OBJ/1002/PJC/1

The Hoad family of Parsonage Farm, and the Trustees and Executors of the Noel de Quincey Estate and Mrs Emma Ainslie of Moat Farm

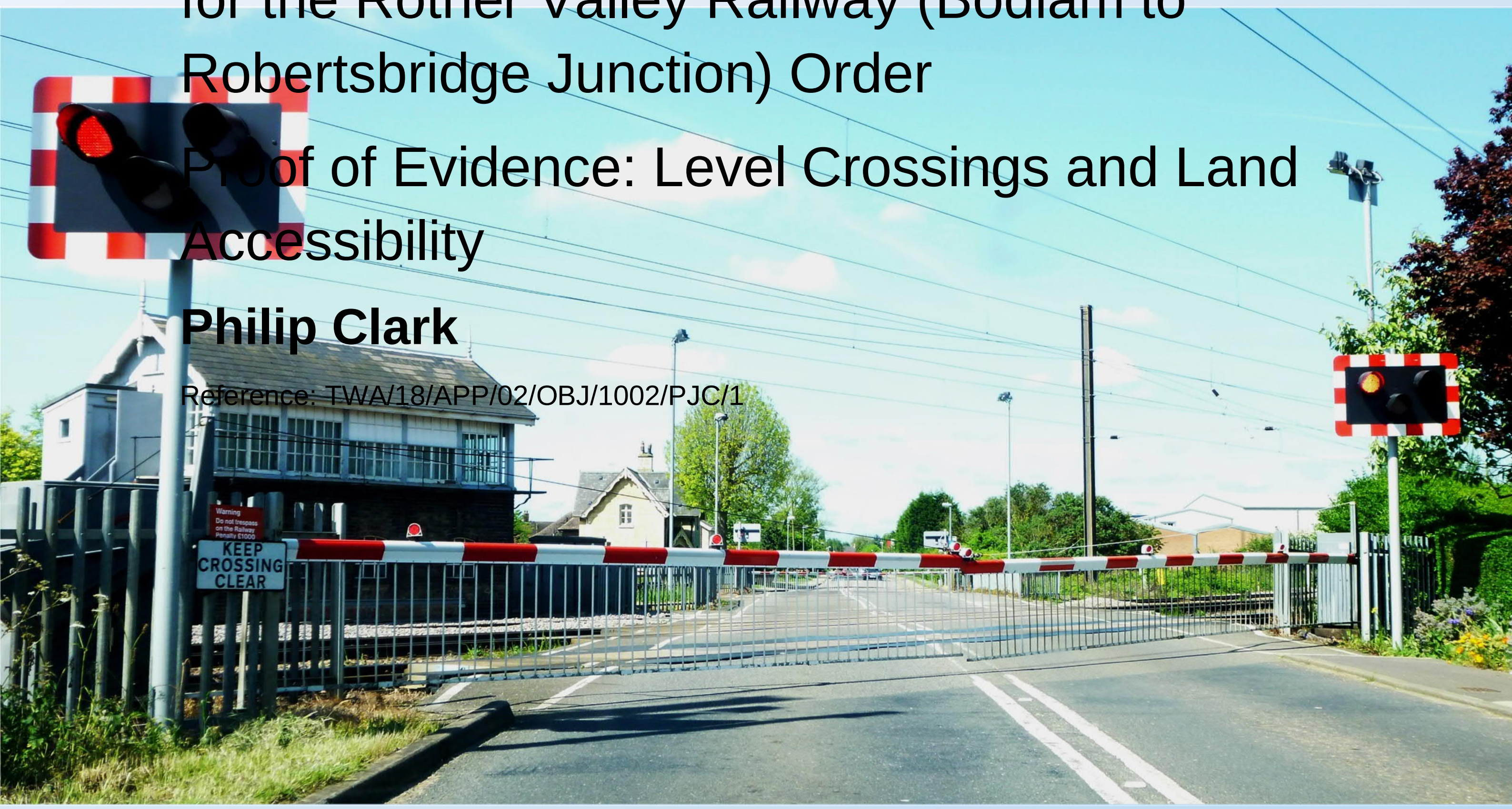
ROTHER VALLEY RAILWAYS

Transport and Works Act 1992 (TWA): Application for the Rother Valley Railway (Bodiam to Robertsbridge Junction) Order

Proof of Evidence: Level Crossings and Land Accessibility

Philip Clark

Reference: TWA/18/APP/02/OBJ/1002/PJC/1



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DATE: JUNE 2021

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- **Appendix B** – NR/L2/SIG/11201/ModX21 **(APP-B)**
- **Appendix C** – Railway Group Standard GK/RT/0075 Lineside Signal Spacing **(APP-C)**
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- **Appendix H -** East Coast Mainline Freedom of Information Request, FOI 696 **(APP-H).**

BIBLIOGRAPHY

Department for Transport. (2019). Road Traffic Statistics - Site Number 944953. Retrieved from https://roadtraffic.dft.gov.uk/manualcountpoints/944953

Design Manual for Roads and Bridges. (2019, November). *GG 142 Walking, Cycling and Horse Riding Assessment and Review*. Retrieved from https://www.standardsforhighways.co.uk/prod/attachments/5f33456d-32f9-4822-abf6-e12510f5c8dc

Design Manual for Roads and Bridges. (2020). CD 109 - Highway Link Design. Retrieved from https://www.standardsforhighways.co.uk/prod/attachments/c27c55b7-2dfc-4597-923a-4d1b4bd6c9fa?inline=true

Design Manual for Roads and Bridges. (2021, March). CD 143 - Designing for Walking, Cycling and Horse Riding. Retrieved from https://www.standardsforhighways.co.uk/dmrb/search/9b379a8b-b2e3-4ad3-8a93-ee4ea9c03f12

Gateley Hamer. (2017). Proposed Network Rail Cambridgeshire Level Crossing Reduction Order. Retrieved from https://gateleyhamer-pi.com/en-gb/cambridgeshire-level-crossings/

Network Rail. (2011). Level Crossings: A Guide for Managers. Designers, and Operators - Railway Safety Publication 7. Retrieved from https://orr.gov.uk/__data/assets/pdf_file/0016/2158/level_crossings_guidance.pdf

Network Rail. (2018, November 9). Farmers are Dicing with Death at Level Crossings as One Incident Involving a Farming Vehicle is Reported on Average Every Week in Britain. Retrieved from https://www.networkrail.co.uk/news/farmers-are-dicing-with-death-at-level-crossings-as-one-incident-involving-a-farming-vehicle-is-reported-on-average-every-week-in-britain/

Network Rail. (2020). Enhancing Level Crossing Safety 2019-2029. Retrieved from https://cdn.networkrail.co.uk/wp-content/uploads/2020/03/Enhancing-Level-Crossing-Safety-2019-2029.pdf

Network Rail. (2020, February). Level Crossings Data - February 2020.

https://www.networkrail.co.uk/wp-content/uploads/2020/04/Level-Crossings-data-February-2020.xlsx

Network Rail. (2020). Models and Tools to Manage Level Crossing Risk. Retrieved from https://www.networkrailconsulting.com/assets/Uploads/RSSB-Level-Crossings.pdf

Network Rail. (2021, April). Retrieved from https://www.networkrail.co.uk/wp-content/uploads/2021/05/Level-Crossings-data-April-2021.xlsx,

Network Rail. (2021). Reducing Risk at Level Crossings. Retrieved from https://www.networkrail.co.uk/communities/safety-in-the-community/level-crossing-safety/reducing-risk-at-level-crossings/

Office of Rail and Road. (2014). RSD Internal Guidance - New Level Crossings. Retrieved from https://orr.gov.uk/__data/assets/pdf_file/0003/16527/rig-2014-06-new-level-crossings-orrs-policy-and-approach-to-handling-requests-for-new-or-reinstated-crossings-on-the-mainline-or-heritage-networks.pdf

Poppinghole Farm. (2013, January 21). Retrieved from https://poppingholefarm.co.uk/new-year-arrivals/)

Rail Accident Investigation Bureau - UK Government. (2016, September 10). Level Crossing Collision, Near Dymchurch. Retrieved from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/576384/D092016_161129_Dymchurch.pdf

Rother Valley Railway. (2018, May 17). Retrieved from https://rvrailway.blogspot.com/2018/05/proposed-level-crossing-update.html

Shropshire Star. (2018, April 6). Heritage Railway Train Hit on Level Crossing. Retrieved from https://www.shropshirestar.com/news/local-hubs/mid-wales/welshpool/2018/04/06/heritage-railway-train-hit-car-on-level-crossing/

UK Government. (2019, April 10). Level Crossing Accident at Penrhyn, Ffestiniog Railway. Retrieved from https://www.gov.uk/government/publications/safety-digest-022019-penrhyn-lc/level-crossing-accident-at-penrhyn-ffestiniog-railway-6-january-2019

WhatDoTheyKnow. (2015, August 5). *Delay Minutes at OD Crossings*. Retrieved from https://www.whatdotheyknow.com/request/delay_minutes_at_od_crossings

GLOSSARY

AADT:	Annual Average Daily Traffic
AADF:	Annual Average Daily Flow
ABCL:	Automatic barrier crossing locally monitored
AFBCL:	Automatic full barrier crossing locally monitored
AHB:	Automatic half barrier crossing
ALCRM:	'All Level Crossing Risk Assessment' tool for assessing risk at level crossings developed by Network Rail in association with the RSSB
AOCL:	Automatic open crossing locally monitored
AONB:	Area of Outstanding Natural Beauty
CB-OD:	Controlled barrier crossing with obstacle detection
CCC:	Cambridgeshire County Council
DfT:	Department for Transport
EIA:	Environmental Impact Assessment
ES:	Environmental Statement
FP/BW:	footpath or bridleway crossing
FP (MSL):	footpath crossing with miniature stop lights
HSWA:	Health and Safety at Work Act 1974
LHSBR:	Leading Health and Safety on Britain's Railway 2020
MCB:	Manually controlled barrier crossing
MCB (CCTV):	Manually controlled barrier crossing with closed circuit television

MCB-OD: Manually controlled barrier crossing with obstacle detection

MCG: Manually controlled gated crossing

NR: Network Rail

OC: Open crossing UWC: user worked crossing

OD: Obstacle Detection

ORR: Office for Rail and Road

PoE: Proof of Evidence

PROW: Public Rights of Way

RSSB: Rail Safety and Standards Board

RVR: Rother Valley Railway

SPAD: Signal Passed At Danger

SoC: Statement of Case

SoS: Secretary of State for Transport

TMO: Train crew (or other peripatetic railway staff) operated crossing

TRL: Transport Research Laboratory

TWAO: Transport and Works Act Order

UWC: User Worked Crossing

UWC (MSL): User worked crossing with miniature stop lights

UWC (T): User worked crossing with telephone

1 INTRODUCTION

1.1 PERSONAL DETAILS – QUALIFICATIONS AND EXPERIENCE

1.1.1. My name is Philip Clark. I am an Associate at WSP UK Limited carrying out the role of Project Manager and Design Manager responsible for the design and management of civils and transport infrastructure projects, and management of a portfolio of rail enhancement and renewal projects on the Network Rail (Anglia) Infrastructure Projects framework, specialising in level crossings.

1.1.2. WSP is a specialist firm of Consulting Engineers and Transport Planners providing advice on traffic, transportation, travel planning, accessibility planning and highways and development infrastructure to both the private and public sectors. WSP UK Limited, forms part of the WSP group which has approximately 54,000 staff worldwide.

1.1.3. My colleague, Mr Ian Fielding is appointed to provide specialist evidence on transport related matters associated with the proposed level crossings on the A21, the B2244 and Northbridge Street. My evidence focuses on the technical aspects of the level crossing infrastructure proposals.

1.2 QUALIFICATIONS AND MEMBERSHIPS

HND Civil Engineering – Sheffield (1991)

Design & Technology Foundation – Open University (1993)

Institution of Civil Engineers – Membership Number: 65461905

Transport Planning Society

1.3 RELATED EXPERIENCE

1.3.1. Of relevance, I have extensive experience in matters relating to level crossings. Under commission to Network Rail, I have worked closely with Level Crossing Managers and Level Crossing Engineers to understand safety concerns uniquely related to level crossings, and carried out individual and collective studies of over 90 level crossings, primarily focussed on assessing the impact of full closure to reduce risk to life and improve operational performance. These studies assessed matters associated with land severance, disruption to the road transport network, level crossing safety, and the identification of appropriate mitigation.

1.3.2. I am the Strategic Level Crossing Design Manager for the Ely Area Capacity Enhancements project considering implications to the operation of 37 level crossings in response to the project objective to increase train service frequency, seeking to mitigate increased risk, delay and dis-benefit to users of level crossings with the provision of enhanced level crossings safety systems or alternative infrastructure to enable full closure of the level crossing.

1.4 DECLARATION

1.4.1. I am instructed by The Hoad family of Parsonage Farm, and the Trustees and Executors of the Noel de Quincey Estate and Mrs Emma Ainslie of Moat Farm (“the Landowners”) to prepare and present evidence at the Transport and Works Act (TWA) Order Inquiry. The Landowners are “statutory objectors” to the Order for the purposes of Rule 23 of the Transport and Works (Applications and Objections Procedure) (England and Wales) Rules 2006.

1.4.2. I have visited the application site and the surrounding area for the purposes of providing evidence at this Inquiry.

1.4.3. The evidence which I have prepared for this Inquiry is true and has been prepared and is given in accordance with the guidance of my professional institutions.

1.5 STRUCTURE OF EVIDENCE

1.5.1. My proof of evidence is structured as follows:

- **Section 2** - Secretary of State for Transport - Statement of Matters;
- **Section 3** - Proposed System;
- **Section 4** - Assessment of Level Crossing Operational Procedures;
- **Section 5** - Review of Degraded Operation Procedure;
- **Section 6** - Considering Non-Motorised Users;
- **Section 7** - Assessment of Engineering Proposals and Land Take Assumptions;
- **Section 8** - Level Crossing Risk;
- **Section 9** - Policy Compliance; and
- **Section 10** – Assessment of Gross Disproportion
- **Section 11** - Summary and Conclusions

2 SECRETARY OF STATE FOR TRANSPORT – STATEMENT OF MATTERS

2.1 BACKGROUND

2.1.1. The Statement of Matters pertinent to this Transport and Works Act Inquiries Procedure published by the Department of Transport, 29 November 2018, sets out the procedures and programme about which the Secretary of State for Transport particularly wishes to be informed.

2.1.2. This Proof of Evidence has been prepared to address matters listed under item 3 of the Statement of Matters:

3). The likely impact of the exercise of the Powers proposed in the TWA Order on land owners, tenants, local residents, businesses and statutory undertakers including any adverse impact on their ability to carry out their business or undertaking effectively and safely and to comply with any statutory obligations applying to their operations during construction and operation of the scheme. Consideration under this heading should include (inter-alia):

3a) The impact of three new level crossings on safety, traffic flows, and congestion particularly in relation to the A21 and future plans for this road

3b) The impact of the scheme on roads, footpaths and bridleways, including the impact on access to property and amenities.

2.1.3. My Proof also considers matters pertaining to the operation and safety of level crossings, including relevant published guidance and good practice applicable to the management and operation of level crossings, industry and academic research considering extent of risk to users of level crossings, and statements provided by the Office of Road and Rail (ORR) as a statutory consultee.

2.2 KEY DOCUMENTS

2.2.1. The key documents referred to in this proof include the following:

- RVR ORR Submission (**CD:RVR/75**)
  - Arup A21 Crossing Feasibility Report (**CD:RVR/75 Document 2**)
  - B2244 Junction Road (**CD:RVR/75 Document 3**)
  - Bridleway Crossing 36b (**CD:RVR/75 Document 4**)
  - Northbridge Street Crossing (**CD:RVR/75 Document 5**)
  - Narrative Risk Assessment A21 (**CD:RVR/75 Document 9**)
  - Narrative Risk Assessment Junction Road (**CD:RVR/75 Document 10**)
  - Narrative Risk Assessment Northbridge Street (**CD:RVR/75 Document 11**)
  - Narrative Risk Assessment Bridleway crossing (**CD:RVR/75 Document 12**)
- J C White – Title Plans (B2 to B6) dated 2016 (**CD:RVR/23**);
- J C White – Plans (Sheets 1 to 8) dated 2017 (**CD:RVR/23**);
- Halcrow – Gradient Profile Plans (RVG – G – 001 – 006) dated 2014 (**CD:RVR/23**);
- ARUP - A21 Proposals 2021**(CD:RVR/74)**
- Temple – EIA Summary Statement 2021 **(CD:RVR/71)**
- ORR Letter response to WSP 25th March 2020 ref **APP-A**

- ES Update Report, March 2021 and Appendix A - Noise **(CD:RVR/70-1)**
- Temple ES Volume 1 Environmental Statement Non-Technical Summary Volume 1 **(CD:RVR/24)**
- Mott MacDonald Traffic Impact Study **(CD:RVR/34)**
- Temple ES Volume 2 **(CD:RVR/25)**
- Estimate of Costs **(CD:RVR/21)**

Representations:

- REP-17 ORR Representation Level Crossings: A guide for managers, designers and operators (Network Rail, 2011) (**CD:REP/17**)

2.2.2. Additional information that has informed my proof has been gathered from the Rother Valley Railway website and the planning application documents held on the Rother District Council portal (application reference RR/2014/1608/P **(CD:RVR/07)**).

2.3 AVAILABILITY OF INFORMATION

2.3.1. My Proof considers the updated Core Documents submitted by RVR on the 08 March 2021, and subsequent release of Narrative Risk Assessments (NRA) received as recently as 25th May 2021 and Walking, Cycling and Horse Riding Assessment received 3rd June, that were compiled in response to the Secretary of State's Rule 17 letter.

2.3.2. Section 2.3 of Mr Fielding's Proof of Evidence explains that a significant amount of new technical and design information has been made available in the last few weeks prior to the deadline for the exchange of evidence.

2.3.3. This information is directly relevant to my proof of evidence. For example, the revised Narrative Risk Assessments describes a change in the proposed A21 level crossing system, from a Manually Controlled Barrier with Obstacle Detection and CCTV system, to a Full Automatic Barrier Locally Monitored with Obstacle Detection system.

2.3.4. The late publication of this evidence has made it extremely difficult for me to finalise my evidence as I have been unable to review all the submitted material in detail in the time available. I have noted and commented on the material where possible but like Mr Fielding, I reserve my position so far as it is necessary for me to clarify my evidence either before or at the public inquiry once I have had a proper opportunity to review the material in full.

2.3.5. Amended submission documents also include revised A21 highway engineering drawings describing proposals to address previous shortcomings in the design of the carriageway interface with the level crossing, including an updated construction and operation commentary, **(CD:RVR/74-n)**.

2.3.6. Additionally, reference is made in the **Temple EIA Air Quality Chapter 6.3.3 (CD:RVR/70-1)** to a level crossing barrier closure duration of **72** seconds.

2.4 SCOPE OF CRITICAL REVIEW

2.4.1. I have reviewed the proposals by Rother Valley Railway Ltd as set out in the submission Documents in respect of level crossing infrastructure and operation of the level crossings where the railway intersects existing public highway, Public Rights of Way (PRoW), and private access across the railway to address matters associated with land severance, disruption to the road transport network, level crossing safety, and the identification of appropriate mitigation.

2.4.2. I consider the proposals for the scheme to be deficient and therefore unacceptable in the following aspects, as detailed in my evidence, below:

- The application is littered with technical discrepancies that undermine the accuracy and integrity of the proposals.
- The proposals lack a full appreciation of safety risk to all users of the level crossings,
- the barrier closure durations have been underestimated
- the needs of all users have not been adequately considered in the design
- the proposals fail to give adequate consideration to agricultural land access and land take requirements for adequate approaches and visibility envelopes
- The proposals do not meet ORR policy requirements.

2.4.3. I have formed this conclusion by drawing on my extensive experience working with Network Rail on over 90 level crossing projects seeking to minimise risk to all users; furthermore, I find it wholly unacceptable that a project that seeks to introduce a total of 9 level crossings should be permitted to proceed without full and adequate consideration of level crossing operations and user safety, particularly those on the public highway. I am of the opinion that this scheme, if granted, will introduce a disproportionate level of risk to all users of the level crossings, and unacceptable imposition on my clients as landowners directly affected by the proposals.

3 PROPOSED SYSTEM

3.1 INTRODUCTION

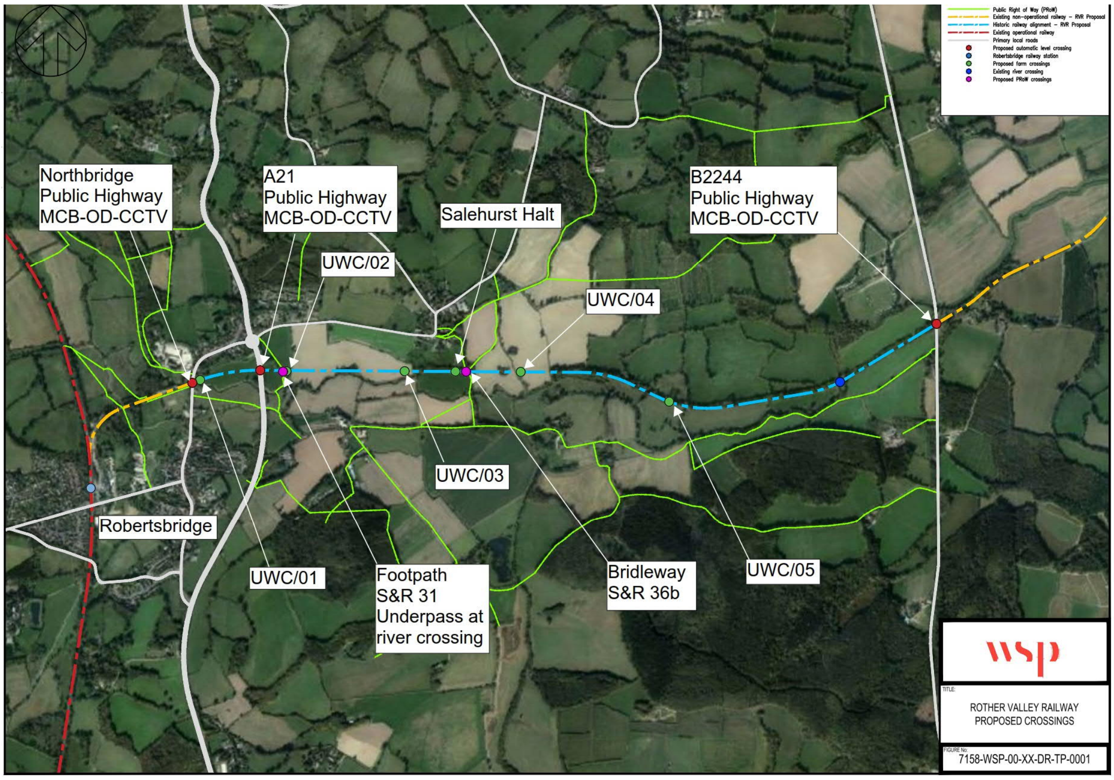
3.1.1. The Rother Valley Railway Limited (RVRL) is a heritage railway company based in Robertsbridge. The project proposed by RVRL is to re-establish a 3.42km / 2.2-mile link between Robertsbridge and the East Sussex and Kent railway to create a contiguous 22.5km / 14-mile route between Robertsbridge and Tenterden for use by heritage train services. The route is illustrated below in **Figure 1.**

3.1.2. The implementation of the railway line requires the introduction of nine level crossings over a distance of 3.42km comprising of:

- Three public highway level crossings
  - A21 (120m south of Northbridge Roundabout);
  - Northbridge Street; and
  - B2244 Junction Road.
- One Bridleway level crossing
- Five uncontrolled private accommodation level crossings (ALC)*
  ** for the purpose of this proof I will use the Network Rail terminology of UWC for User Worked Crossings when referring to private farm access/accommodation level crossings)*

3.1.3. Additionally, the proposals include the diversion of Public Footpath SAL/31/1 to a proposed underpass of the railway to be shared with the Mill Stream watercourse.

Figure 1: Rother Valley Railway – Route illustration with proposed level crossings



3.2 EXISTING ROAD CONDITIONS

3.2.1. Robertsbridge is a rural village located in the Rother District of East Sussex. It is bypassed to the east by the A21 trunk road which runs between London and Hastings. It is located approximately 10 miles north of Hastings and 13 miles south-east of Royal Tunbridge Wells. The A21 connects both settlements, and joins the M25 at junction 5, providing access to Greater London and the wider areas of the United Kingdom.

3.2.2. My colleague Mr Ian Fielding presents a detailed assessment of the existing road conditions in Section 3 of his proof which I will not repeat. However, I provide a brief summary below:

A21

3.2.3. The A21 Robertsbridge Bypass is part of the Strategic Road Network managed by Highways England. The A21 is a mix of single and dual carriageways, and generally runs on a north-south alignment connecting south west London with Hastings.

3.2.4. The section of the A21 Robertsbridge Bypass which will have the largest impact from the implementation of the level crossing is between the A21 Robertsbridge Bypass/ Church Lane/ Northbridge Street roundabout and Redlands Lane. The A21 at this location is subject to the national speed limit south of the River Rother; north of the river towards the roundabout the speed limit drops to 40mph.

3.2.5. There are currently no level crossings on any part of the A21.

Walking and Cycling Provision

3.2.6. There are no formal on-carriageway walking or cycling facilities within this section of the A21, and the high-speed character of the road is unlikely to attract significant numbers of pedestrians and cyclists.

NORTHBRIDGE STREET

Existing Road Conditions

3.2.7. Northbridge Street/ High Street provides the primary access from the A21 to Robertsbridge Village Centre. Northbridge Street is a single carriageway road and is subject to a 30mph speed limit, and serves residential streets, local services and amenities, including schools and shops.

Walking and Cycling Provision

3.2.8. There is a consistent footway of good quality on the west / north side of the High Street, which continues to Northbridge Roundabout. There is an intermittent footway on the east / south side of variable width.

3.2.9. There are several Public Rights of Way within close proximity to the north and south of the existing and proposed railway lines.

B2244 JUNCTION ROAD

Existing Road Conditions

3.2.10. The B2244 Junction Road is a single carriageway. The road is rural in nature and has limited property entrances fronting the road. It has a generally straight alignment and runs north-south from Hawkhurst to Crisps Corner.

3.2.11. The B2244 at the proposed location of the level crossing is subject to a 40mph speed limit. Approximately 50m north where the level crossing is proposed the road narrows over the River Rother to approximately 5m with the central road markings removed. 100m south of the proposed level crossing location the road narrows to 5m wide with the central road markings removed.

Walking and Cycling Provision

3.2.12. There are no formal on carriageway walking or cycling facilities in the vicinity of the proposed level crossing on the B2244 Junction Road. However, Public Footpaths are present to the north and south of the rail line taking direct access from the B2244. These footpaths provide access to the surrounding area, in particular to Bodiam and Ewhurst

3.3 SCHEDULE OF PROPOSED LEVEL CROSSINGS

3.3.1. RVR propose to introduce several level crossings to preserve access across the railway for users of the public highways, public rights of way, and private land access. The RVR proposals do not include grade separation, i.e. the construction of bridges or underpasses.

