ARUP

Subject Rother Valley Railway – A21(T) GG104 Risk Assessment

Date 24 June 2021 **Job No/Ref** REP-239025-R002

A21(T) Level Crossing GG104 Safety Risk Assessment

Introduction

The Rother Valley Railway (RVR) is located between the mainline station at Robertsbridge (on the London and Hastings Line) and the existing Kent & East Sussex Railway, which runs between Tenterden and Bodiam. When completed, the RVR will restore railway transport links between the mainline railway system from Robertsbridge Junction to Bodiam and the Kent & East Sussex Railway and the attractions it serves. The railway already has full planning consent which incorporates level crossing arrangements for crossing several roads.

This report assesses the safety risks associated with the operation and maintenance of the proposed at-grade level crossing on the A21(T) Robertsbridge bypass. It also assesses the operational and future maintenance risks associated with grade-separated alternatives. The risks associated with the alternative options are provided for context as the designs associated with the alternatives have not been developed such that a detailed appraisal can be undertaken. Refer to Table 12, Table 13 and Table 14 for risks associated with grade-separated options.

The report has been prepared in accordance with the requirements of GG104 (revision 0, June 2018) Requirements for Safety Risk Assessment (SRA). The format of the report accords with the framework for an SRA as set out in Appendix A and Appendix B of GG104. Accordingly, following this introductory section the report comprises sections as follows:

- SRA Planning
- Categorisation of Activity Type
- Identification of Affected Populations
- SRA Scope
- Safety Baseline and Safety Objective
- SRA Process (Hazard Identification & Analysis; Analysis & evaluation of safety risk; safety risk mitigation); and
- Maintaining SRA (document, updates, validation and monitoring).

Existing A21 Alignment

The existing alignment of the A21(T) in the vicinity of the proposed level crossing location was assessed in December 2014 against the DMRB design standards at that time and the findings of that assessment are outlined in A21(T) Alignment Review (Doc Ref: REP-239025-R001). The alignment compliance was then reassessed in accordance with the revised DMRB guidance following its release in 2020. The chainages referenced with regard to the existing alignment are taken from the A21(T) Alignment Review and do not correspond to the proposed.

Cross Section

The cross section has been assessed in accordance with CD127 Cross Sections and Headroom.

The A21(T) cross-section comprises 2 x 3.65m lanes, with 1.0m hard strips, and a verge greater than 2.5m to both sides. This cross section is compliant with Figure 2.1.1N1e Dimensions of Cross Section Components for all purpose Roads Mainline, Single Carriageway.

There are two underbridges present and both cross over watercourses. In both cases the lane widths and hard strips remain 3.65m and 1.0m respectively. Vehicular parapets are provided to both bridges, with kerbed verge widths of 1.4m. CD127 Clause 3.6 states a minimum verge width of 0.6m is required.

Horizontal Alignment

The horizontal alignment has been assessed in accordance with CD109 Highway Link Design. Transition lengths have been assessed using Equation 4.13 from the same design guidance document. The existing centreline geometry has been reproduced by tracing the topographical survey and assessing the crossfall to identify vertical transition locations.

The horizontal alignment on the roundabout approach and exit does not follow the centreline geometry, as it consists of flares and or entry / exit radii to the roundabout. As a result, mainline cross falls have been assessed beyond the end of the splitter island.

The horizontal alignment assessment shows that the geometry complies with the requirements of CD109.

Vertical Alignment

The vertical alignment has been assessed in accordance with CD109 Highway Link Design.

There are two underbridges located on this vertical element. Both are kerbed throughout the extent of the structure. In both cases there is a gully downstream of the structure.

The vertical alignment assessment shows that the existing geometry complies with the requirements of CD109.

A21 (T) Crossing Options

The A21(T) Crossing Options Feasibility Report (Doc Ref: REP/239025/R002) documents the option appraisal process undertaken by the RVR to assess the available solutions to take the proposed RVR heritage railway across the A21(T) near Robertsbridge. Four options were assessed:

- At grade level crossing;
- Rail under existing road;
- Rail over existing highway; and
- Rail under raised highway.

RVR submitted an assessment of these options to Office of Rail and Road (ORR) in accordance with their requirements. The ORR have reviewed the submission which included a risk assessment of the at grade level crossing. The ORR concluded that their test of exceptional circumstances on

new level crossings (as defined in ORR policy – RIG-2014-06 "New Level Crossing: How ORR applies its policy of no new crossings unless there are exceptional circumstances") has been met and that an alternative to a level crossing is not reasonably practicable on railway safety issues.

The at-grade level crossing has been assessed as being considerably cheaper than the next least expensive alternative option. The A21(T) Crossing Options Feasibility Report compared the costs of grade separation with the cost of a level crossing based on the RVR delivery strategy with construction elements within the Strategic Road Network (SRN) corridor being undertaken by Highways England (HE) approved contractor partners. This resulted in the difference being assessed as £9.8M between the level crossing and the next lowest cost grade separated option. The relative cost differential between the grade separated alternative and the proposed at grade solution (7.5:1) demonstrates gross disproportion with respect to the cost of achieving grade separation. The ORR have agreed that there is gross disproportion between the costs of a level crossing and the cheapest form of grade separation and the ORR state that a tolerably safe level crossing would be created.

This SRA relates solely to the at-grade level crossing and is confined to the defined activity and associated specific question set out in Section 1, Step 1 – Planning.

1 Step 1 – Planning

Arup have prepared the preliminary design for the highway elements of the level crossing scheme. A summary of the scheme and the preliminary highway design elements (including preliminary design drawings) is provided in Section 1.1. The preliminary design drawings have been reviewed by HE in their role as Overseeing Organisation for the SRN and accepted as compliant with DMRB. The preliminary design will be subject to a Stage 1 Road Safety Audit in accordance with DMRB GG 119 (revision 2, Jan 2020) and this is due to take place following the acceptance of the Departure from Standards associated with the level crossing.

An SRA in accordance with GG104 has been undertaken for the operation of a heritage railway level crossing on the A21, which, in accordance with GG104 is defined as the "activity".

The objective of this SRA is to understand the risk presented to the affected populations by the activity. In summary, the specific question that this SRA seeks to answer is: ***"Is the operation of a heritage railway level crossing on the A21 in this location acceptable in terms of safety risk for all populations."***

1.1 Proposed Scheme

The scheme proposes the installation of an 'Automatic Full Barrier Crossing, Locally Monitored' (AFBCL) level crossing on the A21(T) to the south of the existing junction with Northbridge Street and Church Lane.

The scheme has been progressed to an outline stage. Preliminary highway design drawings listed in Table 1 are included within Appendix A to provide detail as to the proposed level crossing arrangement and location of the scheme within the highway corridor.

Table 1 – Scheme Drawings

Drawing No	Title	Rev
239025-ARP-XX-XX-DR-CH-0001	A21(T) Robertsbridge Bypass – General Arrangement	P1
239025-ARP-XX-XX-DR-CH-0002	A21(T) Robertsbridge Bypass – Road Markings	P2
239025-ARP-XX-XX-DR-CH-0003	A21(T) Robertsbridge Bypass - Traffic Signs Layout	P2
239025-ARP-XX-XX-DR-CH-0010	A21(T) Robertsbridge Bypass – Preliminary Longitudinal Section	P3
239025-ARP-XX-XX-SK-CH-0001	A21(T) Robertsbridge Bypass – SSD Assessment	P1

Operation

A full barriered approach, signage and signals would be introduced within the A21(T) highway boundary as part of the scheme. It should be noted that, due to the proposed rail use being on a predominantly tourist / heritage line, this level crossing is likely to have lower risks than would be associated with a typical level crossing on the national rail network. This is due to the following factors:

- **Fewer days of operation** – the railway operates as a heritage railway with services running on approximately 50% of days annually (prior to Covid-19 restrictions in 2020, planned operation

showed 162 timetabled days) and this has been assumed as a worst-case for future operational forecasting;

- **Fewer trains in winter when poor weather and visibility occurs** – current timetabling only includes 20 total operational days between November and February;
- **Slow speed of trains** – the crossing speed of the train across the level crossing will be limited to 10mph in both directions.
- **Few trains operating during peak traffic periods** – Planning Condition 21 restricts the use of the level crossing over the A21 to outside of peak hours with no operations between 07.00-09.00 and 17.00-19.00 weekdays and bank holidays. As such, all barrier downtimes will be outside of peak periods;
- **Proposed AFBCL level crossing type** – the proposed crossing type provides full barrier closure with obstacle detection equipment. The detection feature means the crossing is not confirmed as clear until the obstacle detection technology has confirmed that to be the case, at which point the exit barriers of the crossing close.

An overview of the railway operation procedure regarding the proposed level crossing are outlined within KESR Railway Operations (Doc Ref: PH/JN/ITL14477-014A) in Appendix D.

Horizontal Alignment

There is no proposed change to the existing horizontal alignment of the A21 to accommodate the at-grade level crossing and the assessment of the current situation is set out in the Introduction. The existing horizontal geometry complies with CD109.

Vertical Alignment

Given that a railway has a lower tolerance to level changes, the crossing of the highway corridor by the rail lines requires the carriageway level be raised to match that of the rail alignment at the crossing location. This is to maintain a smooth and safe overall rail and carriageway profile through the crossing zone.

The eastern channel line has been taken as the fixed point for both rail and highway alignments. The existing highway crossfall is 1:30 (east to west) and the proposed rail gradient which imposes the proposed highway crossfall at the crossing is 1:150. The difference in the gradients requires the vertical geometry of the existing highway to be amended around the crossing to tie the proposed alignment into the existing alignment as soon as possible.

The vertical realignment has been undertaken with the following assumptions:

- The design speed of the road at the crossing location has been assumed as 85A. This is due to its location within an enforceable 40mph speed limit zone and its proximity to the roundabout with Northbridge Street and Church Lane. It would also provide an improved transition onto, through and off the level crossing with associated comfort and visibility benefits. The key difference in vertical design parameters between an 85A and a 70A design speed is the crest K value and the proposed alignment uses a K value of 55 (equating to a vertical crest curve radius of 5500m). Amending this to a crest curve with a K of 30 would make minimal real-term difference to the "feel" of the profile.

- Sag and crest K values corresponding to an 85A design speed have been used and they are 20 and 55 respectively. No relaxations have been sought regarding these K values due to the proximity of the crossing and associated realignment to the junction.
- The change in carriageway crossfall does not vary in grade by more than 1% from the carriageway pivot point.
- A 2.5m verge width has been maintained. No Departure from Standard has been sought regarding the verge width due to the proximity of the crossing and associated realignment to the junction.

The proposed vertical design is shown element by element over the course of the realignment in Table 2 below. Chainages referred to within this table are as per the design in drawing 239025-ARP-XX-XX-DR-CH-0010 included in Appendix A.

Table 2 – Proposed Vertical Alignment

Start Chainage (m)	End Chainage (m)	Speed Limit (mph) / Design speed (kph)	Element Type	K Value	K Value Requirement (CD 109 Table 2.10)	Comment
0	15.533					Existing
15.533	36.617	40 / 85A	Sag	20	20	Standard
36.617	110.167	40 / 85A	Crest	55	55	Standard
110.167	122.420	40 / 85A	Sag	20	20	Standard
122.420	135.291					Existing

Stopping Sight Distance

Stopping sight distance (SSD) has been assessed in accordance with CD 109 Highway Link Design, Table 2.10 and Section 3. SSD has been assessed in northbound from the back of the queue to the proposed level crossing location. Southbound has been assessed from the back of the queue approaching the Robertsbridge Roundabout and then from the necessary SSD to the level crossing stop line.

