

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 Queen Adelaide (Norwich) level crossing.

Crossing details	
Name	Queen Adelaide (Norwich)
Type	AHB
Crossing status	Public Highway
Overall crossing status	Open
Route name	Anglia
Engineers Line Reference	ETN, 72m, 32ch
OS grid reference	tl564814
Number of lines crossed	2
Line speed (mph)	75
Electrification	No
Signal box	Cambridge PSB

Risk assessment details	
Name of assessor	[Name withheld Reg 13(1)]
Post	[Role withheld Reg 13(1)]
Date completed	05/05/2016
Next due date	05/08/2017
Email address	[Name withheld Reg 13(1)]
Phone number	[Mobile No. withheld Reg 13(1)]

ALCRM risk score	
Individual risk	E
Collective risk	2
FWI	0.011643275

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

The reference sources used during the risk assessment included:

- Census, GI Portal, SMIS

1.3 ENVIRONMENT



Up side crossing approach



Down side crossing approach

The level crossing is located on Ely Rd 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 Queen Adelaide (Norwich) the orientation of the road/path from the north is 90°; the orientation of the railway from the north to the up line in the up direction is 250°. 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.

2. LEVEL CROSSING USAGE

2.1 RAIL

The train service over Queen Adelaide (Norwich) level crossing consists of passenger and freight trains. There are 65 trains per day. The highest permissible line speed of trains is 75mph. Trains are timetabled to run for 17.5 hours per day.

2.2 USER CENSUS DATA

A 24 hour census was carried out on 09/09/2015 by Count on us. The census applies to 100% of the year.

The census taken on the day is as follows:

Cars	2671
Vans / small lorries	587
Buses	19
HGVs	69
Pedal / motor cyclists	70
Pedestrians	10
Tractors / farm vehicles	24
Horses / riders	1
Animals on the hoof	0

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

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

Assessor's general census notes:

Average daily usage taken for a 9 day census

2.3 USER CENSUS RESULTS

ALCRM calculates usage of the crossing to be 3370 road vehicles and 80 pedestrians and cyclists per day.

3. RISK OF USE

3.1 CROSSING APPROACHES

The road approach speed is estimated to be 31-40mph. One or more of the approach roads to Queen Adelaide (Norwich) 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:

Road junctions left & right on the down side of the crossing
Turning into residential property on up side

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 known issues with foliage or fog. These known issues might impair visibility of the crossing or crossing equipment, including signage. They might also affect the ability of a vehicle to stop behind the stop line.

Assessor's notes:

Fog at certain times of the year
Sun glare at certain times of year

At the estimated road speed, the visibility of level crossing signage and equipment is considered to be sufficient for road users to be able to react in time 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. Risk of grounding signs have been provided at the crossing.

Assessor's notes:

Crossing sits higher than road approaches

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 a known diversionary route.

Assessor's notes:

Road junctions left & right on the down side of the crossing
Turning into residential property on up side

3.4 AT THE CROSSING – ANOTHER TRAIN COMING RISK

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

3.5 INCIDENT HISTORY

A level crossing safety event has been known to occur at Queen Adelaide (Norwich) crossing in the last twelve months.

Assessor's incident history notes:

22/04/2015 - 1R62 (EMT 0550 Norwich – Liverpool Lime Street) reported cars using Queen Adelaide LC (ETN0) when barriers lowered. Not a near miss.

14/09/2015 - Car on Queen Adelaide AHB LC as 1L07 08:52 Liverpool Lime Street - Norwich approached. Not a near miss

Older than 12 months

04/12/2012– Level Crossing barrier struck and removed by unknown Road vehicle at Queen Adelaide Level Crossing.

Red light violations / barrier weaving

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

Assessor's notes:

See 3.5 Incident history

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	38 seconds	Yes	No
Down line	38 seconds	Yes	No

Assessor's notes and observations on strike in times:

Crossing is skewed resulting in pedestrian traverse of 46 metres. Pedestrians could be hit by descending barriers. Pedestrians could be caught inside the barrier after it has descended, with the possibility of panic.

4. ALCRM CALCULATED RISK

Queen Adelaide (Norwich) level crossing ALCRM results

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

- Crossing approach
- Large number users
- Sun glare
- Reduced visibility

Assessor's key risk drivers notes

The proximity to two other level crossings
 The skew of the crossing
 The potential for cars to zigzag the barriers
 The potential for cars to turn onto the railway
 The steep slope up to the crossing on the down side
 The narrow width of the footpaths
 The length of the footpaths, due to the skew, leading to inadequate warning time to cross on foot;
 The sun impact on the RTLs as the road is east-west and there is no background shielding with a slope up to the crossing;
 The potential for blocking back.
 The provision of red light enforcement cameras that are yet to be commissioned