3.3.2. **Table 1** below presents a schedule of proposed level crossings, representing an introduction of nine level crossings over a 3.4km route. Chainages are measured from Land Use Plans Sheets 1-7 published by JC White Geomatics Ltd July 2017 (**CD/23**).

Table 1: Schedule of Proposed Level Crossings

REFERENCE	USAGE	TYPE	CHAINAGE
Northbridge Street	Public Highway	AFBCL-OD	814.5m
UCW/01	User Worked Farm Access	UWC	960m*
A21	Public Highway	AFBCL-OD	1,122.5m
UCW/02	User Worked Farm Access	UWC	1,240
UCW/03	User Worked Farm Access	UWC	1,760m*
Salehurst & Robertsbridge 36b	Bridleway**	BW	2,041m*
UCW/04	User Worked Farm Access	UWC	2,260m*
UCW/05	User Worked Farm Access	UWC	2,952m*
Junction Road	Public Highway	AFBCL-OD	4209.5m

* Measured distance – no chainage provided on plans

** Evidence in the Core Documents suggests this crossing will also operate as a Farm Access

3.3.3. I note a discrepancy in the location of proposed User Worked Crossing (referred to in my proof as UWC/01) depicted on Order Plans (**CD:RVR/23**) between Northbridge Street and A21 that has bearing on land access and the operation of neighbouring level crossings. RVR drawing published by JC White dated July 2017 (**CD:RVR/23**) shows this UWC located adjacent to Northbridge Street, between Bridges 6 and 7, whereas the Works and Lane Plans (**CD:RVR/23**) show this UWC located further east, positioned centrally between Northbridge Street and A21. **Figure 2** and **Figure 3** below highlight the two different locations shown for UWC/01. Red Line Boundary Plan Showing UWC/01 Location (**CD:RVR/23**)

Figure 2: Red Line Boundary Application Plan showing location of UWC/01 (CD:RVR/23)

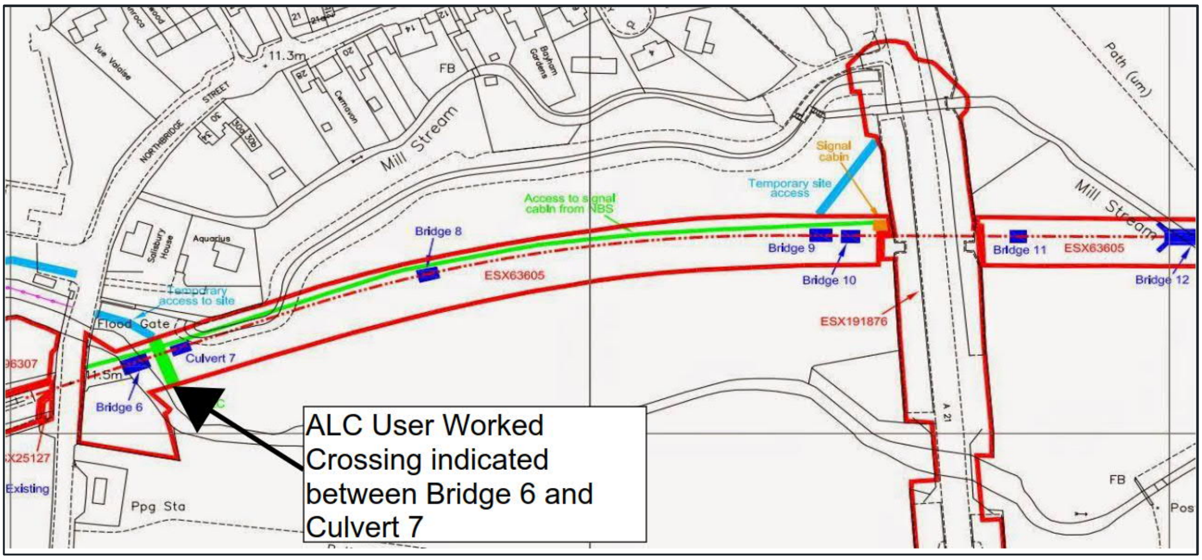
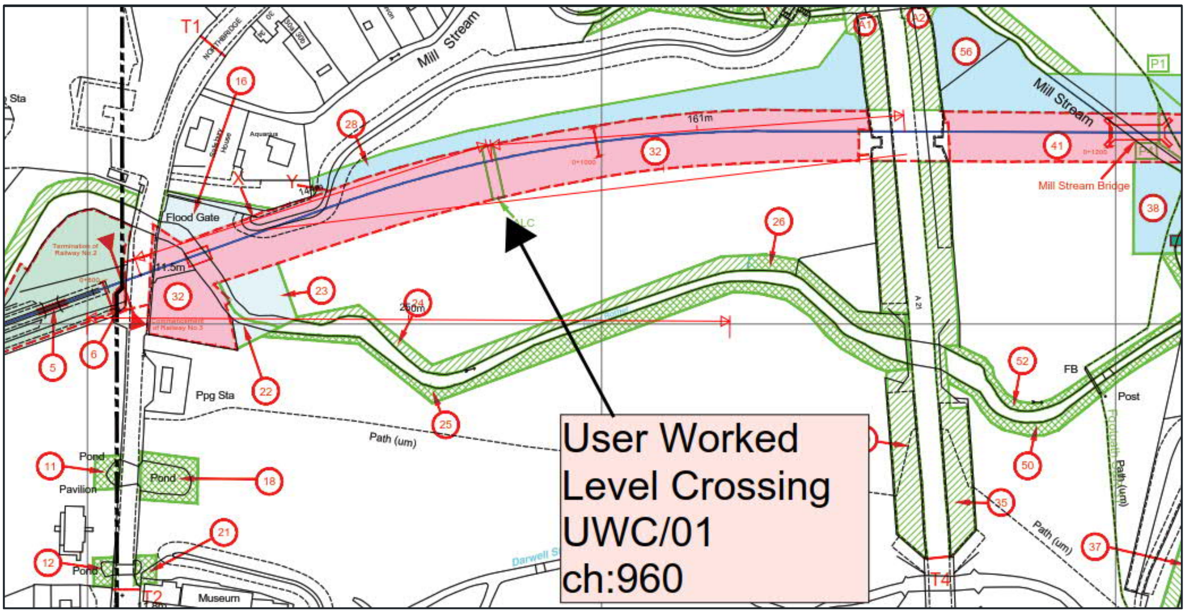
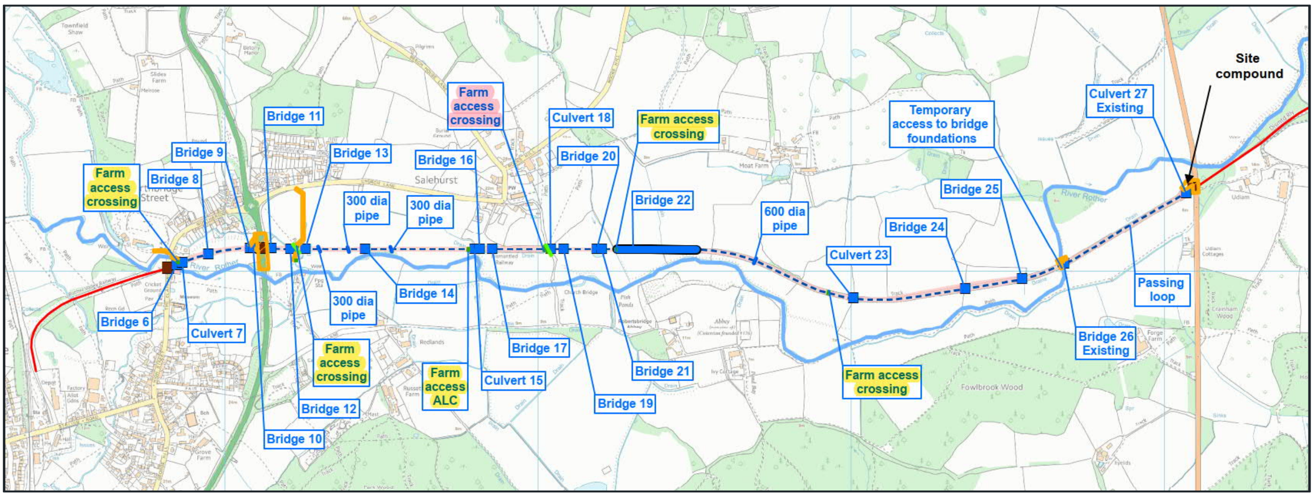


Figure 3: Works and Land Plan Extract Showing UWC/01 Location (CD:RVR/23)



3.3.4. Furthermore, Environmental Statement Non-Technical Summary, Figure 3 Permanent and Temporary Landtake **(CD:RVR/24)** describes the Salehurst & Robertsbridge Bridleway 36b level crossing as a Farm Access Crossing. An extract of the ES land take plan is illustrated in **Figure 4** below depicting an additional Farm Access Level Crossing highlight in pink.

Figure 4: Extract from CD/24 ES Land Take Plan



3.3.5. For the purposes of this proof I have assumed the location of UWC/01, and provision of all UWC's are as defined on Land Use Plans Sheets 1-7 published by JC White Geomatics Ltd July 2017 (**CD:RVR/23**).

4 ASSESSMENT OF LEVEL CROSSING OPERATIONAL PROCEDURES

PUBLIC HIGHWAY

4.1.1. The Narrative Risk Assessments (NRA) **(CD:RVR/75 Document 9,10 & 11)** describe the public highway level crossings as manually controlled barriers operated by a signaller, with Obstacle Detection and Closed Circuit Television, referred to as a MCB-OD-CCTV. The crossings consist of an opposing pair of barriers, each extending over one lane of traffic to both sides of the level crossing as illustrated on the General Arrangement drawing prepared by ARUP, reference C.950.G.102 **CD:RVR/75 Document 2**).

4.1.2. Updated Narrative Risk Assessments received Friday 28th May (16:15hrs) (**APP-D**) show a change to the type of public highway level crossing, described as Automatic Full Barrier Crossing Locally monitored with OD (AFBCL-OD).

4.1.3. The Network Rail publication 'Level Crossings: a guide for managers, designers and operators' (**CD:REP/17**) sets out guidance and examples of good practice. It describes the types of crossing currently in operation of the public rail network as illustrated in **Figure 5** below, noting that an AFBCL-OD is a relatively new type of installation, having first been installed in 2018 at Princess Street, Ardrossan. This type of crossing is derived from an Automatic Barrier Crossing Locally Monitored on low speed routes, and therefore timing standards are not currently available; however, the physical arrangement of an AFBCL-OD is similar to MCB-OD with the provision of a pair of opposing entry-exit barriers, with closure sequence controlled by the OD equipment.

Figure 5: LC - Types of crossings in operation

Protection from train movements	Crossing confirmed clear	Warning arrangements	Full barriers/gates	Half barriers	No barriers	Telephone "protection"
Protected	By signaller or crossing keeper		MCG			
			MCB			
			MCB (CCTV)			
	By obstacle detector		CB-OD			
	By driver			ABCL		
					AOCL	
	By train crew/other		TMO			
Unprotected		Approaching Train		AHB		
					UWC (MSL)	
					FP (MSL)	
		Telephone				UWC (T)
		Line of Sight			OC	
					UWC	
					FP/BW	

Source: Network Rail, 2011

MCB: manually controlled barrier crossing
MCB (CCTV): manually controlled barrier crossing with closed circuit television
CB-OD: controlled barrier crossing with obstacle detection
ABCL: automatic barrier crossing locally monitored
AOCL: automatic open crossing locally monitored
TMO: train crew (or other peripatetic railway staff) operated crossing

AHB: automatic half barrier crossing
UWC (MSL): user worked crossing with miniature stop lights
FP (MSL): footpath crossing with miniature stop lights
UWC (T): user worked crossing with telephone
OC: open crossing UWC: user worked crossing
FP/BW: footpath or bridleway crossing

4.1.4. The updated NRA [**APP-D**] describes the safety system as Obstacle Detection with Local Monitoring performed by the train crew, with access to a trackside Driver Release Unit for manual override control of the barrier. CCTV surveillance by the signaller is also proposed. Although the NRA [**APP-D**] does not stipulate the level of control/intervention the signaller has in the barrier operation, **RVR SoC para 6.4** states that the signaller will have override control of the barrier operation:

'This is a 'locally monitored' by a signalman located in a suitable 'signal box' building immediately adjacent to the A21 crossing and the signalman will also view/oversee the other two road crossings by cameras. At any time the signalman can stop or delay the crossing operation process, such as if a car is stopped within the barrier area, etc. Locating a 'signal box' next to the A21 was decided in discussion with the HA (now HE) in part in response to concerns as to such as how a stationary traffic situation would be managed. [**RVR SoC para 6.4]**

4.1.5. **RVR SoC para 6.2** states that the barrier sequence takes about a minute (allowing for the inclusion of the radar scan).

4.1.6. Red Light Safety cameras are also proposed with the intent to improve user behaviour and deter misuse with reference to examples of similar installations on the national rail network (NRA Introduction [**APP-D**]).

4.1.7. As other Core Documents from the original submission have not been withdrawn and continue to refer to the provision of MCB-OD-CCTV, there remains ongoing confusion regarding the exact nature of the application and crossing type; however for the purpose of this Proof I assume the use of an AFBCL at all interfaces with the public highway.

KEY OBSERVATIONS

4.1.8. For reference, and clarity, Network Rail's published Level Crossing database available online (Network Rail, 2021), lists 6206 operational level crossings on the national network. Of these, 117 are listed as operating with OD (all MCB). 610 are recorded as MCB-CCTV. None are recorded as operating with OD and CCTV. Two crossings are identified as AFBCL-OD, having risk gradings of H2 and G4, as illustrated in **Figure 6** below.

Figure 6: Extract from NR Level Crossing on-line database

Crossing name	Crossing type	Location	risk score	Line speed	No. of trains per day	Census (current expectation)	Current protection arrangements
Ardrossan Princes Street	Public Highway Automatic Full Barrier with Obstacle Detection (locally monitored by Train Driver)	North Ayrshire	**H2**	15 mph	28	6777 Vehicles 864 Pedestrians or Cyclists	* Full barrier equipment * Road traffic light signals * Obstacle detection * Audible alarm * Signage
Dingwall No. 1	Public Highway Automatic Full Barrier with Obstacle Detection (locally monitored by Train Driver)	Highland	**G4**	20 mph	8	3802 Vehicles 701 Pedestrians or Cyclists	* Full barrier equipment * Road traffic light signals * Obstacle detection * Audible alarm * Signage

4.1.9. I am concerned by RVR's approach to apply an AFBCL for use on the Strategic Road Network that carries substantially greater volumes of traffic than the two operational AFBCL-OD crossings on the national rail network, particularly as the local monitoring by the train crew increases the risk of interaction between the train crew and road traffic.

4.1.10. Furthermore, there is a discrepancy between the NRA [**APP-D**] and **RVR SoC** that describe the method of Local Monitoring, with no clear indication of the person holding responsibility for overall control of the level crossing. The NRA states that the train crew hold this responsibility, whereas the SoC states the signaller can intervene at any time. This raises doubt in my mind over the safe control and operation of the level crossing, which has bearing on the actions taken by the train crew on approach to the crossing that ultimately impacts on barrier down time and safety critical operations.

4.1.11. Separately, while the provision of Red Light Safety Cameras (RLSC) is welcomed in order to deter mis-use, Network Rail generally install such cameras at locations with a high risk of mis-use, and high risk crossings with high usage and long barrier down times. The proposal to introduce RSLC's would suggest the application believes there to be a significant risk of mis-use of these crossings, or the existing safety arrangements are insufficient to manage safe and proper use of the crossings.

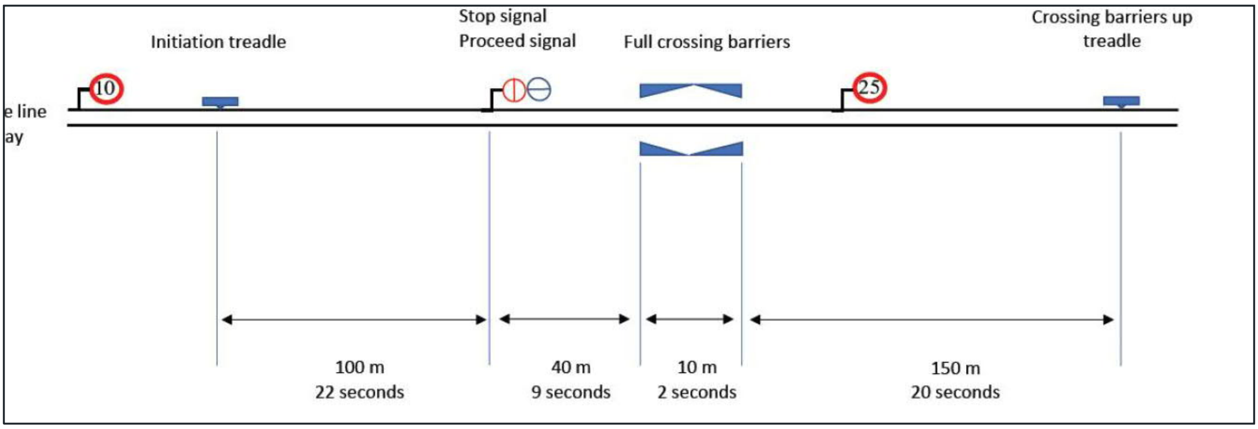
4.1.12. Furthermore, enforcement of RLSC's on the national rail network is generally administered by the relevant local authority or British Transport Police; however, the RVR has not provided evidence of how enforcement will be managed.

4.2 LEVEL CROSSING OPERATION

4.2.1. Within this section I examine the proposed operation of the public highway level crossings as described within Narrative Risk Assessment (NRA) (**APP-D**), considering barrier closure cycle, line speed, and safety critical operations.

4.2.2. Section 7 of the NRA includes a Signalling Diagram Layout depicting signal positions measured from the crossing including transit timings for trains using the crossing travelling at 10mph (16kph), an extract of which is presented in **Figure 7** below.

Figure 7: RVR Level Crossing Schematic



4.2.3. NRA [**APP-D**] states:

'*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*.

4.2.4. *The normal operation procedure is described as*:

'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 wigwag 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'

4.3 BARRIER CLOSURE FREQUENCY

4.3.1. This section examines the barrier closure RVR ORR Submission (**CD:RVR/75**), Document 9 Annex A Part 7 that states:

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.

4.3.2. Mott MacDonald Traffic Impact Study Appendix A: RVR 'Proposed Railway Level Crossings', Section heading 'Timings'(**CD:RVR/75**)

'It is anticipated that crossing closures (in both directions) per day for regular passenger trains would number from about 10, between 1000 hrs and 1700 hrs during spring and autumn, to about 14 between 1000 hrs and 1830 hrs during the peak summer holiday season.'

4.3.3. Mott MacDonald's Rother Valley Railway Traffic Impact Study: 5. Para 2.2.3 and Conclusions and Recommendations, (**CD:RVR/34**) it is noted that trains would normally run on about 50% of the days of the year with 5 to 7 trains operating per day in both directions. Trains would not start running until after 10:00 and would continue throughout the day with the last train running between 16:00 and 18:00, depending on the day.

4.3.4. Environmental Statement Volume 2, Section 2.5.3 (**CD:RVR/25**) provides an alternative operational service frequency with up to 8 return journeys, equating to 16 closures of the level crossings during normal day time operating hours, and an additional evening dinner service, presented in **Figure 7.**The proposed scheduled train services equate to up to 18 closures of the level crossings daily. It is also likely that additional maintenance and marshalling services will run on the route that will further increase the frequency of barrier closures. **Figure 8** - Train service schedule, extract from ES Vol2.

Figure 8: Train service schedule ES Vol2 (CD:RVR/25)

2.5.3 In addition to the regular timetabled services the railway is also used for private charters and as a film location. Under normal circumstances, these additional train movements would not coincide with the most intensive use of the railway and as such it is not anticipated that the railway would exceed ten return journeys in a day during normal operation. The journeys would be provided by a combination of steam and heritage diesel locomotives. The timetabled services can be summarised as follows:

- 9 days a year – 8 return journeys a day;
- 9 days a year – 7 return journeys a day;
- 128 days a year – 5 return journeys a day;
- 14 days a year – 4 return journeys a day; and
- 192 days a year – no timetabled service[1].

2.5.4 The timetabled service usually operates between 10:00hrs and 18:00hrs. However, the railway proposes to extend the evening diner service that currently operates weekly on the Kent & East Sussex Railway through to Robertsbridge. This service would finish at 23:00hrs.

KEY OBSERVATION

4.3.5. The frequency of train paths over the level crossing has direct bearing on the risk grading of a level crossing, whereby the greater the number of services has direct correlation with increased risk.

4.3.6. Greater frequency of level crossing closure also directly and adversely affects traffic flow and other users of the level crossing, leading to increased delay; however, inconsistencies in the deposited plans undermines the ability to make an informed and true assessment of traffic impacts. Also, RVR has not provided any information that considers the running of non-scheduled services, such as maintenance services and train marshalling/stabling trips that will contribute to an increase in frequency of barrier closures. Such inconsistency in train frequency and timetabling does not allow a thorough and informed assessment of transport delay and assessment of risk, and undermines the magnitude of impacts and validity of this application.

4.4 BARRIER CLOSURE DURATION

4.4.1. Level crossing operational timing sequence is dictated by the train speed passing over the crossing. The information pertaining to line speed presented by the RVR is inconsistent, suggesting a range of train speeds and durations for barrier down time.

4.4.2. RVR original SoC Section 6.1 provides a summary of level crossing operations, with a timing sequence described in Para 6.2 as:

*The above sequence takes less than **1 minute**. During the whole sequence the train driver will keep a lookout and be able to stop if the DCI fails to display a flashing white light, or if the crossing is obstructed.*

4.4.3. In contrast, the RVR document, Proposed Level Crossings issued 12th October 2011 (**CD:RVR/34 Appendix A Timings**) provides estimated road closure timings based on relative train speeds of **25mph** and **15mph** using observations of the Kent & East Sussex Railway, with stated level crossing occupation times of 38s and 45s respectively. This is showed in **Figure 9** below.

Figure 9: RVR Level Crossing closure timings

Timings:

The estimated total ABC(L) occupation time for a typical Kent & East Sussex Railway passenger trains are as given below;

Normal train lengths are a locomotive and up to five coaches giving a nominal 115 metres overall length.

Train length	Speed 25 mph - Road closure time	Speed 15 mph - Road closure time
115 metres	38 sec	45 sec

4.4.4. Mott MacDonald's Rother Valley Railway Traffic Impact Study: Appendix A RVR Proposed Railway Level Crossings (**CD:RVR/34**), A brief description of level crossing operation, bullet 'b' states:

*'Sequential operation of traffic warning lights and barriers then commences. Amber lights show on 'wig wag' heads for 3 seconds before alternating red lights start flashing. The barriers shall take not more than **10 seconds** from the time they start to lower, to reach the fully lowered position. The train shall arrive at the crossing not less than 27 seconds after the beginning of the closure sequence.'*

4.4.4.1 Mott MacDonald Traffic Impact Study (CD/RVR ORR Submission) Section 3, para 3.1.1 states

'*A barrier closure time of 55 seconds has been assumed, with sensitivity testing with a 110-second closure.*'

4.4.4.2 Mott MacDonald Traffic Impact Study (**CD:RVR/34**) Section 4.6 states

'On the advice of the ORR/HMIR, see Appendix B, it has been assumed that the normal duration of any closure of the crossing would be 51 seconds. In some instances it may be necessary to close the barrier for a longer period and thus a sensitivity test has been undertaken to establish queue lengths resulting from a 112 second closure, also suggested by the ORR/ HMIR.

4.4.4.3 Mott MacDonald Traffic Impact Study **(CD:RVR/34)** Section 5 states

The level crossing barrier would normally be lowered for a maximum of 51 seconds, to allow a 115m long train travelling at between 10 and 25 mph to cross each of the three roads.

4.4.5. The amended Environment Statement Update Report **(CD:RVR/70-01)**, Air Quality para 6.3.3 states a barrier closure time of 72 seconds, as illustrated on **Figure 10** below.

Figure 10: ES Updated Barrier Closure Time

6.3.3 Following additional transport assessment, longer crossing closure times have been assumed and updated traffic data have been provided for the proposed level crossing on the A21 by I-Transport. Emissions of NO_x and PM_{10} have been calculated for the A21 level crossing following a similar method to that used in the previous assessment of traffic emissions at level crossings. Updates to the method are described below.

- A barrier closure time of 72 seconds was assumed. This is the higher closure time assumed in the updated traffic modelling. DfT traffic counts for 2019 were used, using growth factors provided by I-Transport.

RVR website video comparison

4.4.6. In support of the TWAO application, the RVR has used its internet website to list examples of other level crossings in order to support its case for the introduction of new level crossings. The webpage includes a video of a level crossing in operation on the Isle of Man (Rother Valley Railway, 2018)

4.4.7. The crossing in question, on Castletown Road, Isle of Man is located approximately 465metres to the northeast of Port St Mary station. The barrier downtime in this example is timed at 46 seconds from the start of the closure sequence to the full raising of the barrier. It should be noted that the video starts at the moment of barrier operation, so does not record the elapsed time from when the warning lights are activated to the start of the barrier operation. The train, comprising of a locomotive unit and four passenger carriages, takes six seconds to clear the level crossing.

4.4.8. The video is accompanied with a footnote stating:

It is worthwhile to highlight again that the trains crossing all the roads on the RVR will be in full motion at the barriers, whereas the trains leaving the stations against road crossings on the K&ESR are getting up speed from a standing start.

KEY OBSERVATIONS

4.4.9. Throughout the submission documents, there is considerable inconsistency in the stated and assessed duration of level crossing closure, including variances in the stated train speeds over the crossing. It is my opinion that such discrepancies misrepresent the actual delay to road users at the level crossings, by underestimating the actual length of closure. The RVR has failed to provide any supporting evidence to substantiate the 72 second barrier down time as stated in the Air Quality report.

4.4.10. The messaging associated with the video example available on the RVR website appears to imply that unlike the train shown in the video, described as ‘getting up to speed’, RVR trains will be passing at speed and therefore transit the crossing in less time. If this is the intent, then I would suggest this is a misrepresentation of the actual time required for the RVR trains to transit the level crossing at a maximum speed of 10mph, and therefore this video example is not an accurate indication of the total closure time of the public highway level crossings.

4.4.11. To fully understand the calculation of barrier down time, reference should be made to **ORR: Level Crossings: A Guide For Managers, Designers & Operators (2011)** (**CD:REP/17**) . This guidance sets out the approach to for safe management, operation, modification and use of level crossings in the UK, including timing operations for barriered level crossings and includes timings for barrier operations.

