Rother Valley Railway

New Build Level Crossing Narrative Risk Analysis (NBLC-NRA)

Contents

1 Introduction

The Rother Valley Railway will provide a Full Barrier Automatic Level Crossing, Locally Monitored (AFBCL) incorporating the latest technology for the operation and protective equipment. The crossing will be fully compliant with what is widely used on Network Rail infrastructure today, thus, ensuring the crossing would not require any product approvals, derogations or changes to standards. The maintenance regime would also be standard and no bespoke parts would need to be produced or stocked specifically for the crossing. For the above reasons, the crossing presents a very low reliability and risk concern and would most likely incur the lowest maintenance costs.

A level crossing does not currently exist on the A21 Robertsbridge, therefore a Quantitative Risk Assessment would not provide sufficient evidence to demonstrate that possible risk has been assessed and managed accordingly. However, it is important to establish possible risk from the introduction of a level crossing and possible mitigation measures at an early stage of development.

This NBLC-NRA analyses all relevant data as well as expert opinion to demonstrate that all possible risk has been addressed as well as embroidering new technology to further enhance the safety of the level crossing, for example;

- CCTV for improved safety & security,
- Obstacle Detection
- Home Office Approved Red Light Cameras
- Evaluate the risks at the level crossing.
- Early engagement with stakeholders from different sectors, local authorities, communities and 'users' associations.
- Take engineering measures and find innovative solutions
- Take educational and awareness measures and collaborate with the rail and road sectors.

The level crossing will be carefully assessed via this analysis in collaboration with railways and the road infrastructure managers, local authorities and industry experts to make it more visible and easier to cross particularly for long, heavy and oversized vehicles.

All stakeholders will be in a position to cooperate and design the best level crossing environment.

Narrative Risk Assessments currently used by Network Rail are enabling better targeting of risk reduction measures; blending quantitative modelled risk with structured observation and judgement from competent staff. The NRA process is considered as part of this analysis to encompass the whole level crossing asset system and assess wider aspects of level crossing risk.

This analysis builds upon excellent safety initiatives which were introduced for the first Automatic Full Barrier level crossing by Network Rail including the safety benefits provided, however, RVR intend to introduce additional safety measures such as the use of Red-light safety equipment (RLSE), which has currently been

installed at 31 public road level Crossings on the National Railway Network to improve user behaviour, deterring deliberate misuse. Trials have demonstrated that these Home Office Type Approved (HOTA) cameras have reduced deliberate misuse by approximately 90 per cent at some locations.

RVR will install an automatic level crossing including an object detection system (AFBCL) at the A21 Robertsbridge level crossing. Crossing obstacle detection systems utilise a combination of RADAR and LIDAR technology to scan the crossing before allowing for trains to safely manoeuvre through. In combination these systems detect obstacles on the ground and around the edge of the barrier lines and deliver unique small object detection protecting children and adults as well as vehicles and other large objects. RVR will monitor and review the installation of the obstacle detection system after the first 12 months of operation to determine if additional safety features could be added to further enhance safety of the level crossing.

2 Level Crossing Overview

This is a risk analysis for the A21 Robertsbridge Road level crossing. However, it should be noted that at present a level crossing does not exist, therefore, the analysis is based on the probability of risk if a level crossing was in place. It is imperative that a full Quantitative (and Narrative) Risk Assessment (QRA) is completed before any trains operate over the crossing and that the QRA is presented to the ORR.

Crossing Details	
Name	A21 Robertsbridge Bypass
Type	AFBCL
Crossing status	Public Highway
Overall crossing status	Design Stage
Engineers Lin Reference	N/A
OS grid reference	
Number of lines crossed	1
Line speed (mph)	10
Electrification	No
Signal box	Yes (A21 level crossing)

3 Information Sources

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

- Office of Rail and Road (ORR)
- Kent and East Sussex Railway (K&ESR)
- Bakerail (Track site/project management specialists)
- East Sussex County Council (ESCC)
- Rother District Council (RDC)
- Highways England (extensive consultations have been conducted with Highways England and their predecessor Highways Agency)
- I-Transport (Specialist Planning Transport Consultancy)
- ARUP (Design, Engineering, Architecture and Business consultation Group)
- Level Crossing Risk Management Tool (LXRMT).

Reference sources used during the risk analysis;

- ARUP A21 Options Report
- ARUP Road Safety Audit
- Mott Macdonald road survey report
- Network Rail QRA information
- GG19 Road Safety Report
- ORR Documentation
- GPR219-IDF- Level Crossing Safety
- EU SAFER-LC Project
- Level Crossing Risk Management Tool (LXRMT).

4 Level Crossing Diagrammatic Scheme

The new level crossing to be constructed is a Full Barrier Automatic Level Crossing, Locally Monitored (AFBCL) on the A21 (T) Robertsbridge Bypass.

The road approach speed is 40 mph. the profile of the railway in the vicinity of the crossing has been provided below, as well as the appropriateness of the proposed warning signs in this regard.