Visibility analysis within the roundabout has not been undertaken as this is as per the existing condition.

The analysis has been carried out using an eye height of 1.05m, with an object height of 0.26m.

Full SSD is achieved throughout the area of the proposed crossing and to the back of the worst-case queues resulting from a barrier closure. Results are demonstrated in sketch 239025-ARP-XX-XX-SK-CH-0001 – SSD Assessment.

The Office of Rail Regulation document "Level Crossings: A Guide for Managers, Designers and Operators" Table 6 outlines recommended visibility requirements to the level crossing signals based on design speed. The requirements are 200m and 90m for 100kph and 70kph respectively. An SSD of 215m is achieved in the northbound direction. The southbound direction is constrained by the presence of the roundabout however an SSD from the ICD of 119.5m is achieved. This is compliant with the requirements of a 70kph link.

2 Step 2 – Categorisation of Activity Type

The level of rigour to be applied during the safety risk assessment shall be determined by the categorisation of the activity type into category A, B or C, in accordance with GG104 Table 2.6. The categorisation shown in below is applicable to the assessment of this GG104 for the proposed scheme.

Specifically, the activity being categorised is defined as the operation of a heritage railway level crossing on the A21 in the location shown on the scheme drawings at Appendix A.

Table 3 highlights in green the categorisation of the activity for each feature with explanation provided in Table 4.

Table 3 - GG104 Activity Categorisation.

Feature	**GG104 Categorisation Selection Criteria**	
	Cat	**Indicator**
Extent of prior experience of activity	A	Activities for which there is significant experience within Highways England. Previous safety studies and data are available, and some activity features are codified in a standard or formal procedure.
	B	Activities for which there is limited experience within Highways England but there is transferable experience elsewhere in the UK or internationally. Activities for which there is limited experience in Highways England but there is experience elsewhere in the UK or internationally, including in different industries, which is deemed sufficiently similar to the activity in question to be deemed relevant. Activities for which there is experience within Highways England, but that experience is in a different application of the activity and some adaptation will be required. There might also be local and site-specific issues to take into account that can affect the relevance of the available experience.
	C	Activities for which there is no previous applicable experience from either Highways England or other industries.
Statutory and formal processes and procedures	A	The activity is substantially or entirely within the scope of existing standards, guidance, formal processes or procedures and applicable legislation. The activity requires minimal or no safety related departures from standard or safety related changes to formal processes or procedures (including any legislation).
	B	The activity is largely within the scope of existing standards, guidance, formal processes or procedures. There can be some safety related departures from standards needed and/or safety related changes to formal processes or procedures. The activity can need minor changes to existing legislation.

	C	Activities that are not within the scope of existing standards, formal processes or procedures and require new ones to be developed. Activities for which significant departures from standards, formal processes or procedures are required. Activities which require significant changes to existing legislation or new legislation to be written. Whilst the number of safety departures from standards, formal processes or procedures can affect the categorisation, the most important element in determining this is the nature and type of the departures. For example, a large number of safety departures that can be addressed straightforwardly will have less impact on feature type than a single safety departure that cannot and requires a detailed risk assessment to support it.
Impact on the organisation *The effect that the activity will have on current Highways England processes, procedures, structure, roles and responsibilities, competencies, policies and strategy, in addition to contractual and workforce arrangements.*	A	The activity has no impact on Highways England. The activity has a minor impact on any of these for a finite period of time. Length of time Highways England is affected by decision to undertake the activity is short term.
	B	The activity can lead to permanent minor changes to any of these. These minor changes can introduce new roles and responsibilities, policies, contractual and workforce arrangements. The activity can require a change to organisational arrangements. Length of time Highways England is affected by decision to undertake the activity is medium term.
	C	The activity has significant impact on any of these. The activity can change core safety roles and responsibilities. Length of time Highways England is affected by decision to undertake the activity is long term.
Activity scale	A	The impact of the activity is limited in nature or scale.
	B	The impact of the activity is significant in nature or scale.
	C	The impact of the activity is wide ranging across the network, and/or significantly impacts infrastructure, interventions or workforce.
Technical. *Measure of technical and/or technological novelty and/or innovation the activity involves.*	A	An activity where any processes, techniques, methodologies and/or technologies involved are currently in widespread use and re-examination is unlikely to be needed.
	B	There can be some experience of the processes, techniques, methodologies and/or technologies. The experience can be from use in either another application, or by another road authority, supplier, industry or perhaps from overseas in which case some additional work can be required to adapt them and/or to demonstrate that safety can be assured for the intended application.
	C	Activities that use new processes, techniques, methodologies and/or technologies for which there is no previous experience in the UK or elsewhere.
Stakeholder impact and interest	A	Activities for which the quantity and/or impact of stakeholders, their interest in and resulting ability to influence or impact the activity is low.
	B	Activities that have only a single or a few stakeholders but their impact, in terms of their attitude towards, or ability to influence, and/or interest in the successful achievement of the activities aim can be significant. Alternatively, it will represent an activity that has several stakeholders but the amount, or type, of safety issues involved are limited.

	C	Activities for which there are a large number of stakeholders and their impact in terms of their attitude towards, or ability to influence can be significant. Stakeholders with a strong interest in the potential safety impact of the activity on themselves. Activities where there are conflicting needs arising from different stakeholders or stakeholder groups.

Table 4 - GG104 Assessment Category Justification

Feature	**GG104 Categorisation Justification**	
	Cat	**Reason for Categorisation Selection**
Extent of prior experience of activity	B	Processes, techniques, methodologies and/or technologies involved are currently in use on the national rail/road network. The nature of the crossing being for a heritage railway means the direct relevance of the available experience may be limited and some adaptation may be required. However, a heritage railway crossing on a lower speed section of the SRN could be seen as a lower risk scenario than a mainline crossing elsewhere on the SRN.
Statutory and formal processes and procedures	B	The installation or design of a level crossing on the road network is covered by established ORR design guidance. A Departure from Standards is to be submitted covering the installation of the crossing on the SRN since no design guidance is provided for such a scenario within DMRB. The TWAO process is an established procedure of which Highways England have extensive experience. The installation of a level crossing will require some safety related changes to formal processes or procedure when compared to the current condition.
Impact on the organisation	B	The installation of the proposed level crossing on the A21 creates a new and permanent interface between the RVR and Highways England networks.
Activity scale	A	The activity covers the installation of a single at-grade heritage railway level crossing on the A21 in solely this location.
Technical	B	The principal processes, techniques and methodologies involved are currently in widespread use throughout the national rail network both on the mainline network and on heritage lines. There are several AFBCL crossings in use on the mainline rail network including one which was installed by Network Rail in 2018 on the A862 in Dingwall, Scotland. This location and application are similar to the one proposed by the RVR on the A21. The inclusion of obstacle detection (OD) equipment may require periodic or ongoing re-examination to ensure that the technology remains appropriate and current for the desired use.
Stakeholder impact and interest	B	The nature of the interface between the Highways England road network and a rail corridor would necessitate the involvement of HE, RVR, ORR and others who would have an interest in the potential safety impact of the crossing.

The application of a Category Type B is deemed suitable for this assessment since 5 of the 6 features are categorised as Type B. GG104 Table 2.7N states that if there are three or more features categorised as Type B, then the activity is a Category B.

Due to the categorisation assessment resulting in a Category B, the activity type categorisation and the safety risk assessment process are referred to a Safety Control Review Group (SCRG). The

SCRG is formed of representatives of those business areas who are involved in undertaking or affected by the activity at any stage in the development, implementation and adoption of the activity. RVR will continue to engage with HE and the ORR will ensure that all parties have the necessary input throughout the design, implementation and operation of the level crossing scheme.

3 Step 3 – Identification of the Affected Populations

GG104, Table 1.3 classifies the 3 types of population that may be affected by the works; Road Workers, Road Users and Other Parties.

Risks associated specifically with rail users are not included within the scope of this document as they have been covered by the ORR risk assessment.

Table 5 - Affected Populations

Population	Classification	Affected
Road Workers	*People directly employed by Highways England and who work on the motorway and all-purpose trunk roads either permanently e.g. traffic officers, or periodically e.g. those undertaking site visits; and* *People in a contractual relationship with Highways England, including our national vehicle recovery contract operatives, all workers engaged in traffic management activities and incident support services, and any other activities where traffic is present, such as persons carrying out survey and inspection work.*	Yes
Road Users	*All road users, including the police and emergency services, equestrians, cyclists and pedestrians, as well as those others, who are at work but are not in a contractual relationship with Highways England such as privately contracted vehicle recovery and vehicle repair providers.*	Yes
Other Parties	*Other parties include any person or persons who could be affected by the Highways England motorway and all-purpose trunk roads, but who are neither using it, nor working on it i.e. living or working adjacent to the motorway and all-purpose trunk roads, using other transport networks that intersect with the motorway and all-purpose trunk roads.*	Yes

How Affected

Road Workers The presence of the level crossing will affect both the method and nature of work to the highway. The highway will have differing details adjacent to the crossing, will have differing maintenance cycles and will require differing traffic management arrangements.

Road Users The level crossing is a further consideration for road users travelling along the A21(T). Road user will be required to observe the required procedures on an operational level crossing.

Other Parties For the purposes of this SRA, this party is split into the RVR maintenance and operations personnel (denoted by the "RVR" initials within the Affected Party column of the SRA) and the rail passengers (denoted by the "Rail Passenger" annotation within the Affected Party column of the SRA).

The RVR maintenance and operations personnel incorporates personnel who are responsible for the level crossing and adjacent railway network that intersect with the all-purpose trunk road at the proposed level crossing location. This includes operational staff (train drivers, guard etc.) who will man the train when in operation.

The rail passenger category incorporates any personnel who are travelling on the train and may come into contact with or be impacted by an action concerning from the train concerning its interaction with the level crossing.

The nature of this interface means that the risk associated with interactions between the highway and the railway commonly include both the road user and the "other party" i.e. the installation of the level crossing creates a hazard which involves a possible interaction between the road users and the rail maintenance workers and/or the train and its passengers.

4 Step 4 – Scope

The objective of this SRA is to understand the risk presented to the identified affected populations (Section 3) by the specified activity (Section 1). The specific question that this SRA answers is: **"Is the operation of a heritage railway level crossing on the A21 in this location acceptable in terms of safety risk for all populations."**

This SRA is based on the following assumptions:

- Operation of the Rother Valley heritage railway travelling across the A21(T) as identified in the drawings listed in Table 1 and set out in Section 1.1.
- Adoption of an AFBCL type crossing.
- Highway alignment identified in drawing 239025-ARP-XX-XX-DR-CH-0010.
- Barrier down time of 72 seconds.
- Maximum train approach speed of 10mph.
- Excellent line of sight vision of the crossing and its authorising signal from train footplate.
- All steam locomotives manned by a crew of no less than two footplate staff.
- Diesel locomotives/railcars that are single manned fitted with a deadman's device.

Geographically, the scope extends along the A21 from the location of the proposed level crossing to encompass the maximum extents of any expected queuing. This equates to approximately 500m to the north and 500m to the south of the proposed crossing location.

5 Step 5 – Safety Baseline and Safety Objective

5.1 Safety Data

The existing alignment of the A21(T) has been assessed against the relevant design standards and established as the basis upon which any amendments are to be compared. The existing alignment is wholly compliant with the geometric requirements of CD109.

Personal Injury Accident (PIA) data has been obtained from 'Sussex Safer Roads Partnership' which operates on behalf of Sussex Police for the highway network in the vicinity of the site.

For the most recently available five-year period (01/02/2015 – 31/01/2020), a total of four accidents were recorded on the section of the A21 in the vicinity of the proposed crossing; three resulted in slight and one resulted in serious injuries. It is noted that no PIA were recorded since 2018.