4.4.12. Para 2.64 of the guidance describes the method of operation for level crossings with Obstacle Detection equipment as follows:

The sequence of events to close the crossing to road traffic, once the lowering cycle has been initiated, is:

(a) the amber light on each of the road traffic light signals immediately shows and the audible warning begins. The amber lights show for approximately 3 seconds (up to 5 seconds to suit road conditions);
(b) immediately the amber lights are extinguished, the intermittent red lights should show;
(c) approximately 4 to 6 seconds later the left-hand barriers should start to descend. Once the left-hand side barriers are lowered, a scan of the crossing area is performed by the obstacle detector. If the crossing is clear, the right-hand barriers will begin to descend immediately. If an obstacle is detected, and in order that it may clear the crossing, there will be an interval before the right-hand side barriers may begin to descend. The time for each barrier to reach the lowered position should normally be 6 to 10 seconds. At skew crossings, where the crossing distance can be greater, barrier timings may need to be lengthened accordingly;
(d) it should not be possible to lower the barriers unless at least one red light in each road traffic light signal facing approaching road traffic is working;
(e) once the barriers have started to descend, the lowering cycle should be completed in the normal sequence even if all the red lamps in any one of the road traffic light signals facing approaching road traffic fail. The barriers may then be raised when it is safe to do so. Where, in these circumstances, the barriers have not started to descend, they should remain in the raised position;
(f) the audible warning for pedestrians should stop when all the barriers are fully lowered;
(g) the intermittent red lights should continue to show; and
(h) the crossing is again scanned by the obstacle detector. A clear scan, confirming ‘crossing clear’, is required before railway signals can be cleared for the passage of trains

4.4.13. I have summarised the operation timings described above in **Table 2** below.

Table 2: Level crossing barrier operation timings

	Sequence time (seconds)	Cumulative time (seconds)
*Amber light and the audible warning begins** ** A21 National speed limit approach – recommendation that min Amber time of 5 seconds to allow sufficient time for drivers to react; DfT Traffic Signs Manual Chapter 6 Table 24-1 prescribes a fixed duration of Amber signal of 5 seconds prior to Red flashing.*	5	5
Red wig-wag lights approximately- 4 to 6 seconds later the left-hand barriers should start to descend	4-6	9-11
Left hand (entry) barrier lowering operation	6-10	13-21
Obstacle detection scan If an obstacle is detected there will be an interval before the right-hand side barriers may begin to descend. The time for each barrier to reach the lowered position should normally be 6 to 10 seconds.	1	14-22
Right hand (exit) barrier lowering	6-10	20-32
Final obstacle detection scan (barrier down), confirming 'crossing clear', prior to activation of clear to pass signal	3	23-35
Total time for barrier close sequence		23-35
Train transit time from level crossing protection signal**	9	32-44*
Train transit time at over crossing assuming 115metre overall length travelling at 10mph/4.47ms^{-1}	26	58-70
Time to Barrier-up treadle – 150m beyond level crossing (115m train clearing crossing to locomotive unit striking treadle a further 35m ahead)	8	66-78
Barrier up time	7	73-85

**para 2.94 Method of Operation for ABCL states at least 95% of trains to arrive within 75 seconds and 50% within 50 seconds.*
*** Assumes train is passing signal at 10mph and does not stop. If the train is required to stop and then progress from a stationary braked position that would require additional time to enter crossing.*

4.4.14. Notwithstanding the timings presented in **Table 2** above that indicates a potential minimum time of 23 seconds for the barriers to complete the close cycle, consideration should be given to **NR/L2/SIG/11201/ModX21 table 1 (APP-B),** illustrated in **Figure 11** below, that stipulates a minimum timing sequence from initiation to barrier closure of 35 seconds for manual controlled barriers with OD (applicable to AFBC-OD), and consistent with the upper timing range as set out in above.

Figure 11: MCB Timings - extract from NR/L2/SIG/11201/ModX21

Table 1 – Crossing timings (MCB-OD).

Function	Time
Amber Road Lights	3 Secs
Red Road Lights	5 Secs
Entrance Barriers Lower	10 Secs
Exit Barriers Lower	10 Secs
Down Delay Time	1 Sec
Final Obstacle Detector Check	3 Secs
Interlocking & Aspect Clearing	3 Secs
Total Time	**35 Secs**

4.5 LEVEL CROSSING PROTECTION

4.5.1. Details of the signal protection to the level crossing are presented in the accompanying Narrative Risk Assessments, (**APP-D**) that are intended to describe the operation of the level crossing as detailed below:

4.5.2. A21 Narrative Risk Assessment **(APP-D)** Section 7 states:

‘*The train will approach the protecting signal at the level crossing at a maximum speed of 10 mph, thus ensuring that the train has the ability to stop within 30 metres. The signalman shall check the CCTV monitors, ensure the obstacle detection system displays a clear crossing indication, then operate the closing sequence of the barriers demonstrating that the signaller has full and control of the operation, two train crew members will operate the train and good sighting will always be maintained*.’

4.5.3. The Level Crossing Signalling Arrangement schematic presented by RVR in the Northbridge Street Options report (**CD:RVR/75, Document 9**) is shown in **Figure 7** above.

4.5.4. The schematic shows the crossing initiation treadle is 140m prior to the crossing points. **Figure 7** also indicates that the crossing barrier up treadle is 150m after the crossing. Approach speed of 10mph. The figure from RVR suggests that the same details will be present for the Northbridge Street, A21 and Junction Road.

KEY OBSERVATIONS

4.5.5. An AFBCL generally incorporates a Driver White Light (DWL) indicator positioned at the crossing to provide the driver an indication as to when the crossing safe to pass, allowing the driver to approach the crossing being prepared to stop. This is not present on the signalling schematic.

4.5.6. Based on 100metre separation distance between the initiation treadle and level crossing Stop/Proceed signal, stated as 100metres (**Figure 7** above), it is evident that the approaching train travelling at 10mph (16kph) will arrive at the Stop/Proceed signal after 22 seconds, and before the barriers have completed the close cycle of 35 seconds **Table 2** and **Figure 7** above. In the absence of a DWL, then the driver will be required to stop at the Stop signal to avoid a signal passed at danger (SPAD). The train will be held at the Stop signal and remain stationary until completion of the level crossing barrier closure sequence awaiting the signaller to clear the Stop signal and give permission to proceed. This inherently changes the operational procedure for the level crossing as in all instances the train will have to slow and stop at the signal in advance of the crossing and increase the transit time for the train as it will proceed from a standing start.

4.5.7. The total transit time for a train travelling at 10mph (16kph) to the level crossing, a total distance of 140metres, is 31seconds. Based on the barrier close timings of 35 seconds presented in **Table 2** and **Figure 7** above, if the approaching train failed to stop at the crossing protection signal, and in the absence of any automated train detection systems to bring the train to a halt, or DWL at the crossing, the train is capable of reaching the level crossing before the barrier close sequence is complete.

4.5.8. I therefore disagree with the RVR claimed barrier timing cycles, and expect the likely duration to be between the upper end of the timing sequence set out in **Table 2**.

4.5.9. Furthermore, an essential component of the level crossing protection is the reliance on visual observation of the level crossing by the signaller and train crew, that will be required on each occasion the crossing is in use. With reference to my statements in Section 4.3 above regarding train service frequency, the RVR propose to operate an evening dinner service running until 23:00hrs. This evening service will therefore operate during hours of darkness; however, the accompanying updated NRA for the A21 (**APP-D**) states '*It is not proposed to light the level crossing,'* but states reliance on and extension of the existing highway street lighting system.

4.5.10. Considering Junction Road and Northbridge Street, the NRA (**APP-D**) states that the level crossing will be illuminated. However, ARUP drawing C.950.G.122 P1 Junction Road General Arrangement contained therein (page 5) fails to show any lighting equipment.

4.5.11. Guidance on the lighting of level crossings is provided within NR/L2/SIG/11201/ModX23, that states:

All new MCB-CCTV crossings shall therefore be designed to achieve 40 Lux minimum with a maximum to minimum ratio of 3 to 1, over the crossing surface, at the time of commissioning. This is deemed sufficient to allow for the lighting to degrade over time without infringe the group standard values and generally ensuring that the failure of a single lamp does not require the crossing to be immediately manned.

4.5.12. Typical illumination levels for street lighting on a Highways England is likely to be an M4 or M3 (BS5489) class depending on traffic flows, with equivalent lux levels of 10-15lux, which is substantially lower than the minimum requirement to provide adequate illumination of a level crossing.

4.5.13. The RVR has not presented evidence to determine if the illumination levels provided by the public highway lighting will provide adequate illumination of the level crossing to enable visual supervision by the signaller, train crew, and associated CCTV equipment. I also have concerns over the unreasonable expectation of that the safe operation of the level crossing to be reliant on lighting from the public highway operated by Highways England beyond the direct control of the RVR.

4.5.14. There is also an absence of any reference or assessment of risk associated with the running of evening train services on the safe use of the bridleway and user worked crossing that are unlit.

4.5.15. The proposal to illuminate level crossings at Northbridge Street and Junction Road appears to contravene Condition 6 of the planning notice for application RR/2005/836/P **(CD:RVR/04)** that states:

No floodlighting of the site shall take place.

Reason: To safeguard the amenities of the locality and to accord with Policy of the East Sussex and Brighton & Hove Structure Plan 1991-2011.

4.5.16. However, I note the same condition does not appear in the Planning Notice for RR/2014/1608/P dated 22nd March 2017 **(CD:RVR/07)**.

4.5.17. In my opinion, the deposited plans do not therefore provide sufficient information to demonstrate how night-time operations will operate effectively and safely.

4.5.18. The RVR proposals do not appear to present consistent evidence to describe the safety critical signalling protection systems described above, that define the requirement for, and positioning of, signalling equipment. In my opinion this presents a major concern for the ability of RVR to effectively manage the safe use of level crossings.

4.6 ANALYSIS OF STOPPING DISTANCES.

4.6.1. The A21 Narrative Risk Assessment (reference) Section 7 states:

‘*The train will approach the protecting signal at the level crossing at a maximum speed of 10 mph, thus ensuring that the train has the ability to stop within 30 metres. The signalman shall check the CCTV monitors, ensure the obstacle detection system displays a clear crossing indication, then operate the closing sequence of the barriers demonstrating that the signaller has full and control of the operation, two train crew members will operate the train and good sighting will always be maintained*.’

4.6.2. The Railway Group Standard published document GK/RT/0075 Lineside Signal Spacing and Speed Signage (**APP-C**) mandates requirements for lineside signal spacing, permissible speeds and temporary and emergency speed restrictions.

GK/RT/0075 Appendix B Table B.1 (**APP-C**), an extract of which is presented in **Figure 12** provides signal braking distances for passenger trains for given speeds and track gradients, prescribing a stopping distance of 33metres on the level for train speeds of 10mph.

Figure 12: Extract from GK/RT/0075 Tbl B.1 (APP-C)

Lineside Signal Spacing and Speed Signage

Railway Group Standard
GK/RT0075
Issue Four
Date September 2015

Appendix B Signalling Braking Distances for Passenger Trains

The content of this appendix is mandatory

B.1 Composite table for passenger trains (metres)

DISTANCE (METRES)

GRADIENT (mm/m)

INITIAL SPEED (mph)	Rising								Falling						
	30 (1 in 33)	25 (1 in 40)	20 (1 in 50)	15 (1 in 67)	10 (1 in 100)	5 (1 in 200)	2.5 (1 in 400)	Level Level	2.5 (1 in 400)	5 (1 in 200)	10 (1 in 100)	15 (1 in 67)	20 (1 in 50)	25 (1 in 40)	30 (1 in 33)
10	27	28	29	30	31	32	32	33	33	34	36	38	40	43	46
15	42	44	45	47	49	51	52	53	54	56	59	63	67	72	78
20	62	65	67	70	73	76	78	80	82	84	89	95	101	109	118
25	86	89	93	97	101	106	109	112	115	118	127	136	147	159	174
30	114	120	125	132	138	146	150	154	159	164	175	187	201	218	239
35	150	157	165	173	182	192	197	203	209	215	230	246	265	287	314
40	198	207	215	225	235	246	252	258	266	274	292	312	336	364	399

4.6.3. RVR does not provide details of the braking performance of its rolling stock, but it is reasonable to assume that heritage rolling stock is likely to have less braking efficiency than modern rolling stock. The opportunity to connect to the mainline also is expected to enable various different types of heritage rolling stock to be used on the route which may introduce extra risk of varying braking efficiency, and so one would expect the stopping distances to be greater than prescribed in **Figure 12**, and exceeding the stated stopping distance within the NRA.

KEY OBSERVATIONS

4.6.4. The RVR appears to have underestimated the barrier closure sequence that has compromised the signalling and operational procedures that might result in either a train passing a signal at danger or having to come to a stop on every transit of the level crossing.

4.6.5. Of concern is the operational procedure defined within the Narrative Risk Assessment that implies that the Stop/Proceed signal is positioned at 40 metres from the level crossing to accommodate the claimed 30 metre stopping distance in the event of an incident that prevents the barriers from completing the close cycle.

4.6.6. The stated 30 metre stopping distance is non-compliant with the requirements of GK/RT/0075 Appendix B Table B.1 (**APP-C**), and **Figure 12** above. Furthermore, the statement implies that the train will pass the signal (Signal Passed At Danger - SPAD) before coming to a stop, resulting in potential for a driver having to start away without having the ability to check the aspect displayed by the Stop/Proceed signal.

4.6.7. A Signal Passed At Danger represents a potential significant risk to the safe operation of the level crossing. RVR fail to present any evidence of automated SPAD protections systems. Network Rail guidance document NR/L2/SIG/11201/Mod X21 Section 2: Train Detection System Controls (**APP-B**) describes requirements to incorporate automated train detection systems to protect crossing from instances of a SPAD. This would generally include automatic braking systems to bring the train to a halt. The Narrative Risk Assessment and degraded operation does not include reference to automated train detection systems, and so the RVR has not provided sufficient detail of the operational and safety procedures to manage SPAD and its intent to incorporate automated train detection system control.

5 REVIEW OF DEGRADED OPERATION PROCEDURE

5.1.1. The RVR proposals as presented in the application for the most part consider the normal operation of the system under typical conditions; however, there is a risk that the level crossings will not operate effectively all of the time and will suffer from issues and incidents that will need to be appropriately managed by the RVR workforce, without putting railway staff at risk.

5.1.2. The Narrative Risk Assessments appended to [**CD:RVR/75 Annex D**] provide details of operational procedures intended to manage foreseen degraded operations, such as failure of the barrier close sequence. In this instance the procedure is described as follows:

- *If the signaller cannot initiate and complete the closing sequence on the control panel the indication to the driver shall not change, i.e. the indication to the driver shall be that they must stop the train on the approach to the crossing. The driver shall contact the signaller to reach an understanding of what the issue is that has prevented the signal clearing. The signaller can attempt to re-start the closing sequence from the signal box panel or at ground level at the level crossing local control. Should either of these fail the barriers can be manually lowered by the signaller, however, assistance from the train crew may be necessary to halt road traffic safely.*

5.1.3. However, I am concerned by the absence of a similar assessment of degraded operation from the revised NRA **(APP-D)**, that consequently overlook the hazard and associate risk of such events. This is in my opinion a serious shortcoming of the NRA.

5.1.4. For the purpose of my review I shall consider the operational procedures described within the original submission NRA reports appended to Core Document **(CD:RVR/75)**, that includes the procedure described in 5.1.2 above.

KEY OBSERVATIONS

5.1.5. I am deeply concerned by an operational procedure placing an expectation that train crew may be involved in traffic management activities to halt traffic safely placing train crew in a potential position of danger interacting with vehicles on the public highway, which in turn increases safety risks to the operators of the railway and users of the A21. It is unlikely that RVR staff will be qualified or licenced to carry out safety critical activities within the public highway such as managing and stopping live traffic. This procedure remains relevant to the AFBCL type crossing as the procedure describes a scenario in which the local control fails to operate the close sequence.

5.1.6. The procedure makes no reference to how the train crew are expected to halt traffic, nor give a prediction of the duration required to halt traffic and allow the passage of the train, and disregards the adverse impact on highway performance, queue length and delay to users of the highway.

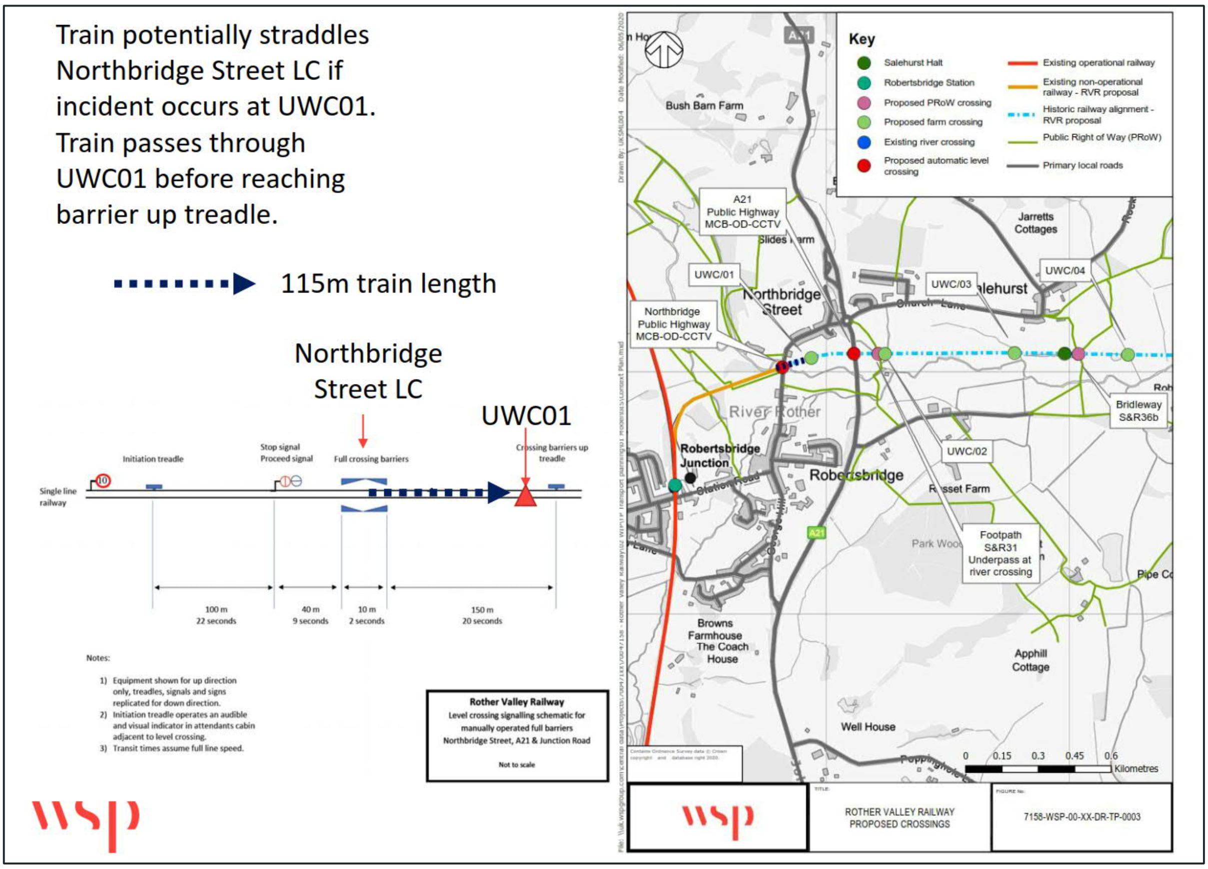
5.1.7. The operation procedure fails to describe the arrangement for maintaining control of the traffic when the train crew return to the locomotive to proceed over the level crossing.

5.1.8. In my opinion this is an entirely unsatisfactory arrangement placing train crews in a position of danger within the highway.

5.1.9. Furthermore, it is apparent that the NRA's focus is on individual crossings in isolation and does not adequately consider the collective consequence of degraded operation on adjacent level crossings, that might result in scenarios of trains blocking level crossings resulting in greater disruption.

5.1.10. I have examined potential conflicts and consequential impact of arising from the interaction of degraded operation between adjacent level crossings. The following figures are intended to illustrate some of these scenarios having greatest impact on the public highway crossings A21 and Northbridge Street and neighbouring accommodation user worked crossings.

Figure 13: Incident at UWC/01 blocking Northbridge St

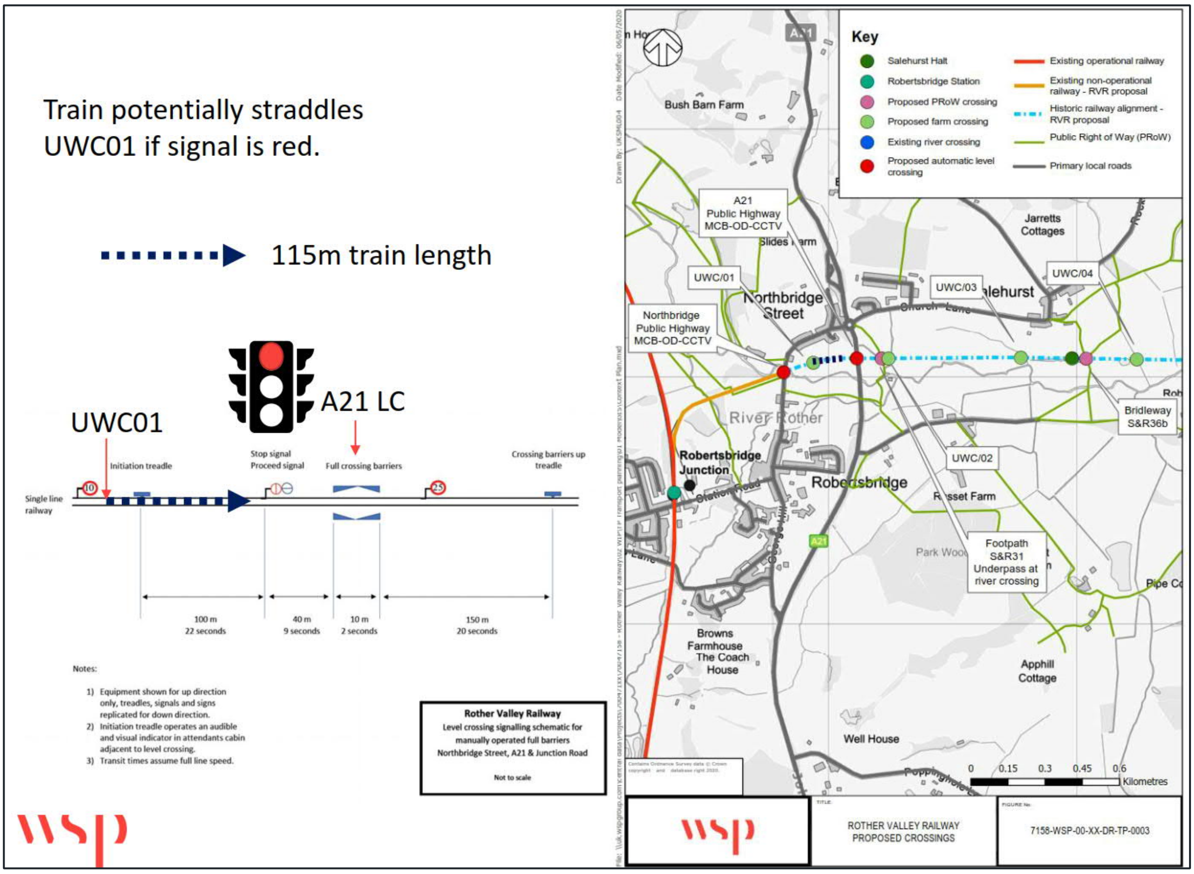


5.1.11. In this scenario, an incident at UWC/01 (crossing centre chainage 960m) would result in the eastbound train potentially blocking, or not fully clearing Northbridge Street level crossing (crossing centre chainage 814.5m).

5.1.12. Additionally, as UWC/01 is less than 150m from Northbridge St level crossing, even if the rear carriage of the train has cleared the level crossing, the engine unit will not have reached the Barrier-Up treadle and will therefore fail to initiate release of the level crossing.

5.1.13. The RVR Degraded Operations procedure fails to address the significant consequence arising from blocking of UWC/01, such as by conflict with agricultural vehicles or obstruction by farming debris from spilt loads on the line, and potential extensive traffic delays on Northbridge Street and Robertsbridge.

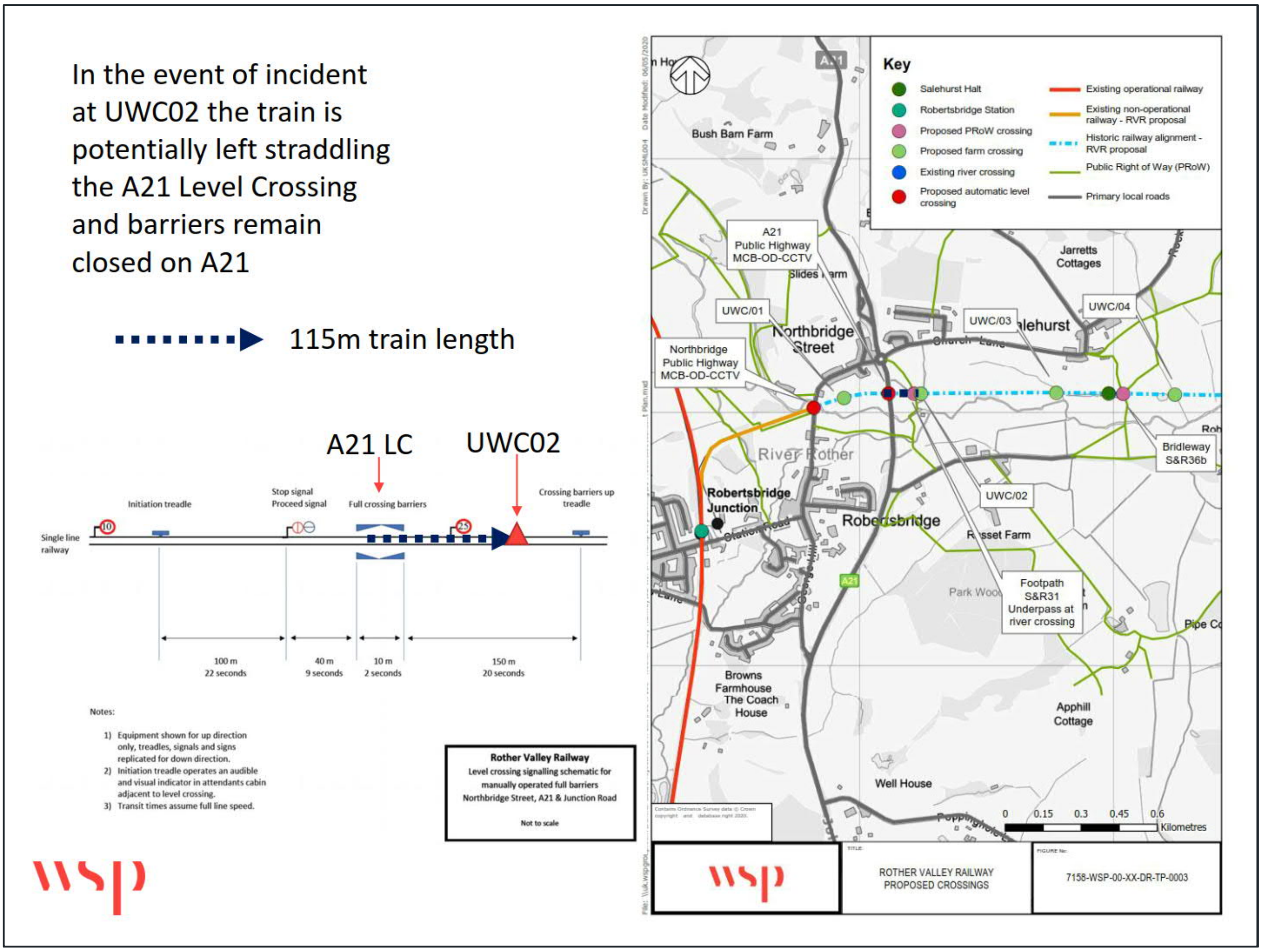
Figure 14: Train held at A21 signal blocking UWC/01



5.1.15. In this scenario, an eastbound train held at the A21 level crossing Stop signal (chainage 1,077.5m) risks blocking the neighbouring UWC/01 (crossing centre chainage 960m).