Diagram of the proposed railway Alignment

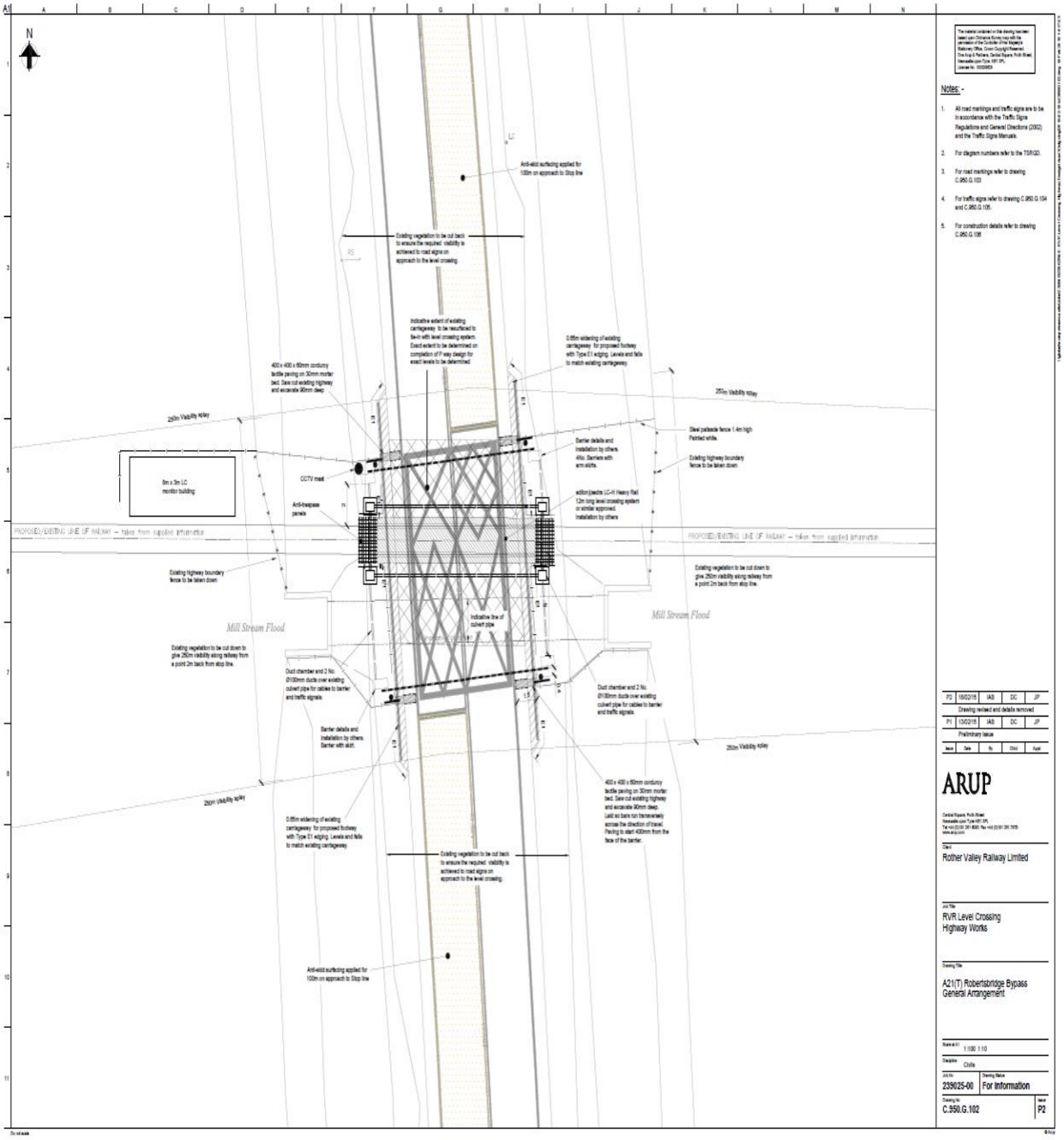
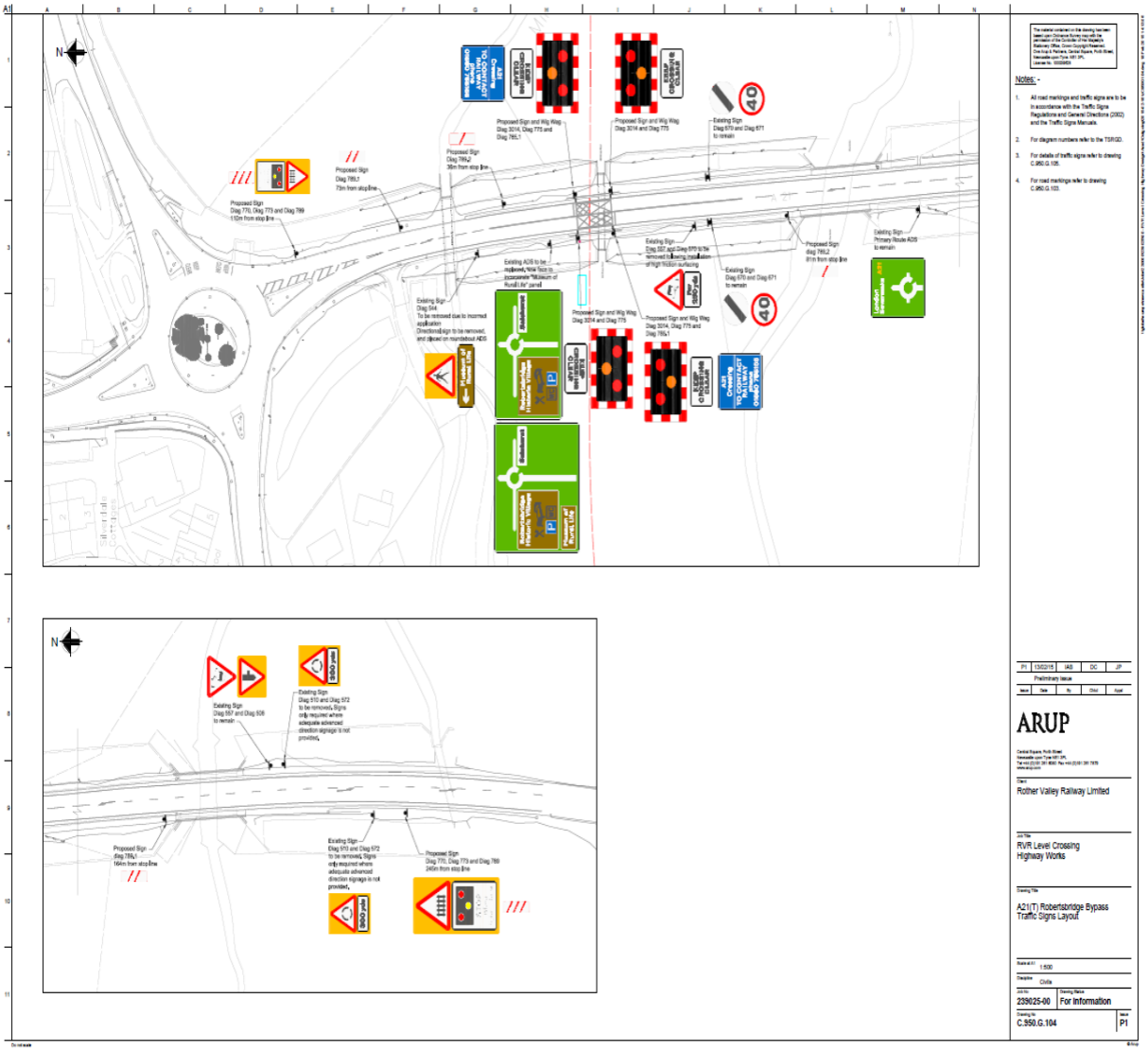
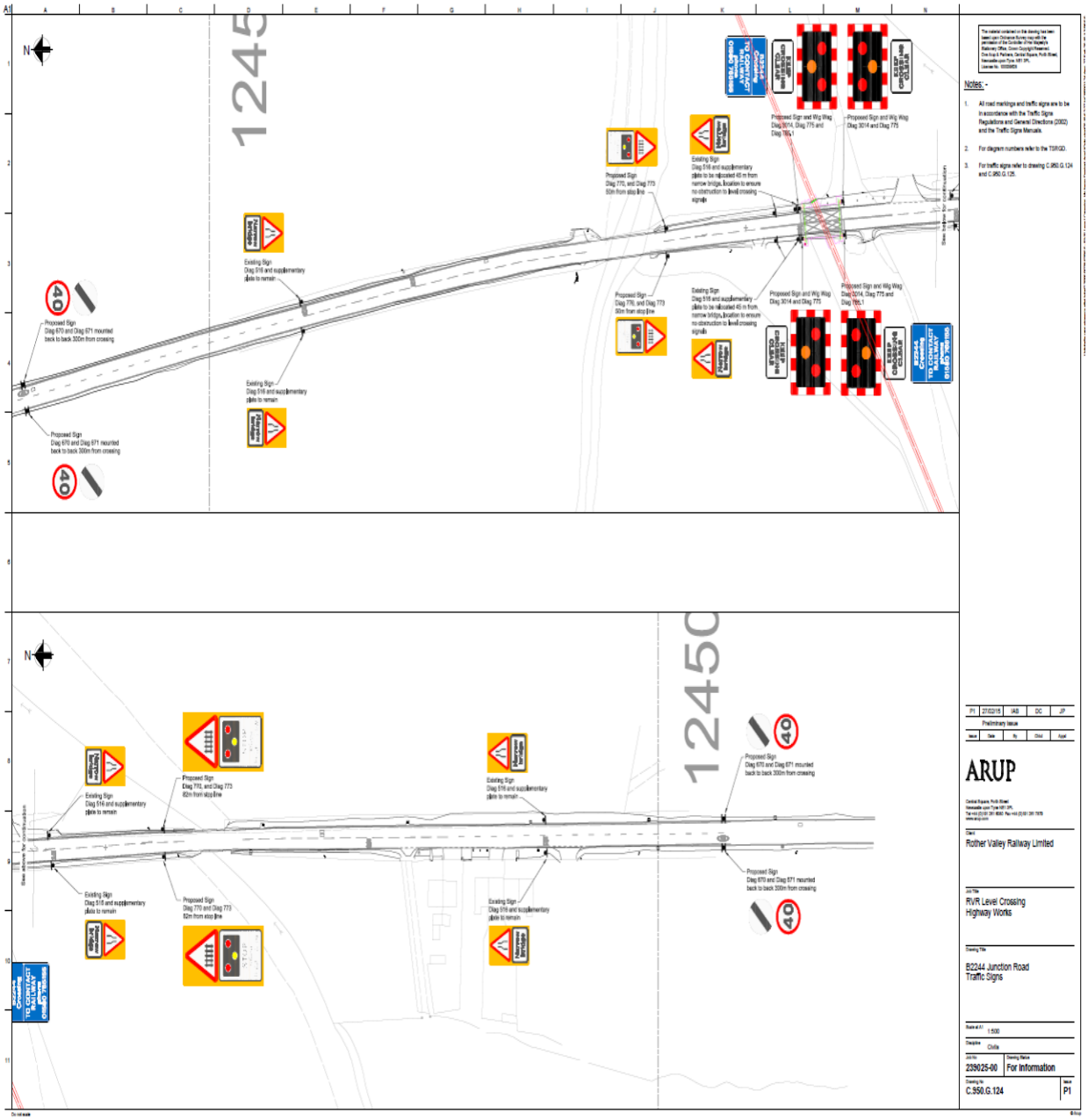