Table 6 below details the number of collisions per year in the vicinity of the proposed crossing, along with the severity of each collision. The accidents over the previous three-year period (full years) are highlighted in green.

Table 6 - Number of Accidents 2015-2020 by Severity

Severity	2015	2016	2017	2018	2019	2020	Total
Slight	0	0	2	1	0	0	3
Serious	1	0	0	0	0	0	1
Fatal	0	0	0	0	0	0	0
Total	1	0	2	1	0	0	4

The serious injury accident involved a single car travelling south on the A21. It occurred when the driver crossed over into the northbound carriageway and collided with a lamppost. It was noted that the driver was under the influence of alcohol and fatigued. The road surface was dry, and the weather was recorded as fine. It happened at 19:38 during daylight on the 2nd June 2015 and streetlights were present.

Two of the slight injury accidents occurred at the A21 Robertsbridge Roundabout. One was a rear end shunt as a car slowed on the approach to the roundabout whilst a 3.5t goods vehicle behind failed to stop in time. The road surface was dry, and the weather was recorded as fine. It happened at 17:45 during daylight on the 28th March 2017; street lighting was present. The second involved a single car travelling northbound on the A21 upon exiting the roundabout. It occurred when the driver lost control of their vehicle and collided with the safety barriers protecting the footpath. The road surface was wet, and the weather was recorded as raining without high winds. It happened at 05:00 during darkness on Friday 22nd December 2017 with street lighting present.

The third slight injury accident occurred on the A21 south of the Robertsbridge Roundabout and involved three vehicles. It occurred when a car travelling southbound went over a bump causing the caravan that it was towing, to detach and cross over the northbound carriageway into an oncoming 7.5t goods vehicle and a 3.5t goods vehicles. The road surface was dry, and the weather was recorded as fine. It happened at 12:07 during daylight on the 6th September 2018 and street lighting was present.

None of the collisions had non-motorised user (NMU) involvement. The existing A21 in the location of the proposed crossing has no existing pedestrian (or other NMU) provision within the verges. A summary of the available NMU data for the proposed level crossing site is included within Summary of NMU Data (Doc Ref: PH/JN/ITL14477-015) in Appendix B.

The full PIA data and plan is included within Accident Analysis Note (Doc Ref: PH/JN/LC/LM/ITL14477-008) in Appendix C. It should be noted that PIA data for entries Police Ref: 1606185 (2016) and 1700531 (2017) have not been included within the statistics reported within Table 6 - Number of Accidents 2015-2020 by Severity as they did not take place on the A21. Both entries correspond to slight injury accidents.

Heritage Railway Level Crossings

The following summarises the evidence included within "Strategy for regulation of health and safety risks" (ORR, 2020) which outlines the current state-of-play with regards to level crossing interfaces on the UK rail network and highlights the ORR approach to health and safety regulation of this interface type.

The majority of heritage railways have level crossings as part of their operation and around half have level crossings that cross public carriageways. A 2014 ORR survey of level crossing types in the heritage sector found that around 16% of these public carriageway crossings were public open level crossings. Of these, half are automatic with lights (Automatic Open Crossings Locally Monitored) (AOCL), and half are crossings with signage only where the train driver is required to observe that the crossing is clear (Open Crossings) (OC).

RIDDOR reportable incidents for the heritage sector show that there have been 12 collisions between trains and vehicles between 2011 and October 2019, with train speed ranging from 2-19mph. None of these resulted in injury to the vehicle or train occupants. In the case of the A21 crossing, the crossing speed of the train across the level crossing will be limited to 10mph in both directions.

Between 2001 and October 2019, RAIB investigated six collisions, additional to those that were RIDDOR reported, including those with crossing gates. None of the collisions resulted in injury but did result in derailment on one occasion (Dymchurch 2016). In addition, the RAIB investigated a runaway train, which passed over two Open Crossings (Welshpool and Llanfair 2010).

Proposed Level Crossing Type

The type of level crossing proposed is an 'Automatic Full Barrier Locally Monitored' level crossing (AFBCL). This type of crossing provides full barrier closure of the carriageway and includes Obstacle Detection equipment. The crossing is automatically activated by an approaching train. The inclusion of obstacle detection means the crossing is not confirmed as clear until the obstacle detection technology has confirmed that to be the case, at which point the exit barriers of the crossing close.

According to "Strategy for regulation of health and safety risks" (ORR, 2020) there are currently 3 'Automatic Full Barrier Locally Monitored' (AFBCL) crossings owned, operated and maintained by Network Rail on the mainline rail network:

- Dingwall Middle Level Crossing (A862 Newton Road, Dingwall);
- Dingwall No. 1 Level Crossing (Craig Road, Dingwall); and

- Ardrossan Princes Street Level Crossing (Princes Street, Ardrossan)

These crossings are considered as inappropriate comparators with RVR for a number of reasons, including that a train on Network Rail will operate at typically around 80mph or more with an emergency brake stopping distance of +/- one mile.

ORR have accepted the railway safety risk, being satisfied that their test of exceptional circumstances has been met. An overview of the proposed level crossing and its operation is included in KESR Railway Operations (Doc Ref: PH/JN/ITL14477-014) in Appendix D.

5.2 Safety Baseline

The safety baseline for the activity for Road Users is based upon the available existing PIA data for the A21(T) in the vicinity of the proposed level crossing location as summarised above. It is defined as the latest three-year period from Jan 2017 – Dec 2019 for which data is available. This baseline period may need to be updated to incorporate the most current data prior to construction commencing. The safety baseline for each population is set out in Table 7 below.

Table 7 - Safety Baseline Parameters

Population	Parameter
Road Users	*The number and severity of PIA entries on the A21 within the scheme area, i.e. three collisions (01/01/2017 – 31/12/2019)*
Road Workers	*There is no numerical objective or target for road worker safety on schemes and the risk must be managed to reduce risk in accordance with the As Low as Reasonably Practicable (ALARP) principle.*
Other Parties	*There is no numerical objective or target for this population as defined in Section 3 and the risk must be managed to reduce risk in accordance with the As Low as Reasonably Practicable (ALARP) principle.*

5.3 Safety Objectives

The safety objectives for the activity are:

- **Road Users** – To ensure that road users are not disproportionally adversely affected in terms of safety risk and that the rate of collisions associated with the proposed level crossing is no more than the baseline.
- **Road Workers** – To manage the risk during the operational and maintenance regimes so far as is reasonably possible.
- **Other Parties** – To manage the risk during the operational and maintenance regimes so far as is reasonably possible.

The Road User objective will be measurable in terms of the number and severity of collisions and the associated collision rate for a period of 3 years post scheme opening.

Additional or revised objectives may be required following review of this SRA with the SCRG once formed and convened.

6 Step 6 – Hazards, Risk and Evaluation

A risk assessment tool is detailed within GG104, outlining an example methodology for risk assessment. This has been utilised as the method for assessing the implications of the operation of a level crossing on the A21(T) Robertsbridge Bypass. It has also been used to assess the safety implications of the alternative grade-separated options for the purposes of a simple comparison.

The methodology identifies a 5 x 5 risk matrix for classifying the risk associated with identified hazards, this is shown in Table 8 - Risk Classification (Likelihood x Severity). The definitions for each of the probability and severity parameters are shown in Table 9.

Table 8 - Risk Classification (Likelihood x Severity)

Likelihood (L) x Severity (S) = Risk Value (R)		**Severity (S)**				
		1	**2**	**3**	**4**	**5**
Likelihood (L)		**Minor harm**	**Moderate harm**	**Serious harm**	**Major harm**	**Catastrophic harm**
1	**Extremely unlikely**	1	2	3	4	5
2	**Unlikely**	2	4	6	8	10
3	**Likely**	3	6	9	12	15
4	**Extremely likely**	4	8	12	16	20
5	**Almost certain**	5	10	15	20	25

Table 9 - Classification Definitions (Likelihood and Severity)

Likelihood that harm will occur (L)			**Severity of harm (S)**		
1	**Extremely unlikely**	*Highly improbable, never known to occur*	**1**	**Minor harm**	*No injury, only minor damage or loss*
2	**Unlikely**	*Less than once per 10 years*	**2**	**Moderate harm**	*Public: Slight Injury* *Workers: Harm of lesser nature i.e. not RIDDOR reportable illness/injury AND/OR moderate damage or loss*
3	**Likely**	*Once every 5-10 years*	**3**	**Serious harm**	*Public: Serious Injury* *Workers: RIDDOR reportable illness/injury AND/OR substantial damage or loss*
4	**Extremely likely**	*Once every 1-4 years*	**4**	**Major harm**	*Fatality, major damage or loss*
5	**Almost certain**	*Once a year*	**5**	**Catastrophic harm**	*Multiple fatalities, catastrophic damage or loss*

The outcome of the review of each hazard is a risk rating, this is calculated through the multiplication of the probability and severity scores. The associated ratings along with appropriate actions and considerations are shown in Table 10.

Table 10 - Risk rating and required actions

Risk Value (R)	**Required Action**	**Control measures should be considered using these categories:**	
1 – 9 = Low	*Ensure control measures are maintained and reviewed as necessary*	• Infrastructure • Enforcement • Operating Procedures • Specific monitoring (with owners and timescales)	• Training / Education / Induction Briefing • Permits • Method Statements
10 – 19 = Medium	*Control measures needed to reduce risk rating to a level which is as low as is "reasonably practicable"*		
20 – 25 = High	*Activity not permitted – hazard to be avoided or risk to be considerably reduced so it is tolerable*		

The safety risk assessment has been carried out by Arup on behalf of the RVR. Those specifically involved were:

- Ed Kell, Highway Engineer, MEng, CEng, MICE
- Laura O'Toole, Senior Consultant, MEng, CMILT, MCIHT
- Jonathan Portlock, Associate, MEng, MST, CEng, MICE, MIStructE

The SRA was carried out in consultation with the RVR protect team. The project team includes experience highway engineers and experienced railway engineers.

The safety risk assessment is presented in Table 11 - Level Crossing - Safety Risk Assessment (SRA). It outlines key risk items associated with the operation of an at-grade AFBCL level crossing on the A21(T), assesses their safety implications without mitigation, and then assesses them again following the application of mitigation or control measures.

It should be noted that this assessment does not look to directly compare the existing scenario with that following the installation of the level crossing or the grade-separated alternatives, but assesses the risks which will occur within the highway corridor following the installation of the crossing.