5.1.16. The RVR fails to address the issue of blocking within the Degraded Operations procedure, and impact on land use and farming operations reliant upon the level crossing for access.

Figure 15: Incident at UWC/02 blocking A21

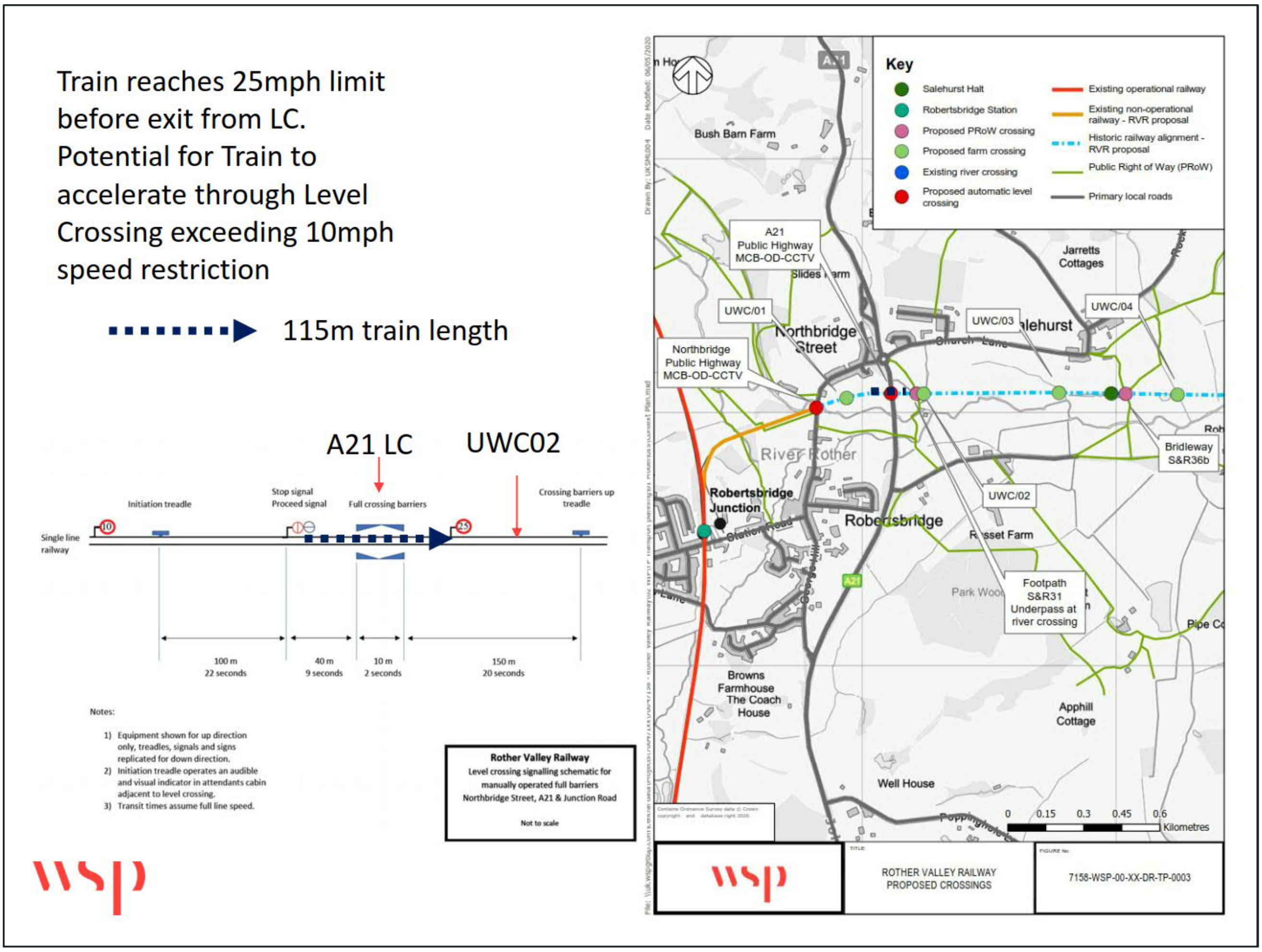


5.1.17. In this scenario, an incident at UWC/02 (crossing centre chainage 1,240m) would result in the eastbound train blocking the A21 level crossing (crossing centre chainage 1,122.5m).

5.1.18. Additionally, as UWC/02 is less than 150m from the A21, even if the rear carriage of the train has cleared the level crossing, the engine unit will not have reached the Barrier-Up treadle and so fail to initiate release of the level crossing.

5.1.19. The RVR Degraded Operations procedure fails to address the significant consequence arising from blocking of UWC/02, such as by conflict with agricultural vehicles or obstruction by farming debris from spilt loads on the line, and potential extensive traffic delays to the strategic road network

Figure 16: Train exceeding 10mph speed limit through crossing



5.1.20. The 25mph speed indicator in shown to be in very close proximity to the level crossing, and within a train length (115metres). The RVR has failed to provide evidence to describe how the train operator measures distance travelled passed the speed indicator, that introduces a risk that trains begin to accelerate before the rear of the unit has cleared the level crossing and so increase the likelihood of trains exceeding the maximum permissible speed of 10mph within the level crossing.

5.1.21. I consider the absence of a collective assessment of safety critical operations to consider interactions between level crossings to be a serious deficiency within the application and assessment of degraded operations. The RVR has failed to provide evidence on how it will manage and mitigate the impact of back-blocking of the public highway, that has the potential to cause significant delay to motorist and secondary impacts of disruption to local residents on possible diversionary routes.

5.2 CLOSURES DUE TO BARRIER/EQUIPMENT MALFUNCTION

5.2.1. In the event of a barrier malfunction, the level crossing could be closed for a much longer period causing long queues to form and traffic to redistribute in response to the obstruction of the highway. This would potentially require A21 traffic to divert through Robertsbridge.

5.2.2. In relation to the delay minutes at OD level crossings on the ECML, an FOI request was submitted to Network Rail in 2015 seeking clarification on typical delays at OD crossings in comparison with standard Manual Controlled Barrier crossings. This indicated that in 2015 the average delay at Moss Level Crossing (which is OD controlled) was significantly typically longer than the average delay for a similar level crossing that is not OD controlled. Network Rail's FOI696 response and data is provided in **APP-H**. This compares delays attributed to incidents of level crossing failure at Moss OD Level Crossing and North Carr Manually Controlled Level crossing on the ECML.

5.2.3. For North Carr MCB level crossing, there was approximately one incident recorded per month with on average 96 minutes delay to users attributed to Level Crossing failure, with individual instances ranging from 3 minutes to 516 minutes. Whereas Moss OD Level Crossing recorded a range of 3 to 600 minutes user delay with an average of 154 minutes delay per incident (WhatDoTheyKnow, 2015).

5.2.4. This example highlights the risk of disruption to the local highway network and Strategic Road Network that are presented by level crossing failures even with manual controlled barriers the delays can be extensive. Delays in excess of 90 minutes on average for users of the SRN cannot be tolerated even on an infrequent basis.

5.2.5. In the event of a level crossing failure of such duration, traffic would most likely divert to Northbridge Street which is not suitable to carry the volume of traffic currently on the A21.

5.2.6. **Figure 17** illustrates congestion on High Street, Robertsbridge, where the combination of on street parking and narrow road widths limits the ability for large vehicles to pass. The image recorded during a site visit shows the green vehicle stationary waiting for the lorry to pass.

Figure 17: High Street, Robertsbridge

6 CONSIDERING NON-MOTORISED USERS

6.1.1. Core Document **CD:RVR/62** contains a Non-Motorised User (NMU) audit carried out in 2013 by consulting engineers Mott MacDonald. The document states that "The audit was carried out for the Design Team in June 2013 in accordance with Highways Agency standard, HD42/05 'Non-Motorised User Audits'". An NMU Context Report dated January 2013 for the RVR proposals which preceded the NMU Audit report was also supplied as Core Document **CD:RVR/32**.

6.1.2. The NMU Audit process defined in HD42/05 requires NMU objectives to be identified. The NMU Objectives are defined in section of the NMU Context report as follows:

- NMU Objectives Based on the above, the objectives of the NMU assessment are to:
- Ensure continuity of NMU routes where applicable,
- Maintain safety for vulnerable NMU users on the A21 and where it intersects with the existing highway network; and
- Ensure the design of the proposal is cognisant of NMU requirements.

6.1.3. It concerned me that the NMU Audit **(CD:RVR/62)** is now in excess of 6 years old and may therefore be unrepresentative of current site conditions or usage of the highways and public rights of way. It should be noted that DfT publication HD42/05 was superseded by: HD 42/17 Walking, cycling and horse-riding assessment and review (HE, 2017) which was available at the time plans were deposited for this application, and which in itself has more recently been superseded by GG142 - Walking, cycling and horse-riding assessment and review in November 2019) (Design Manual for Roads and Bridges, 2019) that was available prior to the applicants resubmission of Core Documents in 2021.

6.1.4. Following discussions with Highways England, I was provided with a WCHAR prepared by i-Transport on behalf of RVR on 03 June 2021. I understand this document is referenced as "**RVR/HE/04** Redacted Walking Cycling and Horse-Riding Assessment". This document is dated January 2021. Given that this report was provided two working days prior to exchange of proofs, I have not had sufficient time to review in detail and consider its implications. I note however that the WCHAR is focused on the A21 level crossing, and as such I have seen no updates or consideration on the other proposed crossing locations.

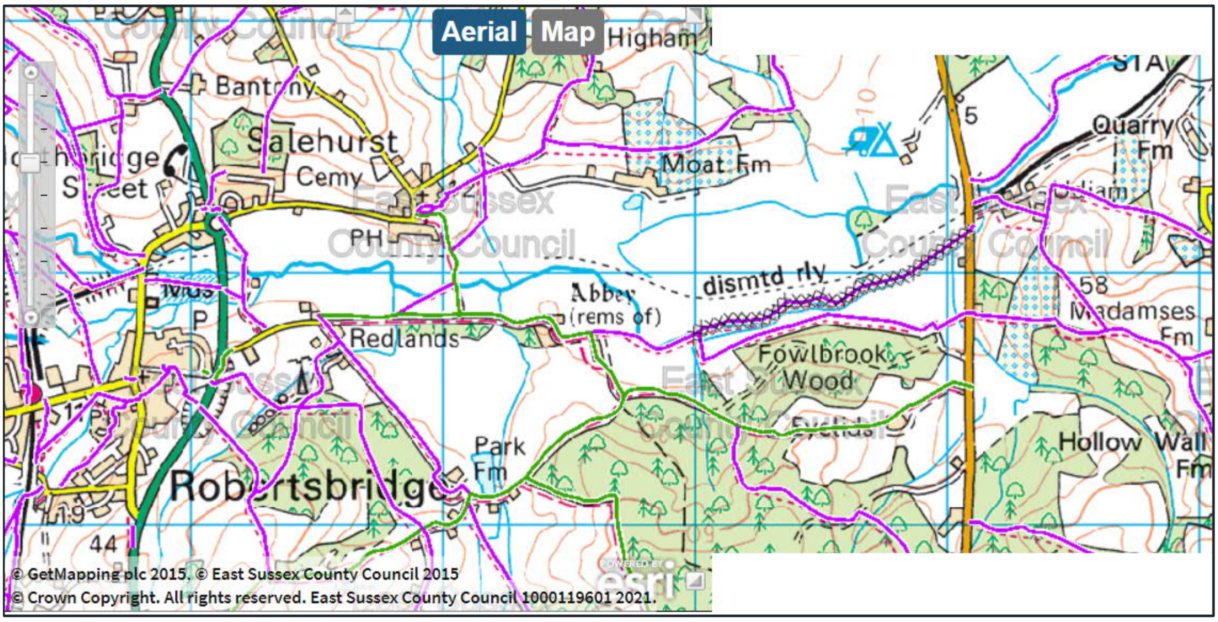
NMU Audit and Context reports (CD:RVR/62 and CD:RVR/32) and WCHAR (RVR/HE/04)

6.1.5. My assessment of the NMU Audit and Context Reports is that they are extremely limited in scope, being confined to considering the A21 level crossing, and do not give due consideration to other public highway or public bridleway level crossings. Indeed, the NMU Audit Context report states 'in *Figure 4-1 above shows the location of existing bridleways. None of these are affected by the scheme proposa*l'. This statement is blatantly incorrect when footpath SAL31/1 and Bridleway SR36b cross the proposed railway.

6.1.6. Similarly, I note that the WCHAR is focused primarily on the A21 and Northbridge Roundabout. Given that "small" schemes, as identified in GG 142, should review facilities within a 1km study area, it would be expected that further review of the footpaths and nearby bridleways are completed.

6.1.7. Although the presence of footpath SR31 is acknowledged in paragraph 4.1.2 which states 'There is one footpath that passes beneath the A21 close to the site of the proposed level crossing,' there is no further mention of this in the remainder of the report. One would expect the NMU Audit to consider the interaction of the proposals on affected public rights of way and the wider public rights of way network. An extract of East Sussex County Council Definitive Map (online version) depicting the extent of local Public Rights of Way is attached to **Figure 18** below:

Figure 18: Extract from East Sussex Definitive Map



6.1.8. A further notable deficiency on the NMU Audit is the absence of any assessment to consider Northbridge Street public highway, in which a level crossing is proposed in close proximity to a recreation ground (120m to the south), along with housing and local facilities such as bus stops, public houses and primary school. A number of public footpaths converge on Northbridge Street to the immediate north and south of the level crossing. Also, as a tourist attraction, this level crossing is most likely to attract seasonal NMU activity that is not addressed.

6.1.9. During a site visit on a typical school day in April 2021 a significant number of primary school children (some of whom were unaccompanied), were observed walking along Northbridge Street over the proposed location of the level crossing at the end of the school day, as illustrated **in Figure 19** below. The presence of vulnerable users such as pedestrians, cyclists and unaccompanied school children are likely to increase risk at level crossings.

Figure 19: Children travelling to/from school at Northbridge Street

6.1.10. Whilst the WCHAR (RVR/HE/04) provides a single paragraph with regards to existing conditions at Northbridge Street, it does not define the locations of the reviews and instead appears to focus largely on the approach to the A21 / Northbridge Street Roundabout. I therefore consider that it does not adequately review the nearby facilities in the area, as required in GG 142.

6.1.11. Around The Clappers and Northbridge Street, Footpath 16a (SAL/16/1) runs parallel to the existing railway line, meeting The Clappers from the west. This footpath, and Footpath 27 both cross the existing railway line by going underneath. Footpath 30c (SAL/30/3) begins on the east side of The Clappers, crossing the A21, with footpath 30a (SAL/30/1) and 30b (SAL/30/2) picking up on the other side. Also accessing Northbridge Street are Footpaths 8 and 28, and around Northbridge roundabout are Footpaths 64, 7, 65, and 31. This suggests Northbridge Road will attract significant numbers of pedestrians.

6.1.12. The scope of the audit and context report are clearly inadequate and need to be expanded to match the entire extents of the proposed RVR scheme, as required by CD 143 and should consider all NMU routes that intersect the proposed railway, either directly or indirectly, and consider the impacts on all Non-Motorised Users.

6.1.13. In relation to traffic survey data, the report relies on data from the 2011 TRADS database which is almost 10 years old now and extremely out of date. In relation to NMU surveys the report states the following:

Mott MacDonald has been unable to directly source data from any public authority relating to pedestrian, cycle and equestrian activity along the A21 at Robertsbridge (between the roundabout with the C18 to the north and the roundabout with the A2100 to the south). However, as part of the scheme development proposals, RVR has undertaken a number of surveys to conduct counts of NMU movement along the A21 at the location of the proposed level crossing in order to quantify the level of activity that does occur. Initial surveys conducted by RVR on Wednesday 14th November 2012 for the 12-hour period 0700-1900 showed that no pedestrians, cyclists or horses were recorded as passing the site. Further surveys conducted at the site of the proposed A21 level crossing on Sunday 13th January 2013 for the 12-hour period 0700- 1900 again showed that no pedestrians, cyclists or horses were recorded as passing the site.

6.1.14. I note these surveys were carried out during the winter months when NMU activity is typically lower than other times of year. January is also not usually considered to be a typical survey month by local highway authorities. Weather conditions at that time in January 2013 included heavy snow in the local area (Poppinghole Farm, 2013).

6.1.15. I note that the WCHAR report refers to 2019 automatic traffic counter recording cyclist movements and a video survey of the Northbridge roundabout in March 2020 that also recorded cyclist movements. However, I consider this data to be insufficient to determine the potential NMU movements that could occur over the wider network of public highway and public rights of way.

6.1.16. Also, the survey dates are highly inappropriate given that the RVR proposals are for a seasonal tourist attraction that is intend to operate April to October, with peak services throughout August (**CD:RVR 25 para 2.5.3**), when Public Rights of Way are most likely at their busiest.

6.1.17. It should be noted that whilst new traffic surveys and accident data have been referenced in the revised submission in March 2021, the effects on Non-Motorised Users do not appear to have been considered and updated accordingly.

6.1.18. I would also draw attention to the WCHAR report, in paragraph 1.1.7, which acknowledges the following *"However, it is recognised that queue lengths may extend through the roundabout and potentially interact with pedestrian and cyclist activity"; how*ever, of concern is that no assessment of the potential impacts from the increased queues on pedestrian and cyclists has been undertaken.

6.1.19. I have not been given enough time to review the WCHAR provided. However, I consider that the document is limited in scope and does not provide an adequate assessment of potential impacts and summarise my notes as follows;

- There is no assessment of increases in trip generation as a result of the proposals or movements towards Robertsbridge or Robertsbridge car park;
- There is no assessment of the forecast queue lengths and their impacts on the existing provision;
- I would expect these assessments would have been used to identifying further opportunities for improvement for pedestrians, cyclists and equestrians as a result of the developing highway scheme design;
- Whilst I note the WCHAR references a Footpath SAL31/1 crossing – I have seen no evidence that addresses the implications of dedicating a footpath diversion route over my client's land;
- The WCHAR should review an area extending up to 1km from the proposals. I would argue that Robertsbridge station (approximately 915m as the crow flies) should have been included as, this forms a key element of the overarching RVR scheme.

6.1.20. In conclusion, I am concerned by any reliance given to the NMU Audit document supplied by RVR that is now considerably out of date, and does not fully address its own objectives by omission of key NMU routes from the scope of the NMU Context Report and NMU Audit Report, which in my opinion cannot be considered to be appropriate or fit for purpose.

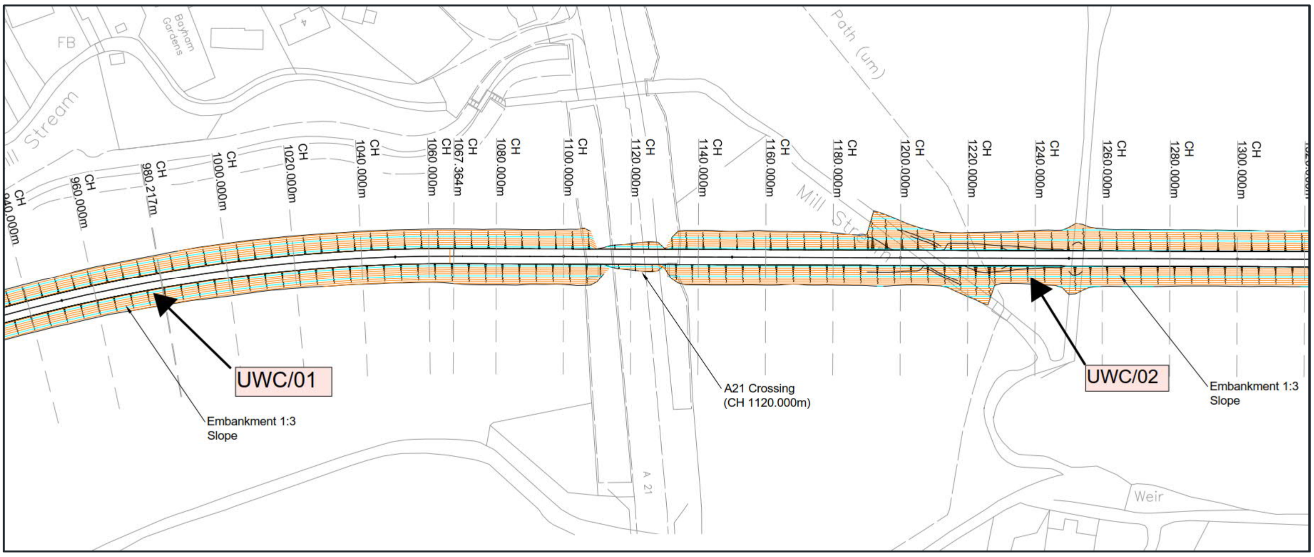
7 ASSESSMENT OF ENGINEERING PROPOSALS AND LAND TAKE ASSUMPTIONS

7.1 USER WORKED CROSSING – PRIVATE FARM ACCESS CROSSINGS

7.1.1. The Proof of Mr Andrew Highwood considers matters of land access and severance imposed by the RVR and reliance upon restricted enjoyment and benefit of the land with reliance upon User Worked level crossings for access to this land; however, in this section I consider the engineering aspects of the proposed UWC and implications for land access and extents of the application boundary.

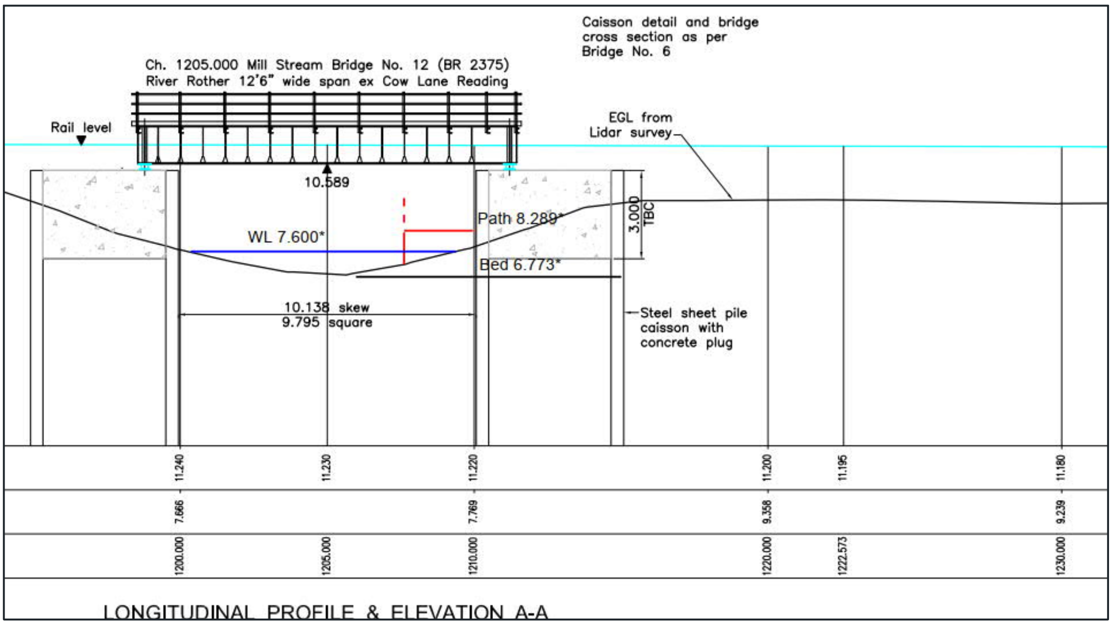
7.1.2. The RVR proposals include the reinstatement of the former rail embankment, measuring up to 2 metres in height (**CD:RVR/23**, and **CD:RVR/75** ARUP Option Feasibility Report). The extent of earthworks illustrated on the ARUP drawing 2390325-A21-G-001, extract illustrated in **Figure 20** show a continuous embankment with side slopes of 1in3 gradient.

Figure 20: Extract from ARUP General Arrangement (CD:RVR/75)



7.1.3. **Figure 21** presents an extract from Halcrow drawing RVR-UB12-01 Mill Stream Bridge **(CD:RVR/75)** depicting a longitudinal section of the track in vicinity of Mill Stream and UWC/02, that is consistent with **Figure 20** above. Ground levels at this location are indicated to be approximately 9.3m AOD, with a track level of approximately 11.19m AOD, equating to a level difference of 1.9m.