Diagram of the proposed traffic signs



Rother Valley Railway



5 Site Visit General Observations

The A21(T) Robertsbridge Bypass Stage 1 Road Safety Audit report identified possible road distractions which are considered as part of this analysis, for example,

- Blocking on the circulatory carriageway of a roundabout can lead to significant frustration for drivers on the side roads, not included in the main queue. This can lead to drivers trying to force their way around the junction, resulting in circulatory collisions.

To remove this concern, it is advised to reduce the speed limit over this length of road.

Photograph 1

- The proposed level crossing layout does not consider the existing traffic signing or the effect of the proposed level crossing signing on the existing signing. This could lead to drivers missing some signs and the warnings they portray leading to a range of conflicts and/or collision types, photographs 2 (a), (b) below.

To avoid the risk of confusion between signage a comprehensive review will be conducted as part of detailed design of the level crossing.

Photograph 2(a)

Photograph 2b

- The level crossing is proposed some 40m from the end of the existing street lighting system on the approach to the A21(T) Northbridge Street roundabout. It is not proposed to light the level crossing. Some drivers' eyes can take several seconds to adjust from lit to unlit conditions, and vice versa. A hazard such as a level crossing or queue located within that transition distance could result in shunt type collisions or a collision at the crossing itself.

To remove this concern, it is advised to extend the street lighting system to the south side of the level crossing in order to adequately light the hazard.

Photograph 3

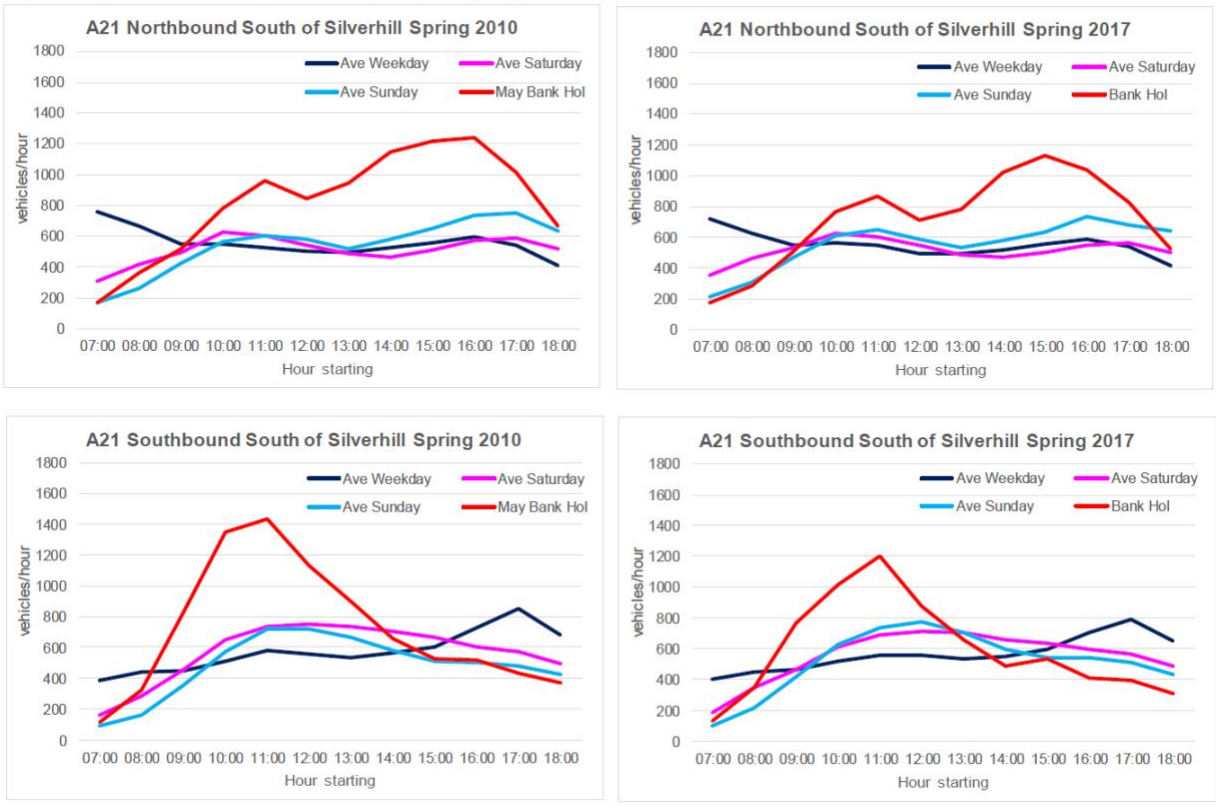
6 A21 Robertsbridge Bypass Traffic Flows

The chart below compares traffic flows on A21(T) Robertsbridge Bypass, for Spring and Summer months, based on ATC data provided by Mott McDonald Addendum to traffic impact study report (2018).

On the A21 at Robertsbridge the changes in traffic demand between 2010 and 2017 are limited with minimal changes on weekdays, some increases on Sundays and on the August Bank Holiday but reduced flow on the May Bank Holiday.

The predicted maximum queue lengths on the A21 are 60m-70m on weekdays, Saturdays and Sundays, increasing to 100m-120m on the Bank Holidays, using 2017 traffic demand. With traffic growth, these queue lengths increase to 2027 although the southbound queue length is only predicted to exceed 140m (the length from the level crossing back to the roundabout) on the May Bank Holiday in 2027 and even then, it is only just exceeded at 143m.
(Mott Macdonald Addendum report 2018).

Figure 4: A21 Traffic Flows South of Silverhill in Spring 2010 and 2017



Queue length results with a 110-second closure.

For the A21, maximum queue lengths of 100m-150m are predicted for weekdays, Saturdays and Sundays, increasing to 160m-240m on the Bank Holidays. With traffic growth, these corresponding queue lengths increase to 120m-180m and 190m-290m by 2027.

For the August Bank Holiday, the average northbound queue lengths are a little higher in 2017 and 2021, when compared to the previous results, and maximum queue lengths are higher by 10m-13m. For the southbound direction, the new results are higher by up to 18m but the maximum queue length in 2021 is 85m, still well below the 140m back to the A21 roundabout.

