

1.3 ENVIRONMENT



Up side crossing approach



Down side crossing approach

The level crossing is located on Ely Road (B1382) 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 (Kings Lynn) 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 195°. Low horizon can result in sun glare; sun glare is not necessarily an issue at this crossing which has LED Lights and medium extended hoods.

Queen Adelaide (Kings Lynn) is an AHB crossing with two half-width barriers and four RTLs. It is monitored from Cambridge signal box. It is close to, and on the same road as two other crossings of the same type:

Queen Adelaide (Peterborough) which is about 150m to the west. This is on the EMP ELR (Ely North Junction to Peterborough).

Queen Adelaide (Norwich) which is about 350m to the east. This is on the ETN ELR (Ely North Junction to Trowse Junction).

Perhaps uniquely for crossings so close together, these three crossings are all on different railway lines so the crossings will often be closed at different times

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

Site visit general observations:

Possible By Pass Construction in the next 10 years. Third Party Vegetation around signs has been better managed on the Up Side – some signage is fading but not significantly as per inspection of 04.04.16

2. LEVEL CROSSING USAGE

2.1 RAIL

The train service over Queen Adelaide (Kings Lynn) level crossing consists of passenger and freight trains. There are 76 trains per day. The highest permissible line speed of trains is 80mph. Trains are timetabled to run for 20 hours per day.

Assessor's train service notes:

A frequent and fast service runs through this crossing – line speed is 80mph but trains may well be slowing down in the Up Direction on the curve as the train approaches Ely North Junction

2.2 USER CENSUS DATA

A 24 hour, Nine Day Census was carried out firstly on 08/06/2013 to 17/06/2013 by Count on us and secondly on 05/09/2015 to 13/05/2015 by Sotera. The census information taken from both surveys applies to 100% of the year.

The census totals used are as follows below:

Cars	4,299
Vans / small lorries	811
Buses	52
HGVs	141
Pedal / motor cyclists	162
Pedestrians	117
Tractors / farm vehicles	10
Horses / riders	1
Animals on the hoof	0

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

Vulnerable user observations:

No evidence from the Count On Us 9 Day Survey of 8th June 2103 / Sotera 9 Day Survey of 5th September 2015
No evidence witnessed on risk assessment

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

Irregular user observations:

No evidence from the Count On Us 9 Day Survey of 8th June 2103 / Sotera 9 Day Survey of 5th September 2015
No evidence witnessed on risk assessment

Assessor's general census notes:

All data used from both the Count On Us Survey June 2013 and the Sotera Survey 5th September 2015 to 13th September 2015

2.3 USER CENSUS RESULTS

ALCRM calculates usage of the crossing to be 5,313 road vehicles and 279 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 (Kings Lynn) 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:

Fog and Bad Weather at certain times of year
Middle Crossing in the sequence of three Queen Adelaide's that are within sight of each other

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 and Bad weather at certain times of the 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 not been provided at the crossing.

Assessor's notes:

No real issues with grounding reported at this crossing

3.3 AT THE CROSSING – BLOCKING BACK

The road layout at or close to the crossing does result in identified incidents of traffic queuing over the crossing. Blocking back risk is known to occur OCCASIONALLY In addition, the road is not a known diversionary route.

Assessor's notes:

Count On Us Survey – July 2013 revealed a small risk/Sotera Assessment 05.09.15 also recorded risk and recorded a small but definite risk given that although it recorded only a few instances – one was for 49seconds

3.4 AT THE CROSSING – ANOTHER TRAIN COMING RISK

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

Assessor's another train coming notes:

Crossing has ATC Warning signs and yodels sound a quicker tone if this occurs

3.5 INCIDENT HISTORY

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

Assessor's incident history notes:

Permanent Misuse Cameras in place and working – first offence recorded 19/05/15 and current total levels are 136 recorded offences since inception and 13 offences recorded in P13 2015/16

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.- see above incident history notes

Assessor's notes:

26/11/2013 10:00 Finalised Queen Adelaide Lynn Rd LC Non-Rail vehicles- 6E84 (DBS 0820 Middleton Towers – Monk Bretton) reported road vehicle struck and removed barrier at Queen Adelaide AHB LC(BGK0). QSE/2013/NOV/1193
08/10/2015 14:45 Finalised Queen Adelaide Lynn Rd LC LC Misuse - Person with a bicycle crossed Queen Adelaide Lynn Road LC as the barriers lowered. QSE/2015/OCT/337

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	30 to 33 seconds	YES	NO
Down line	33 to 40 seconds	YES	NO

Assessor's notes and observations on strike in times:

