London North Western (LNW) Route
Level Crossing Risk Assessment

Somerton
User Worked Crossing/Footpath Bridleway Crossing with Miniature Stop Lights

15 March 2018

CONTENTS

1 INTRODUCTION

1.1 Reason for the risk assessment

Network Rail has a responsibility and legal duty under the Health and Safety at Work Act 1974 for the health, safety and welfare of its employees and for protecting others against risk.

Network Rail also has a legal responsibility under the Management of Health and Safety at Work Regulations 1999. Section 3 focuses on the requirement for suitable and sufficient assessments of risk to health and safety of employees and others in connection with their undertaking.

Network Rail is committed to reducing the risk on the railway and has identified that one of its greatest public risks is at level crossings. This is where the railway has a direct interface with other elements e.g. vehicles and/or pedestrians. Network Rail is working to reduce this risk to as low as is reasonably practicable.

2 DESCRIPTION OF THE SITE

2.1 Level crossing details

Name of crossing	**Somerton**
Type	**User Worked Crossing/Footpath Bridleway Crossing with Miniature Stop Lights**
Engineers Line Reference (ELR)	**DCL**
Mileage	**77 miles 24 chains**
OS grid reference	**SP490278**
Number of lines crossed	**2**
Line speed (mph)	**90**
Electrification	**No**
Signal box	**West Midlands Signalling Centre**
Risk assessment next due date	**15 June 2020**

As part of a level crossing risk assessment, data is entered into the industry accepted risk modelling support tool (All Level Crossing Risk Model) which enables Network Rail to compare risk at all level crossings throughout the network. Results for this level crossing are provided below; see Appendix A for further details on how this is calculated.

ALCRM Risk Details	
Risk Score	**B3**
FWI	**0.006024817**

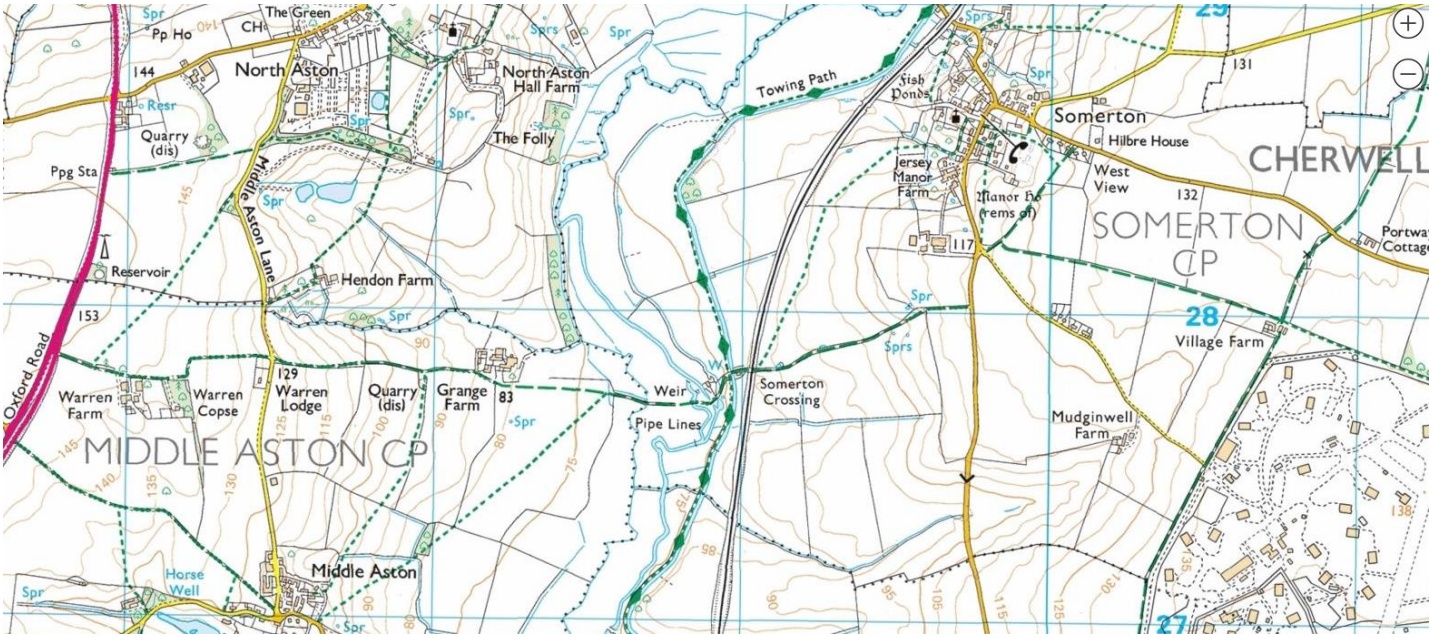
Somerton level crossing is an unprotected crossing. This means the crossing is not protected from train movements and therefore trains can traverse the crossing whether it is clear or not. However this level crossing can also be recognised as an active crossing as there is an active method of warning in place, via the miniature stop lights, to warn users of an approaching train.