Traffic Growth Factors 2017 – 2021 – 2027

Table 3: Predicted Queue Lengths at A21 Level Crossing

	2017 Northbound		2017 Southbound		2021 Northbound		2021 Southbound		2027 Northbound		2027 Southbound	
	Maximum	Average	Maximum	Average	Maximum	Average	Maximum	Average	Maximum	Average	Maximum	Average
Spring/Autumn												
Weekday	51	45	60	49	55	49	65	53	60	53	71	57
Saturday	50	45	61	56	54	48	66	60	59	52	72	66
Sunday	62	52	66	54	67	56	71	58	73	61	78	64
May BH	99	75	121	62	106	81	131	66	116	89	143	72
Summer												
Weekday	50	45	74	54	54	49	80	58	59	53	88	63
Saturday	55	47	65	59	59	51	70	64	65	56	76	70
Sunday	70	60	67	57	75	64	72	61	82	70	79	67
Aug BH	96	70	79	67	103	76	85	72	113	83	93	79

Source: Mott MacDonald analysis of existing and predicted traffic volumes, queue lengths in metres assuming 5.75m/vehicle

Table 6: Predicted Queue Lengths at A21 Level Crossing with 110 Second Closure

	2017 Northbound		2017 Southbound		2021 Northbound		2021 Southbound		2027 Northbound		2027 Southbound	
	Maximum	Average	Maximum	Average	Maximum	Average	Maximum	Average	Maximum	Average	Maximum	Average
Spring/Autumn												
Weekday	101	90	120	98	109	97	130	105	119	106	141	115
Saturday	101	89	122	112	108	96	131	121	118	105	143	132
Sunday	125	104	132	108	134	112	142	117	147	122	155	127
May BH	197	151	243	123	213	162	261	133	232	177	285	145
Summer												
Weekday	100	90	149	108	108	97	161	116	117	106	175	127
Saturday	110	95	129	118	118	102	139	127	129	111	152	139
Sunday	140	119	134	114	150	129	144	122	164	140	158	134
Aug BH	192	141	158	134	206	152	170	145	225	165	186	158

Source: Mott MacDonald analysis of existing and predicted traffic volumes, queue lengths in metres assuming 5.75m/vehicle

Conclusion;

On the A21 at Robertsbridge the changes in traffic demand between 2010 and 2017 are limited with minimal changes on weekdays, some increases on Sundays and on the August Bank Holiday, however, reduced flow on the May Bank Holiday.

Comparison with the queue length predictions reported in October 2011 shows the new 2017 and 2021 results are generally similar to the previous results for 2016 and 2021 on the A21. The major difference is

that long queues are no longer predicted for the A21 Southbound on the May Bank Holiday. This is because the traffic demand recorded in 2017 is significantly lower than that in 2010 (reduced from around 1,600 vehicles/hour to 1,400 vehicles/hour).

7 The Railway

The train service over the A21 Robertsbridge level crossing will consist of passenger trains only. There will be approximately 10 trains per day. The highest permissible line speed of trains over the crossing will be 10 mph. Trains are timetabled to run for 10 hours per day.

The RVR Level Crossing Operational Management Plan (LCOMP) sets out the strategy for operational management of the A21 Robertsbridge level crossing to be installed on the Rother Valley Railway (RVR) where it interfaces with the road at level grade, so requiring control of road vehicles to enable a train to cross.

The LCOMP describes the principles of how the level crossing is to be operated under normal conditions and in the event of failure.

This shall be the basis for developing operational procedures for the railways operation when services commence to which staff shall be trained and assessed on an ongoing basis.

Compliance with Industry guidelines;

The design for the level crossings, developed from this document, shall be compliant with industry guidelines, e.g. The Office of Rail Regulation: A Guide for Managers, Designers and Operators (Railway Safety Publication 7 December 2011) and approved by a suitably independent person before installation.

A21 Robertsbridge Level Crossing Operation;

It shall be noted that a signaller will be on duty at all times of normal operation. The signaller will monitor operation of the crossings at the A21 via a Closed-Circuit Television link.

Normal operation to and from Robertsbridge

The train will approach the level crossing at a maximum speed of 10 mph, thus ensuring that the train has the ability to stop in 30m. The AFBCL (Automatic Full Barrier Crossing, Locally Monitored) crossing area is equipped with obstacle detection technology that scans the crossing area at various stages during the closure sequence. The crossings are provided with crossing illumination (for night visibility) and a drivers' flashing red and white light indicator in each direction on final approach for local monitoring by the train crew. The speed approaching the AFBCL crossing is limited to 10mph, so the approaching train is able stop under all railhead conditions before the road if the crossing is either visibly blocked or the flashing indicator hasn't changed from red to white. The approach of a train automatically begins the crossing closure sequence. This commences with the road traffic wig-wag signals and audible warnings to indicate to road traffic to stop. Obstacle detection technology prevents

to lowering of the crossing entrance barriers until the crossing is clear. Once the entrance barriers are down and the crossing surface is scanned to continue to be clear the lowering of the exit barriers can commence. If the equipment is proven to be fully functional and the OD sensors have confirmed clearance of the road surface between the fully down barriers then the indicator for the train driver will be showing flashing white light before the train reaches the crossing speed board.

The Drivers White Light is only given if all the barriers are fully down and in the unlikely event of a trapped user (vehicle or pedestrian) the train driver is able to raise and re-lower the exit barriers using a Drivers Release Unit (DRU).

The barriers will rise as soon as practicable after trains for which the lower sequence has been initiated or maintained, have passed clear of the crossing. The sequence of events to open the crossing to road traffic, once the raising cycle has been initiated or maintained is, all the barriers begin to rise simultaneously and should normally rise in 4 to 6 seconds; and the intermittent wig wag red lights should be extinguished as the barriers rise.

Railway signalling and control

Railway signalling will be provided to ensure the level crossing is fully protected on all railway approaches. The railway approach signals are interlocked with the lifting barriers so that it is not possible to clear the signals unless the road is fully closed by the barriers, additionally, it will not be possible to raise the barriers unless the signals are set at Stop and free of approach locking, or the train has passed the signal and traversed the crossings. It will not be possible to clear any protecting signals until 'crossing clear' is confirmed either automatically by obstacle detection equipment, or manually when that equipment is not being used. Discrete function controls will be provided at the control point for authorised railway staff use when obstacle detection equipment is not being used.

If a train passes a protecting signal at Stop, the road traffic light signals will immediately show an intermittent red light (omitting the steady amber phase) and the audible warning will start. The barriers will not be lowered as this may strike or trap crossing users.

To ensure that the crossing operates safely when the railway line is open to traffic, indicators at the control point will confirm that the equipment is powered and functioning correctly.

Level Crossing barriers & CCTV Systems Maintenance Plan

The maintenance plan for the three-level crossings shall be based on that recommended by the supplier of the equipment. It shall comprise:

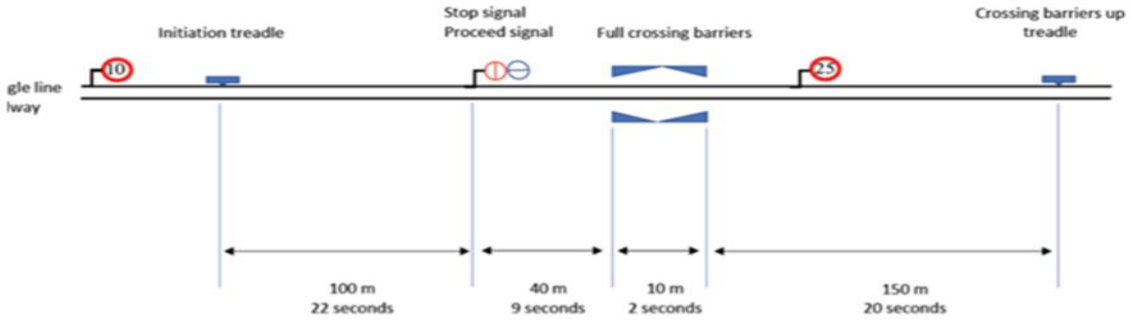
- Regular planned maintenance at the required intervals.
- Work arising from planned maintenance, within the required timescales
- Fault response, within specified timescales.
- Work arising from fault responses, within the required timescales.