Figure 21: Extract from RVR-UB12-01 Mill Stream Bridge (CD:RVR/75)



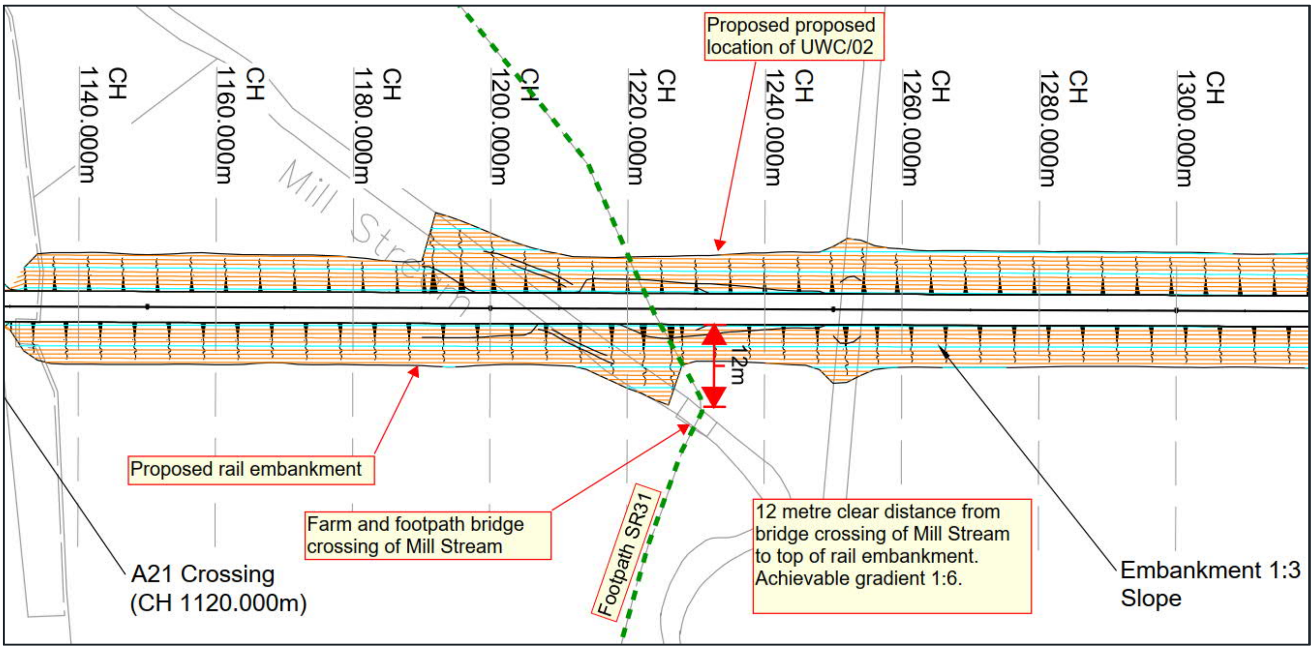
7.1.4. What is apparent from **Figure 20** and **Figure 21** is the absence of any provisions for earthworks and associated construction to accommodate vehicle ramps required to gain access up to the proposed farm access level crossing, as it is unreasonable and impracticable for my client to negotiate a 1:3 embankment to cross the level crossing.

7.1.5. Furthermore, Section 2 of the Level Crossing Guide for Managers, Designers and Operators **(CD:REP/17)** provides guidance on the appropriateness of approach gradients and need to avoid sudden changes in vertical gradients.

> *Vertical profile*
>
> *2.196 The profile over any vehicular crossing should have no sudden changes of vertical curvature. The profile over an automatic half barrier or user worked crossing is critical to safety. At other types of crossing it is less critical because these crossings are either manually operated by railway staff, or locally monitored by the drivers of trains travelling at restricted speeds such that they can stop short of the crossing.*
>
> *2.197 The profile over automatic half barrier or user worked crossings should not cause a vehicle, such as a low-loader or a tractor and trailer, to become grounded and obstruct the railway. The likelihood of grounding depends on the characteristics of the road surface at the crossing and any potentially low clearance vehicles that might use the crossing.*

7.1.6. Examining the proposed location of UWC/02 in more detail, I present an extract from ARUP drawing 2390325-A21-G-001 to illustrate the setting of the raised embankment in relation to existing ground level, proximity to Mill Stream and associated bridge crossing conveying public footpath SR31 and agricultural access to onward land parcels south of the railway.

Figure 22: Annotated extract from ARUP 2390325-A21-G-001 CD:RVR/23



7.1.7. To assess the extent of additional land take required to accommodate a vehicle ramp, the design of approach ramps should be considered. Ramps should be relatively perpendicular to the railway crossing and be of suitable gradients to enable safe access both on foot and by vehicle, expected to be between 1in12 and 1in20. A two-metre change in elevation would therefore require an approach ramp of between 24metres to 40metres in length, with suitable transitions at the top and bottom of ramp to avoid grounding of long agricultural vehicles (tractor and trailer) at the change in gradients. A typical example of a longitudinal section through a farm crossing is presented in **Figure 23** below to illustrate how approach ramps will extend beyond the limits of the proposed application boundary defined in the extract from the submitted Land Plans **(CD:RVR/23)**, and extract of which is presented in **Figure 24**. Note, **Figure 23** is not site specific and shown for illustrative purposes only.

Figure 23: Typical section through farm crossing

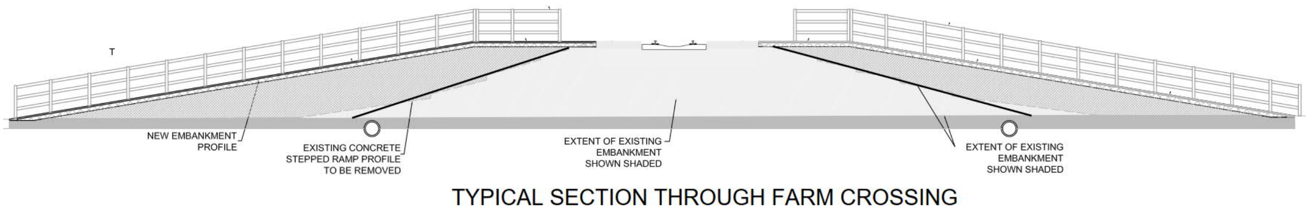
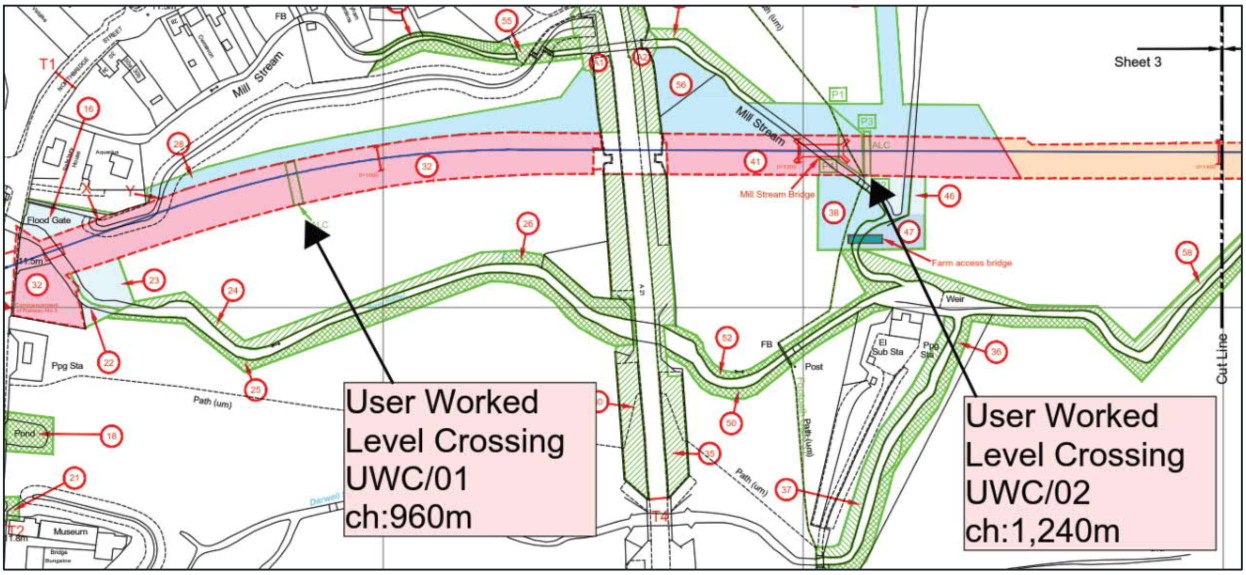


Figure 24: Extract from Land Plans (CD:RVR/23)



KEY OBSERVATIONS

7.1.8. I am concerned by the absence of any provisions for pedestrian and vehicle access to overcome the level difference between the railway and surrounding ground level on the approach to the level crossings, which is a significant oversight in this application and therefore in my opinion, the scheme is not deliverable given the reliance on additional third party land to accommodate permanent engineering works associated with the construction of a suitable access to avoid land severance and ensure the safe use of the level crossings.

7.1.9. Furthermore, the ORRs recommendation was that the RVR and landowners be required to come to agreement on alternative methods of access that do not require at-grade level crossings, and that if the crossings are authorised through a TWA Order then ORR would expect that the railway would install the highest level of protection at crossings that was reasonably practicable. ORR would expect to have further discussion on the type and detail of any crossings as part of the project development and the drawing up of appropriate Orders under the Level Crossings Act 1983. Unfortunately, there does not appear to be a fall-back position if the RVR and landowner fail to agree on the type of crossing facility, or if a crossing design fails to meet the satisfaction of the ORR

7.1.10. Based on the evidence above, and the absence of any engineering proposals that address the level differences, extent of earthwork, or guidance on the safe operational procedure for a farm access crossing, I find it difficult to comprehend that a satisfactory solution is achievable within the limitations of this application.

7.2 LEVEL CROSSING SIGHTING DISTANCES

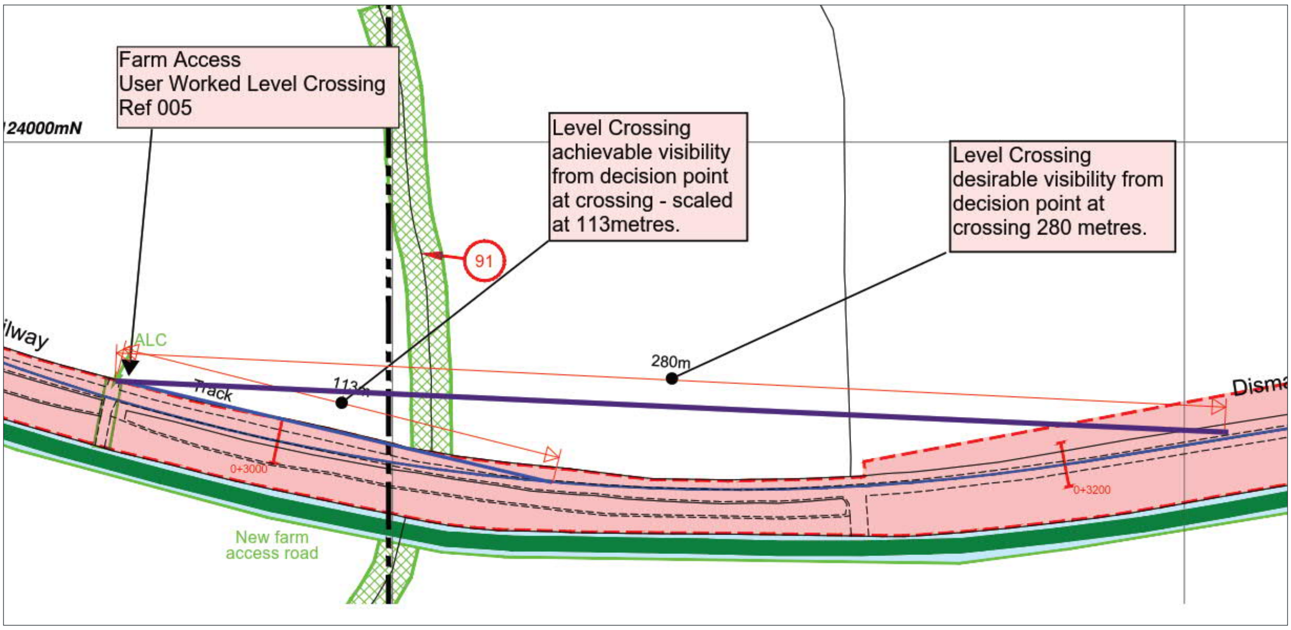
7.2.1. Within this section, I examine how the RVR fails to achieve the minimum sighting distances to level crossings, set out in both national guidance and RVR's own submission documents.

7.2.2. To inform this assessment I refer to the Heritage Railway Guidance document HGR-A0458 **(APP-F)** for sighting distances to footpath and user worked crossings – 280m for a UWC with line speed of 25mph. This visibility envelope serves two purposes – firstly it allows the crossing users to see oncoming trains with sufficient time to complete the crossing maneuverer; and secondly it also allows the train driver to have sight of any user of the crossing with adequate time to brake, or to see if the crossing user is in a safe position, stationary or moving away from the crossing, and acknowledge the presence of the approaching train.

KEY OBSERVATIONS

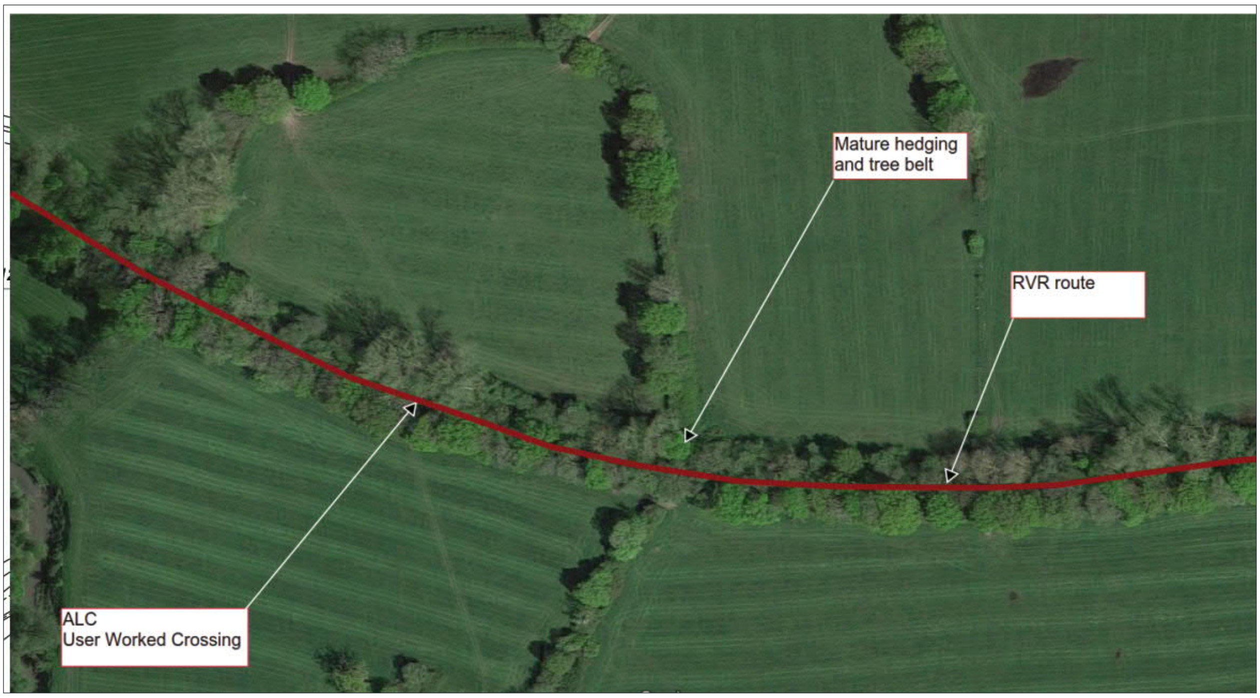
7.2.3. In the case of UWC/005, by plotting the 280m sighting distance it is evident that the desirable sighting distance is not achievable within the application boundary and would require additional land take and loss of hedgerow and trees. **Figure 25** shows the area required to achieve a suitable visibility envelope (with much of the required space outside of the red line boundary).

Figure 25: Deficient crossing sighting distance



7.2.4. **Figure 26** shows an aerial photo of the same section of route, which clearly shows mature trees and hedgerows within the visibility splay area that would be affected by the proposals. It is unlikely that the environmental impacts of achieving a compliant visibility splay have been considered within the proposals since the area is outside the ES assessment boundary.

Figure 26: Deficient crossing sighting distance



7.2.5. I have grave concerns about the ORR response **APP-A**:ORR/250320, which states '*in the case of the proposed RVR route the alignment is relatively straight making sighting of approaching trains relatively easy for users, and train speeds would be limited to 40kph (25mph). Similarly the train crew would benefit from the alignment in having good time to see an obstructed crossing and reduce speed on the approach*'. It is clearly evident from the plan extracts illustrated in **Figure 25** and **Figure 26** above that the assessment by ORR is clearly flawed and underestimates the track curvature and extent of appropriate visibility envelope. This is deeply concerning as the ORR underestimates the risk to users of the farm crossings.

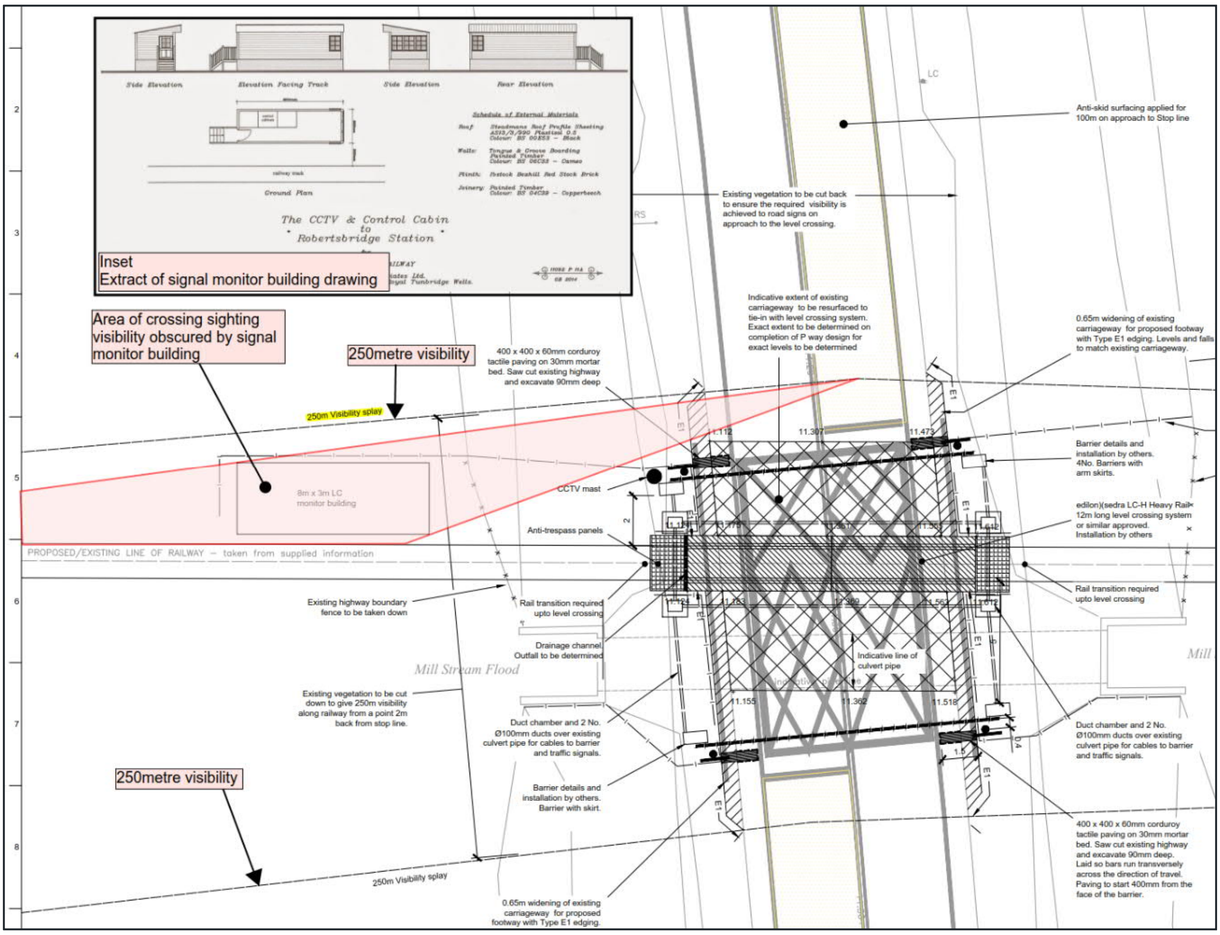
A21 VISIBILITY

7.2.6. RVR document Proposed Railway Level Crossing (**CD:RVR/34 Appendix A**), provides a description of the highway-rail visibility extents on the approach to the level crossing

*'A level crossing would be flat, skewed at approximately 5 degrees and in open country. Local clearance of vegetation would permit views of the railway over a distance of at least **250** metres in each direction, affording road users early visual contact with approaching trains (in addition to level crossing signage)*'

7.2.7. In this statement, the RVR gives an undertaking to provide views of the railway over a distance of 250 metres. This arrangement is known as the sighting distance or sighting envelope, and is represented on ARUP drawing C.950.G.102 (**CD:RVR-ORR Submission, Document 2: ARUP A21(T) Crossing Options Feasibility Report, Appendix A**), and extract of which is presented in **Figure 27** below.

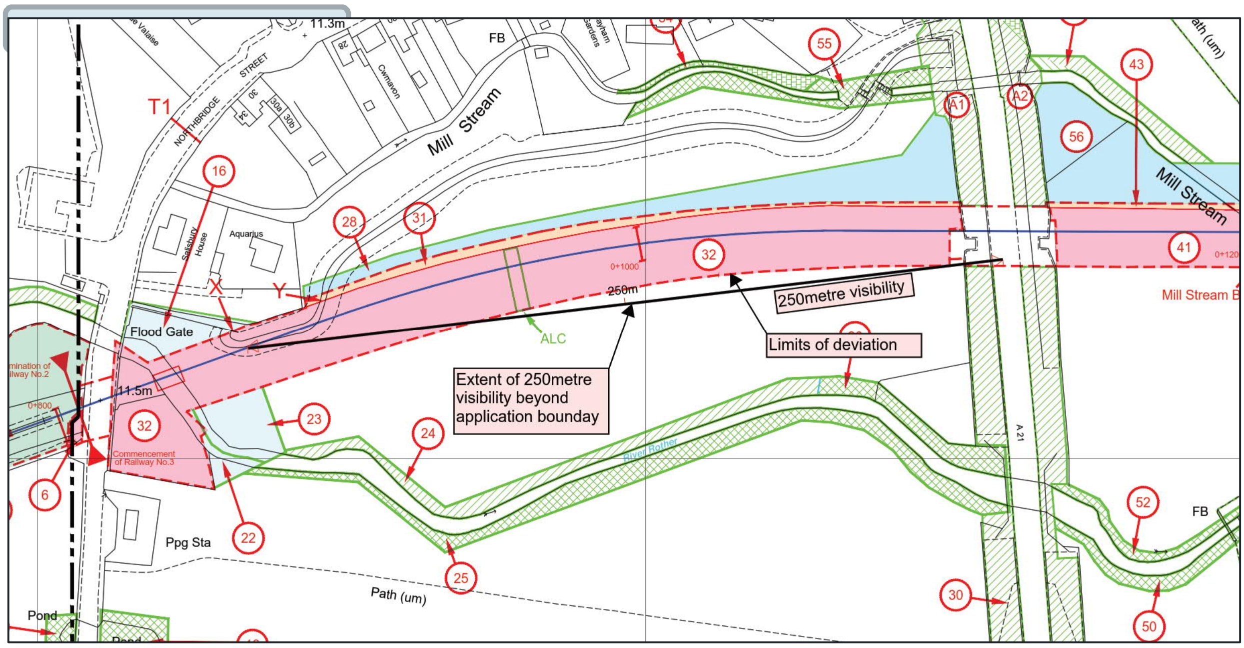
Figure 27: Level crossing visibility extents



7.2.8. It is evident that the presence of the signal control building obscures a significant proportion of the level crossing sighting envelop, shaded pink in **Figure 27** above. This is a clear non-compliance of RVR’s own undertaking to provide at least a 250 metre sighting distance to the crossing.

7.2.9. Furthermore, on investigation of the sighting distance to the south-west quadrant of the level crossing, for vehicles approaching from the south, it is evident that in order to achieve the stated 250metre sighting distance, the RVR would require control of land and extensive clearance of road side vegetation beyond the extent of the application boundary as illustrated on the extract from JC White deposited plan Sheet 3 **(CD:RVR/23)**, upon which I have plotted the 250 metre sighting distance and illustrated **Figure 28** below.

Figure 28: Level Crossing sighting - extract from Land Plans (CD:RVR/23)



KEY OBSERVATIONS

7.2.10. On the basis of the evidence presented in **Figure 27** and **Figure 28**, I do not consider the current application to be compliant with the stated provisions, and the works will not be deliverable within the application boundary. This increased land take may have an additional cost which has not been factored into the scheme and would also have environmental impacts that have not been assessed.

7.3 A21: ALTERATIONS TO HIGHWAY INFRASTRUCTURE

7.3.1. In this section, I present my evaluation of the proposed alterations the A21 highway infrastructure to highlight discrepancies in the submission documents, and departures from design standards published by the DfT.

7.3.2. A design statement contained within the ARUP A21 Options Feasibility Report [**CD:RVR/75, Document 3 Section 5.4.1**] Suggested that construction works within the A21 would be limited:

Installation of the track bed crossing is expected to be achieved via either single lane running over a short period or more likely a single night time road closure, allowing installation to both traffic lanes. ***As there are no proposals to alter highway levels the length of highway affected either side of the crossing is limited.***

7.3.3. My concern with this statement was the failure to address the discrepancy between the proposal rail alignment having a longitudinal gradient of 1:1000 across the level crossing, and the existing crossfall on the A21 of 1:25, resulting in a level difference in excess of 300mm. This had been a key concern in my initial draft Proof of Evidence; however, the RVR has since provided detail on how they intend to address this discrepancy, with a proposal to reprofile the A21 by raising the carriageway up to the level crossing in the following: 23905-ARP-XX-XX-DR-CH-0004 titled Robertsbridge Bypass Construction Details.

7.3.4. This document includes the following description of the proposals:

'Since the longitudinal gradient of the level crossing (1 in 150) is different to the super-elevated cross fall of the road (1 in 25), the highway vertical alignment will need to be adjusted. The east channel or high side will be retained at the same level, whereas the west channel will be raised 0.314m. This will require transitions within the highway surface in accordance with CD 109 (formerly TD 9/93). A minimum drainage gradient of 0.5% (1 in 200) will be maintained in any direction in accordance with CD 109 clause 5.2.'

7.3.5. The same document also provides a commentary to describe the anticipated duration of construction works:

'It is envisaged that there will be full road closure for one weekend to allow for installation of pre-cast concrete level crossing modules and regrading of the road surface to suit the track gradient where it crosses the highway. Traffic would be diverted through Robertsbridge via The Clappers and Northbridge Street for the duration of the closure.'

7.3.6. Extracts of drawings 239025 ARP-XX-XX-DR-CH-0002 P1 A21 Road Markings, and C.950.G.201 P2 A21 Proposed Geometry are presented below in **Figure 29** and **Figure 30** to illustrate the extent of regrading of the A21 carriageway, extending approximately of 41m to the south, and 66m to the north. An overall distance of approximately 107m.