At present, there are 745 level crossings on the LNW route. Out of this figure Somerton crossing is ranked number 41. However, as this is the only User Worked Crossing/ Bridleway with Miniature Stop Lights it cannot be compared to those other of a similar type.

2.2 Crossing imagery

Aerial view of Somerton Level Crossing

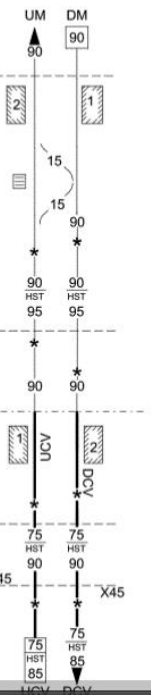
Ordinance Map view of Somerton Level Crossing



Extract from the Sectional Appendix

LOR	Seq.	Line of Route Description	ELR	Route	Last Updated
MD401	001	Heyford to Bordesley Junction	DCL	LNW South	08/08/2016

Location	Mileage M Ch	Running lines & speed restrictions	Signalling & Remarks
Continued in Western Sectional Appendix.		To/from Oxford GW200 seq 008	TCB Oxford SB (UM, DM) GSM-R
Tackley LC (UWC)	72 47	T	
TACKLEY	72 50		Platform Lengths: Tackley (See Western Sectional Appendix)
Tackley GF	72 60		
	72 69 ★ 73 12 ★		
Inkpens No.1 LC (UWC)	74 10	T	
	74 50 ★ 74 64 ★		Axle Counter area: Down line from 75m 36ch Up line to 74m 78ch
Route Boundary	75 00	WESTERN ROUTE BOUNDARY	West Midlands S.C. (OL) Cherwell Valley Workstation
HEYFORD	75 21		Platform Lengths: Heyford Platform 1 - 70 metres (77 yards) Platform 2 - 70 metres (77 yards)
	76 35 ★ 76 40 ★		
Knaptons LC (UWC)	76 55	T	
Somerton LC (UWC)	77 24	T	UCV: Up Cherwell Valley DCV: Down Cherwell Valley
	77 40 ★		



Up side approach of Somerton Crossing

Down side approach of Somerton Crossing

Additional photographs of the surrounding environment are provided in Appendix B.

2.3 Crossing environment

Somerton User Worked Crossing/ Bridleway crossing is located between Leamington Spa and Banbury stations on the DCL line (Didcot to Chester Line) that takes passenger and freight services between Birmingham and London Marylebone, formally known as The Chiltern Mainline. The immediate surrounding areas of the crossing consist mainly of fields, farmland and footpaths that are used for arable/pastoral farming and recreational purposes.