- Work arising due to other parties planned work.

Road Crossing Design and Construction

The construction of the road crossings comprise concrete units designed to meet the requirements of a high friction skid resistant road surface through the crossing. This has been tested for the proposed installation and passed the test level requirement as set by The Highways Agency, reference document RD/GN/009 dated September 1989.

Level Crossing Signalling Diagram



Rother Valley Railway
Level crossing signalling schematic for manually operated full barriers
Northbridge Street, A21 & Junction Road

Not to scale

Notes:

1 Equipment shown for up direction only, treadles, signals and signs replicated for down direction

2 Transit times assume full line speed

8 5 X 5 Risk Assessment

Hazards are identified, listing possible causes if appropriate and assessed for severity. These are then multiplied by the frequency or likeliness of an incident occurring if no controls were applied. This produces the risk factor; the numerical assessment table gives guidelines on how to assess severity and frequency.

The risk assessments for the crossings are based on generic issues and then modified to reflect the specific issues at the individual crossing to reflect that risk can change significantly from one site to another. The generic risk assessment will be reviewed by the appointed Project Manager and then modified as required to reflect the

hazards and the necessary controls identified during site visits (pre-works) or through information passed to them by stakeholders and any other third party.

Rother Valley Railway (Bodiam to Robertsbridge Junction)

Bridleway Crossing 36b at Salehurst, Robertsbridge risk Assessment, including Management arrangements for User Worked Crossings

Prepared for:
The Office of Rail and Road

21 April 2021

Summary

The completion of the Missing Link will bring significant benefits to the local economy and there is no question that a grade level crossing solution at Salehurst is capable of being self-operated safely for horses and pedestrians. The cost differential between the costs of the proposed bridleway crossing (£30K) and implementing and constructing and thereafter maintaining a bridge (approximately £400K) at this location is grossly disproportionate. A tunnel under option is not practical as it would be subject to flooding from the nearby River Rother and would require almost constant pumping to keep it safe for use by pedestrians.

RVR requested Rother District Council (RDC) to review the use of a bridleway bridge at Salehurst, illustrating the type of structure that would be constructed to form a bridge for horses and riders over the approved line of the heritage railway (RR/2014/1608/P). RDC responded to the request on (13 August 2020) stating that:

‘RDC would not support a planning application for a bridge to take the bridleway over RVR at Salehurst, and that a proposed bridge to accommodate a bridleway/footpath crossing is a disproportionate response to an issue that is addressed by alternative and rather more sympathetic solutions at other locations along the route of the existing heritage railway line and they appear to function satisfactorily. Additionally, a principal planning issue in considering the proposal would be the impact of the development on the appearance and character of the countryside landscape, which is within the designated High Weald Area of Outstanding Natural Beauty. The Government's planning policies and how they should be applied are set out in the National Planning Policy Framework (NPPF), which states at paragraph 172 that great weight should be given to conserving and enhancing landscape in Areas of Outstanding Natural Beauty, which have the highest status of protection in relation to these issues. The Council's own development plan policies as contained in the Core Strategy (2014) at EN1 and the adopted Development and Sites Allocation Plan (2019) at DEN2 accord with the NPPF and are consistent with this approach. With respect to the proposed development, the railway sits within the broad flat landscape of the Rother Valley at this point and there are long views over the Weald. It is a very attractive rural landscape. The significant scale of the proposed bridge, combined with its very urban character and appearance, would result in it appearing an intrusive and incongruous feature in the countryside landscape. It would be harmful to the character and appearance of the AONB and contrary to the afore-mentioned national and local planning policies. In the circumstances, it is RDC’s informal view that a planning application would not be supported by the local planning authority.

I feel as though the proposed bridge to accommodate a bridleway/footpath crossing is a disproportionate response and I would therefore ask that you investigate alternative proposals for a bridleway crossing that would be more appropriate to conserving the AONB countryside setting of the railway’.

Therefore, the only alternative for RVR is to provide an at grade bridleway crossing suitable for all users and local residents (See options below).

1. Introduction

The former railway line between Robertsbridge and Tenterden was closed in 1961. Much of the trackbed remained in place for many years and, in 1974, the line between Tenterden and Rolvenden was re-opened as the Kent and East Sussex Railway (K&ESR). The line was further reinstated to Bodiam (the site of the National Trust's Bodiam Castle) in 2000 and K&ESR has become a successful heritage railway and major tourist attraction. Reinstatement work to date on the K&ESR and the Missing Link has been undertaken mainly by volunteers and local contractors who have developed cost-effective and quality methods for the work.

The "Missing Link" is the section of former railway corridor 3.42km long running from Junction Road (the B2244) in Bodiam to the terminus at Robertsbridge. Policy EM 8 of the Rother District Plan expressly supports the reinstatement of RVR. The local plan was the subject of a Public Inquiry and the Inspector's report gave full support to completing the Missing Link, subject to meeting the following criteria:
"(i) it must not compromise the integrity of the floodplain and the flood protection measures at Robertsbridge;
(ii) it has an acceptable impact on the High Weald Area of Outstanding Natural Beauty;
(iii) it incorporates appropriate arrangements for crossing the A21, B2244 at Udiam, Northbridge Street and the River Rother."
These criteria were all resolved and approved with full Planning approval given by Rother District Council in March 2017. Once completed, visitors will travel on a well-regarded Heritage Railway on the historic route within the Rother Valley between Tenterden and the mainline at Robertsbridge, with stops at a number of attractive tourist destinations.

Over the course of a number of years, planning permission has been obtained for the re-instatement of the railway between Bodiam and Junction Road in 2011, from Robertsbridge to Northbridge Street in 2013 and the construction of Robertsbridge Junction Station. Re-construction of the railway within those sections has now been completed (utilising volunteer professionals and local subcontractors). The connection to the main line was completed in late 2016 with the support of Network Rail.

Following consultation over a period of 6 years, including discussions with all relevant statutory bodies and the local planning authority – as reported in the Consultation Report accompanying the TWAO application - planning consent for the Missing Link was unanimously approved by the Rother District Planning Committee on 17 March 2017. (RR/2014//1608/P). Letters of support for the project from Kent CC, East Sussex CC, Rother DC, Ashford BC, Network Rail, National Trust, and 1066 Country are included in the Consultation Report. The planning consent was accompanied by planning conditions to ensure the safety and effectiveness of the road crossings.

The Missing Link will comprise a simple single-track railway with straightforward construction, utilising the same local contractors and volunteers (qualified and experienced, as appropriate) as on the sections already completed.

This document relates to the proposed level crossing at Bridleway S&R36b at Salehurst as well as management arrangements for user worked crossings.