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 327118	0.000003057	0.005904943	
Van / small lorries	1 in 57517	0.000017386	0.001297717	
HGV	1 in 20523	0.000048724	0.000050249	
Bus	1 in 56516	0.000017694	0.000013837	
Tractor / farm vehicle	1 in 7138	0.00014008	0.000017478	
Cyclist / Motor cyclist	1 in 24670	0.000040534	0.002071286	
Pedestrian	1 in 24670	0.000040534	0.000295898	
				Derailment contribution
Passengers			0.000275035	94.472935887
Staff			0.001716832	1.798638679
Total			0.011643275	2.496831817
Collision frequencies	Train / user	User equipment	Other	
Vehicle	0.013229448	0.223341447	0	
Pedestrian	0.003196708	0	0.001567172	
Collision risk	Train / user	User equipment	Other	
Vehicle	0.007284224	0	0	
Pedestrian	0.002336154	0	0.00003103	

5. OPTION ASSESSMENT AND CONCLUSIONS

[Pages 7, 8 and 9 withheld Reg 12(4)(d)]

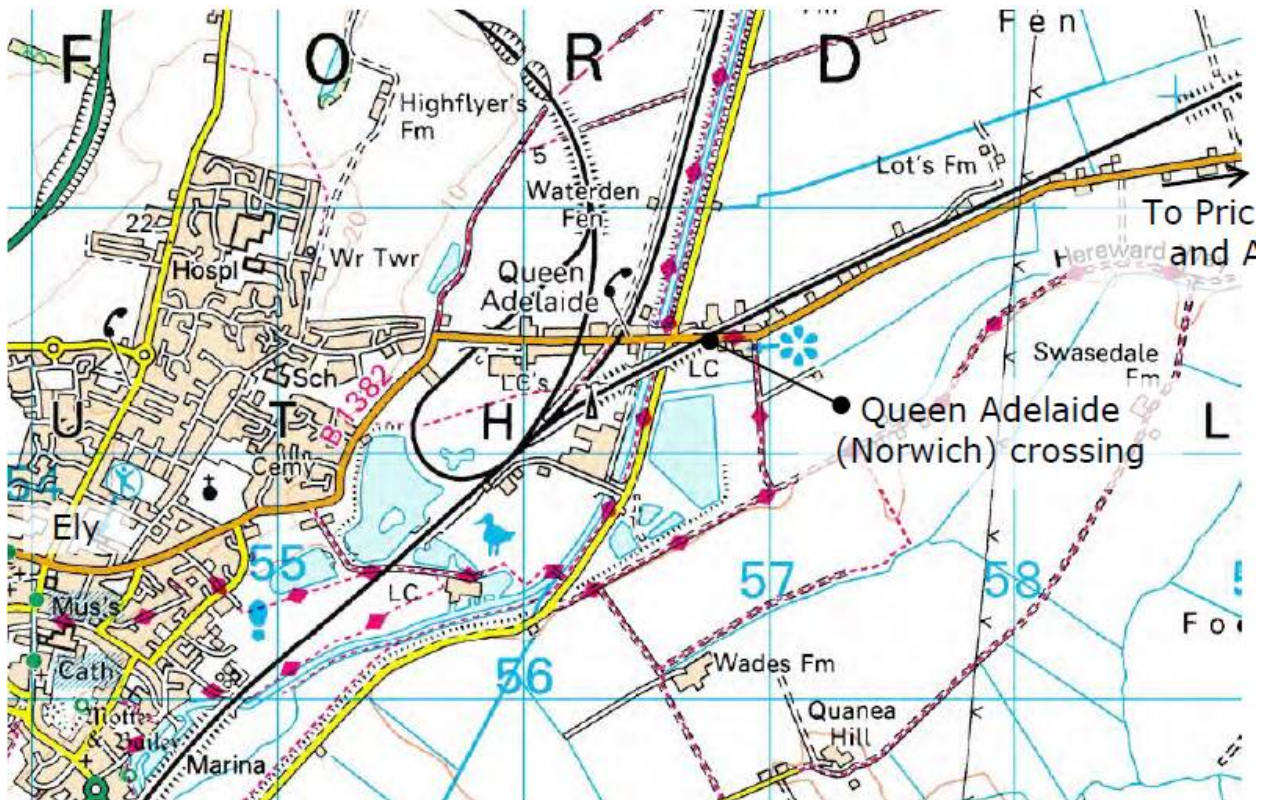
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5.2 CONCLUSIONS

[Page 10 withheld Reg 12(4)(d)]

ANNEX A – ADDITIONAL PHOTOGRAPHS



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"> 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 <p>Additional examples include:</p> <ul style="list-style-type: none"> 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) 	<p>Controls can include:</p> <ul style="list-style-type: none"> 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	<p>Examples include:</p> <ul style="list-style-type: none"> 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 	<p>Controls can include:</p> <ul style="list-style-type: none"> 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

	Hazard	Control
	<ul style="list-style-type: none"> schools, local amenities or other attractions are known to contribute towards user error <p>Additional examples include:</p> <ul style="list-style-type: none"> 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) 	<p>gates</p> <ul style="list-style-type: none"> 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	<p>Examples include:</p> <ul style="list-style-type: none"> 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 	<p>Controls can include:</p> <ul style="list-style-type: none"> 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	<p>Examples include:</p> <ul style="list-style-type: none"> 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 	<p>Controls can include:</p> <ul style="list-style-type: none"> 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