Located immediately to the West of the crossing lies a residential property, known as Mill Cottages and around 150 meters further West is another residential dwelling, known as Somerton Mill. These properties are split in between by the Oxfordshire Canal with a small canal bridge that links the access road. Located further beyond the second property is also the River Cherwell meaning that the area is known to be a wetland during the winter months. The occupiers of these properties are the predominant authorised users of the locked gated crossing, however there is also vehicular access granted, in addition, to the farmer of the land to the North West of the crossing. In addition to this there is also a public footpath/bridleway which runs adjacent to the user worked crossing.

Looking further afield, situated 1.1 kilometres to the North East of the crossing lay the village of Somerton with a total population of approximately 305 people. Located 2.5 kilometres to the South West is the village of Steeple Aston and Middle Aston with a combined population of 1169 and located 2.98 kilometres to the South East and 3 kilometres to the South lay the villages of Upper and Lower Heyford with a combined population of 1787. RAF Upper Heyford is also situated 2.58 kilometres to the South East of Somerton Crossing with the infrequent possibility that overhead aircraft can be heard from the crossing.

Historically this crossing and bridleway was a manned crossing with the crossing keeper living in Mill Cottages which was provided by the Great Western Railway at the time. This right of way would have once been the main link between the two villages, Somerton and Middle Aston with direct access leading from the Oxford Canal which is where produce would have been sourced from. However since modernisation better and more direct vehicular access is made via the main road Water Street and Somerton Road. Now this bridleway is used predominantly by the property owners, dog walkers, canal users and recreational walkers/ramblers.

2.4 Approach to crossing

This crossing is located between the smaller stations of Heyford and Kings Sutton which traverse two lines with approaches from the East and West, meeting a line speed of 90mph for both lines.

The approach from the East or up side is via a fairly long private track that runs between fields spurring off Somerton Road. This track is set on a slight decline which is made up of a rough stone, brick and mud surface which is used to access a number of fields before gradually descending down towards the crossing where for the last few meters become a tarmac road surface. This area has a white stop marking and a white stop line painted onto the surface which can become obscured with mud during the winter months due to the transfer of dirt from the access track.

It is important to note that this access track is predominantly used by two properties located on the West side of the crossing. One of these properties utilises parking spaces and a garage on the East side of the crossing and rarely takes vehicles across. The second property regularly uses the crossing to take vehicles back and forth. It is also this access track that the public footpath runs along so pedestrians would also take this route.

On the final approach to the crossing warning signage becomes immediately noticeable with a 770 gates warning sign, 782 risk of grounding sign, 783 drivers of long or low vehicles must call prior to crossing, a STOP sign and a partial 784.1 sign dictating that drivers of large or slow vehicles must call prior to crossing. All of these are post mounted in an elevated position on the left hand side, also known as the nearside approach to the crossing so that they can be seen by approaching vehicles.

Once at the STOP marking a red target sign has been installed onto the gate of the private user worked crossing with additional instructional signage for the miniature stop lights installed on the right hand side. These signs include a CC08Z red/green light sign, CC09Z instructions sign and a large name plate with the direct connect telephone positioned underneath. These signs have been installed between the bridleway element of the crossing and the private user worked crossing because both parts to this hybrid crossing use the same active warning to determine whether it is safe to cross. Additionally installed on the bridleway gates are a CC14Z instructions sign to guide pedestrians and horseback riders across. N.B all of the signs mentioned above can be seen in section 10 Appendix B.

The level crossing deck is made up of a rubber surface which crosses over two lines and is split in the middle by a tarmac surface. The crossing deck is flat and straight which runs at a 90 degree angle from the approach path with white lining in place to

determine the edges of each element of the crossing. In addition to this low level solar lights have been installed to the edges of the bridleway section of the crossing to guide pedestrians in a “runway style” over the railway during periods of darkness.

