this incident high profile patrols were carried out by British Transport Police, Police Scotland and Local Community Wardens to try and detect the offenders and deter youths from congregating in the area.

Since the introduction of these patrols there have been no further reports of misuse at the crossing.

Red light violations / barrier weaving

The chance of a vehicle user deliberately misusing the crossing is estimated by ALCRM as low. Historically there has been little or no vehicle misuse at the crossing. Other factors contributing are low vehicle usage and also the crossing is under observation by the Signaller at Arbroath Signal Box who would report any misuse to the Police.

3.6 THE CROSSING – STRIKE IN TIMES

Strike in times

	Designed strike in time (Obtainable from RAM)	Does the observed strike in time conform to the designed strike in time?	Is the observed barrier down time excessive?
Up line	n/a	Yes	No
Down line	n/a	Yes	No

When The Signaller at Arbroath receives notification from Inverkeilor signal box that a train has entered his section on the Up line he will lower the barriers at Arbroath. Likewise when he receives a notification that a train has left Carnoustie in the down direction he will activate the crossing at Arbroath.

The Level Crossing Manager has received no complaints of excessive barrier down time.

4. ALCRM CALCULATED RISK

ARBROATH ***level crossing ALCRM results***

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

- Frequent trains
-

Frequent Trains are a residual business risk. The high frequency of trains may influence the behaviour of regular crossing users who may rush to beat the barriers as they are lowered. There have been no reports of this happening at Arbroath Wellgate.

No other risk drivers have been identified.

Safety risk				
Compared to other crossings the safety risk for this crossing is	**Individual risk**		**Collective risk**	
	F		**4**	
	Individual risk (fraction)	**Individual risk (numeric)**		
Car	1 in 8474576	0.000000118	0.000010378	
Van / small lorries	1 in 1689189	0.000000592	0.000002595	
HGV	0	0	0	
Bus	0	0	0	
Tractor / farm vehicle	0	0	0	
Cyclist / Motor cyclist	0	0	0	
Pedestrian	1 in 229885	0.00000435	0.001114483	
				Derailment contribution
Passengers			0.000000008	0
Staff			0.00000843	0
Total			0.001135894	0
Collision frequencies	**Train / user**	**User equipment**	**Other**	
Vehicle	0.000076312	0.010958332	0.00000636	
Pedestrian	0.001093858	0.001757141	0.009007087	
Collision risk	**Train / user**	**User equipment**	**Other**	
Vehicle	0.000012973	0	0	
Pedestrian	0.000888213	0.000028114	0.000198156	

5. OPTION ASSESSMENT AND CONCLUSIONS

5.1 OPTIONS EVALUATED

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

Option	Term[1]	ALCRM risk score	ALCRM FWI	Safety Benefit	Cost	Benefit Cost Ratio	Status	Comments
Negotiate with Local Authority to close the crossing	Long Term	M13	0.0E+00	1.144-03	0.0	7514266-04	Rejected	The crossing cannot be closed at the current time Owing to access issues.
Upgrade to MCB OD	Long Term	F4	1.14E-03	-1.03E-03	1000000	-0.03	Rejected	This option has been rejected due to the benefit to cost ratio giving a weak safety and business benefit.
SFAIRP No further mitigation identified	Long Term	F4	1.14E-03	Base Option	Base Option	Base Option	Recommended	The risk identified are currently managed So Far As Is Reasonably Practicable
Installation of Road Lights	Long Term	F4	1.14E-03	-1.14E-04	500000	-0.01	Rejected	This option has been rejected due to the benefit to cost ratio giving a weak safety and business

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

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

Arbroath Wellgate is a manually controlled barrier crossing, meaning the signaller raises and lowers the barrier to road traffic and pedestrians.

The crossing is situated between Arbroath and Montrose on this section of line. The line speed of trains over the crossing is 20mph.

The crossing leads straight across the track and consists of a rubber Strail unit surface. The signal box is situated on the South side of the crossing. There is a footbridge at the crossing.
.
The crossing is used mainly by pedestrians going to and from a nearby Supermarket.

Current protection arrangements:

Barrier
Signage
Audible Alarms
Road Markings

Upgrade to MCB-OD

Upgrade of the current crossing to include MCB with Obstacle Detection (OD). A MCB crossing already offers the highest level of protection to crossing users however the obstacle detection provides and additional safety feature whereby the crossing is scanned for objects on the track. This safety feature does mean that additional timings need to be factored into the crossing closure sequence which could result in longer barrier down times. At present there is both a weak business and safety case for this solution therefore this has been rejected. This will however be looked at again in the future, particularly when the asset is due for renewal.

Installation of Road Traffic Signals

The installation of road traffic signals on the crossing approaches has been considered. This would provide an indication to users that the barriers were about to close or the crossing is closed. This option has been rejected due to the benefit to cost ratio giving a weak safety and business benefit

Closure of the Crossing

Closing the crossing has been considered however the Local Authority cannot agree to this at the current time. This matter will be revisited at future meetings with Angus Council.

Taking into account the available information, the current risk controls in place at Arbroath Wellgate level crossing remain suitable and sufficient for its current use

ANNEX A – ADDITIONAL PHOTOGRAPHS

Upside Across Crossing

Downside Across Crossing

Upside Up Direction Train Approach

Upside Down Direction Train Approach

Downside Up Direction Train Approach

:

Downside Down Direction Train Approach

NEX 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	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 / violations • 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	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

	Hazard	Control
	• 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)	
Pedestrian and train collision risk	Examples include: • high chance of a second train coming • increased likelihood of user error, 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 • 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)	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 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

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