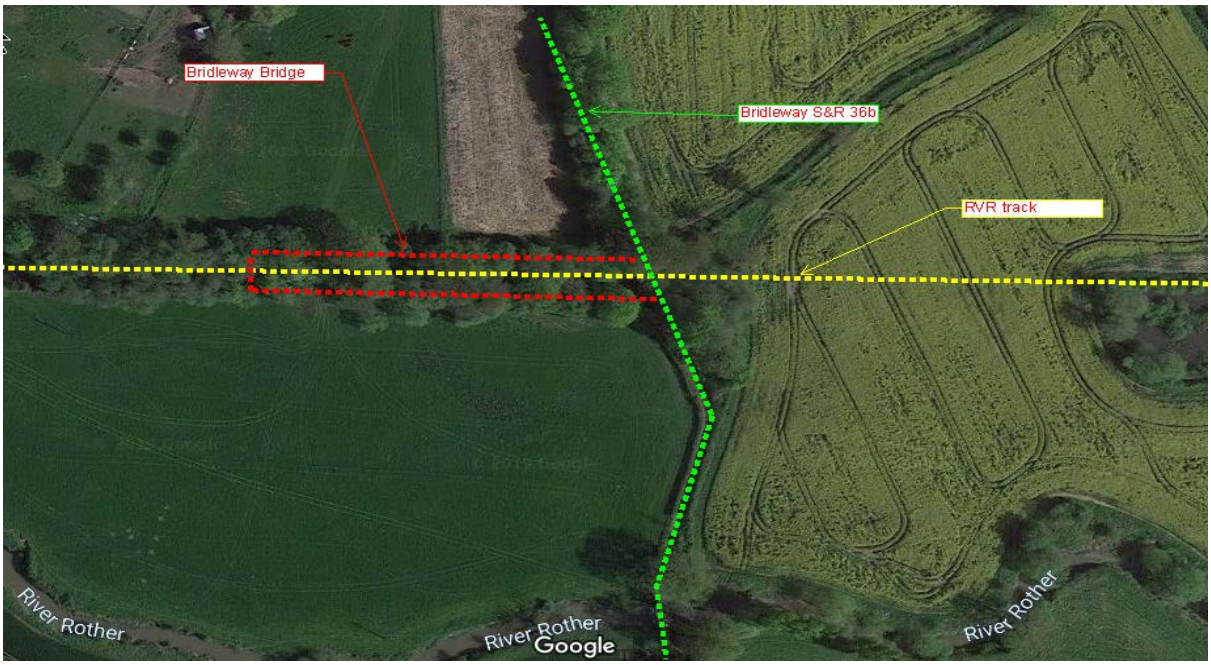


Figure 1 - Proposed location of Bridleway S&R36b crossing at Salehurst

2. Economic Benefits

A comprehensive Economic Benefits Report by Steer, leading UK specialist consultant, in 2018, forecast that the RVR will generate local economic benefits of up to £35 million over a two-year construction period and the first ten years of operation, and up to £4.6 million per annum of local economic benefits from 2030. It will generate approximately 34 jobs in the construction phase and up to 85 in the operational phase. Additional rail revenues of approximately £355,000 per annum are forecast to accrue to the main line operator.

3. Traffic Studies

In respect of the Bridleway Crossing (S&R 36b) at Salehurst, a crossing design similar to that used on the West Highland Railway was proposed and included in the planning documentation that was approved by Rother District Council. (RDC). During the course of the preparation of the planning documentation, extensive discussions and site visits to the location of the bridleway crossing were held with the local representative of the horse riders, the East Sussex County Council Senior Rights of way Officer, the Ramblers Association, and the Horse Society Access Field Officer for London and the South East.

4. Crossing Survey

There are a number of bridleway crossings on the existing Kent and East Sussex Railway that operate safely, effectively and without difficulty. Crossing Surveys were held at the Salehurst site over a period of a week in mid-summer. These showed an average of 4 pedestrians crossing on weekdays, and up to 20 a day at weekends. Whilst no horses were recorded, the local horse representative advised that normally around 4 horses would use the crossing each way at weekends, and less frequently on weekdays and in the winter. The Ramblers Association and the Horse Society advised us that their members are familiar with the bridleway crossing proposed and did not envisage any problems with them, particularly as there would be a maximum of only 10 train crossings a day in the summer months and none in the winter. Additionally, RVR will continue to collaborate with the Horse Society, Ramblers Association and local residents during the design, build and operational stages of the bridleway crossing ensuring we satisfy all concerns by building a robust and safe bridleway crossing that meets the needs of all users.

5. The Crossing Options

At the time of the Planning preparations no other options for the crossing were considered. However, the options considered are: -

(a) Option one, involving an “at grade” level crossing introduces no engineering challenges and would cause minimal disruption during construction. The RVR estimated cost (taking account of preliminary work and advance purchases of materials already completed etc.) is approximately £30,000.

(b) Option 2, considered the feasibility of taking the bridleway beneath the railway either parallel to or at right angles to the railway. Principal engineering and approval challenges are around the bridleway being below the level of the River Rother which is nearby. The tunnel would flood in a 5-year flood and above to a depth of 10 feet and would-be significant risk to local children and pedestrians in wet weather. The estimated cost is £6.8m. Option 2 is therefore unsuitable as an alternative arrangement to Option 1.

(c) Option 3, considers taking the rail over the bridleway. This scheme involves a sizable length of elevated viaduct structure with a significant impact on cost and would involve significant visual intrusion within the AONB. The viaduct would be adjacent to the existing houses in Salehurst and be particularly visible and intrusive to a quiet and most pleasant village. The estimated cost would be similar to that calculated by Arup for the A21 crossing at £20.2m. RDC have informed RVR that they would not support a planning application for a bridleway bridge, therefore taking the

rail over the bridleway would not be supported by RDC as RDC's reasons for not supporting a bridleway bridge would apply equally to rail over the bridleway.

(d) Option 4, would be a bridge carrying the bridleway over the railway. This would involve two long approach ramps either parallel to or at right angles to the railway due to the required maximum gradient for horses of 1 in 16, and the need for intermediate "level landings" to meet normal health and safety requirements. Obviously, the presence of a bridge and ramps directly on the bridleway alignment will prevent its use by farm vehicles, so the bridge has to have sufficient load bearing capacity to carry those vehicles. The Bridge would appear intrusive to the residents of Salehurst and several houses would lose the privacy of their rear gardens. The estimated cost for this option based on similar schemes by Network Rail elsewhere (e.g., over the main line railway at Kings Mill), and pro rata for this more straight forward location, is around £400,000. A recent new pedestrian crossing bridge at Wool Station by Network Rail cost £825,000. This option would also require a significant additional compulsory land take, above that required for option one, the "at grade" crossing. Additionally, RDC have informed RVR that they would not support a planning application for a bridleway bridge.

6. Timing

The majority of the construction materials for Option one would be delivered by rail, the fill material and track ballast via the Network Rail connection at Robertsbridge (from stock piles that RVR are already holding at several south coast ports), and track materials by rail from those already held for the project by Kent and East Sussex Railway (K&ESR) at Northiam Station. Upon gaining access to the land, it is anticipated that there will be 12 months of surveys in order to discharge the relevant planning conditions, with subsequent construction taking approximately 12 months. Commissioning and trials by K&ESR will take approximately 3 months. The reinstated railway will be operated by K&ESR as an integral part of its successful heritage undertaking. (K&ESR has been operating trains since 1974.)

7. Bridleway Design and Build

The bridleway crossing will be constructed from sections of revolutionary lightweight panels and edge beams. Every component weighs less than 60kg so it can be fitted manually by two people without the need for expensive machinery.

It is simple to fit and, unlike timber and heavier rubber systems they, can easily be removed and replaced during routine track maintenance.

The system shares the high grip surface of the heavy-duty steel framed polymer panel, so performs in the wet. It can be painted on in the same way as a road surface and the paint does not wear off easily as it does on other systems.

The surface is integral so does not peel off or need replacing like the expensive surface used on timber decks. The bridleway system is ideal wherever pedestrians or horses cross the track.

The lightweight nature also makes it ideal for remote or difficult to access installations such as rambling routes. Although rated as bridleway level crossing system, it has been tested way in excess of this using concrete blocks and vehicles.

Figure 2 Pedestrian and Bridleway Panels

8. Meerkat System

RVR will install the Meerkat warning device system to reduce user risk at the crossing to as low as reasonably practicable.