The approach from the West or down side leads from the two properties, as mentioned above, and mirrors that of the up side approach in particular the signage and layout. However unlike the descending approach on the up side of the crossing the down side approach rises slightly up to the crossing deck which is flat and straight, it is on this side that there is a greater risk of grounding although it is not likely considering the vehicle types which use this crossing, however this is why the warning signs have been installed. Once again during the winter months in particular due to the muddy dirt track the stop markings and lines can become obscured and hard to visualise.

2.5 Crossing usage

Normal passenger services run between the hours of 04:46 and 00:18 with approximately 154 services per day and approximately 86 freight trains running through the full 24 hours. The number and frequency of services can fluctuate depending on operational requirements, engineering works or during times of disruption.

At some level crossings, there is a chance that a second train may pass the crossing within 20 seconds of the first train. At this location, there is a chance this will happen sometimes.

Additionally, the chance that a second approaching train may not be seen until the first train has passed is possible.

Crossing usage figures at Somerton have been obtained from a number of sources, one of these sources was from a motion activated camera that was deployed at the crossing to observe usage. This visual census was completed during March 2018 for a period of 9 days, during this period the weather was particularly wet and this tends to reduce the number of traverses as walking and going out are not as attractive as when the weather is fair and dry. During the 9 days the crossing was used 81 times, in contrast to the previous census which identified that the crossing was used 260 times, in November 2015. The crossing continues to be used by mainly pedestrians travelling alone or with their dog and/or cars. In total 41 pedestrians traversed the crossing, 34 cars passed over and 2 slightly larger trucks crossed (to clear the drains to help with the flooding issues).

In addition to this for each vehicle movement over the crossing a pedestrian would have to cross four times to open and close the gates.

Furthermore an interview was conducted by the Level Crossing Manager with the homeowner, who lives at Mill Cottages – closest to the railway to obtain further usage information. He confirmed that both residents from each property use the crossing on a daily basis and this is typically cars and pedestrian movements. He also stated that the majority of users for the footpath were walkers/dog walkers and that he had also witnessed the odd horse rider, but none of these were in great numbers. This census data and previous census data corroborates this information. The homeowner also confirmed that a local farmer also uses the crossing on a regular basis to access fields on the west side of the crossing and this is usually by vehicle in his 4x4.

Based on the interview with the authorised user, the census data from this census and the previous census in November 2015 an accurate estimate for usage has been reached and this can be seen in the table below. This information has been applied to 100% of the year as there are no known local seasonal events that would affect crossing usage. The crossing is also used mainly by the two dwellings to access their properties. From the census information obtained it appears that usage is regular and fits to a certain pattern.

Night time usage between the hours of 23:00 and 07:00 was recorded as 10% of the total number which was obtained from the visual census and confirmed by the authorised user. Due to the miniature stop lights operating 24 hours a day night time usage is not a significant concern as the lights can be seen at all times.

Furthermore there may be some irregular users, such as ramblers or delivery drivers, but the census information obtained does not show that there is a higher number than usual with the majority of users being the people who live in the two properties on the down side of the crossing. Furthermore the post man parks on the up side of the crossing and walks across to reach Mill Cottages and he has been witnessed to use the crossing on a regular basis.

From the census information obtained and speaking with the authorised users there is no evidence to suggest that any of the users would be determined as vulnerable. However it is important to note that a visual census would not identify those users with hidden protected characteristics. As such the traverse time has not been increased by 50%.

User Type	**Number**
Cars	**5**
Vans / Small Lorries	**1**
Buses	**0**
HGVs	**0**
Pedal / Motor Cycles	**0**
Pedestrians	**12**
Horses / Horse Riders	**0**

Animals on the Hoof	**0**
Tractors / Farm Vehicles	**1**

3 HAZARDS

3.1 Sighting and traverse

A decision point is a position where an individual would reasonably make a decision to cross the railway.

Sighting is the distance that can be seen in both directions for approaching trains. At this crossing the sighting distance is shorter in one direction than required for the time needed to allow an able bodied pedestrian to traverse the crossing on foot. The traverse time at this crossing has not been increased by 50% for vulnerable users. This is based on the information observed from the census images and conversations with the authorised user. For a vehicle to traverse the crossing sighting distances are also insufficient in all directions as such the miniature stop lights provide a sufficient warning to mitigate this.