Observed Down times at risk assessment were as follows –

33 seconds – Down Passenger

42 seconds Up Passenger

4. ALCRM CALCULATED RISK

Queen Adelaide (Kings Lynn) level crossing ALCRM results

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

- Crossing approach
- Frequent trains
- Large number users
- Blocking back
- Reduced visibility

Assessor's key risk drivers notes

[Volume of road traffic and frequency of trains together with a small blocking back risk all come together at this crossing]

Safety risk				
Compared to other crossings the safety risk for this crossing is	Individual risk		Collective risk	
	D		2	
	Individual risk (fraction)	Individual risk (numeric)		
Car	1 in 327546	0.000003053	0.008075932	
Van / small lorries	1 in 49431	0.00002023	0.001523513	
HGV	1 in 26089	0.00003833	0.000087254	
Bus	1 in 96218	0.000010393	0.000032179	
Tractor / farm vehicle	1 in 1850	0.000540459	0.000006188	
Cyclist / Motor cyclist	1 in 25367	0.00003942	0.004661775	
Pedestrian	1 in 19025	0.00005256	0.004489117	
				Derailment contribution
Passengers			0.000503244	95.490071097
Staff			0.002340211	2.450718876
Total			0.021719412	3.302115608
Collision frequencies	Train / user	User equipment	Other	
Vehicle	0.019570182	0.290821612	0	
Pedestrian	0.013035191	0	0.005465512	
Collision risk	Train / user	User equipment	Other	
Vehicle	0.009725066	0	0	
Pedestrian	0.009048105	0	0.000102787	

5. OPTION ASSESSMENT AND CONCLUSIONS

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

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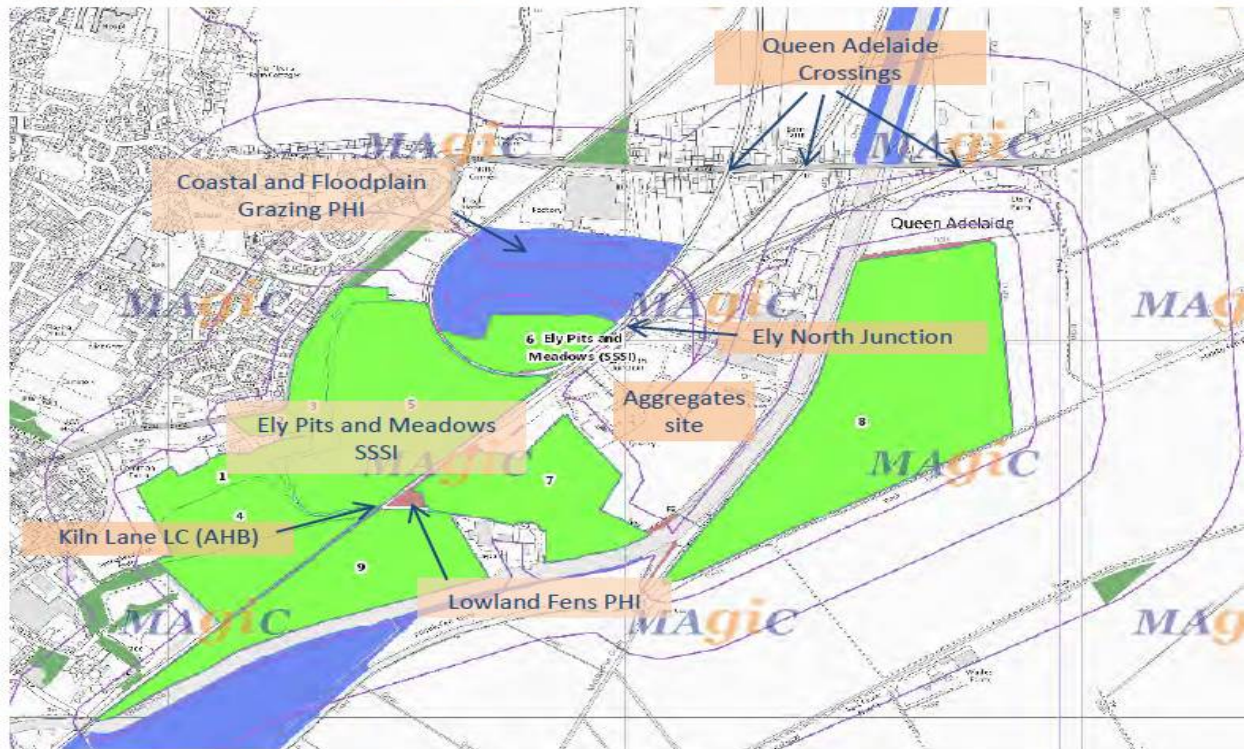
5.2 CONCLUSIONS

[Pages 9, 10 and 11 withheld under Reg 12(4)(d)]

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Map of environmentally significant sites



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