Figure 29: Extract from 239025 ARP-XX-XX-DR-CH-0002 P1

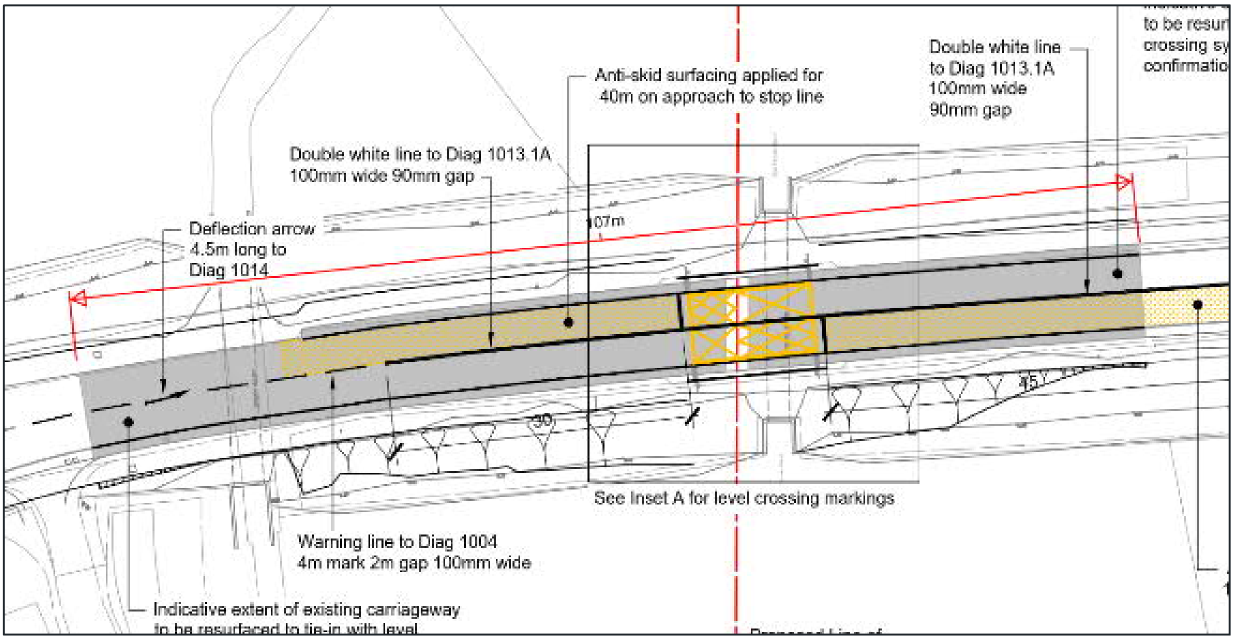
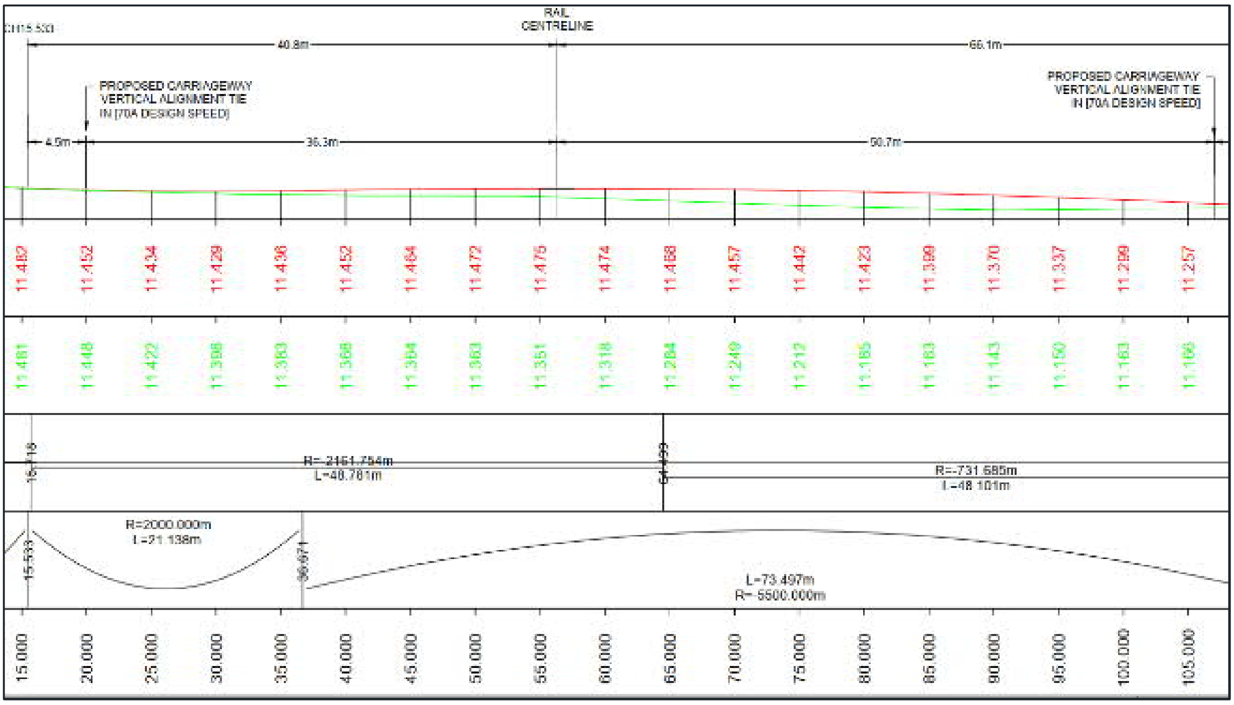
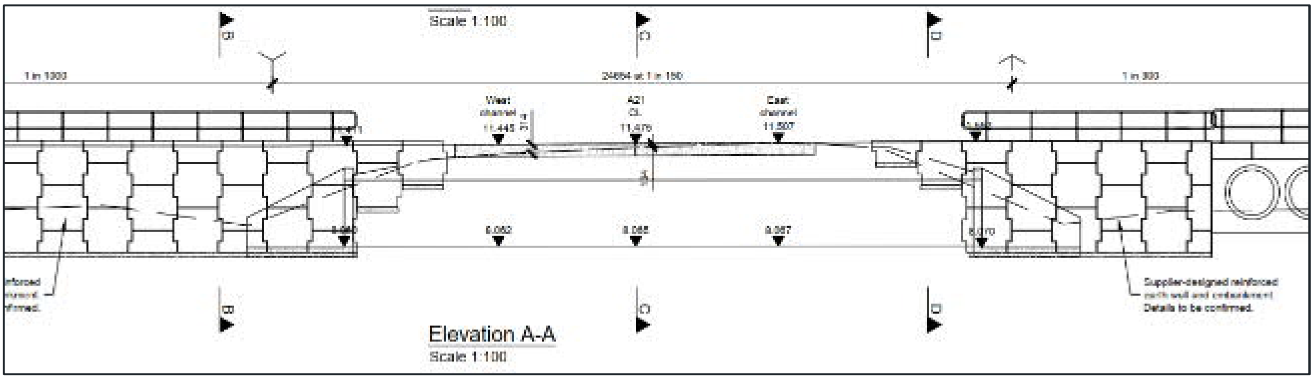


Figure 30: Enlargement of level crossing arrangement depicting road levels



7.3.7. The proposed resurfacing of the A21 road also introduces a change to crossfall to align the carriageway with the rail track bed. To visualise proposed changes to the A21 cross, **Figure 31** below presents an extract of ARUP drawing 239025-ARP-XX-XX-DR-CB-0001 Embankment Retaining Wall General Arrangement and Sections, (**CD:RVR/74-6**) shows detail of the proposed levels and track gradient. The northbound carriageway is to be raised by in excess of 314mm. The carriageway crossfall will change to be equal to the track gradient of 1:150.

Figure 31: Extract from ARUP drawing



7.3.8. This change has the effect of reducing (flattening) the crossfall gradient, from 1:25 down to 1:150. To understand the implication of this change and the effect on the drainage of surface water I draw attention to the DfT publication DMRB CD 109 Highway Link Design (Design Manual for Roads and Bridges, 2020) that prescribes very specific design requirements for highway design. Table 2.10 of this document, illustrated in **Figure 32** below, defines the applicable superelevation for a prescribed design speed and road curvature.

7.3.9. Defining the design speed of the highway is essential to determine compliance with CD 109, unfortunately this remains unclear within this application for the following reasons:

7.3.10. The A21 is currently subjected to a 60mph limit, equating to a Design Speed of 100A kph.

i. RVR propose to extend the 40mph south of the level crossing which, if achievable, gives a Design Speed of 70A kph.

ii. ARUP drawing C.950.G.201 P2 A21 Proposed Geometry states a design speed of 70A (70kph)

iii. GG104 Safety Risk Assessment 1.1 Proposed Scheme Vertical Alignment states design speed of 85kph.

iv. GG104 Safety Risk Assessment only considers vertical Sag and Crest curve for compliance with DMRB CD 109.

v. GG104 Safety Risk Assessment give no consideration of super-elevation. Higher design speed requires super-elevation of 3.5% min

7.3.11. CD109 states that a highway with design speed of 40mph/70A kph and horizontal curvature of 720m, requires a superelevation of 2.5% (1:40). A design speed of 85kph requires superelevation of 3.5%. RVR design proposals state the crossfall to be 1:150 at the level crossing. The highway longitudinal section only depicts centre line road levels but does not depict level values at the highway verges to show the full extent of level transition; as such, the extent of non-compliant superelevation is indeterminant from the information provided.

wsp

Figure 32: Extract from DMRB CD109 table 2.1

Table 2.10 Design speed related parameters

Design speed kph	120	100	85	70	60	50	V2/R
Stopping sight distance (metres)							
Desirable minimum	295	215	160	120	90	70	-
One step below desirable minimum	215	160	120	90	70	50	-
Horizontal curvature (metres)							
Minimum R* with adverse camber and without transitions	2880	2040	1440	1020	720	520	5
Minimum R* with superelevation of 2.5%	2040	1440	1020	720	510	360	7.07
Minimum R* with superelevation of 3.5%	1440	1020	720	510	360	255	10
Desirable minimum R (superelevation 5%)	1020	720	510	360	255	180	14.14
One step below desirable Minimum R (superelevation 7%)	720	510	360	255	180	127	20
Two steps below desirable minimum radius (superelevation 7%)	510	360	255	180	127	90	28.28
Vertical curvature							
Desirable minimum* crest K value	182	100	55	30	17	10	-
One step below desirable min crest K value	100	55	30	17	10	6.5	-
Desirable minimum sag K value	37	26	20	20	13	9	-
Overtaking sight distances							
Full overtaking sight distance FOSD (metres)	-	580	490	410	345	290	-
FOSD overtaking crest K value	-	400	285	200	142	100	-
* Not recommended for use in the design of single carriageways (see Section 9)							
The V²/R values shown above simply represent a convenient means of identifying the relative levels of design parameters, irrespective of design speed.							

CD 109 Revision 1

7.3.12. Furthermore, the longitudinal section shows that between chainage 50m to 55m, the change in vertical level from 11.472m to 11.475m is just 3mm; and between chainage 55m to 60m the vertical change for 11.475m to 11.474m is 1mm. These level changes equate to a longitudinal gradient of 1:1666, and 1:5000 respectively.

7.3.13. DMRB CD109 Chapter 4 para 4.8 states 'Superelevation shall not be introduced, nor adverse camber removed, so gradually as to create large flat areas of carriageway, nor so sharply as to cause road user discomfort due to the change in carriageway profile.'

7.3.14. Para 4.8.3 states 'A minimum longitudinal gradient of at least 0.5% should be maintained wherever superelevation is to be applied or reversed.'

7.3.15. DMRB CG501 Design of Highway Drainage systems acknowledges carriageway crossfalls of 1:150, generally occurring at transitions (roll-overs) in superelevation, however this is generally in conjunction with appropriate longitudinal gradient to maintain drainage function. Additional measures such as carriageway markings not exceeding 3mm in thickness to allow surface water to flow over lines and reduce risk of ponding, and ice forming in winter periods.

KEY OBSERVATIONS

7.3.16. Now that site levels have been considered in more detail, it is clear that alterations to the A21 are far more extensive than previously envisaged. These works now include lengthy resurfacing of the A21 carriageway across the full width of carriageway, where previously no works beyond the immediate vicinity of the level crossing were proposed, ref. ARUP A21 Options Feasibility Report (**CD:RVR/75, Document 3 Section 5.4.1**).

7.3.17. It seems unlikely that these works can be entirely completed in one weekend and therefore the A21 will need to be closed for much longer to install the crossing than indicated by the applicant.

7.3.18. This increased duration of works will add cost to the scheme, which does not appear to have been considered within the calculation of Gross Disproportion. RVR cost estimate (**CD:RVR/21**) remains unchanged by stating a cost of £700,000 for all highway works including level crossings. Of significance, HE response (ref SRD_102131_0 dated 26th May 2021) raises concern that the RVR proposes to use volunteer workers during construction of the level crossing to reduce costs to the £1.5m on which ORR have based their disproportionality conclusion. HE emphasis the point that '*approved partners in place who provide construction and maintenance services on the SRN and any works on the SRN to be undertaken by others would require approval from HE. Works undertaken by HE construction partners would Increase the RVR cost comparison*'.

7.3.19. With unknown additional costs for these works, the comparative case for a grade separated solution therefore becomes more compelling when realistic assumptions are applied.

7.3.20. I also consider the combination of an exceptionally flat longitudinal gradient and crossfall that is below the minimum requirements of CD109 Tbl 2.10, are a concerning departure from standards, presenting a significant risk of motorists being exposed to standing water with risk of aquaplaning on the approach to the level crossing. The applicant has failed to demonstrate how this risk is to be mitigated by appropriate management of surface water to ensure effective drainage of the carriageway.

7.3.21. Furthermore, the proposed extent of reprofiling and rate of level change is reliant upon a reduction in design speed; however, the RVR has not considered the implications for design if the 40mph limit is not achievable or enforceable.

7.3.22. Notwithstanding the above consideration of the A21, the RVR do not provide details of intentions to address level differences at Northbridge St and Station Road highway level crossings.

7.3.23. This revised submission merely highlights additional operational and discrepancies and shortcomings of the RVR proposals over and above those gleaned from the earlier submission documents.

7.4 BRIDLEWAY CROSSING 36B AT SALEHURST

7.4.1. The NRA [**APP-D**] Section 7 Bridleway Design and Build describes the type of deck plate construction as *'revolutionary lightweight panels and edgebeams*', going on to state '*the bridleway system is ideal wherever pedestrians and horse cross the track*', and presenting an illustration of a proprietary product manufactured by Polysafe for pedestrian and bridleway use.

7.4.2. Section 8 describes the Salehurst Bridleway 36b level Crossing as protected by self closing wicket gates suitable for use by mounted horse rides to open without the need to dismount.

KEY OBSERVATIONS

7.4.3. The description of the crossing construction suggests access will be confined to authorised users of a bridleway (pedestrians, cyclists and horse riders); however, this contradicts the Section 5 bullet (d) that states the crossing will be used by farm vehicles: '*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*.'.

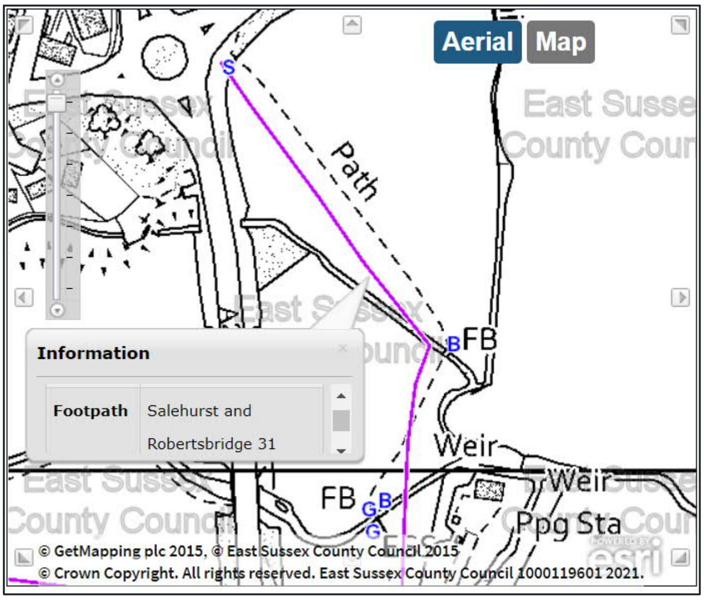
7.4.4. The proposed construction therefore appears unsuitable for use by agricultural vehicles.

7.5 DIVERSION OF PUBLIC FOOTPATH SAL/31/1

7.5.1. In this section I consider the proposals to divert public footpath Salehurst & Robertsbridge 31 (SAL/31/1) at the point of intersection with the proposed railway.

7.5.2. The public footpath is recorded on the East Sussex Definitive Map (online version), an extract illustrated in **Figure 33** below.

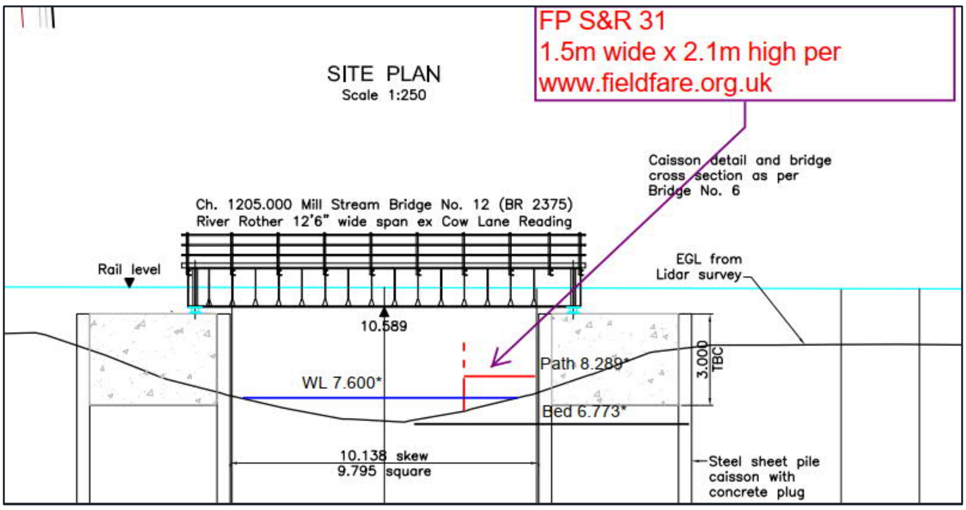
Figure 33: Extract from East Sussex Online Definitive Map



Source: *https://www.eastsussex.gov.uk/leisureandtourism/countryside/rightsofway/map/*

7.5.3. Halcrow drawing RVR-UB12-01 Mill Stream Bridge **(CD:RVR/75)** provides a detail illustrating the arrangements to divert footpath SAL31/1 to under river bridge UB12, as illustrated in **Figure 34** below. The proposal involves diversion of the footpath to within the existing river channel to a level of approximately 8.5m AOD, providing a headroom clearance of 2.1m. The proposed path level is approximately 1m below existing ground level.

Figure 34: Extract from RVR-UB12-01 Mill Stream Bridge (CD:RVR/75)



KEY OBSERVATIONS

7.5.4. DfT guidance document CD143 (Design Manual for Roads and Bridges, 2021), National Application Annex E/1 provides design requirements for minimum headroom and width clearances to footpaths.

7.5.5. Table E/1.2 of this document stipulates an absolute minimum width of 2.0m where no vertical feature present, increasing to 2.5m where a vertical feature greater than 1.2m high is present to one side.

Figure 35: Extract from CD 143 Table E/1.2

Table E/1.2 Widths for walking routes

	No vertical features present either side	Vertical feature on one side and < 1.2 metres height	Vertical feature on one side and ≥ 1.2 metres height	Vertical features on both sides (distance per side)
Desirable minimum width	2.6 metres	+ 0.25 metres	+ 0.5 metres	0.25 metres for < 1.2 metres height 0.5 metres for ≥ 1.2 metres height
Absolute minimum width	2.0 metres			

7.5.6. Table E/1.3 of this document defines a headroom requirement of 2.3m as illustrated in **Figure 36** below.

Figure 36: Extract from CD143 Table E/1.3

Headroom on walking routes

Headroom for walking routes where obstructions are present shall be in accordance with Table E/1.3.

Table E/1.3 Headroom on walking routes

Length of obstruction	Headroom
Longer than 23.0 metres in length	2.6 metres
Up to and including 23.0 metres in length	2.3 metres

7.5.7. Based on the design requirements presented above, I am concerned by the RVR proposals that depict a path width of 1.5m, bounded on one side by a full height wall (abutment to bridge structure), with headroom of 2.1m show little regard to the design standards, requiring significant departures from the minimum width requirement of 2.5m, and desirable minimum headroom of 2.3m.

7.5.8. Furthermore, I am concerned by the proposal to divert the footpath to within the river channel, reducing its level to up to 1metre below adjacent ground level not only fails to address two key points

- Consideration of the additional land required to construct the approach ramps beyond the extents of the application boundary
- Directing users over a route highly susceptible to flooding

7.5.9. The applicant has not presented evidence that considers the impact of flooding on the usability of the footpath in terms of frequency, depth and velocity of flood waters at this location; however, the applicants NRA for Bridleway 36b Salehurst Para 5 bullet (b) [**APP-D**] considers the implications of flooding to the usability of a bridleway underpass:

(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.

7.5.10. The applicant readily discounts the introduction of an underpass at Salehurst bridleway 36b due to the frequency and depth of flooding posing a significant risk to users. It seems likely therefore that footpath SAL31/1 will be subjected to similar instances of flooding and will become inundated and impassable, resulting in loss of benefit to users on more frequent occasions than its current route at ground level.

7.5.11. Table 4 of the DEFRA Supplementary Note on Flood Hazard, 2008 [**App-G**] presents a hazard rating of flood depth to flood flow velocity to persons. This demonstrates that even a relatively shallow depth of flooding presents a danger to the public, that the RVR has failed to address.

Figure 37: Extract from DEFRA Table 4 (App-G)

Table 4 – Hazard to People Classification using Hazard Rating *(HR= d x (v + 0.5) + DF)* for (Source Table 13.1 of FD2320/TR2 - Extended version)

HR	Depth of flooding - d (m)												
	DF = 0.5				DF = 1								
Velocity v (m/s)	0.05	0.10	0.20	0.25	0.30	0.40	0.50	0.60	0.80	1.00	1.50	2.00	2.50
0.0	0.03 + 0.5 = 0.53	0.05 + 0.5 = 0.55	0.10 + 0.5 = 0.60	0.13 + 0.5 = 0.63	0.15 + 1.0 = 1.15	0.20 + 1.0 = 1.20	0.25 + 1.0 = 1.25	0.30 + 1.0 = 1.30	0.40 + 1.0 = 1.40	0.50 + 1.0 = 1.50	0.75 + 1.0 = 1.75	1.00 + 1.0 = 2.00	1.25 + 1.0 = 2.25
0.1	0.03 + 0.5 = 0.53	0.06 + 0.5 = 0.56	0.12 + 0.5 = 0.62	0.15 + 0.5 = 0.65	0.18 + 1.0 = 1.18	0.24 + 1.0 = 1.24	0.30 + 1.0 = 1.30	0.36 + 1.0 = 1.36	0.48 + 1.0 = 1.48	0.60 + 1.0 = 1.60	0.90 + 1.0 = 1.90	1.20 + 1.0 = 2.20	1.50 + 1.0 = 2.55
0.3	0.04 + 0.5 = 0.54	0.08 + 0.5 = 0.58	0.15 + 0.5 = 0.65	0.19 + 0.5 = 0.69	0.23 + 1.0 = 1.23	0.30 + 1.0 = 1.30	0.38 + 1.0 = 1.38	0.45 + 1.0 = 1.45	0.60 + 1.0 = 1.60	0.75 + 1.0 = 1.75	1.13 + 1.0 = 2.13	1.50 + 1.0 = 2.50	1.88 + 1.0 = 2.88
0.5	0.05 + 0.5 = 0.55	0.10 + 0.5 = 0.60	0.20 + 0.5 = 0.70	0.25 + 0.5 = 0.75	0.30 + 1.0 = 1.30	0.40 + 1.0 = 1.40	0.50 + 1.0 = 1.50	0.60 + 1.0 = 1.60	0.80 + 1.0 = 1.80	1.00 + 1.0 = 2.00	1.50 + 1.0 = 2.50	2.00 + 1.0 = 3.00	2.50 + 1.0 = 3.50
1.0	0.08 + 0.5 = 0.58	0.15 + 0.5 = 0.65	0.30 + 0.5 = 0.80	0.38 + 0.5 = 0.88	0.45 + 1.0 = 1.45	0.60 + 1.0 = 1.60	0.75 + 1.0 = 1.75	0.90 + 1.0 = 1.90	1.20 + 1.0 = 2.20	1.50 + 1.0 = 2.50	2.25 + 1.0 = 3.25	3.00 + 1.0 = 4.00	3.75 + 1.0 = 4.75
1.5	0.10 + 0.5 = 0.60	0.20 + 0.5 = 0.70	0.40 + 0.5 = 0.90	0.50 + 0.5 = 1.00	0.60 + 1.0 = 1.60	0.80 + 1.0 = 1.80	1.00 + 1.0 = 2.00	1.20 + 1.0 = 2.20	1.60 + 1.0 = 2.60	2.00 + 1.0 = 3.00	3.00 + 1.0 = 4.00	4.00 + 1.0 = 5.00	5.00 + 1.0 = 6.00
2.0	0.13 + 0.5 = 0.63	0.25 + 0.5 = 0.75	0.50 + 0.5 = 1.00	0.63 + 0.5 = 1.13	0.75 + 1.0 = 1.75	1.00 + 1.0 = 2.00	1.25 + 1.0 = 2.25	1.50 + 1.0 = 2.50	2.00 + 1.0 = 3.00	3.50	4.75	6.00	7.25
2.5	0.15 + 0.5 = 0.65	0.30 + 0.5 = 0.80	0.60 + 0.5 = 1.10	0.75 + 0.5 = 1.25	0.90 + 1.0 = 1.90	1.20 + 1.0 = 2.20	1.50 + 1.0 = 2.50	1.80 + 1.0 = 2.80	3.40	4.00	5.50	7.00	8.50
3.0	0.18 + 0.5 = 0.68	0.35 + 0.5 = 0.85	0.70 + 0.5 = 1.20	0.88 + 0.5 = 1.38	1.05 + 1.0 = 2.05	1.40 + 1.0 = 2.40	1.75 + 1.0 = 2.75	3.10	3.80	4.50	6.25	8.00	9.75
3.5	0.20 + 0.5 = 0.70	0.40 + 0.5 = 0.90	0.80 + 0.5 = 1.30	1.00 + 0.5 = 1.50	1.20 + 1.0 = 2.20	1.60 + 1.0 = 2.60	3.00	3.40	4.20	5.00	7.00	9.00	11.00
4.0	0.23 + 0.5 = 0.73	0.45 + 0.5 = 0.95	0.90 + 0.5 = 1.40	1.13 + 0.5 = 1.63	1.35 + 1.0 = 2.35	1.80 + 1.0 = 2.80	3.25	3.70	4.60	5.50	7.75	10.00	12.25
4.5	0.25 + 0.5 = 0.75	0.50 + 0.5 = 1.00	1.00 + 0.5 = 1.50	1.25 + 0.5 = 1.75	1.50 + 1.0 = 2.50	2.00 + 1.0 = 3.00	3.50	4.00	5.00	6.00	8.50	11.00	13.50

Flood Hazard Rating (HR)	Colour Code	Hazard to People Classification
Less than 0.75		Very low hazard - Caution
0.75 to 1.25		Danger for some – includes children, the elderly and the infirm
1.25 to 2.0		Danger for most – includes the general public
More than 2.0		Danger for all – includes the emergency services

7.5.12. This Inquiry should also be aware of the findings of similar applications to divert public footpaths to rail underpasses adjacent to watercourses presented at Public Inquiry that examined flood frequency, depth, and usability of the public right of way, notably Transport and Works Act 1992: Application for the proposed Network Rail (Cambridgeshire level crossing reduction) Order, ref DPI/Z1585/17/11 (Gateley Hamer, 2017).