The traverse time has been has been calculated for a pedestrian from the pedestrian/user worked crossing gates as vehicle movements are mitigated by the miniature stop lights. The up side traverse time for a pedestrian is 8.33 seconds, which was calculated from a decision point of 2m, at the pedestrian gate itself, and a total crossing distance of 9.9m. The required sighting distance for a pedestrian from the up side is 335 metres with the actual sighting distances available being 270 metres and 991 metres providing a 6.71 second and 24.63 second warning time. The sighting distances available are deficient in one direction and as such miniature stop lights are in place to provide an adequate warning which in turn provides a 52 second warning between the red lights initially engaging and when the train is on the crossing (based on a passenger train).

The traverse time has once again been calculated for a pedestrian from in front of the pedestrian/user worked crossing gates as vehicle movements are mitigated by the miniature stop lights. The down side traverse time for a pedestrian is 8.66 seconds based on a decision point of 2.5m and a total crossing distance of 10.3m. The down side traverse is slightly longer due to an obstruction when standing at the gate, a user would naturally look before this point is reached and thus is further away. The required sighting from this side is 348 metres with the actual sighting distances available being 312 metres and 991 metres which provides a 7.75 second and 24.63 second warning time. Once again the sighting distances available are deficient in one direction and as such miniature stop lights are in place to provide an adequate warning which in turn provides a 52 second warning between the red lights initially engaging and when the train is on the crossing (based on a passenger train).

Pedestrian users opening the vehicle gate and using that instead of the pedestrian gates would use the same distances as described above, as the gates are in line with one another. However pedestrian sighting in the up direction train approach on the up and down sides, falls below the minimum requirement due to the track curvature and green palisade fence. As previously stated this is one of the reasons why miniature stop lights have been installed at the crossing and it is important to note that all pedestrians, whatever gate they are using, should obey the light sequence at the crossing whether sighting is sufficient or not.

For vehicle use the decision point on the up side would be 3.1m with a total traverse distance of 11m, which gives a crossing time for the slowest vehicle that may use the crossing, which is a tractor with a trailer, at 32.04 seconds. These timings and distances are also the same for the down side when using the user worked element of the crossing. Sighting for vehicle users at the crossing is insufficient so this is mitigated by the miniature stop lights that inform a user of when it is safe to cross. Although vehicle timings are based on a tractor and trailer such a vehicle should use the telephones at the crossing to check that it is safe to cross as they are long and slow moving, signage in place at the crossing informs users of this.

Telephones have also been installed at this crossing as a failsafe system so that so that in the event of the miniature stop lights failing users should call the signaller to get permission to cross, this is confirmed by the instructional signage in place. Telephones are dependent on users reliably using the telephones and on the controlling signaller being able to know the location of any trains in relation to the crossing in order to advise the users. This is not possible on lines with long signal sections where long waiting times can lead to users failing to use the telephones.

Details of sighting distance and traverse times are available below.

	Decision point (m)	Traverse length (m)	Measured from
Up side	2	9.9	Level with the pedestrian/user worked crossing gates
Down side	2.5	10.3	Beyond the pedestrian/ user worked crossing gates level with the troughing route on the users left hand side due to an old metal post partially obscuring view at a closer distance

	Traverse Time Up Side (seconds)	Traverse Time Down Side (seconds)
Pedestrians	8.33	8.66
Vehicles	32.04	32.04
MSL Warning	52 seconds	52 seconds

	Minimum sighting distance required (m)	Available sighting distance (m)	Comments	Warning time provided by sighting distance (seconds)
Upside looking towards up train approach	335	270	Measured to the vegetation on the down side at the point of track curvature	6.71
Upside looking towards down train approach	335	991	Measured to a track side cabinet in the distance	24.63
Down side looking towards up train approach	348	312	Measured to past the 75 sign to the vegetation on the curve on the up side	7.75
Down side looking towards down train approach	348	991	Measured to a track side cabinet in the distance	24.63