The new warning device can detect an oncoming train and provide an audible and visible warning to alert users that a train is approaching, therefore, have a significant impact on public safety at level crossings.

The entrance or decision point to the bridleway, which includes both sides of the railway will be protected by a self-closing wicket gate. Additionally, the wicket gate to be used will be designed to ensure it is possible for a mounted horse rider to open the gates without dismounting. RVR will follow in its entirety the ORR guidelines and current BHS specifications.

When cyclists use the crossing, notices will be sighted encouraging cyclists to dismount.

A sign explaining how to cross safely will also be displayed at the decision point on each side of the crossing. Instructions to users will be placed at appropriate points.

The minimum width between fences guiding users to the decision point or safe waiting area will be a minimum width of 3m. However, these widths may need to be increased depending on user requirements as part of the consultation process.

9. Railway Operation

The nature of the railway operation is an infrequent heritage railway, travelling at a maximum speed of 25mph. The intended design of the Bridleway crossing will incorporate the most recent crossing technology including a maximum speed of 10mph reducing risks to level as low as reasonably practicable.

The reinstated railway will be operated by Kent and East Sussex Railway (K&ESR) as an integral part of its successful heritage undertaking. (K&ESR has been operating trains since 1974). K&ESR have existing operating rules that safely manage these crossing types and which will be used, additionally, this crossing will have much improved safety systems.

10. Risk Assessment

The “Risk Assessment” documentation (Annex A) shows how the risks of a Bridleway crossing would be managed in accordance with ORR guidance.

Risk Profile

The risk profile of the bridleway has been assessed by considering the calculations provided within Network Rail’s strategy document ‘transforming Level Crossings 2015 – 2040, for example, passive crossing types are so called because they do not provide users with warning or protection from approaching trains. The primary method of operation for passive crossings is through users observing whether it is safe to cross. For this method of operation there needs to be enough sighting distance available to provide users with adequate time to cross and this is based on the railway line speed. Where pedestrians use the crossing the traverse time is affected by use by vulnerable users or those with mobility impairments. Passive crossing types include footpaths, station crossings, bridleways, user worked crossings and user worked crossings with telephones.

Table 1 below provides a breakdown of the passive level crossing numbers in more detail along with the total risk in Fatalities and Weighted Injuries (FWI) for each core crossing type.

Table 1

Source – ALCRM, August 2015	**Crossing core type**	**Number of level crossings on the network**	**FWI (as calculated by ALCRM) (All Level Crossing Risk Model)**
Passive level crossings	UWC/Bridleway (with telephone)	1717	1.1

	Footpath/bridleway/station	2246	2.8
	UWC	686	0.4
	Open crossing	48	0.1

The network Rail data does not provide a realistic FWI when compared with Salehurst Bridleway due to the slow speeds operated on Kent and East Sussex Railway, and that mitigation is provided by a very low speed over the crossing allowing any train to stop before any possible conflict with horse or human. Additionally, RVR will be installing the Meerkat system as described above, therefore reducing the risk to as low as reasonably practicable. However, Network Rail's FWI indicators as well as supporting data are a useful guide to assist in the management of safety at level crossings. RVR are monitoring the results of Network Rail's strategy document, transforming Level Crossings 2015 – 2040. In channelling its efforts further, RVR is focussed on the key objectives of the level crossing safety strategy as outlined within RSSB's Level crossings document 2019/20, A summary of health and safety performance, operational learning, and risk reduction activities on Britain's railway, for example,

- Crossings that are not equipped with automatic train-detection warning equipment remain a key focus for Network Rail. In partnership with one of its suppliers, Network Rail, is developing a new cost-effective train-detection warning solution for deployment at footpath and bridleway crossings. The project, named Meerkat, is well-advanced in its development and Network Rail has targeted to add this solution to its suite of risk controls before the end of the financial year. Should Network Rail identify any further improvements to the Meerkat system, RVR will install any updated latest technology available.

11. User Worked Crossings

Where property is severed by the reinstated railway, RVR are committed to work with all affected parties to ensure all possible safe access routes are considered. For example, seeking alternatives to crossings wherever possible, and that if any crossings are required that they would be spaced and located relative to other crossing points to reduce operational confusion, additionally subject to any necessary operational controls deemed necessary such as speed limits on approach.

RVR ensure that after consultations with all parties concerned, only the safest option will be installed as described within the Railway Clauses Consolidation Act 1845, section 68,

None of the proposed crossings are on the route of public rights of way. Whilst the proposed TWAO Deposited Plans include for the provision of up to nine user worked

crossings, the draft Order does not seek specific detailed powers for accommodation crossings. Detailed design and operation would therefore be by way of subsequent negotiation following the making of an Order at which time we would approach ORR with proposed fully detailed solutions for each location.

The design and operation of those fully gated user worked crossings would be all as outlined in ORR Level Crossings – a Guide for Managers, Designers & Operators (latest issue) with associated signage, protection and any other necessary measures to provide a safe solution as detailed in that document. Nevertheless, while the described minimum warning time of trains is achievable at all the proposed user worked crossing locations (ref guidance document 2.145) the crossings would nevertheless be enhanced by way of the provision of visual signal display to the crew of an approaching train indicating that the associated crossing gates are in the closed position.

The maximum line speed for the railway will be 25 mph. Local reduced speed limits will be incorporated where necessary at each user worked crossing set by way of sight line assessment - all as detailed in the Heritage Railway Association HGR-A0458 guidance document endorsed by the ORR for the assessment of user worked crossings.

RVR will enter into consultation with land owners to discuss options for removal of crossings wherever possible and where this is not possible RVR will provide a variety of control measures to protect users as mentioned above, including providing the minimum safe distance to see an approaching train,

RVR will provide instructions for the safe use of level crossings for authorised users. The instructions will ensure the method of working for each crossing are adequate and suitable to ensure the safety of trains and crossing users. This may include employees, contractors, postal staff, drivers of delivery vehicles and visitors. The safety of those who use private level crossings on farms and other business premises in the course of their work.

The authorised user also has responsibilities for ensuring that everyone who uses the crossing has been properly instructed in how to do this safely. RVR will liaise with the authorised user and jointly prepare a specific joint risk assessment to ensure that a safe method of using the crossing is agreed and adopted. Particular attention will focus on the robustness of any agreed method of work between the two parties for periods of intensive use. The Heritage Railway Association HGR-A0458 guidance document will provide additional guidance and support.

- Provisions to be made available at the crossings include;
- Single gates that open away from the railway and kept closed across the roadway.
- The crossing surface and adequate approaches, suitable for the location and use.
- Vehicular gates may be locked to prevent unauthorised use.
- It is not envisaged that telephones and warning lights are required, however, this will form part of the consideration of the potential control measures identified within each specific crossing risk assessment.

- Instructions will be posted near every access point to the crossing, on a statutory sign.
- Adequate sighting in either direction will be maintained for crossing users
- Crossing with vehicles or livestock: The correct procedure is detailed in the instructions provided at each crossing;

Users will be encouraged to report any deficiencies or problems in using the crossing to the train operator and contact details will be made available at each crossing location.

RVR is also aware that it is likely that new and emerging risks will materialise during the implementation stages and beyond; either following accidents or incidents, through new stakeholder concerns or through changes in user behaviour. This is foreseeable and will result in a fresh set of safety concerns to address in the future. To move to a truly proactive strategy RVR will critically evaluate level crossing designs using hazard identification, based on current progressive thinking regards level crossing safety. As part of the operational control measures, RVR have identified the following areas as key to safe operation of the level crossings,

- Risk Management
- Influencing user behaviour
- Implementing a level crossing strategy
- Monitoring and review

RVR will run targeted education campaigns for external stakeholders and users of all level crossings and continue to support Kent and East Sussex Railway to manage their level crossings effectively through improved knowledge, equipment, and IT solutions.