Table 11 - Level Crossing - Safety Risk Assessment (SRA)

			Proposed Hazard Scoring (without mitigation/control measures)				Proposed Hazard Scoring (with mitigation/control measures)			
Ref	**Hazard Description**	**Affected Party**	**L**	**S**	**R**	**Justification / Control Measure**	**L**	**S**	**R**	**Details / Assumptions / Monitoring**
H1a	Pedestrians are more likely to undertake risky behaviour at vehicular level crossings where bridges or underpasses are not provided. Potential conflict between train and errant pedestrian.	Road User	1	4	4	There is currently no pedestrian access along either verge of the A21 in the vicinity of the proposed crossing location. The proposed level crossing arrangement affords at-grade pedestrian crossing provision beside each traffic lane to prevent the need for any pedestrian user to enter live carriageway lanes in order to cross the railway. The use of a fully barriered crossing with skirts attached on all barriers prevents pedestrians from crossing the A21 on a train's approach. Anti-trespass panels are to be installed across the railway corridor in both directions at the level crossing location to provide delineation and warning to any pedestrians and discourage walking on the railway. The panels do not act as a physical barrier to prevent incursion into the rail corridor but act as a deterrent. Provide 'Do Not Trespass on the Railway' signage adjacent to the level crossing to discourage trespassing.	1	4	4	
H1b	Pedestrians are more likely to undertake risky behaviour at vehicular level crossings where bridges or underpasses are not provided. Potential conflict between train and errant pedestrian.	Other Party (RVR)	1	2	2	There is currently no pedestrian access along either verge of the A21 in the vicinity of the proposed crossing location. The proposed level crossing arrangement affords at-grade pedestrian crossing provision beside each traffic lane to prevent the need for any pedestrian user to enter live carriageway lanes in order to cross the railway. The use of a fully barriered crossing with skirts attached on all barriers prevents pedestrians from crossing the A21 on a train's approach. Anti-trespass panels are to be installed across the railway corridor in both directions at the level crossing location to provide delineation and warning to any pedestrians and discourage walking on the railway. The panels do not act as a physical barrier to prevent incursion into the rail corridor but act as a deterrent. Provide 'Do Not Trespass on the Railway' signage adjacent to the level crossing to discourage trespassing.	1	2	2	
H1c	Pedestrians are more likely to undertake risky behaviour at vehicular level crossings where bridges or underpasses are not provided. Potential for injury to rail passenger if train was to brake suddenly to avoid conflict between train and errant pedestrian.	Other Party (Rail Passenger)	1	1	1	There is currently no pedestrian access along either verge of the A21 in the vicinity of the proposed crossing location. The proposed level crossing arrangement affords at-grade pedestrian crossing provision beside each traffic lane to prevent the need for any pedestrian user to enter live carriageway lanes in order to cross the railway. The use of a fully barriered crossing with skirts attached on all barriers prevents pedestrians from crossing the A21 on a train's approach. Anti-trespass panels are to be installed across the railway corridor in both directions at the level crossing location to provide delineation and warning to any pedestrians and discourage walking on the railway. The panels do not act as a physical barrier to prevent incursion into the rail corridor but act as a deterrent. Provide 'Do Not Trespass on the Railway' signage adjacent to the level crossing to discourage trespassing.	1	1	1	

Ref	Hazard Description	Affected Party	Proposed Hazard Scoring (without mitigation/control measures)				Proposed Hazard Scoring (with mitigation/control measures)			
			L	S	R	Justification / Control Measure	L	S	R	Details / Assumptions / Monitoring
H2a	Drivers of large vehicles are involved in a disproportionately high number of incidents at level crossings. Potential conflict between train and errant / stranded vehicle.	Road User	2	5	10	The vertical geometry over the crossing is in accordance with CD109 and, as such, complies with the design parameters for a normal highway link. The K values for both crest and sag curves will prevent HGV grounding and associated gradients will not cause concern for larger/heavier vehicles. The crossing will be controlled through obstacle detection (OD) radar protection which will ensure the crossing is not confirmed as clear for the train to proceed until the obstacle detection technology has confirmed that to be the case. if the crossing is blocked the signals authorising trains to cross will not be initiated The train will be approaching the crossing at a maximum speed of 10mph with excellent line of sight vision of the crossing and its signal authorising the train to proceed. This will mitigate any risks associated with breakdowns within the crossing area and/or exceptional vehicles.	1	5	5	
H2b	Drivers of large vehicles are involved in a disproportionately high number of incidents at level crossings. Potential conflict between train and errant / stranded vehicle.	Other Party (RVR)	2	3	6	The vertical geometry over the crossing is in accordance with CD109 and, as such, complies with the design parameters for a normal highway link. The K values for both crest and sag curves will prevent HGV grounding and associated gradients will not cause concern for larger/heavier vehicles. The crossing will be controlled through obstacle detection (OD) radar protection which will ensure the crossing is not confirmed as clear for the train to proceed until the obstacle detection technology has confirmed that to be the case. if the crossing is blocked the signals authorising trains to cross will not be initiated The train will be approaching the crossing at a maximum speed of 10mph with excellent line of sight vision of the crossing and its signal authorising the train to proceed. This will mitigate any risks associated with breakdowns within the crossing area and/or exceptional vehicles.	1	3	3	
H2c	Drivers of large vehicles are involved in a disproportionately high number of incidents at level crossings. Potential for injury to rail passenger if train was to brake suddenly to avoid conflict between train and errant / stranded vehicle.	Other Party (Rail Passenger)	2	1	2	The vertical geometry over the crossing is in accordance with CD109 and, as such, complies with the design parameters for a normal highway link. The K values for both crest and sag curves will prevent HGV grounding and associated gradients will not cause concern for larger/heavier vehicles. The crossing will be controlled through obstacle detection (OD) radar protection which will ensure the crossing is not confirmed as clear for the train to proceed until the obstacle detection technology has confirmed that to be the case. if the crossing is blocked the signals authorising trains to cross will not be initiated The train will be approaching the crossing at a maximum speed of 10mph with excellent line of sight vision of the crossing and its signal authorising the train to proceed. This will mitigate any risks associated with breakdowns within the crossing area and/or exceptional vehicles.	1	1	1	
H3a	Should the crossing system fail there is no warning in place for an approaching train, and the crossing remains open. Poorly maintained level crossing equipment can affect user behaviour and increase the chance of personal injury. Potential conflict between train and vehicles and/or pedestrians.	Road User	2	4	8	Robust inspection and maintenance regime to be implemented in line with industry best practice and ORR guidance. The crossing will be controlled through obstacle detection (OD) radar protection which will ensure the crossing is not confirmed as clear for the train to proceed until the obstacle detection technology has confirmed that to be the case. if the crossing is blocked the signals authorising trains to cross will not be initiated The train will be approaching the crossing at a maximum speed of 10mph with excellent line of sight vision of the crossing and its signal authorising the train to proceed. This will mitigate any risks associated with breakdowns within the crossing area and/or exceptional vehicles.	1	4	4	Robust inspection and maintenance regime to be implemented in line with industry best practice and ORR guidance.

Ref	Hazard Description	Affected Party	Proposed Hazard Scoring (without mitigation/control measures)				Proposed Hazard Scoring (with mitigation/control measures)			
			L	S	R	Justification / Control Measure	L	S	R	Details / Assumptions / Monitoring
H3b	Should the crossing system fail there is no warning in place for an approaching train, and the crossing remains open. Poorly maintained level crossing equipment can affect user behaviour and increase the chance of personal injury. Potential conflict between train and vehicles and/or pedestrians.	Other Party (RVR)	2	3	6	Robust inspection and maintenance regime to be implemented in line with industry best practice and ORR guidance. The crossing will be controlled through obstacle detection (OD) radar protection which will ensure the crossing is not confirmed as clear for the train to proceed until the obstacle detection technology has confirmed that to be the case. if the crossing is blocked the signals authorising trains to cross will not be initiated The train will be approaching the crossing at a maximum speed of 10mph with excellent line of sight vision of the crossing and its signal authorising the train to proceed. This will mitigate any risks associated with breakdowns within the crossing area and/or exceptional vehicles.	1	3	3	Robust inspection and maintenance regime to be implemented in line with industry best practice and ORR guidance.
H3c	Should the crossing system fail there is no warning in place for an approaching train, and the crossing remains open. Poorly maintained level crossing equipment can affect user behaviour and increase the chance of personal injury. Potential for injury to rail passenger if train was to brake suddenly to avoid conflict between train and vehicles and/or pedestrians.	Other Party (Rail Passenger)	2	1	2	Robust inspection and maintenance regime to be implemented in line with industry best practice and ORR guidance. The crossing will be controlled through obstacle detection (OD) radar protection which will ensure the crossing is not confirmed as clear for the train to proceed until the obstacle detection technology has confirmed that to be the case. if the crossing is blocked the signals authorising trains to cross will not be initiated The train will be approaching the crossing at a maximum speed of 10mph with excellent line of sight vision of the crossing and its signal authorising the train to proceed. This will mitigate any risks associated with breakdowns within the crossing area and/or exceptional vehicles.	1	1	1	Robust inspection and maintenance regime to be implemented in line with industry best practice and ORR guidance.
H4	High vehicle approach speed. The vehicle speed over a level crossing is a factor in vehicle driver errors.	Road User	3	4	12	The speed limit has been reduced on the northbound A21 approach to the crossing location to 40mph. The approaches to the crossing in both directions have adequate stopping sight distance (SSD) to the proposed crossing location. Several layers of warning are present on the approach to the crossing including advanced warning signs, countdown markers, flashing wigwags and an audible alarm. The signage sequence to Diagram 789 is also to be installed to count down from the advanced warning signs (Diagram 770 and 773) to the crossing. The northbound approach sign sequence begins 245m from the stop line. High friction surfacing (HFS) is to be installed on the approach to the crossing in both directions. A double white line to Diagram 1013 and preceding arrows to Diagram 1014 will be installed on the approaches and through the crossing to prohibit overtaking manoeuvres.	2	4	8	The entry assumes that the extension of the 40mph zone and therefore the reduction in northbound approach speed from 60mph to 40mph provides a considerable mitigation to the high vehicle approach speed scenario.
H5	Road speed profile changes (from high to low speed and vice versa) can influence the speed at which a vehicle approaches a level crossing.	Road User	3	4	12	The key change is for northbound traffic moving from 60mph to 40mph limit zones prior to the level crossing location. Several layers of warning are present on the approach to the crossing including advanced warning signs, countdown markers, flashing wigwags and an audible alarm. The signage sequence to Diagram 789 is also to be installed to count down from the advanced warning signs (Diagram 770 and 773) to the crossing. High friction surfacing (HFS) is to be installed on the approach to the crossing in both directions.	2	4	8	The entry assumes that users are already used to reducing speed on the approach to the roundabout and that additional warning signage and a revised speed limit gateway will provide adequate warning of the upcoming change in speed and scenario.

Ref	Hazard Description	Affected Party	Proposed Hazard Scoring (without mitigation/control measures)				Proposed Hazard Scoring (with mitigation/control measures)			
			L	S	R	Justification / Control Measure	L	S	R	Details / Assumptions / Monitoring
H6a	Road junction close to the level crossing might result in decision making and performance errors by vehicle drivers travelling northbound and blocking back onto the crossing whilst waiting to access junction. Potential conflict between train and errant / stranded vehicle.	Road User	3	4	12	The nearest junction to the crossing is the roundabout between the A21(T) and Northbridge St / Church Lane. Yellow box markings will be installed to help ensure traffic keeps clear of the crossing and to limit the impact of a blocking-back situation. Modelling of the roundabout demonstrates that vehicle queues will not extend back to the proposed level crossing location. The crossing will be controlled through obstacle detection (OD) radar protection which will ensure the crossing is not confirmed as clear for the train to proceed until the obstacle detection technology has confirmed that to be the case. if the crossing is blocked the signals authorising trains to cross will not be initiated The train will be approaching the crossing at a maximum speed of 10mph with excellent line of sight vision of the crossing and its signal authorising the train to proceed This will mitigate any risks associated with breakdowns within the crossing area and/or exceptional vehicles.	2	4	8	
H6b	Road junction close to the level crossing might result in decision making and performance errors by vehicle drivers travelling northbound and blocking back onto the crossing whilst waiting to access junction. Potential conflict between train and errant / stranded vehicle.	Other Party (RVR)	3	3	9	The nearest junction to the crossing is the roundabout between the A21(T) and Northbridge St / Church Lane. Yellow box markings will be installed to help ensure traffic keeps clear of the crossing and to limit the impact of a blocking-back situation. The crossing will be controlled through obstacle detection (OD) radar protection which will ensure the crossing is not confirmed as clear for the train to proceed until the obstacle detection technology has confirmed that to be the case. if the crossing is blocked the signals authorising trains to cross will not be initiated The train will be approaching the crossing at a maximum speed of 10mph with excellent line of sight vision of the crossing and its signal authorising the train to proceed This will mitigate any risks associated with breakdowns within the crossing area and/or exceptional vehicles.	2	3	6	
H6c	Road junction close to the level crossing might result in decision making and performance errors by vehicle drivers travelling northbound and blocking back onto the crossing whilst waiting to access junction. Potential for injury to rail passenger if train was to brake suddenly to avoid conflict between train and errant / stranded vehicle.	Other Party (Rail Passenger)	3	1	3	The nearest junction to the crossing is the roundabout between the A21(T) and Northbridge St / Church Lane. Yellow box markings will be installed to help ensure traffic keeps clear of the crossing and to limit the impact of a blocking-back situation. The crossing will be controlled through obstacle detection (OD) radar protection which will ensure the crossing is not confirmed as clear for the train to proceed until the obstacle detection technology has confirmed that to be the case. if the crossing is blocked the signals authorising trains to cross will not be initiated The train will be approaching the crossing at a maximum speed of 10mph with excellent line of sight vision of the crossing and its signal authorising the train to proceed This will mitigate any risks associated with breakdowns within the crossing area and/or exceptional vehicles.	2	1	2	
H7a	Train lines with a high frequency of long trains or freight services are associated with risk taking behaviour in crossing users. Potential conflict between train and vehicles and/or pedestrians.	Road User	2	4	8	The nature of the railway operations being for tourism purposes means trains are not likely to be of a length to cause a change in driver behaviour. Train operations on the KESR use a maximum train length of 115m. The use of a fully barriered crossing with appropriate warning sequence ensures that any change in behaviour is mitigated against. The proposed barrier down time (when vehicles are prevented from travelling along the A21) is anticipated to be no more than 72 seconds.	1	4	4	