3.2 Identified hazards and risks

Hazard	Potential impact	Mitigations
Trains	Fatality or serious injury	• Level crossing signage. • Miniature Stop Lights in place • Train warning given
Slip, trip, falls	Fatality or serious injury	• Appropriate crossing decking for crossing type and location. • Regular crossing inspections and maintenance regime in place. • Vegetation management plan in place.
Difficulty on hearing approaching trains due to inclement weather	Fatality or serious injury	• Level crossing signage. • Vegetation management plan in place. • Train warning given via MSL
Darkness	Fatality or serious injury	• Review of night time usage completed • Low level solar studs installed to the bridleway/pedestrian crossing
Vegetation growth between visits reducing the ability to see trains approaching crossing	Fatality or serious injury	• Vegetation management plan in place. • Regular inspection and maintenance regime in place.
Unfamiliar users	Fatality or serious injury	• Standard crossing layout, compliant with ORR (Office of Rail and Road) guidance. • Instructional signage at crossing • Level crossing safety awareness days.
Increased usage due to future developments	Fatality or serious injury	• Review and update this risk assessment appropriately.
Decision point not highlighted	Fatality or serious injury	• Decision point marked at the user worked crossing • Warning and instructional signage available and clearly visible.
Long signal sections (increased waiting time at crossing)	Fatality or serious injury	• Inclusion of authorised users when undertaking risk assessment. • Regular discussion and education with authorised users. • Briefing to authorised users and delivery drivers if required. • Educational films created by LNW Route for User Worked Crossings. • Users must adhere to instructions given by signaller. • Signallers undertake location specific training and are assessed on both location specific tasks and knowledge

		of the rules and regulations. • Signallers are assessed as part of Network Rails continuous competency standard (this includes knowledge testing, safety critical communication monitoring and observation visits).

The risk assessment is based on data collected at the crossing and entered into ALCRM. This is a computer-based application used by Network Rail to assist in the risk management of level crossings. The risk result consists of a 'letter' and 'number' classification of safety risk, giving the 'letter' (A-M for individual risk) or 'number' (1-13 for collective risk) band. These rankings represent the range of risk across all types of crossings where A and 1 are the highest and M and 13 are the lowest.

Safety Risk

	Individual Risk	Collective Risk	Risk Group	Risk Category
Compared to other Crossings the safety risk for this crossing is:	**B**	**3**	**Z04**	**Yellow**

	Individual Risk (Fraction)	Individual Risk (Numeric)	Collective Risk
Car	1 in 1268	7.88115E-4	0.002738315
Van / Small Lorries	1 in 211	0.004732785	5.47663E-4
HGV	0	0.0	0.0
Bus	0	0.0	0.0
Tractor / Farm Vehicle	1 in 639	0.001563312	1.80407E-4
Cyclist / Motorcyclist	0	0.0	0.0
Pedestrian	1 in 7915	1.26336E-4	0.001334846

		Derailment Contribution
Passengers	3.63041E-4	95.104060327
Staff	8.60545E-4	6.97152834
Total	**0.006024817**	**6.726508077**

Collision Frequencies

	Train / User	User Equipment	Other
Vehicle:	0.005011296	0.004926108	0.0
Pedestrian:	0.001623212	0.0	7.63554E-4

Collision Risk

	Train / User	User Equipment	Other
Vehicle:	0.003466385	0.0	0.0
Pedestrian:	0.001318048	0.0	1.6798E-5

4 SAFETY MANAGEMENT INFORMATION SYSTEM

4.1 Network Rail internal Safety Management Information System (SMIS) has been interrogated and revealed that during the previous year there has been one reported incident at the crossing. This incident involved a gate on the user worked element of the crossing being left open.