7.5.13. I draw attention to C22 Wells Engine level crossing, that sought to divert a public footpath to under Newmarket Bridge spanning over the River Great Ouse, taking a route that passes through a designated Flood Zone 3. The Secretary of State for Transport Decision Letter, ref TWA/17/APP/03, dated 29th October 2020 rejected this application. Para 92 of the decision notice states:

'*The Secretary of State concurs with the Inspector's consideration that in relation to C21 the proposed route would be suitable and convenient for the proposed use and should be included in the Order. He further notes that for C22 the lack of information on the likely flooding events does not assist the Inspector in determining that the route would be suitable and convenient for users and agrees with the Inspector's view that it should not be included in the Order (IR 7.11.55 and 7.11.57).*

7.5.14. In this case, in which the prospective route was liable to flooding, the applicant failed to provide evidence that demonstrated the suitability of the diversion in terms of likelihood of flooding causing obstruction and inconvenience to users, and the application rejected. I would expect this Inquiry to draw the same conclusion.

7.5.15. I am therefore of the view that the diversion of footpath SAL/31/1 via Mill Stream bridge is not achievable, and therefore will be reliant upon diversion via the UWC at this location; however, to do so will materially affect the ORR's position as set out in paragraph 39 of their **SoC:**

39. ORR supports the diversion of the footpath beneath the railway alignment and we expect that provisions will be made in the TWA Order for the diversion of the footpath to avoid an at-grade crossing. ORR would have significant reservations if there were proposals to create an at-grade foot crossing in such close proximity to the A21 crossing location. Footpath crossings on other railway systems do not generally have a good safety record on average; this is partly due to user behaviour and partly to infrastructure issues such as poor sighting.

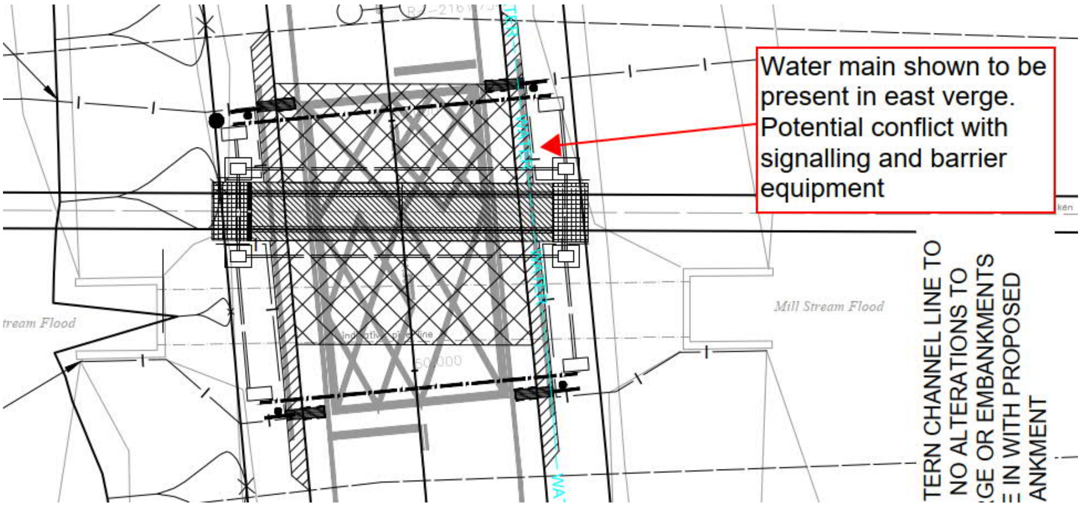
7.6 PUBLIC UTILITIES

7.6.1. Following assessment based on ARUP drawing C.950.G.201 P2 A21 Robertsbridge Bypass Proposed Geometry (**CD:RVR/74-5**).

7.6.2. This drawing indicates the presence of a public water main located within the east verge of the A21, referred to as a 200mm diameter pipe operated by South East Water (REF REP/239025/R002 A21 Crossing Options Feasibility Report 3.7.1 Utilities, extract illustrated in **Figure 38** below.

7.6.3. The associated level crossing general arrangement drawing 239025-ARP-XX-XX-DR-CH-0001 P1 does not show the water main.

Figure 38: Water Main Utility



KEY OBSERVATIONS

7.6.4. RVR fails to demonstrate how the installation of the level crossing equipment, particularly installation of foundation bases to barriers and signals, considers the presence of the water main or the method of protection or diversion of the pipe. The deposited plans do not provide evidence of consultation with South East Water to explore the extent of works required, timescale or cost to carry out these works.

7.6.5. This is of concern as the RVR GRIP2 cost estimate (ref: REP/239025/R002 A21 Crossing Options Feasibility Report Appendix C Cost Report part 5.0 Executive Summary part 3), indicated Construction Costs excludes an allowance against utilities as illustrated in **Figure 39.**

Figure 39: Extract from construction cost estimate

Sub -Total (Construction Costs)		£4,104,000	£7,123,000	£12,191,000	£6,841,000
3	Project / Design Team Fees and Other Project Costs				
3.01	Design Team Fees (10%)	£410,000	£712,000	£1,219,000	£684,000
3.02	Project Team Fees (5%)	£205,000	£356,000	£610,000	£342,000
3.03	Other Project Development Costs				
	Possessions	excl	excl	excl	excl
	Land	excl	excl	excl	excl
	Utilities	excl	excl	excl	excl

7.6.6. Furthermore, RVR's anticipated construction programme (correspondence from Peter Barber dated 1st February 2019 (p160) assumes installation of the level crossing equipment within the A21 can be completed within a single 52hr weekend road closure. This estimate also excludes service diversions; as such it is reasonable to assume that any additional works to divert of protect the water main will add to cost and programme, increasing the duration of the road closure beyond the stated 52hours.

7.6.7. The conclusion I draw from this is that the cost estimate grossly underestimates the true cost of the works to construct a level crossing at this location, and undermines the accuracy and validity of the cost estimate.

8 LEVEL CROSSING RISK

8.1 ACCIDENTS ON HERITAGE RAILWAYS AT LEVEL CROSSINGS

8.1.1. Summarised below are a series of incidents that have occurred at level crossings on Heritage Railways. The purpose of this information is to demonstrate that heritage railways are not immune to risk of incident where the railway interfaces with members of the public at level crossings, and the construction of new level crossings introduces a risk where previously there was none.

WELSHPOOL AND LLANFAIR LIGHT RAILWAY LINE - 2018

8.1.2. A heritage railway train and car were involved in a level crossing crash on Thursday 5th April 2018 (**Figure 40**).

Figure 40: Welshpool and Llanfair level crossing collision

The scene of the crash. Photo: John Titlow.

(Shropshire Star, 2018)

Thursday 5th April, incident involving 823 Countless locomotive was passing over the level crossing at Cyfronydd Station in collision with a red Chevrolet car. The driver of the car escaped unharmed, along with the 77 passengers and crew on board the train, however significant damage was caused to the car and the locomotive.

FFESTINIOG RAILWAY LINE - 2019

8.1.3. Sunday 6 January 2019 at around 16:30 hrs, an engineering train failed to stop as it approached the level crossing at Penrhyn (**Figure 40**). The gates were closed across the railway, and the train struck the upper gate and pushed through it, coming to a stand part way across the crossing, fouling both carriageways of the road, the A4085 (UK Government, 2019).

8.1.4. On applying the locomotive brakes with the intention of stopping short of the gate, the driver realised that the locomotive wheels had locked and that the train was continuing to move down the 1 in 80 gradient, and additional braking action was insufficient to stop the train in time.

ROMNEY HYTHE AND DYMCHURCH RAILWAY (RH&DR) 10 September 2016

8.1.5. A (15 inch) gauge miniature steam engine coupled to 13 coaches and carrying between 50 and 80 people, struck a tractor at a user worked level crossing (**Figure 41**). In this instance, the tractor driver did not use the level crossing in accordance with the instructions provided on the signs.

Figure 41**: Dymchurch level crossing collision**

Romney Hythe and Dymchurch locomotive Number 1 'Green Goddess' lying on its side after the accident

The tractor involved in the accident. The train hit the red counter-weight attached to the front

(Rail Accident Investigation Bureau - UK Government, 2016)

SHERINGHAM LEVEL CROSSING CRASH - 2018

8.1.6. A low speed collision involving a 1912 Y14 locomotive and a Mercedes on the Poppy Line route between Sheringham and Holt on the Norfolk coast. The train was travelling at 8mph and not carrying any members of the public. The driver of the car failed to stop at the level crossing, which had lights and sirens sounding. No reportable injuries, but the car was badly damaged.

WENSLEYDALE RAILWAY – 2016

8.1.7. A Class 27 locomotive with three carriages collided with a VW Polo on a level crossing in North Yorkshire. The driver the car became trapped and had to be released by a fire crew using hydraulic cutting equipment. The driver sustained head and leg injuries.

WENSLEYDALE RAILWAY – 2011

8.1.8. A driver in a Volkswagen was attempting to cross a level crossing by edging out slowly onto the track to see around vegetation. The train struck the front of the car, pushing it round to one side. It is estimated that the locomotive was travelling at 18mph. There were no injuries from the incident.

LEIGHTON BUZZARD RAILWAY – 2007

8.1.9. A driver in a Mercedes failed to stop at give way lines that gave priority to the locomotive number 80 'Beaudesert' using the line at that time. The car stopped across the track whilst queuing in wait to use the junction on the far side of the level crossing. There were no injuries and damage done to both vehicles was superficial. After the incident three recommendations were made by the Rail Accident Investigation Branch, regarding; the operation and visibility of crossings, vegetation management, and signage at level crossings.

8.2 RISK GRADING AND RISK ASSESSMENT

8.2.1. Within this section, I present evidence that considers safety and risk associated with level crossings as a point of interaction between rail services and members of the public, drawing on examples of similar level crossings on both the national rail network and heritage railways, and the approach taken by Network Rail to determine Risk Grading of level crossings to assess the safety implications of introducing level crossings.

8.2.2. I consider specifically the frequency of incidents, such as collisions with trains, vehicle strikes of the barrier equipment, misuse, or road traffic incidents including examples of level crossings located on similar category roads, and user worked crossings on heritage railways. This section highlights shortcomings within the application by RVR, and why I consider the mitigation measures to be inadequate.

8.2.3. A review of the existing road conditions, walking and cycling provision, traffic flows, speed, safety and accident records for each of these links is given in the Transport Proof of Evidence presented by Mr Ian Fielding.

8.2.4. To assess the risk associated with the introduction of level crossings, the RVR commissioned a series of individual risk assessments, comprising of Narrative Risk Assessments for the public highway level crossings, and more simplified '5x5' Risk Assessments for the Farm Access User Worked Crossings (UWC) and Bridleway level crossings.

8.2.5. I draw attention to the fact a suite of revised Narrative Risk Assessments were provided only as recently at 16:30hrs on Friday 28th May 2021 (Bank Holiday weekend), offering very little time to examine in detail.

8.2.6. These risk assessments state that as the level crossings do not yet exist a quantitative risk assessment has not been carried out; however, this approach is not aligned with the approach taken on the national rail network that supplements Narrative Risk Assessment with a quantitative assessment using the 'All Level Crossing Risk Assessment' (ALCRM) (Network Rail, 2020) tool for assessing risk at level crossings, the purpose of which is to quantify the level of risk applicable to existing and proposed level crossing infrastructure.

8.2.7. Network Rail describes the ALCRM approach as:

The 'Enhanced Specification' has been used to facilitate a technical audit by the Office of Rail Regulation and is regularly updated to reflect minor changes made to the model.

The ALCRM brings three distinct advantages to the rail industry:

- *it supports the on-going collection and collation of site data to ensure that level crossings are actively and correctly managed*
- *it allows the industry, for the first time, to compare the risk at completely different types of crossings in a consistent way so that resources are used to best advantage*
- *it underpins the formulation and review of the industry's level crossing strategy*

8.2.8. The ALCRM method considers a range of physical and environmental factors, including frequency of use by users, setting, sighting, line speed, level crossing safety equipment. This approach generates an output for Collective Risk and Individual Risk.

8.2.9. Collective Risk and Individual Risk are defined as follows:

- Collective Risk: is the risk to the general population of all users – based on the number of conflicts. This is a measure of the total harm, or safety loss and is expressed in terms of Fatalities and Weighted Injuries (FWI) per year. This is reported in a simplified numeric form ranked from '1 to 13'. '1' represents the highest risk. '13' represents nil risk, crossings would only score a 13 where the crossing is closed, or it receives no usage.
- Individual Risk: the risk to the individual crossing user is presented as individual risk of fatality per year. It is expressed as a letter, ranked from 'A to M' where 'A' represents the highest risk, and 'M' represents nil risk, crossings would only score 'M' where the crossing is closed or no usage is recorded or observed during an extended census.

8.2.10. Despite the uniqueness of the setting of an individual level crossing, there remains a distinct lack of benchmarking by RVR against other similar level crossings that would generally be used to inform production of a risk assessment in the absence of a quantitative assessment. Such information is readily available from the schedule of level crossing risk gradings for all level crossings published and updated annually by Network Rail .

8.2.11. In my opinion, the absence of any Quantitative Risk Assessment for the proposed RVR level crossings to determine an actual risk grading, the RVR has failed to define what is, or is not 'tolerable'. To contextualise the level of risk, I have reviewed level crossing risk data published by Network Rail February 2020, available online from networkrail.co.uk, for similar level crossings to those proposed by the RVR. The following section presents a summary of recorded risk gradings of similar level crossings on the national rail network for use as a comparative assessment.

8.2.12. The comparative benchmarks for public highway level crossings are based on similar classification of road and traffic flow defined by the DfT as the Annual Average Daily Traffic (AADT):

- Northbridge Level Crossing: Public Highway with 1,000 to 3,000 vehicles per day AAD
- B2244 Level Crossing: Public Highway with 4,000 to 6,000 vehicles per day AADT
- A21 Level Crossing: Public Highway with >10,000 vehicles per day AADT
- User Worked Crossings
- Public Right of Way Level Crossings

8.2.13. I should note, this assessment was initially prepared based on RVR's original proposal to install a MCB-OD-CCTV type level crossing prior to the change to AFBCL-OD; however, due to the limited number of AFBCL-OD in current operation, as discussed in para 4.1.8 and presented in **Figure 6**, I base my assessment on MCB-OD that has similar operational characteristic from a road user perspective.

8.3 NORTHBRIDGE STREET LEVEL CROSSING

8.3.1. **Figure 42** below presents risk grade data for MCB level crossings with low line speed and road traffic flows in the range of 1,000 to 3,000 vehicles per day.

Figure 42: Level crossings with a slow line speed (1000-3000 AADT)

Crossing name	Crossing type	Current assessment date	Next assessment due date	Individual Risk	Collective Risk	Line speed	No. of trains per day (approximately)	Census (current expectation)
Alexandra Road	Public Highway Manually Controlled Barriers (locally monitored by CCTV)	Jun-18	Sep-21	H	5	25 mph	53	1598 Vehicles 427 Pedestrians or Cyclists
Banavie	Public Highway Manually Controlled Barriers	Feb-17	May-20	K	6	20 mph	12	2766 Vehicles 170 Pedestrians or Cyclists
Barmouth South	Public Highway Manually Controlled Barriers	May-19	Aug-21	H	4	15 mph	18	2088 Vehicles 1638 Pedestrians or Cyclists
Eggesford	Public Highway Manually Controlled Barriers	Sep-19	Dec-22	L	7	15 mph	28	1026 Vehicles 24 Pedestrians or Cyclists
Insch	Public Highway Manually Controlled Barriers	Aug-18	Nov-21	L	7	10 mph	24	1904 Vehicles 41 Pedestrians or Cyclists
Paignton South	Public Highway Manually Controlled Barriers	Oct-18	Jan-22	H	4	20 mph	14	1411 Vehicles 1080 Pedestrians or Cyclists
Wainfleet	Public Highway Manually Controlled Barriers	Apr-19	Jul-21	I	4	15 mph	30	2552 Vehicles 797 Pedestrians or Cyclists

8.3.2. The results presented **Figure 42** above range from L7 to H4 that are considered as Low to Moderate Individual Risk, and Moderate to High Collective risk. It is therefore evident from this data that crossings even with low train speed, low frequency of use (1000-3000 AADT), and relatively low traffic flow, are capable of attracting a high Collective Risk.

8.3.3. Applying this comparison to Northbridge Street Level crossing, the local context of the public highway needs to be taken into consideration given the restricted visibility on the northern approach, on street parking, and narrow footways. Despite a lower train frequency, I would expect the site constraints noted here to place the crossing in the upper range risk category.

8.3.4. The Northbridge Street crossing would potentially have a lower Collective Risk and a moderate Individual Risk as in a village setting, many trips over the crossing is likely to be undertaken by residents familiar with the level crossing; however, the RVR is intended as a tourist destination attracting users unfamiliar with the area. Also, the presence of a recreational ground 120m to the south of the crossing would potentially attract more vulnerable users, particularly unaccompanied children, that would contribute to an increase in Individual Risk.

8.4 B2244 PROPOSED LEVEL CROSSING

8.4.1. The crossing proposed on B2244 is in close proximity to a bend to the north on the B2244 and a vehicle access to the south. There is a caravan park and camp site to the north-west of the crossing and the nearest bus stops for users of the caravan site are to the south of the level crossing. This arrangement is likely to result in a measurable number of pedestrian trips over the level crossing by holiday makers unfamiliar with the function and operation of the level crossing.

8.4.2. According to DfT published monitoring counts (Department for Transport, 2019) the B2244 carried 5123 total 2-way vehicle AADT flows in 2018. Level crossings with similar average daily vehicle usage are listed below for comparison.

Figure 43: Summary of Risk Grading for MCB Highway 4000-6000 AADT

Crossing name	Crossing type	Current assessment date	Next assessment due date	Individual Risk	Collective Risk	Line speed	No. of trains per day (approximately)	Census (current expectation)
Bedlington South	Public Highway Manually Controlled Barriers	Nov-18	Feb-22	J	5	20 mph	8	4995 Vehicles 972 Pedestrians or Cyclists
DODWORTH	Public Highway Manually Controlled Barriers (locally monitored by CCTV)	Sep-17	Dec-20	K	6	10 mph	36	4158 Vehicles 216 Pedestrians or Cyclists
Latteridge	Public Highway Manually Controlled Barriers	Oct-18	Jan-22	L	7	20 mph	4	4617 Vehicles 54 Pedestrians or Cyclists
Llandovery	Public Highway Manually Controlled Barriers	May-18	Aug-21	J	5	15 mph	8	5886 Vehicles 729 Pedestrians or Cyclists
Porthmadog	Public Highway Manually Controlled Barriers	Oct-19	Dec-21	J	4	15 mph	16	5335 Vehicles 808 Pedestrians or Cyclists
Rufford Station	Public Highway Manually Controlled Barriers	May-18	Aug-20	I	4	15 mph	34	4374 Vehicles 648 Pedestrians or Cyclists
Victoria Road	Public Highway Manually Controlled Barriers (locally monitored by CCTV)	Dec-18	Mar-22	J	5	25 mph	33	6114 Vehicles 298 Pedestrians or Cyclists

The results presented in **Figure 43** above range from L7 to J4 which are considered to be a low to moderate Individual Risk, and low to high Collective risk. It is evident from this data that a larger proportion of crossings on public highways with increased traffic flow fall within the High Collective Risk category.

8.5 A21 PROPOSED LEVEL CROSSING

8.5.1. Public highway level crossings, such as the solutions proposed at the A21 and B2244, would most likely have a lower individual risk as the users vary considerably each day, but due to the high volumes of traffic in these locations, the proposed crossings would potentially have a high or very high collective risk score. Even with low frequency and speed of trains, there remains a relatively high probability of conflict.

Figure 44 presents risk grade data for MCB level crossing with low line speed and road traffic flows in excess of 10,000 vehicles per day, in the order of magnitude forecast over the A21 level crossing.

Figure 44: Manually Controlled Barrier Level Crossings on Roads with AADT > 10,000 vehicles

Crossing name	Crossing type	Current assessment date	Next assessment due date	Individual Risk	Collective Risk	Line speed	No. of trains per day (approximately)	Census (current expectation)
Ammanford Relief Rd	Public Highway Manually Controlled Barriers	Apr-19	Jun-22	J	4	10 mph	2	12717 Vehicles 3348 Pedestrians or Cyclists
Boston Bypass	Public Highway Manually Controlled Barriers	Dec-18	Mar-22	L	5	10 mph	3	29660 Vehicles 1148 Pedestrians or Cyclists
Boston West Street	Public Highway Manually Controlled Barriers	Oct-19	Jan-21	I	2	15 mph	31	25623 Vehicles 8870 Pedestrians or Cyclists
Filey	Public Highway Manually Controlled Barriers (locally monitored by CCTV)	Mar-19	Jun-21	I	4	15 mph	30	10071 Vehicles 1998 Pedestrians or Cyclists
Grand Sluice	Public Highway Manually Controlled Barriers (locally monitored by CCTV)	Nov-19	Feb-22	J	4	20 mph	30	11853 Vehicles 1796 Pedestrians or Cyclists
Llanbadarn	Public Highway Manually Controlled Barriers	Nov-17	Feb-20	K	5	20 mph	15	18954 Vehicles 459 Pedestrians or Cyclists
North Seaton	Public Highway Manually Controlled Barriers	Nov-19	Feb-23	L	6	30 mph	8	16119 Vehicles 216 Pedestrians or Cyclists

8.5.2. The risk gradings of existing NR level crossings with similar barrier types (full barrier with manual control, CCTV or Obstacle Detection), line speed <55mph and AADT similar to the A21 (>10,000) are shown above in **Figure 44**. The majority of these crossings have a High Collective Risk score of 5 or above. It is worth noting that there are no existing level crossings of the proposed type on slow line speed routes for roads with higher AADT than 14,000 vehicles. It is therefore anticipated that introducing a new level crossing on the A21 with an AADT of 16,000 vehicles would potentially result in a HIGH to VERY HIGH collective risk grading.

COMPARATOR SITE - A5, OSWESTRY EXAMPLE

8.5.3. The RVR has cited the example of the Cambrian Heritage Railway, Oswestry, Shropshire as a precedent for the introduction of a highway level crossing. (**CD:RVR/34** Appendix A Precedents).

8.5.4. The former single rail line, now disused, crosses the A5, with level crossing barriers and most associated infrastructure still in place on the carriageway. The line runs from Gobowen to Llanyblodwel quarry and was in use until 1988.

8.5.5. The Cambrian Heritage Railway applied for a Transport & Works Act Order (TWAO) for transfer of Network Rail's rights to itself, which permits them to reopen the route including the reinstatement of level crossings over the A5 and A483; however, this was discounted following objection from the ORR and decision from the Secretary of State for Transport following submission of a Transport & Works Act Order 2017 No370, Part 2 Article 4, stating:

4. Regardless of the effect of article (1) (transfer of rights and obligations to undertaker, etc), the undertaker must not—

(1) without the consent in writing of the Office of Rail and Road and Highways England operate—

a) railway no. 1 at the point where it is crossed by the A5 trunk road at Pentre Clawdd; and

b) railway no. 2 at the point where it is crossed by the A483 trunk road at Weston,

and such crossings must not be on the level;

'In response to these objections CHRL accepted amendments to the Order proposed by the ORR which would prohibit the railway from crossing the A5 and A483 trunk roads on the level.'

8.5.6. In the current conditions, the level crossing infrastructure and track remain in situ, giving the impression of a functional level crossing.

8.5.7. The angle of approach, nature of the A5 and level crossing layout is similar to that proposed on the A21 by the RVR. Therefore, Oswestry crossing is considered a comparable level crossing, that would have operated similarly. As set out above the Secretary of State declined to approve a new level crossing in that case.

8.6 USER WORKED LEVEL CROSSINGS

8.6.1. For User Worked Crossings, despite having a limited number of authorised users, the Individual risk to those users is typically Very High. This means that an individual authorised user would be exposed to significant risk each time they use the crossing.

8.6.2. Network Rail's online news article titled '*Farmers are dicing with death at level crossings, as one incident involving a farming vehicle is reported on average every week in Britain*' (Network Rail, 2018) highlights the risk associated with agricultural farm access crossings, and includes an image taken from a train in-cab camera showing a near miss with a farm tractor on a level crossing.

Figure 45: UWC Near miss

8.6.3. The risk to users of UWCs with manual vehicle gates, can be significantly increased as crossing in single occupant vehicle requires the user to make five passes over the level crossing:

1) Park vehicle and cross on foot to open exit gate on far side of the crossing
2) Return over the crossing to vehicle (exit gate left open)
3) Drive over crossings (gate on entry side left open)
4) Return over crossing on foot to close entry gate.
5) Repass over crossing to complete the sequence and continue journey

8.6.4. As this process can take the user several minutes to complete, the risk to the individual increases due to the increased exposure to the railway, during which time a train might approach even if the crossing was clear at the start of the procedure. Also, as the user is required to open the gate on the far side of the crossing before transiting the crossing in a vehicle, the gate will be open for a period of time until the whole procedure is complete; consequently the risk increase if a train approaches during the crossing sequence, particularly if livestock are present, as an open gate provides an opportunity for livestock to access the railway.

8.6.5. Also, UWC's also pose a significant obstacle to the safe movement of livestock across the railway due to time and logistics of herding animals on the railway. This imposes a significant risk to the safe farming of livestock reliant on access across the railway, and considerable dis-benefit to my clients. The RVR do not appear to have considered the use of 'Cattle Creeps' to allow livestock to pass under the railway

8.6.6. The RVR has not submitted Narrative Risk Assessment for farm access UWC so there is no evidence to determine the extent of consideration given to the operation of the crossing, nature of the protection available, audible and/or visual warnings, telephone, and risk to the user of the crossing, and so the RVR fails to address the considerable risks described above.