Ref	Hazard Description	Affected Party	Proposed Hazard Scoring (without mitigation/control measures)				Proposed Hazard Scoring (with mitigation/control measures)			
			L	S	R	Justification / Control Measure	L	S	R	Details / Assumptions / Monitoring
H7b	Train lines with a high frequency of long trains or freight services are associated with risk taking behaviour in crossing users. Potential conflict between train and vehicles and/or pedestrians.	Other Party (RVR)	2	3	6	The nature of the railway operations being for tourism purposes means trains are not likely to be of a length to cause a change in driver behaviour. Train operations on the KESR use a maximum train length of 115m. The use of a fully barriered crossing with appropriate warning sequence ensures that any change in behaviour is mitigated against. The proposed barrier down time (when vehicles are prevented from travelling along the A21) is anticipated to be no more than 72 seconds.	1	3	3	
H7c	Train lines with a high frequency of long trains or freight services are associated with risk taking behaviour in crossing users. Potential for injury to rail passenger if train was to brake suddenly to avoid conflict between train and vehicle and/or pedestrian.	Other Party (Rail Passenger)	2	1	2	The nature of the railway operations being for tourism purposes means trains are not likely to be of a length to cause a change in driver behaviour. Train operations on the KESR use a maximum train length of 115m. The use of a fully barriered crossing with appropriate warning sequence ensures that any change in behaviour is mitigated against. The proposed barrier down time (when vehicles are prevented from travelling along the A21) is anticipated to be no more than 72 seconds.	1	1	1	
H8a	Variations in train schedules (e.g. unexpected delays to train services and line speed restrictions) results in trains not passing crossings at standard 'known' times or lack of user concentration. Includes: • Changes in demand and peak usage • Over familiarisation by local users • Low train frequency • Timetable variations Potential conflict between train and vehicles and/or pedestrians due to risk taking or lack of adherence to rules	Road User	3	4	12	The use of a fully barriered crossing with appropriate warning sequence ensures that drivers are not permitted to cross on a train's approach even if it is at a non-standard time. The proposed barrier down time (when vehicles are prevented from travelling along the A21) is anticipated to be no more than 72 seconds. The nature of the railway operations is predominantly for tourism purposes which means there are only likely to be 10 scheduled train movements requiring the use of the crossing per day.	1	4	4	The entry assumes that a crossing type which permitted unprotected access to the tracks even when a train is approaching (e.g. open crossing or user worked crossing) could lead to users not heeding warnings when train movements are not as timetabled.
H8b	Variations in train schedules (e.g. unexpected delays to train services and line speed restrictions) results in trains not passing crossings at standard 'known' times or lack of user concentration. Includes: • Changes in demand and peak usage • Over familiarisation by local users • Low train frequency • Timetable variations Potential conflict between train and vehicles and/or pedestrians due to risk taking or lack of adherence to rules	Other Party (RVR)	3	3	9	The use of a fully barriered crossing with appropriate warning sequence ensures that drivers are not permitted to cross on a train's approach even if it is at a non-standard time. The proposed barrier down time (when vehicles are prevented from travelling along the A21) is anticipated to be no more than 72 seconds. The nature of the railway operations is predominantly for tourism purposes which means there are only likely to be 10 scheduled train movements requiring the use of the crossing per day.	1	3	3	The entry assumes that a crossing type which permitted unprotected access to the tracks even when a train is approaching (e.g. open crossing or user worked crossing) could lead to users not heeding warnings when train movements are not as timetabled.

Ref	Hazard Description	Affected Party	Proposed Hazard Scoring (without mitigation/control measures)				Proposed Hazard Scoring (with mitigation/control measures)			
			L	S	R	Justification / Control Measure	L	S	R	Details / Assumptions / Monitoring
H8c	Variations in train schedules (e.g. unexpected delays to train services and line speed restrictions) results in trains not passing crossings at standard 'known' times or lack of user concentration. Includes: • Changes in demand and peak usage • Over familiarisation by local users • Low train frequency • Timetable variations Potential for injury to rail passenger if train was to brake suddenly to avoid conflict between train and vehicle and/or pedestrian.	Other Party (Rail Passenger)	3	1	3	The use of a fully barriered crossing with appropriate warning sequence ensures that drivers are not permitted to cross on a train's approach even if it is at a non-standard time. The proposed barrier down time (when vehicles are prevented from travelling along the A21) is anticipated to be no more than 72 seconds. The nature of the railway operations is predominantly for tourism purposes which means there are only likely to be 10 scheduled train movements requiring the use of the crossing per day.	1	1	1	The entry assumes that a crossing type which permitted unprotected access to the tracks even when a train is approaching (e.g. open crossing or user worked crossing) could lead to users not heeding warnings when train movements are not as timetabled.
H9a	Risk taking at level crossings increases during rush hours, at midday and at the beginning and end of the school day. Risk taking behaviour at level crossings increases on workdays. Potential conflict between train and vehicles and/or pedestrians.	Road User	3	4	12	The nature of the railway operations is predominantly for tourism purposes which means there are reduced operations during weekdays and generally during non-school holiday periods. The planning permission restricts the use of the level crossing over the A21 to only operating between the hours of 09.00 and 17.00 daily and thus outside of peak traffic periods. The use of a fully barriered crossing with appropriate warning sequence ensures that drivers are not permitted to cross on a train's approach.	1	4	4	
H9b	Risk taking at level crossings increases during rush hours, at midday and at the beginning and end of the school day. Risk taking behaviour at level crossings increases on workdays. Potential conflict between train and vehicles and/or pedestrians.	Other Party (RVR)	3	3	9	The nature of the railway operations is predominantly for tourism purposes which means there are reduced operations during weekdays and generally during non-school holiday periods. The planning permission restricts the use of the level crossing over the A21 to only operating between the hours of 09.00 and 17.00 daily and thus outside of peak traffic periods. The use of a fully barriered crossing with appropriate warning sequence ensures that drivers are not permitted to cross on a train's approach.	1	3	3	
H9c	Risk taking at level crossings increases during rush hours, at midday and at the beginning and end of the school day. Risk taking behaviour at level crossings increases on workdays. Potential for injury to rail passenger if train was to brake suddenly to avoid conflict between train and vehicle and/or pedestrian.	Other Party (Rail Passenger)	3	1	3	The nature of the railway operations is predominantly for tourism purposes which means there are reduced operations during weekdays and generally during non-school holiday periods. The planning permission restricts the use of the level crossing over the A21 to only operating between the hours of 09.00 and 17.00 daily and thus outside of peak traffic periods. The use of a fully barriered crossing with appropriate warning sequence ensures that drivers are not permitted to cross on a train's approach.	1	1	1	

Ref	Hazard Description	Affected Party	Proposed Hazard Scoring (without mitigation/control measures)				Proposed Hazard Scoring (with mitigation/control measures)			
			L	S	R	Justification / Control Measure	L	S	R	Details / Assumptions / Monitoring
H10a	Level crossings located in a dip or on the brow of a hill on a long straight road might not be noticeable due to the 'see-through effect'. Potential conflict between train and vehicles and/or pedestrians.	Road User	3	4	12	Level crossing located on the crest of a vertical curve for the revised highway alignment with a K value of 50. Assumed that this K value and preceding distances (plus associated gradients) would not create a prominent brow scenario. The use of a fully barriered crossing with skirts attached on all barriers ensures that the perceived crossing will be closed with a lesser potential for 'see-through' conditions to occur when the crossing is closed. Several layers of warnings are present on the approach to the crossing including advanced warning signs, countdown markers, flashing wigwags and an audible alarm. The signage sequence to Diagram 789 is also to be installed to count down from the advanced warning signs (Diagram 770 and 773) to the crossing.	2	4	8	
H10b	Level crossings located in a dip or on the brow of a hill on a long straight road might not be noticeable due to the 'see-through effect'. Potential conflict between train and vehicles and/or pedestrians.	Other Party (RVR)	3	3	9	Level crossing located on the crest of a vertical curve for the revised highway alignment with a K value of 50. Assumed that this K value and preceding distances (plus associated gradients) would not create a prominent brow scenario. The use of a fully barriered crossing with skirts attached on all barriers ensures that the perceived crossing will be closed with a lesser potential for 'see-through' conditions to occur when the crossing is closed. Several layers of warnings are present on the approach to the crossing including advanced warning signs, countdown markers, flashing wigwags and an audible alarm. The signage sequence to Diagram 789 is also to be installed to count down from the advanced warning signs (Diagram 770 and 773) to the crossing.	2	3	6	
H10c	Level crossings located in a dip or on the brow of a hill on a long straight road might not be noticeable due to the 'see-through effect'. Potential conflict between train and vehicles and/or pedestrians.	Other Party (Rail Passenger)	3	3	9	Level crossing located on the crest of a vertical curve for the revised highway alignment with a K value of 50. Assumed that this K value and preceding distances (plus associated gradients) would not create a prominent brow scenario. The use of a fully barriered crossing with skirts attached on all barriers ensures that the perceived crossing will be closed with a lesser potential for 'see-through' conditions to occur when the crossing is closed. Several layers of warnings are present on the approach to the crossing including advanced warning signs, countdown markers, flashing wigwags and an audible alarm. The signage sequence to Diagram 789 is also to be installed to count down from the advanced warning signs (Diagram 770 and 773) to the crossing.	2	3	6	
H11a	Straight roads increase the opportunity for vehicle drivers to take risks on the approach to level crossings. Potential conflict between train and vehicles and/or pedestrians.	Road User	3	4	12	Several layers of warnings are present on the approach to the crossing including advanced warning signs, countdown markers, flashing wigwags and an audible alarm. The signage sequence to Diagram 789 is also to be installed to count down from the advanced warning signs (Diagram 770 and 773) to the crossing. A double white line to Diagram 1013 and preceding arrows to Diagram 1014 will be installed on the approaches and through the crossing to prohibit overtaking manoeuvres. The use of a fully barriered crossing with appropriate warning sequence ensures that drivers are not permitted to cross on a train's approach.	2	4	8	