There have also been 12 instances of misuse at the crossing since 2008, with all instances being where the gates at the user worked element of the crossing have been left open.

5 OTHER FACTORS AFFECTING THE CROSSING

5.1 At the time of this assessment there were no other factors that affected the crossing.

6 OPTIONS EVALUATED

6.1 Detailed below are a number of options that have been considered to reduce the risk at the crossing.

Option	Original ACLRM risk score	New ALCRM risk score	New ALCRM FWI	Safety benefit %	Cost	Cost Benefit Ratio
Closure by vehicular over bridge	B3	M13	0.0000	100%	£4,000,000	0.06
Closure by vehicular underpass	B3	M13	0.0000	100%	£4,000,000	0.06
Closure by diversion (work)	B3	M13	0.0000	100%	£1,000,000 (estimate)	0.26
Power operated gate openers (POGOs)	B3	B3	0.006024817	0%	£50,000	0.00

NOTES
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.

7 CONCLUSIONS AND RECOMMENDATIONS

7.1 *Provision of a vehicular over bridge*

The construction of a vehicle over bridge would most likely require the purchase of land. Agreement would also be required to negotiate between the authorised users and land owners, as a significant portion of land would be required for this option. In contrast to this the authorised users are likely to reject this option due to the close proximity the bridge would be to their properties.

Building such a structure would be a costly and complex exercise however this would close the crossing, remove crossing risk and misuse. At this time due to an unsupportive cost to benefit and the additional reasons as mentioned above this option should be discounted.

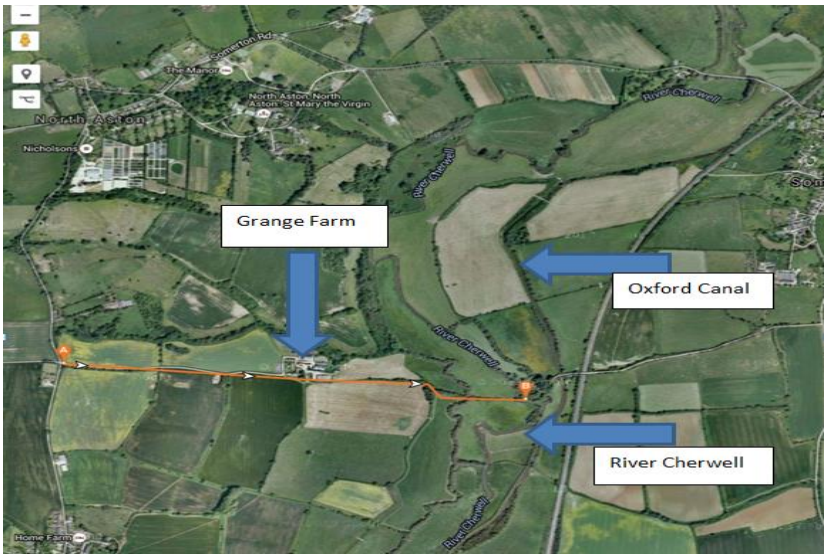
Provision of vehicular underpass

The construction of a vehicle underpass has briefly been considered but due to the location of the Oxford Canal the River Cherwell and the fact that this area of land is highly prone to flooding this option would not be viable and has been discounted.

Closure by diversion (work)

A work required diversion is when new paths or accesses would need to be built to allow for a more appropriate diversion. At this time this option has not been discussed or raised with any of the authorised users. A diversion in this location would be a complex task due to the surrounding area.

To the west of the crossing, and the first property, lies the Oxford Canal which has a small bridge going over it to access the second property that the crossing leads to. The track continues onto the second property and also the River Cherwell, and while not being a large river it would cause issues that would also require a bridge to negotiate over it. The bridleway that runs along the track and over the crossing does continue on to Grange Farm which is shown on the map below.