Hazards and possible causes identified – **Bridleway Risk Assessment**	Potential Risk or consequences associated with the Hazard	S	L	RF	Control Measures	S	L	RF
Regular users are more likely to undertake risk taking behaviour at crossings with a low frequency of trains.	The regularity of trains is a risk factor for crossing users, due to "the rarity of them encountering a train and the reduced vigilance that they might therefore demonstrate in crossing". Accidents are associated with lines that have low frequencies of trains.	4	2	8	The introduction of an audible alarm to provide users with a warning that a train is approaching. RVR intend to install the most relevant up to date safety equipment i.e., Meerkat. Use of new signage	2	1	2
Regular users and those living close to level crossings are more likely to undertake risk taking behaviour when using the crossing.	Potential behaviour traits of frequent users might include: Expectation by the user that there will not be any trains in the area. Familiar users apply prior knowledge of train times / frequencies. User believes he / she has enough time to beat the train. User has a low level of concentration and is easily distracted. User does not look in both directions. User has low perception of risk. User thinks he / she understands procedure without reading instructions User unaware of risks to subsequent users. User assumes that the train is stopping at the station (based on	4	2	8	The introduction of an audible alarm to provide users with a warning that a train is approaching. RVR intend to install the most relevant up to date safety equipment i.e., Meerkat. Use of Bridleway crossing is primarily covered in Local Training Plans and educational material to cover; Hazards associated with the crossing, How to make decisions about whether requests to cross can be granted. how to check whether a crossing is clear.	2	1	2

	prior experience) and chooses to cross in front of the train.							
Low train speeds might increase the risk-taking behaviour of users	It has been established that users might perceive the crossing to be safer to cross when trains are moving more slowly. This might result in them behaving less cautiously e.g. by crossing while a train is in view, crossing more slowly, or checking the line less often while crossing.	4	3	12	The introduction of an audible alarm to provide users with a warning that a train is approaching. RVR intend to install the most relevant up to date safety equipment i.e., Meerkat. Eyes watching signs to encourage users to behave safely e.g., put dogs on leads, close gates etc. Education Awareness Self-closing gates	3	2	6
Young children who are not old enough to understand safe crossing procedure might cross unsafely.	Young children might not fully understand the risks associated with level crossings or the correct crossing procedure and therefore traverse in an unsafe manner. This issue might be particularly prevalent in locations where it is likely that unaccompanied children use the crossing, such as near residential areas, schools, playgrounds and youth clubs.	4	3	12	The introduction of an audible alarm to provide users with a warning that a train is approaching. RVR intend to install the most relevant up to date safety equipment i.e., Meerkat. Use of level crossings is primarily covered in Local Training Plan and educational material to cover; Hazards associated with the crossing, How to make decisions about whether requests to cross can be granted. how to check whether a crossing is clear. Ensure signage is appropriate for the status and specific risks at, and on the approaches to, a crossing.	3	2	6

					Education Campaign.			
Errors by crossing users might increase at crossings without warning signs or lights in the hours of darkness.	Poor lighting conditions at and around the crossing can affect a user's behaviour in several ways: Failure to see the crossing / crossing equipment and signs. Deviation from the crossing Inability to read crossing instructions. Misjudgement of train speed.	3	2	6	The introduction of an audible alarm to provide users with a warning that a train is approaching. RVR intend to install the most relevant up to date safety equipment i.e., Meerkat. Use of level crossings is primarily covered in Local Training Plans and educational material to cover; Hazards associated with the crossing, How to make decisions about whether requests to cross can be granted. how to check whether a crossing is clear. Ensure signage is appropriate for the status and specific risks at, and on the approaches to, a crossing. Education Campaign.	2	1	2
The visibility (and hence effectiveness) of information on the approach to and at the crossing is reduced by overgrown foliage.	Overgrown foliage on the approach to a level crossing can obscure signs at the crossing, and also restrict the visibility of approaching trains. This could result in the user either not seeing the sign or train (complete or partial) or the user not seeing the sign or train in time to sufficiently interpret the information and respond appropriately.	3	2	6	Foliage Management System in place. The introduction of an audible alarm to provide users with a warning that a train is approaching. RVR intend to install the most relevant up to date safety equipment i.e., Meerkat.	2	1	2
An uneven and/or slippery crossing surface might present a potential hazard to those using the crossing.	Poor surfaces might present particular problems for cyclists (especially those wearing cycling shoes with slippery soles), horse riders, mobility scooter users,	3	3	9	Foliage Management System in place which ensures that all crossing surfaces are maintained, including the approach to the crossing, not just the area between the gates	3	2	6

	wheelchair users, the elderly, visually or physically impaired crossing users, and users with encumbrances such as luggage or pushchairs. The crossing surface might also present a hazard to road vehicles in general as well as a hazard to trains. Reasons for uneven/slippery crossing surfaces include: Missing, partial, worn or damaged crossing deck Poor decking panel alignment / position on skewed crossing Wet or icy weather conditions Uneven ballast distribution				and signs. Th Bridleway will allow sufficient space to provide a position of safety before/after the crossing for all users. Additionally, ensuring that the Bridleway crossing surface is profiled as the user moves through the entrance/exit to reduce the risk of slips, trips and fall thus preventing risk of personal injury. The Bridleway crossing will be constructed from sections of revolutionary lightweight panels and edge beams and a high-grip surface.			
User Worked Crossings - Additional								
Unreliable crossing equipment (telephones, warning lights, gates, means to secure gates including toe catches, and signs) due to poor maintenance, vandalism or general deterioration;	Damaged or missing signs can prevent a user understanding the crossing instructions / procedure Damaged equipment can affect its likelihood of use Damaged/difficult to use gates can affect a user's adherence to the correct gate crossing procedure Poorly maintained equipment can create a perception that the level crossing is not in use/ infrequently used and therefore reduce the perceived importance of following	4	3	12	Regular monitoring of the crossing, maintenance program in place Enhanced communication reporting arrangements between user and operator Installation of trespass guards on one or both sides of the crossing, together with any fencing as deemed necessary.	2	2	4

	the correct procedure Poorly maintained level crossing equipment can influence a user's behaviour in a variety of ways: Damaged or missing signs can prevent a user understanding the crossing instructions / procedure.							
Poor, worn or damaged crossing surfaces or cattle guards that cause difficulty in moving vehicles or livestock across the tracks;	Poor crossing surfaces make it more difficult for users to traverse the level crossing by distracting the user and causing them to look at their footing, by increasing user crossing time, and by increasing the potential for slips, trips and falls. In addition, footpath surfaces in a poor condition increase the likelihood of users diverting from the designated footpath or slipping / tripping into the carriageway.	3	2	6	Regular monitoring of the crossing, maintenance program in place Enhanced communication reporting arrangements between user and operator Installation of trespass guards on one or both sides of the crossing, together with any fencing as deemed necessary.	2	2	4
The type of level crossing might be unsuitable for a number of reasons, including its location, train service, line speed and/or user type	UWCs might become unsuitable due to a chance in land use (e.g. farming land diversification) or a new housing development nearby, which results in a higher number of crossing users and a change in user types. Another example might include an industrial estate being developed near to a rural crossing that is unsuitable for HGV use.	3	2	6	Review Signage. Involve users in the RA process Consider is current level crossing is correctly graded.	2	2	4
Restricted sighting of approaching trains caused by;	lineside development, erection of fences, or growth of vegetation, at a user worked crossing without additional protection measures,	3	2	6	Review Signage. Involve users in the RA process Consider is current level crossing is correctly graded. Vegetation clearance	2	2	4