Ref	Hazard Description	Affected Party	Proposed Hazard Scoring (without mitigation/control measures)				Proposed Hazard Scoring (with mitigation/control measures)			
			L	S	R	Justification / Control Measure	L	S	R	Details / Assumptions / Monitoring
H11b	Straight roads increase the opportunity for vehicle drivers to take risks on the approach to level crossings. Potential conflict between train and vehicles and/or pedestrians.	Other Party (RVR)	3	3	9	Several layers of warnings are present on the approach to the crossing including advanced warning signs, countdown markers, flashing wigwags and an audible alarm. The signage sequence to Diagram 789 is also to be installed to count down from the advanced warning signs (Diagram 770 and 773) to the crossing. A double white line to Diagram 1013 and preceding arrows to Diagram 1014 will be installed on the approaches and through the crossing to prohibit overtaking manoeuvres. The use of a fully barriered crossing with appropriate warning sequence ensures that drivers are not permitted to cross on a train's approach.	2	3	6	
H11c	Straight roads increase the opportunity for vehicle drivers to take risks on the approach to level crossings. Potential conflict between train and vehicles and/or pedestrians.	Other Party (Rail Passenger)	3	3	9	Several layers of warnings are present on the approach to the crossing including advanced warning signs, countdown markers, flashing wigwags and an audible alarm. The signage sequence to Diagram 789 is also to be installed to count down from the advanced warning signs (Diagram 770 and 773) to the crossing. A double white line to Diagram 1013 and preceding arrows to Diagram 1014 will be installed on the approaches and through the crossing to prohibit overtaking manoeuvres. The use of a fully barriered crossing with appropriate warning sequence ensures that drivers are not permitted to cross on a train's approach.	2	3	6	
H12	Crossings and their associated signs and equipment should be visible to the approaching user from a distance.	Road User	3	4	12	Ensure verge vegetation is removed to allow clear visibility of level crossing signage both on approaches and at the crossing. Remove any trees/shrubs likely to cause ongoing maintenance requirements. Provide yellow backing boards on advance warning signs (e.g. Diagrams 770, 771 and 773). This will improve the conspicuity of the signs on the approach to the crossing. Add red and white chequered edges to wigwag backboards to make the wigwags more conspicuous. The southbound approach to the crossing has existing street lighting provision due to its proximity to the preceding roundabout. Additional street lighting may be required for the northbound approach and confirmation of this will be sought during detailed design.	1	4	8	The visibility requirements are outlined in Traffic Signs Manual (TSM) and within DMRB, namely CD123 for the stopping sight distance to the wig-wag traffic signals. The relevant visibility splays have been assessed and are included within the splay sketches provided alongside this document. The ongoing maintenance of the verge and management of vegetation within the sign visibility splays should form part of the maintenance regime for the highway in the vicinity of the level crossing.
H13	The recognition of a hazard from a warning sign is improved when the warning sign is near the hazard. Superfluous information and roadside structures on the approach to a crossing might impair the user's ability to detect level crossing information and warning signs.	Road User	3	4	12	All road markings and signage are as per the design guidance given within TSRGD (2016) and TSM Chapter 5 (2003). The proximity of the crossing to the roundabout means that the signage for both hazards overlaps, however, there is clear separation between signs so as not to overload the user with information.	2	4	8	
H14a	Road works on the local highway network (not level crossing construction related) might result in vehicles blocking back onto the crossing. Potential conflict between train and errant / stranded vehicle.	Road User	2	4	8	Yellow box markings will be installed to help ensure traffic keeps clear of the crossing and to limit the impact of a blocking-back situation. The crossing will be controlled through obstacle detection (OD) which will ensure the crossing is not confirmed as clear for the train to proceed until the obstacle detection technology has confirmed that to be the case, at which point the exit barriers of the crossing will close. This will mitigate any risks associated with the impact of blocking back within the crossing area.	1	4	4	HE to liaise with RVR regarding any planned maintenance activities in the vicinity of the crossing as part of a stakeholder consultation process. Process regarding emergency works and works by additional third parties (utility companies etc.) to be established.

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H14b	Road works on the local highway network (not level crossing construction related) might result in vehicles blocking back onto the crossing. Potential conflict between train and errant / stranded vehicle.	Other Party (RVR)	2	4	8	Yellow box markings will be installed to help ensure traffic keeps clear of the crossing and to limit the impact of a blocking-back situation. The crossing will be controlled through obstacle detection (OD) which will ensure the crossing is not confirmed as clear for the train to proceed until the obstacle detection technology has confirmed that to be the case, at which point the exit barriers of the crossing will close. This will mitigate any risks associated with the impact of blocking back within the crossing area.	1	4	4	HE to liaise with RVR regarding any planned maintenance activities in the vicinity of the crossing as part of a stakeholder consultation process. Process regarding emergency works and works by additional third parties (utility companies etc.) to be established.
H14c	Road works on the local highway network (not level crossing construction related) might result in vehicles blocking back onto the crossing. Potential for injury to rail passenger if train was to brake suddenly to avoid conflict between train and errant / stranded vehicle.	Other Party (Rail Passenger)	2	1	2	Yellow box markings will be installed to help ensure traffic keeps clear of the crossing and to limit the impact of a blocking-back situation. The crossing will be controlled through obstacle detection (OD) which will ensure the crossing is not confirmed as clear for the train to proceed until the obstacle detection technology has confirmed that to be the case, at which point the exit barriers of the crossing will close. This will mitigate any risks associated with the impact of blocking back within the crossing area.	1	1	1	HE to liaise with RVR regarding any planned maintenance activities in the vicinity of the crossing as part of a stakeholder consultation process. Process regarding emergency works and works by additional third parties (utility companies etc.) to be established.
H15	Sunlight shining directly into bulbs on signs and signals can serve to 'wash-out' the appearance of the bulb.	Road User	2	4	8	Provision of LED warning lights in place of filament light bulbs. Install longer sun hoods on warning lights where sun glare might be problematic at certain times of the day / year.	1	4	4	
H16a	Worn or missing road markings at level crossings might impact upon a vehicle driver's ability to stop in the correct place. Potential conflict between train and errant / stranded vehicle.	Road User	2	4	8	All road markings to be installed in accordance with TSRGD (2016) and TSM Chapter 5 (2003). All thermoplastic road markings to be in accordance with MCHW Volume 1 Clause 1212. Marking material to comply with BS EN 1463-1:2009 and BS 3262 Part 3:1989.	1	4	4	Highway maintenance regime and resurfacing on and adjacent to the crossing should ensure reinstallation of any affected road markings.
H16b	Worn or missing road markings at level crossings might impact upon a vehicle driver's ability to stop in the correct place. Potential for injury to rail passenger if train was to brake suddenly to avoid conflict between train and errant / stranded vehicle.	Other Party (Rail Passenger)	2	1	2	All road markings to be installed in accordance with TSRGD (2016) and TSM Chapter 5 (2003). All thermoplastic road markings to be in accordance with MCHW Volume 1 Clause 1212. Marking material to comply with BS EN 1463-1:2009 and BS 3262 Part 3:1989.	1	1	1	Highway maintenance regime and resurfacing on and adjacent to the crossing should ensure reinstallation of any affected road markings.
H17	The effectiveness of visual information at crossings, including lights, can be impaired by: • Adverse weather conditions e.g. fog and snow. • Veiling glare • Limited light output • Overgrown foliage	Road User	3	4	12	The approaches to the crossing in both directions have adequate stopping sight distance (SSD) to the proposed crossing. Several layers of warning are present on the approach to the crossing including advanced warning signs, countdown markers, flashing wigwags and an audible alarm. The signage sequence to Diagram 789 is also to be installed to count down from the advanced warning signs (Diagram 770 and 773) to the crossing. Provide yellow backing boards on advance warning signs (e.g. Diagrams 770, 771 and 773). This will improve how conspicuous the signs on the approach to the crossing are. Add red and white chequered edges to wigwag backboards to make the wigwags more conspicuous. A road Safety Audit will further review and direct the provision of any additional general street lighting requirements. and will review effectiveness of signage,	1	4	4	The nature of the railway operations being for predominantly tourism purposes means reduced operations during the seasons where adverse weather is more likely to occur. RVR to consider limiting operation when adverse weather could be deemed to restrict visibility to the crossing. RVR will liaise with HE on operations during adverse weather conditions. Ongoing maintenance to monitor condition and visibility of visual information.

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H18	Icy weather conditions on the approach and exit to the crossing might affect the behaviour of crossing users.	Road User	3	4	12	Increased PSV through the installation of high friction surfacing (HFS) on both approaches to the crossing. Clearance of snow and gritting of level crossing surfaces will limit the potential for traffic accidents and any pedestrian slips, trips and falls.	1	4	4	Any gritting should be conducted in accordance with the National Level Crossing gritting policy and in agreement with HE.
H19a	Events such as heritage railway galas can attract many railway related visitors who may see the level crossing as an access point to the railway and the land adjacent to it. Potential conflict between vehicle or train and errant pedestrian.	Road User	2	4	8	There is currently no pedestrian provision within the cross section on either approach to the proposed level crossing location. No future provision is to be included in the approach cross sections due to this increasing the potential for pedestrian-vehicle conflict on the A21. Provision for pedestrians is included across the level crossing (widened 1.5m hard strip) to prevent the need for any errant pedestrians who find themselves at the level crossing location to need to enter the live A21 carriageway in order to cross the railway. Anti-trespass panels are to be installed across the railway corridor in both directions at the level crossing location to provide delineation and warning to any driver trying to make the movement onto the railway. The panels do not act as a physical barrier to prevent incursion into the rail corridor but act as a deterrent. The cross section of the railway corridor open to the highway is limited to reduce the opportunity or perceived notion that this is an access. Fence / guard rail panels will be used to restrict this between the barrier and the rail alignment. Provide 'Do Not Trespass on the Railway' signage adjacent to the level crossing to discourage trespassing.	1	4	4	The entry assumes the continued disincentivising of access along the A21 (no future pedestrian provision within the cross section) would reduce the likelihood of pedestrians being within the A21 corridor in the vicinity of the proposed crossing. This would therefore remove the incidence of conflict between pedestrians and both vehicles and trains. Discussions with adjacent landowners about boundary delineation and improved fencing surrounding level crossing site.
H19b	Events such as heritage railway galas can attract many railway related visitors who may see the level crossing as an access point to the railway and the land adjacent to it. Potential for injury to rail passenger if train was to brake suddenly to avoid conflict between train and errant vehicle.	Other Party (Rail Passenger)	2	1	2	There is currently no pedestrian provision within the cross section on either approach to the proposed level crossing location. No future provision is to be included in the approach cross sections due to this increasing the potential for pedestrian-vehicle conflict on the A21. Provision for pedestrians is included across the level crossing (widened 1.5m hard strip) to prevent the need for any errant pedestrians who find themselves at the level crossing location to need to enter the live A21 carriageway in order to cross the railway. Anti-trespass panels are to be installed across the railway corridor in both directions at the level crossing location to provide delineation and warning to any driver trying to make the movement onto the railway. The panels do not act as a physical barrier to prevent incursion into the rail corridor but act as a deterrent. The cross section of the railway corridor open to the highway is limited to reduce the opportunity or perceived notion that this is an access. Fence / guard rail panels will be used to restrict this between the barrier and the rail alignment. Provide 'Do Not Trespass on the Railway' signage adjacent to the level crossing to discourage trespassing.	1	1	1	The entry assumes the continued disincentivising of access along the A21 (no future pedestrian provision within the cross section) would reduce the likelihood of pedestrians being within the A21 corridor in the vicinity of the proposed crossing. This would therefore remove the incidence of conflict between pedestrians and both vehicles and trains. Discussions with adjacent landowners about boundary delineation and improved fencing surrounding level crossing site.