If the track were to be extended from Grange Farm along the path of the bridleway it would need the agreement of the land owner/s and most likely the agreement of the authorised users of the properties and land that the crossing currently accesses. This would be a complex and costly exercise and the initial cost of around £1,000,000 is likely to significantly increase.

Not only this but this but the current distance from Somerton Road to Mill Cottages is 814 metres, if this diversion was considered the new distance from Somerton Road to Mill Cottages would be 5.9 kilometres and would therefore increase not only the vehicular diversion but also the pedestrian diversion by just over 5 kilometres. Due to these reasons this option should be discounted due to disproportionate costs to benefit and the hugely extended diversionary distance.

Power operated gate openers (POGOs)

POGOs are a mechanical arm fitted to gates that open and close via a press of a button. They reduce the number of times vehicle users traverse the crossing from 5 to 1 therefore reducing level crossing risk. Misuse of gates is known where the user didn't close the gates after use. This may result in the next user on seeing that the gates are open assuming it is safe to cross. However it is important to note that gates are not interlocked with the signalling equipment and will still open when a train is approaching the crossing.

It must also be recognised that where there are Miniature Stop Lights in place there is a risk that non-interlocked gates could conflict with the message of the MSL equipment; e.g. opening gates / red light exhibited. This could result in user confusion or falsely generate greater trust in the gates than the lights. As per guidance from the LCG 14 standard (Applying risk reduction benefits in ALCRM) it states that a risk reduction should be applied to MSL UWCTs of between -1 and 4% and in the case of Somerton this has been based around a 0% reduction. The reasons for this are mainly outlined in the statement above however there is also a risk that irregular vehicle users may begin to use the crossing as the gates would not be locked and the crossing remains to be on a public right of way in the form of a bridleway. This could potentially also attract use from quadbikes and persons wishing to use the canal.

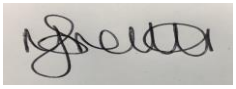
It is for these reasons that this option has been discounted.

7.2 Network Rail is subject to the requirements of the Health and Safety at Work Act etc. 1974 to reduce risk ‘so far as is reasonably practicable’. In simple terms this means that the cost, time and effort required in providing a specific risk reduction measure needs to be commensurate with the safety benefit that will be obtained as a result of its implementation.

Following the completion of the risk assessment and having reviewed all relevant information and options, the assessor has identified that closure of this crossing via the above methods is not viable as either the cost associated with each solution outweighs the safety benefit or they are just not viable given the local layout of the area and environment. Unless there is a significant change or increase in crossing usage, train frequencies, speed or electrification which alters the FWI score all options remain exponential to the cost benefit.

Having installed low level lighting to the pedestrian/bridleway element of the crossing with a 0% risk reduction (LCG14 states that MSL crossings do not qualify for a risk reduction, although it being the sensible thing to do) there are no other outstanding risk reduction methods available at this time. Therefore the risk at this crossing can be considered to be as low as is reasonably practicable and no further action, other than routine inspection and monitoring is required until the next risk review, or changes in the risk profile are identified.

8 APPROVAL

Prepared by: Natalie Stretton	Signature: 
Job Title:	Network Rail Level Crossing Manager
Date:	22 March 2018
Approved by: Ben Parish	Signature: 
Job Title:	Network Rail Route Level Crossing Manager
Date:	22 March 2018

9 APPENDIX A

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

10 APPENDIX B

Additional photographs of crossing environment

User Worked Crossing with Miniature Stop Lights

Up side Crossing approach

Up side across crossing

Up side towards up train approach

Up side towards down train approach

Up side signage

Down side crossing approach

Down side across crossing

Down side towards up train approach

Down side towards down train approach

Down side signage

Footpath/Bridleway with Miniature Stop Lights

Up side crossing approach

Up side across crossing

Up side towards up train approach

Up side towards down train approach

Up side signage

Down side crossing approach

Down side across crossing

Down side towards up train approach

Down side towards down train approach

Down side signage