8.6.7. NR published data on similar existing User Worked Crossings provides an indication of the level of risk with varying levels of protection, **Figure 46** presents risk grading for UWC protected by whistleboards only**. Figure 47** presents risk grading for crossings protected by telephone and whistleboards. No additional protection such as automatic locking gates or miniature stoplights is assumed.

Figure 46: User Worked Crossing with Whistleboards

Crossing name	Crossing type	Current assessm ent da	Next assessme nt due da	Individual Risk	Collective Risk	Line spee	No. of trains per day (approximately	Census (current expectation)
Dinas UWC	Private User Worked Crossing	May-19	Aug-21	C	10	20 mph	12	Infrequent vehicular use Infrequent Pedestrian use
Low Newbeggin Farm 2	Private User Worked Crossing with Whistleboard	Aug-19	Nov-21	C	8	25 mph	18	Infrequent vehicular use Infrequent Pedestrian use
Low Newbeggin Farm 3	Private User Worked Crossing	May-18	Aug-20	C	9	25 mph	18	Infrequent vehicular use Infrequent Pedestrian use
Morton Grange Farm 1	Private User Worked Crossing with Whistleboards	Aug-19	Nov-21	C	6	20 mph	13	2 Vehicles 2 Pedestrians or Cyclists
Morton Grange Farm 2	Private User Worked Crossing with Whistleboards	Sep-19	Dec-21	C	6	20 mph	13	Infrequent vehicular use 2 Pedestrians or Cyclists
Ty Du	Private User Worked Crossing	Dec-19	Mar-22	C	6	20 mph	18	Infrequent vehicular use 2 Pedestrians or Cyclists

Figure 47: User Worked Crossing with Telephone and Whistleboards

Crossing name	Crossing type	Current assessm ent da	Next assessme nt due da	Individual Risk	Collective Risk	Line spee	No. of trains per day (approximately	Census (current expectation)
Aronarff	Private User worked Crossing with Telephone with Whistleboards	Jul-18	Oct-20	C	6	25 mph	8	Infrequent vehicular use 8 Pedestrians or Cyclists
Griggs	Private User worked Crossing with Telephone with Whistleboards	Mar-18	Jun-20	C	6	25 mph	14	Infrequent vehicular use 2 Pedestrians or Cyclists
Sowters	Private User worked Crossing with Telephone with Whistleboards	May-18	Aug-21	D	12	20 mph	9	Infrequent vehicular use Infrequent Pedestrian use
Stepps Cottage	Private User worked Crossing with Telephone with Whistleboards	Jun-19	Sep-21	D	5	25 mph	12	12 Vehicles 8 Pedestrians or Cyclists

8.6.8. The subset of level crossings shown have a train frequency between 8 and 18 trains per day, and line speed of 20mph – 25mph that is representative of the RVR proposals that has UWC crossings located beyond the 10mph restriction on the approach to public highway level crossings.

8.6.9. The data shows that all of the User Worked Crossings protected only by Whistleboards have an individual risk score of 'C' which is considered as Very High risk. The date presented for User

Worked Crossings protected by Telephone and Whistleboards record Individual Risk ranging from ‘D’ to ‘C’, which is consider as High to Very High risk.

8.6.10. This clearly demonstrates that User Worked Crossings present an unacceptable risk to users even on lines with low train speed and low frequency of train passes per day. Furthermore, it should be noted that the risk grading is assessed on an individual crossing basis, while the RVR proposals incorporate several crossings in close proximity to one another, which is likely to introduce a cumulative risk and is therefore not expected to offer a suitable solution.

8.6.11. The ORR (**CD:REP-17 para 41**) states *‘RVR has not set out the case for the User Worked Crossings. These crossings should be avoided if at all reasonably practicable and we refer the Inquiry to the poor safety record of such crossings on the mainline railway’. While crossings on the mainline generally experience far higher levels of train movements and at much higher speeds than is proposed here, there is evidence that such crossings on minor railways also suffer from levels of user misuse that make them undesirable.*

We recommend that the railway and landowners be required to come to agreement on alternative methods of access that do not require at-grade crossings of the railway route.

8.6.12. Clearly, RVR’s proposal to introduce User Worked Crossings is contrary to ORR Policy and the work to improve safety being undertaken elsewhere on the railway network.

8.6.13. In addition to the above statements, I am cognisant of the nature of the RVR as a tourist attraction which, by its very nature, will see a peak in operation during the summer period, a time at which coincides with a peak in farming activity that is likely to see an increased usage of UWC level crossings. Harvesting activities are often undertaken by sub-contractors that are perhaps unfamiliar with the operation of the UWC, which might lead to misuse and increased risk.

8.6.14. I am therefore of the opinion that the introduction of User Worked Crossings imposes an unnecessary and unacceptable safety risk upon my clients and authorised users who depend on these crossings to preserve access to land severed by the railway.

8.7 PROPOSED PUBLIC BRIDLEWAY LEVEL CROSSING

8.7.1. Bridleway crossings have inherent risks due to the varied spectrum and ability of users (which includes pedestrians, cyclists and horse-riders).

8.7.2. Due to the recreational nature of the proposals and the site location between the village of Salehurst and the River Rother, and adjacent to the proposed Salehurst station halt, Bridleway36b is likely to attract high usage, particularly at times when the railway is operational, and so the individual and collective risk gradings for this crossing are likely to be High

8.7.3. To mitigate risk the RVR propose to introduce a proprietary Meerkat train warning protection system to reduce risk to users [NRA **App-D** received 28th May 2021]. This product is currently under trials with Network Rail with product acceptance anticipated for July 2021.

8.7.4. As no data currently existing of the effectiveness of this system I am unable to comment of the suitability of the application on the RVR, however, if the Meerkat trial is unsuccessful, or the product is unavailable to the RVR, then the assessment of risk should assume a worst case and be based upon an uncontrolled Stop-Look-Listen crossing.

8.8 SUMMARY OF LEVEL CROSSING RISK APPRAISAL

8.8.1. I have grave concerns that the RVR has not fully assessed and quantified the level of risk to users in an equivalent qualitative assessment.

My review of comparative ALCRM online data published by Network Rail, February 2020 concludes the following (https://www.networkrail.co.uk/wp-content/uploads/2020/04/Level-Crossings-data-February-2020.xlsx)

a) For the **A21 Public Highway** crossing the risk gradings of existing similar NR level crossings with similar barrier types/line speed, showed the majority of have a High Collective Risk score of 5 or above.

b) For **Northbridge Street** similar crossings range from L7 to H4, are considered to be a low to moderate Individual Risk, but Moderate to High Collective risk.

c) Level crossings similar to the **B2244** proposed crossing range from risk grading L7 to J4 are considered to be a low to moderate Individual Risk, and Low to High Collective risk.

d) For **User Worked Crossings**, the Individual risk to users is typically Very High. It should also be noted that a single crossing movement by one vehicle requires five passes over the level crossing to open and close gates, increasing the Individual Risk due to the time taken to complete the crossing manoeuvres.

8.8.2. This clearly demonstrates that unprotected User Worked Crossings present an unacceptable high risk to users; a risk that is compounded by the introduction of five such crossings on this route.

8.8.3. The incidence of vehicle collisions or degraded operation at level crossings on Heritage railways demonstrates the risk of operating level crossings, even at low line speed, remains High. This is equally unacceptable.

8.8.4. Human error is also a key factor in many rail safety incidents and this is especially of concern with a volunteer workforce who may not be adequately trained to manage risk. This is a particular risk for the A21 level crossing.

8.8.5. I am also concerned by RVR's approach to adapt the AFBCL for use on the strategic road network with that carries substantially greater volumes of traffic than the only two operational AFBC-OD crossings on the national rail network, particularly as the local monitoring by the train crew increases the risk of interaction between the train crew and road traffic.

9 POLICY COMPLIANCE

9.1 ROTHER DISTRICT LOCAL PLAN

9.1.1. The current Rother District Local Plan (adopted in 2006) includes considerations for the proposed Scheme. Policy EM8 indicates that an extension to the Kent & East Sussex Steam Railway from Bodiam to Robertsbridge, along the route identified on the Proposals Map, will be supported, subject to any proposal meeting the following criteria:

1) *it must not compromise the integrity of the floodplain and the flood protection measures at Robertsbridge;*
2) *it has an acceptable impact on the High Weald Area of Outstanding Natural Beauty; and*
3) ***it incorporates appropriate arrangements for crossing the A21, B2244 at Udiam, Northbridge Street and the River Rother."***

9.1.2. Despite the granting of planning consent, it is my professional opinion that due regard to level crossing risk has not been given in this case, and that proposals to introduce new level crossing on the public highway, including the strategic road network, are not appropriate without a fully considered and informed assessment of risk and mitigation, which is absent from this application.

9.2 OFFICE OF RAIL AND ROAD (ORR)

9.2.1. The ORR states that NR, operators of heritage and light railways and those who control depots have an explicit legal duty under the Health and Safety at Work etc. Act 1974 (HSWA) to minimise risks arising on their networks, so far as is reasonably practicable.

9.2.2. The ORR acknowledges that level crossings present a risk to the railway and users of the crossing. ORR guidance document RIG 2014-06 (Office of Rail and Road, 2014) states:

*1. This RIG provides guidance on how ORR applies its "**no new level crossings unless there are exceptional circumstances**" policy and sets out a process that ORR inspectors should follow if they receive information concerning a proposed new crossing of any type. It covers mainline and heritage networks but does not apply to new crossings on tramways as such intersections are governed by road traffic signals.*

2. New level crossings introduce particular risks to the railway; ORR, therefore, considers that there should generally be enhanced scrutiny of how proposers are complying with their health and safety duties (for example, around the suitable and sufficient assessment of risk). There may be cases where a proposer will have other steps to take before developing a level crossing, such as the amendment of a safety authorisation involving the necessary scrutiny and decisions from ORR, or safety verification.

*7. ORR's policy is that new level crossings should only be considered appropriate in exceptional circumstances. This was set out in a 2007 level crossings policy statement (now removed from the ORR website) and more recently in Chapter 4 of ORR's Strategy for Regulation of Health and Safety Risks 7 (***APP-E***). This remains ORR's starting position when giving an opinion on a new level crossing because level crossings introduce risk to the railway and to those using the crossing, and we support the closure of level crossings as part of our drive to reduce risk on the railway. This is consistent with the principle of eliminating risk as the priority in a hierarchy of risk control.*

8. Network Rail also has a general "no new crossings" policy. The heritage sector is encouraged to publish details of crossings on its network and any planned closures. The Highways Agency has a policy of no new accesses on the strategic road network other than in exceptional circumstances where it can be sufficiently demonstrated that there is a net benefit to the network.'

9.2.3. The ORR policy advocates a risk assessment-based approach to the design process:

- *Ensure that the closure [i.e. eradication] of level crossings is the first option considered in a risk-control strategy by the duty holder, in line with the principles of prevention.*
- *encourage alternatives to crossings to be fully explored and delivered where reasonably practicable. In principle, we do not support the creation of new level crossings where there is a reasonably practicable alternative";*

9.2.3.1 It does not appear that a risk-assessment based approach has been taken in this case with the opportunities to design out level crossings given low priority at the design stage, but the introduction of the railway places a burden of risk on my client who will be reliant upon UWC to maintain access to their land, and contravenes ORR guidance that promotes minimising these types of crossings for safety concerns.

9.2.4. ORR has published a consultation on their updated guidance on level crossing safety (January 2021). At the time of writing, the updated guidance is still progressing through the consultation process. The updated guidance still advocates the closure of level crossings and eliminating risk, but sets out an updated review to reflect latest policy.

9.2.5. With regards to risk factors, paragraph 19 of the consultation document states: *"…that a level crossing design that minimises cognitive demands and places as little onus as possible on the user to take decisions about when it is safe to use the crossing is preferable."*

9.2.6. Within the consultation draft, of relevance to this proof, more detail on how to approach the cost benefit case if the costs of grade separation are disproportionate and substantially outweigh the benefits/impacts although it is clearly noted that each crossing is to be considered on a case by case basis.

9.2.7. In relation to new level crossings that are linked with older railway lines the draft guidance states:

26.Proposals for new level crossings are rare, but projects to reinstate old railways may include proposals to reinstate a level crossing which previously existed on the route. In principle, ORR does not support the creation of new level crossings where there is a reasonably practicable alternative, and we encourage alternatives such as diversions, bridges or tunnels, to be fully explored and delivered where reasonably practicable.

9.2.8. It should be noted that the RVR proposals are not aligned with this consideration as the A21 Robertsbridge bypass was constructed after the dismantling of the original railway, and therefore not previously subjected to a level crossing. Consequently, although the RVR proposals would reinstate the old railway, the introduction of a level crossing over the A21 is not reinstatement, but rather this would be a new level crossing of the SRN.

9.3 NETWORK RAIL GUIDANCE

9.3.1.1 The proposals do not support the sentiments of Network Rail's recently published Enhancing Level Crossing Safety 2019 – 2029 (Network Rail, 2020) document, which provides a long-term strategy.

9.3.1.2 The introduction from NR's Chief Executive Andrew Haines advocates that new level crossings should not be introduced:

"If we were to build the railway from scratch today, we wouldn't include level crossings. They pose a risk to our passengers and members of the public, who can also be delayed if there is a fault or incident at a level crossing… There are far too many near misses and there are still, sadly, fatalities on level crossings". "Simply put, the safest level crossing is a closed one"

9.3.1.3 Network Rail's Level Crossing Safety webpage (Network Rail, 2021) goes on to state:

Level crossings were part of a network built around 180 years ago, when there were fewer and slower trains, no cars and the pace of life was much slower. If you were to build a railway today it would not have any level crossings. For example, HS1 does not have any level crossings.

We believe the most effective way of reducing level crossing risk is to eliminate the crossing completely by closing it. Where we cannot do this we will look at options to make the crossing safer.

10 ASSESSMENT OF GROSS DISPROPORTION

10.1.1. The ORR stresses the importance of considering alternative options other than level crossings, and whilst engineering options have been considered in the Option Selection Report **(CD:RVR/76)**, alternative proposals for grade separation of crossings have been readily discounted on grounds of disproportionate costs without a fully considered assessment of the whole life operational costs of level crossings, level crossing renewals cost, cost of continual safety mitigation, cost of catastrophic incidents, and reliance on a discounted cost for construction of at grade level crossings provided by the RVR used to inform the assessment of Gross Disproportion.

10.1.2. The RVR's discounted costs are reliant upon use of its own contractors and volunteer workforce to undertake the engineering works within the A21 public highway. The ORR states in its representation that '*We note that RVR's figures for the cost of level crossing options reflect a degree of unpaid or low cost labour from within the heritage company's own resources. This has the effect of reducing the cost of a level crossing alternative when compared with the other engineering solutions which would be needed to be delivered almost entirely by professional external contractors. ORR has not sought confirmation of the suitability of the in-house resource and has taken at face value that work would be delivered to expected standards.' (**CD:REP-17** ORR paragraph 26).*

10.1.3. It is a concern that the ORR has not sought confirmation of these costs and placed such reliance on the assumption that unpaid or low-cost labour from within the heritage company's own resources will carry out safety critical works and works within the public highway. Noting that both Highways England and the local highway authority only permit licenced competent contractors to carry out safe construction works within the highway or to carry out appropriate traffic management, accompanied by the payment of bonds to cover defects during the maintenance period, it is my view that the cost estimates presented by RVR are a gross underestimation of the actual construction costs.

10.1.4. Arup produced a cost comparison based on construction industry standard approach to cost estimating **(CD:RVR/76)** presenting a figure of £6.8m for Option 1 At Grade level crossings. This figure is based on an allowance of £300k for level crossing works. This contrasts to the figure of £1.513m to construct a level crossing at the A21 provided by RVR set out in its assessment of Gross Disproportion [**SoC p242**]. Of concern is that the ARUP cost summary table, **Figure 48** below, states that the RVR cost of £1.5m includes costs for all works listed for Option 1.

10.1.5. Separately, the RVR lists a cost of £700k as presented in the Estimate of Costs **(CD:RVR/21)** to cover the cost for all level crossings and associated highway works, which is inconsistent with the ARUP cost estimate, and assessment of Gross Disproportion. The only conclusion I draw from this is that the assessment of gross disproportionality is flawed on the basis of the inconsistent cost assessments and discounted price provided by RVR when compared to cost estimated based on industry standard rates for all other options, without an equivalent discounted RVR price being offered.

Figure 48: Extract of ARUP cost estimate

Table 1 – Referenced Documents

Option	Structures	Highway/Traffic	Flooding	Environment	Maintenance	Cost
1 At grade level crossing	Rail embankment Level Crossing Flood relief bridges and culverts	Most impact on permanent traffic flows H&S concerns associated with level crossings to be mitigated Least impact on traffic during construction	Modelling and FRA completed showing minimal effect to the wider area	Low land take Neutral impact on visual Best recreates the historic route Minor footpath diversions Low embodied CO2	Maintenance requirements for level crossing Maintenance and inspection of flood relief bridges and culverts	£6.8M
2 Rail under existing highway	U-Shaped RC trough A21 road bridge Inverted siphons for watercourses and flood relief	Temporary diversion required during construction No impact on permanent traffic flows as highway remains unchanged during construction phase	Modelling and FRA would have to be redone EA likely to have significant concerns regarding the use of inverted siphons making approval of the scheme unlikely	Low land take but large volume of cut Lower visual impact Inverted siphons, pumps etc detrimental to the stream environment Footpath diversion Moderate embodied CO2	Expensive and difficult for inverted siphons Maintenance and inspections required to make railway operational after flood Maintenance and inspection of road over rail bridge	£11.8M
3 Rail over existing highway	Embankments	No impact on permanent traffic flows as highway remains unchanged Restricts future highway improvements	Modelling would have to be checked. Likely to have minimal impact on flooding in the wider area so FRA would probably not need updating	Significant construction period High embodied CO2	maintenance requirements due to height and length of viaduct structure.	£20.2M
4 Highway raised by 2m with rail under	Rail embankment A21 road bridge A21 embankment Flood relief bridges and culverts	Temporary diversion required during construction Slight impact on permanent traffic due to reduced speed limit	Modelling would have to be checked. Likely to have similar results to Option 1 so FRA would probably not need updating	Low land take Moderate impact on visual Minor footpath diversions Low embodied CO2	Maintenance and inspection of road over rail bridge Maintenance and inspection of flood relief bridges and culverts	£11.3M
RVR fully costed option 1 – at grade level crossing designed and constructed by RVR	Rail embankment Level Crossing Flood relief bridges and culverts	Most impact on permanent traffic flows H&S concerns associated with level crossings to be mitigated Least impact on traffic during construction	Modelling and FRA completed to satisfaction of EA showing minimal effect to the wider area	Low land take Slight impact on visual Best recreates the historic route Minor footpath diversions Low embodied CO²	Maintenance requirements for level crossing Maintenance and inspection of flood relief bridges and culverts	£1.5M

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11 CONCLUSION

11.1 SUMMARY

11.1.1. This summary presents a concise overview of my main evidence regarding level crossing operation and risk in response to Item 3 of the Statement of Matters in relation to the TWA Order:

3a) The impact of three new level crossings on safety, traffic flows, and congestion particularly in relation to the A21 and future plans for this road

3b) The impact of the scheme on roads, footpaths and bridleways, including the impact on access to property and amenities.

11.1.2. My colleague Mr Ian Fielding has prepared a proof of evidence focusing on traffic flow matters.

I have reviewed the deposited plans in respect of level crossing infrastructure and operation of the level crossings where the railway intersects existing public highway, Public Rights of Way (PRoW), and private access across the railway to address matters associated with land severance, disruption to the road transport network and level crossing safety.

INCONSISTENCY

11.1.3. The submission documents contain numerous inconsistencies, addressed in Section 4 of my Proof, particularly in relation to the frequency of barrier closures, duration of barrier down time, and method of operation and control of the barrier equipment, in particular, an absence of supporting evidence presenting the calculations to determine the barrier down duration. It is my opinion that such discrepancies misrepresent the actual delay to road users at the level crossings, by underestimating the actual length of closure.

RESPONSE TO 3a

11.1.4. Section 8 of this Proof addresses matters considered in response to 3a.

3a) The impact of three new level crossings on safety, traffic flows, and congestion particularly in relation to the A21 and future plans for this road

11.1.5. I consider that RVR has failed to appropriately assess and acknowledge the safety risk associated with the introduction of at grade level crossings, particularly on the strategic road network and user worked farm crossings, introducing risk to members of the public where previously there was none.

11.1.6. Examples of vehicle collision and degraded operation at level crossings on Heritage railways demonstrate the inherent risk of operating level crossings, even on routes with trains operating at low speed, with a risk of significant disruption to services and users of the level crossing. The consequential impact of incidents at level crossings are not adequately addressed within the Narrative Risk Assessments.

11.1.7. The A21 currently has no level crossings along its route between the M25 and Hastings. Level crossings that are present in the area are generally confined to minor local roads, private access and public rights of way; as such, drivers will not expect a level crossing on the A21, or for it to be in operation. This increases the risk of an accident by poor driver behaviour which is the reason for the majority of accidents at Level Crossings.

11.1.8. Alternative proposals for grade separation of crossings have been readily discounted on the grounds of Gross Disproportion assuming that a new railway can be delivered within a very unrealistic budget and without a fully considered assessment of the whole life operational costs of level crossings, level, cost of continual safety mitigation, and cost of catastrophic incidents.

11.1.9. The arrangement for level crossing signalling protection as described within the Narrative Risk Assessment (APP-D) do not reflect the change in level crossing type, from MCB-OD-CCTV to AFBCL-OD; as such, RVR has not fully considered the operational and crossing protection requirements to demonstrate its ability to adequately minimise risk and ensure the safety of users.

11.1.10. I am deeply concerned by an unsatisfactory operational procedure placing an expectation for train crew to carry out traffic management duties to halt traffic, with no authority from the highway authority, places train crew in a position of danger by interacting with vehicles on the public highway, and is potentially unsafe.

11.1.11. RVR has not considered the consequential impacts of an incident at one crossing, effecting a neighbouring crossing as presented in Section 5, para 5.1.10 of my Proof.

11.1.12. Comparisons to existing level crossings in the national rail network suggest crossings similar to those proposed by RVR present a risk to users, particularly as the A21 in which comparators score a High to Very High Collective Risk

11.1.13. For User Worked Crossings, the Individual risk to those users is typically very high. This means that an individual user would be exposed to significant risk each time they use the crossing placing an unnecessary burden on my clients.

11.1.14. Based on the above evidence, and absence of a comprehensive assessment of risk, it is my opinion that grade separation is required for the A21 crossing in the interests of highway and user safety. The RVR has failed to adequately consider the operational impacts of introducing a level crossing on the strategic road network or demonstrate how incidents of level crossing mis-use will be addressed.

RESPONSE TO 3B

11.1.15. Section 8 of this Proof addresses matters considered in response to 3b.

3b) The impact of the scheme on roads, footpaths and bridleways, including the impact on access to property and amenities.

11.1.16. I note that Highways England have yet to confirm their acceptance of the level crossing of the A21 and require further mitigation measures to be considered.

11.1.17. I have grave concerns regarding the scale of design departures proposed by the RVR, some of which present a safety risk to road users:

Highway design speed discrepancies include:

- CD:RVR74 ARUP = 70kph (to justify SSD to signals, signage and reduction in superelevation)
- GG104 Safety Risk Assessment states a design speed of 85kph.
- The design assessment fails to assess changes to superelevation. Higher design speed requires super-elevation of 3.5% min.

11.1.18. A higher design speed of 85kph will contribute to a further departure from standards that dictate appropriate highway geometry and increase risk to road users. High design speeds also contradict the proposal to introduce a lower speed limit and raise concerns over enforceability of the speed restriction.

11.1.19. The RVR does not address necessary arrangements to provide access to farm access level crossings. I am concerned by the absence of any provisions for pedestrian and vehicle access to overcome the level difference between the railway and surrounding ground level on the approach to the level crossings, which is a significant oversight in this application and therefore in my opinion, the scheme is not deliverable given the reliance on additional third party land to accommodate permanent engineering works associated with the construction of a suitable access to avoid land severance and ensure the safe use of the level crossings.

11.1.20. Proposed rail signalling layouts, level crossing barrier timing sequences, assumed train stopping distances are below the minimum requirements of the Railway Group Standard, and ORR design requirements.

HINDERANCE TO EVIDENCE REVIEW

11.1.21. The late publication of this evidence has made it extremely difficult for me to finalise my evidence as I have been unable to review all the submitted material in detail in the time available. I have noted and commented on the material where possible but like Mr Fielding I reserve my position so far as it is necessary for me to clarify my evidence either before at the public inquiry once I have had a proper opportunity to review the material in full."

11.1.22. Furthermore, Highways England have set out 33 items that the designers must address. At the time of writing, it is unclear whether these items can be responded to within the Inquiry timetable. The number of items identified required to be responded to confirms the significance of the need to provide a crossing in an appropriate form such it does compromise the safety of users of the A21.

11.2 CLOSING REMARKS

11.2.1. I consider the proposals for the scheme to be deficient and therefore unacceptable in the following aspects, as detailed in my evidence:

- The application contains numerous technical discrepancies that undermine the accuracy and integrity of the proposals.
- The proposals lack a full appreciation of safety risk to all users of the level crossings,
- the barrier closure durations are underestimated
- the proposals fail to give adequate consideration to agricultural land access and land take requirements for adequate approaches and visibility envelopes
- The proposals do not meet ORR policy requirements.
- Level crossings, whether over public highway, public right of way, or private access, provide a point of interaction between members of the public and railway, creating a potential point of conflict resulting in an increased risk to all users.

- The applicant has substantially underestimated the construction and whole life costs for a fully informed assessment of 'gross disproportionality' when considering alternative grade separated options that would eliminate risk

11.2.2. I consider the proposals for this application to be inappropriate as they present a risk to the railway and public highway network as, in my opinion, this scheme would introduce a disproportionate level of risk to potential users within the surrounding network.

11.2.3. I am concerned by the lack of consideration of sighting distances to all level crossings, and access provisions to UWC on an elevated embankment. Based on the evidence provided, and the absence of any engineering proposals that address the level differences, extent of earthwork, or guidance on the safe operational procedure for a farm access crossing, the proposed works are not achievable within the extents of this application boundary.

11.2.4. Precedent from the Cambrian Railways TWAO application, and Network Rail Wells Engine footpath diversion, demonstrate that the Inspector should refuse this application on grounds that the introduction of a level crossing on the strategic road network, and diversion of a public footpath without proper assessment of flood risk, are inappropriate and present an unnecessary risk.

11.2.5. I have formed this conclusion by drawing on my extensive experience working with Network Rail on over 90 level crossing projects seeking to minimise risk to all users; furthermore, I find it wholly unacceptable that a project that seeks to introduce new level crossings should be permitted to proceed without full and adequate consideration of level crossing operations and user safety, particularly those on the public highway.

I am of the opinion that this scheme, if granted, will introduce a disproportionate level of risk to all users of the level crossings, and unacceptable imposition on my clients as landowners directly affected by the proposals.

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