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H20	Queuing traffic on the A21 and surrounding connecting routes whilst the crossing is down may lead to an increase in collisions between stationary queueing vehicles and those approaching the back of the queue.	Road User	4	3	12	Traffic modelling data shows that the worst-case queues on the A21 resulting from the barrier downtimes would result in queues of between 450m to 500m for northbound traffic, and 370m to 420m for southbound traffic on the busiest day of the year. At all other times, queues for northbound and southbound traffic are much less, typically between 70m and 150m in length. Due to the limited barrier down time (maximum 72 seconds) and the extended intervals between closures (commonly 10 closures maximum per day) queues will dissipate quickly. On days when the railway operates a more intensive special timetable, the crossing would be closed for a total of 17 minutes across a whole day. The appropriate SSD to DMRB standard to the maximum back of queue is achievable for both the northbound and southbound carriageway. The appropriate SSD (to DMRB standard) is achievable along the full length of the A21 from the maximum back of queue to the proposed location of the level crossing. Additional “keep clear” road markings have been provided on the roundabout circulatory to limit the interface between vehicles joining the roundabout and any queue that has formed.	3	3	9	Ongoing traffic monitoring should be undertaken after opening to ensure that excessive queue-back is not occurring. Planning Condition 18 requires that queue monitoring is undertaken for a period of 3 years post-completion.
H21a	Shunting of vehicles into the barrier and through into the crossing area. Potential conflict between train and errant vehicle.	Road User	3	4	12	Several layers of warning are present on the approach to the crossing including advanced warning signs, countdown markers, flashing wigwags and an audible alarm. The signage sequence to Diagram 789 is also to be installed to count down from the advanced warning signs (Diagram 770 and 773) to the crossing. The crossing will be controlled through obstacle detection (OD) which will ensure the crossing is not confirmed as clear for the train to proceed until the obstacle detection technology has confirmed that to be the case, at which point the exit barriers of the crossing will close. Should the shunt/incursion into the crossing area happen following the completion of the closure sequence, i.e. after the barriers have closed and the train crew has been given the indication to proceed, then the low speed approach speed of the train (10mph) combined with the continued assessment of the crossing by the two train crew members will further mitigate any risks associated with the impact of shunted or stranded vehicles within the crossing area. Crossing barriers have a sacrificial mechanism that is designed to detach the barrier boom at a specified tip deflection. This is to protect the barrier mechanism from damage and allow it to be replaced/repaired swiftly should there be an impact. This minimises any disruption to service following an incident. No railway level crossing barriers on the UK railway system are designed to act as a vehicle restraint..	2	4	8	RVR to produce protocol/process to close, inspect and assess crossing infrastructure in the case of an impact from a vehicle.

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H21b	Shunting of vehicles into the barrier and through into the crossing area. Potential conflict between train and errant vehicle.	Other Party (RVR)	3	3	9	Several layers of warning are present on the approach to the crossing including advanced warning signs, countdown markers, flashing wigwags and an audible alarm. The signage sequence to Diagram 789 is also to be installed to count down from the advanced warning signs (Diagram 770 and 773) to the crossing. The crossing will be controlled through obstacle detection (OD) which will ensure the crossing is not confirmed as clear for the train to proceed until the obstacle detection technology has confirmed that to be the case, at which point the exit barriers of the crossing will close. Should the shunt/incursion into the crossing area happen following the completion of the closure sequence, i.e. after the barriers have closed and the train crew has been given the indication to proceed, then the low speed approach speed of the train (10mph) combined with the continued assessment of the crossing by the two train crew members will further mitigate any risks associated with the impact of shunted or stranded vehicles within the crossing area. Crossing barriers have a sacrificial mechanism that is designed to detach the barrier boom at a specified tip deflection. This is to protect the barrier mechanism from damage and allow it to be replaced/repaired swiftly should there be an impact. This minimises any disruption to service following an incident. No railway level crossing barriers on the UK railway system are designed to act as a vehicle restraint.	2	2	4	RVR to produce protocol/process to close, inspect and assess crossing infrastructure in the case of an impact from a vehicle.
H21c	Shunting of vehicles into the barrier and through into the crossing area. Potential for injury to rail passenger if train was to brake suddenly to avoid conflict between train and errant vehicle.	Other Party (Rail Passenger)	3	1	3	Several layers of warning are present on the approach to the crossing including advanced warning signs, countdown markers, flashing wigwags and an audible alarm. The signage sequence to Diagram 789 is also to be installed to count down from the advanced warning signs (Diagram 770 and 773) to the crossing. The crossing will be controlled through obstacle detection (OD) which will ensure the crossing is not confirmed as clear for the train to proceed until the obstacle detection technology has confirmed that to be the case, at which point the exit barriers of the crossing will close. Should the shunt/incursion into the crossing area happen following the completion of the closure sequence, i.e. after the barriers have closed and the train crew has been given the indication to proceed, then the low speed approach speed of the train (10mph) combined with the continued assessment of the crossing by the two train crew members will further mitigate any risks associated with the impact of shunted or stranded vehicles within the crossing area. Crossing barriers have a sacrificial mechanism that is designed to detach the barrier boom at a specified tip deflection. This is to protect the barrier mechanism from damage and allow it to be replaced/repaired swiftly should there be an impact. This minimises any disruption to service following an incident. No railway level crossing barriers on the UK railway system are designed to act as a vehicle restraint.	2	1	2	RVR to produce protocol/process to close, inspect and assess crossing infrastructure in the case of an impact from a vehicle.

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H22a	Hazard related to crossing misuse e.g. drivers attempting to turn (right or left) onto the railway from the A21. Potential conflict between train and errant vehicle.	Road User	3	4	12	Anti-trespass panels are to be installed across the railway corridor in both directions at the level crossing location to provide delineation and warning to any driver trying to make the movement onto the railway. The panels do not act as a physical barrier to prevent incursion into the rail corridor but act as a deterrent. The cross section of the railway corridor open to the highway is limited to reduce the opportunity or perceived notion that this is an access. Fence / guard rail panels will be used to restrict this between the barrier and the rail alignment. The speed of the train on the approach to and across the level crossing will be limited to 10mph with excellent line of sight vision of the crossing in both directions.	2	4	8	
H22b	Hazard related to crossing misuse e.g. drivers attempting to turn (right or left) onto the railway from the A21. Potential conflict between train and errant vehicle.	Other Party (RVR)	3	3	9	Anti-trespass panels are to be installed across the railway corridor in both directions at the level crossing location to provide delineation and warning to any driver trying to make the movement onto the railway. The panels do not act as a physical barrier to prevent incursion into the rail corridor but act as a deterrent. The cross section of the railway corridor open to the highway is limited to reduce the opportunity or perceived notion that this is an access. Fence / guard rail panels will be used to restrict this between the barrier and the rail alignment. The speed of the train on the approach to and across the level crossing will be limited to 10mph with excellent line of sight vision of the crossing in both directions.	2	3	6	
H22c	Hazard related to crossing misuse e.g. drivers attempting to turn (right or left) onto the railway from the A21. Potential for injury to rail passenger if train was to brake suddenly to avoid conflict between train and errant vehicle.	Other Party (Rail Passenger)	3	1	3	Anti-trespass panels are to be installed across the railway corridor in both directions at the level crossing location to provide delineation and warning to any driver trying to make the movement onto the railway. The panels do not act as a physical barrier to prevent incursion into the rail corridor but act as a deterrent. The cross section of the railway corridor open to the highway is limited to reduce the opportunity or perceived notion that this is an access. Fence / guard rail panels will be used to restrict this between the barrier and the rail alignment. The speed of the train on the approach to and across the level crossing will be limited to 10mph with excellent line of sight vision of the crossing in both directions.	2	1	2	
H23	Driver behaviour hazards created by delays and queuing e.g. u-turning, parking and exiting vehicle to investigate delay etc.	Road User	4	2	8	Planning Condition 21 restricts the use of the level crossing over the A21 to outside of peak hours – no operations 07.00-09.00 and 17.00-19.00 weekdays. This reduces the likelihood of extensive queueing occurring at peak traffic times when such queues may cause undesirable behaviours. Due to the limited barrier down time (maximum 72 seconds) and the extended intervals between closures (commonly 10 closures maximum per day) queues will dissipate quickly. On days when the railway operates a more intensive special timetable, the crossing would be closed for a total of 17 minutes across a whole day.	2	2	4	The entry assumes that the planning condition acts as a control measure (albeit imposed by an external body) and that the off-peak nature of any crossing closures would reduce the likelihood of road users at that time needing to exhibit risk taking behaviours (not during commute etc.) The barrier down time being of short duration means that the length of any delay which may lead to road users feeling the need to exhibit risk taking behaviours is reduced.

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H24	Increased risk to errant vehicles posed by the presence of level crossing and railway infrastructure. Potential conflict between errant vehicle and proposed level crossing infrastructure.	Road User	3	3	9	The crossing location and associated infrastructure will be subject to the RRRAP process as part of the detailed design and a vehicle restraint systems (VRS) will be installed to cover any items deemed to - require protection. Crossing barriers have a sacrificial mechanism that is designed to detach the barrier boom at a specified tip deflection. This is to protect the barrier mechanism from damage and allow it to be replaced/repaired swiftly should there be an impact. This minimises any disruption to service following an incident. No railway level crossing barriers on the UK railway system are designed to act as a vehicle restraint.	2	2	4	RRRAP process to be undertaken as part of the detailed design process.
H25	Maintenance activities for railway related infrastructure require operatives being in close proximity to live lanes of traffic on the A21.	Other Party (RVR)	5	3	15	RVR maintenance activities are to be planned and a process created in collaboration with Highways England. Any necessary maintenance activities in close proximity to the carriageway should be carried out with appropriate traffic management (TM) in place in accordance with Traffic Signs Manual (TSM) Chapter 8 and with the necessary controlled conditions. All works to be undertaken in accordance with DfT works guidance “Safety at Street Works and Road Works: A Code of Practice” (2013). Precise conditions and requirements are to be borne out of the discussions between RVR and Highways England.	3	3	9	Working group to be set up between relevant parties within HE and RVR to establish a process for railway/level crossing maintenance activities with an interface with the highway environment.
H26	Maintenance activities for the highway and highway related infrastructure require being in close proximity to the railway and within the crossing zone.	Road Worker	5	3	15	Highways England maintenance activities are to be planned and a process created in collaboration with RVR. Maintenance activities to, where possible, be programmed to coincide with railway non-operational days or periods. Any necessary maintenance activities in close proximity to the carriageway should be carried out with appropriate traffic management (TM) in place and with the necessary controlled conditions. All works to be undertaken in accordance with DfT works guidance “Safety at Street Works and Road Works: A Code of Practice” (2013). Precise conditions and requirements are to be borne out of the discussions between RVR and Highways England.	3	3	9	Working group to be set up between relevant parties within HE and RVR to establish a process for highway maintenance activities with an interface with the railway environment.
H27	Road junctions close to the level crossing might result in decision making and performance errors by vehicle drivers travelling southbound and blocking back onto A21(T) / Northbridge St / Church Lane junction. Potential conflict between vehicle stranded on roundabout circulatory and vehicle entering junction.	Road User	3	3	9	The nearest junction to the crossing is the roundabout between the A21(T) and Northbridge St / Church Lane. Specific “keep clear” markings at the roundabout will be installed to help ensure traffic keeps clear of the roundabout circulatory and to limit the impact of a blocking-back situation.	2	3	6	Ongoing traffic monitoring should be undertaken after opening to ensure that excessive queue-back is not occurring. Planning Condition 18 requires that queue monitoring is undertaken for a period of 3 years post-completion.

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H28a	Degraded operation of the crossing infrastructure and incapacity of local monitoring results in train crossing with barriers open.	Road User	2	5	10	The train will be approaching the crossing at a maximum speed of 10mph with excellent line of sight vision of the crossing and its signal authorising the train to proceed, therefore risk of not stopping likely to be from a medical emergency with the locomotive driver. All steam locomotives are manned by a crew of no less than two footplate staff both of whom are trained and able to take over and bring the train to a halt. Some diesel locomotives/railcars can be single manned but only when fitted with a deadman's device whereby if that safety device is released by the driver for more than 20 seconds the train brakes are applied automatically. Furthermore, the operator of the line, K&ERS, undertake high standard of regular medical examination of footplate staff. There has been no known medical emergency with a driver since the heritage railway was opened in 1974.	1	5	5	
H28b	Degraded operation of the crossing infrastructure and incapacity of local monitoring results in train crossing with barriers open.	Other Party (Rail Passenger)	2	5	10	The train will be approaching the crossing at a maximum speed of 10mph with excellent line of sight vision of the crossing and its signal authorising the train to proceed, therefore risk of not stopping likely to be from a medical emergency with the locomotive driver. All steam locomotives are manned by a crew of no less than two footplate staff both of whom are trained and able to take over and bring the train to a halt. Some diesel locomotives/railcars can be single manned but only when fitted with a deadman's device whereby if that safety device is released by the driver for more than 20 seconds the train brakes are applied automatically. Furthermore, the operator of the line, K&ERS, undertake high standard of regular medical examination of footplate staff. There has been no known medical emergency with a driver since the heritage railway was opened in 1974.	1	5	5	
H29a	Breaking of the rules of the highway or general bad or neglectful behaviour associated with the use of the crossing by the road users e.g. • Red light running • 'Zigzagging' around lowering barriers. • Trespass • Playing 'chicken' • Being distracted • Risk taking due waiting time or perceived low risk of slow trains • Group or 'herd mentality' encouraging risk taking. • Violation due to age. Potential conflict between train and vehicle.	Road User	2	4	8	The use of an AFBCL full barrier crossing with appropriate warning sequence ensures that drivers are not permitted to cross on a train's approach. Should a road user attempt to cross after the warning sequence has begun then the sequence will be terminated due to OD, and the train will not pass. The proposed barrier down time (when vehicles are prevented from travelling along the A21) is anticipated to be no more than 72 seconds. The nature of the railway operations is predominantly for tourism purposes which means there are only likely to be 10 scheduled train movements requiring the use of the crossing per day. The location of the crossing is unlikely to be targeted for bad behaviour and the signage, visibility and crossing system make bad behaviour difficult.	1	4	4	

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H29b	Breaking of the rules of the highway or general bad or neglectful behaviour associated with the use of the crossing by the road users e.g. • Red light running • 'Zigzagging' around lowering barriers. • Trespass • Playing 'chicken' • Being distracted • Risk taking due waiting time or perceived low risk of slow trains • Group or 'herd mentality' encouraging risk taking. • Violation due to age. Potential conflict between train and vehicle.	Other Party (RVR)	2	3	6	The use of an AFBCL full barrier crossing with appropriate warning sequence ensures that drivers are not permitted to cross on a train's approach. Should a road user attempt to cross after the warning sequence has begun then the sequence will be terminated, and the train will not pass. The proposed barrier down time (when vehicles are prevented from travelling along the A21) is anticipated to be no more than 72 seconds. The nature of the railway operations is predominantly for tourism purposes which means there are only likely to be 10 scheduled train movements requiring the use of the crossing per day. The location of the crossing is unlikely to be targeted for bad behaviour and the signage, visibility and crossing system make bad behaviour difficult.	1	3	3	
H29c	Breaking of the rules of the highway or general bad or neglectful behaviour associated with the use of the crossing by the road users e.g. • Red light running • 'Zigzagging' around lowering barriers. • Trespass • Playing 'chicken' • Being distracted • Risk taking due waiting time or perceived low risk of slow trains • Group or 'herd mentality' encouraging risk taking. • Violation due to age. Potential conflict between train and vehicle.	Other Party (Rail Passenger)	2	3	6	The use of an AFBCL full barrier crossing with appropriate warning sequence ensures that drivers are not permitted to cross on a train's approach. Should a road user attempt to cross after the warning sequence has begun then the sequence will be terminated, and the train will not pass. The proposed barrier down time (when vehicles are prevented from travelling along the A21) is anticipated to be no more than 72 seconds. The nature of the railway operations is predominantly for tourism purposes which means there are only likely to be 10 scheduled train movements requiring the use of the crossing per day. The location of the crossing is unlikely to be targeted for bad behaviour and the signage, visibility and crossing system make bad behaviour difficult.	1	3	3	
H30a	Track wheel adhesion issues cause train to cross open barrier. Potential conflict between train and vehicle.	Road User	1	4	4	Train speed low (10mph) resulting in adhesion issues not causing enough unexpected travel to reach crossing.	1	4	4	
H30b	Track wheel adhesion issues cause train to cross open barrier. Potential conflict between train and vehicle.	Other Party (RVR)	1	4	4	Train speed low (10mph) resulting in adhesion issues not causing enough unexpected travel to reach crossing.	1	4	4	
H30c	Track wheel adhesion issues cause train to cross open barrier. Potential conflict between train and vehicle.	Other Party (Rail Passenger)	1	4	4	Train speed low (10mph) resulting in adhesion issues not causing enough unexpected travel to reach crossing.	1	4	4	

Ref	Hazard Description	Affected Party	Proposed Hazard Scoring (without mitigation/control measures)				Proposed Hazard Scoring (with mitigation/control measures)			
			L	S	R	Justification / Control Measure	L	S	R	Details / Assumptions / Monitoring
H31	Drivers, cyclists or pedestrians being struck by lowering barrier boom.	Road User	2	3	6	Barriers of lightweight construction to minimise any injury. Ample warning mechanisms to prevent risky crossing by road user.	1	3	3	
H32	Presence of trackside workers or other rail staff causing distraction to road users.	Road User	3	3	9	Crossing signage in advance of crossing to warn road users of upcoming railway asset.	2	3	6	
H33	Presence of train enthusiasts or 'trainspotters'. Train enthusiasts often undertake risky behaviour at level crossings to view trains more closely such as parking on the road verge in the proximity of the crossing.	Road User	3	3	9	Signage to advise against inconsiderate or risky parking.	2	3	6	

Table 12 - Rail Under Existing Road - Safety Risk Assessment (SRA)

Ref	Hazard Description	Affected Party	Proposed Hazard Scoring (without mitigation/control measures)				Proposed Hazard Scoring (with mitigation/control measures)			
			L	S	R	Justification / Control Measure	L	S	R	Details / Assumptions / Monitoring
X1	Maintenance activities for the highway and highway related infrastructure (road crosses rail on bridge structure) require being in close proximity to the railway. Potential conflict between train and road worker.	Road Worker	5	3	15	Highways England maintenance activities are to be planned and a process created in collaboration with RVR. Maintenance activities to, where possible, be programmed to coincide with railway non-operational days or periods. Any necessary maintenance activities in close proximity to the carriageway should be carried out with appropriate traffic management (TM) in place and with the necessary controlled conditions. All works to be undertaken in accordance with DfT works guidance "Safety at Street Works and Road Works: A Code of Practice" (2013). Precise conditions and requirements are to be borne out of the discussions between RVR and Highways England.	2	4	8	Working group to be set up between relevant parties within HE and RVR to establish a process for highway maintenance activities with an interface with the railway environment.
X2	Maintenance activities for railway related infrastructure require operatives being in close proximity to live lanes of traffic on the A21. Potential conflict between vehicle and RVR operatives.	Other Party (RVR)	5	3	15	RVR maintenance activities are to be planned and a process created in collaboration with Highways England. Offline access to be provided wherever possible and appropriate VRS provided to limit likelihood of errant vehicle incursion into the rail corridor. Any necessary maintenance activities in close proximity to the carriageway should be carried out with appropriate traffic management (TM) in place in accordance with Traffic Signs Manual (TSM) Chapter 8 and with the necessary controlled conditions. All works to be undertaken in accordance with DfT works guidance "Safety at Street Works and Road Works: A Code of Practice" (2013). Precise conditions and requirements are to be borne out of the discussions between RVR and Highways England.	2	4	8	Working group to be set up between relevant parties within HE and RVR to establish a process for railway/level crossing maintenance activities with an interface with the highway environment.
X3	Maintenance activities for the crossing structure (bridge bearing replacement, replacing waterproofing etc.) require temporary closure of the A21 and increase traffic on less suitable diversionary routes. Potential issue surrounding queued vehicles on smaller roads and/or increased likelihood of risks due to hazardous features on diversionary routes.	Road User	2	4	8	Structure type to be constructed such that it would require minimal closure of the highway corridor to allow routine maintenance activities to take place. More involved maintenance to be possible without extensive (area and duration) closures being required. Highways England maintenance activities are to, where possible, be programmed to coincide with off-peak or non-holiday periods. Any necessary maintenance activities should be carried out with appropriate traffic management (TM) in place in accordance with Traffic Signs Manual (TSM) Chapter 8 and with the necessary controlled conditions. All works to be undertaken in accordance with DfT works guidance "Safety at Street Works and Road Works: A Code of Practice" (2013).	1	4	4	HE to liaise with RVR regarding any planned maintenance activities in the vicinity of the crossing as part of a stakeholder consultation process. Strategic diversion route to be developed in collaboration with Highways England. Process regarding emergency works and works by additional third parties (utility companies etc.) to be established.
X4a	Increased risk to errant vehicles posed by the presence of the railway in cutting on the approach to the crossing. Potential conflict between errant vehicle and train.	Road User	3	3	9	The crossing approach and any associated infrastructure (parapets etc.) will be subject to the RRRAP process as part of the detailed design and a vehicle restraint systems (VRS) will be installed to cover any items deemed to require protection.	2	2	4	RRRAP process to be undertaken as part of the detailed design process.
X4b	Increased risk to errant vehicles posed by the presence of the railway in cutting on the approach to the crossing. Potential conflict between errant vehicle and train.	Other Party (RVR)	3	3	9	The crossing approach and any associated infrastructure (parapets etc.) will be subject to the RRRAP process as part of the detailed design and a vehicle restraint systems (VRS) will be installed to cover any items deemed to require protection.	2	2	4	RRRAP process to be undertaken as part of the detailed design process.

Ref	Hazard Description	Affected Party	Proposed Hazard Scoring (without mitigation/control measures)				Proposed Hazard Scoring (with mitigation/control measures)			
			L	S	R	Justification / Control Measure	L	S	R	Details / Assumptions / Monitoring
X4c	Increased risk to errant vehicles posed by the presence of the railway in cutting on the approach to the crossing. Potential for injury to rail passenger if train was to brake suddenly to avoid conflict between train and errant vehicle.	Other Party (Rail Passenger)	3	1	3	The crossing approach and any associated infrastructure (parapets etc.) will be subject to the RRRAP process as part of the detailed design and a vehicle restraint systems (VRS) will be installed to cover any items deemed to require protection.	2	1	2	RRRAP process to be undertaken as part of the detailed design process.

Table 13 - Rail Under Raised Highway - Safety Risk Assessment (SRA)

Ref	Hazard Description	Affected Party	Proposed Hazard Scoring (without mitigation/control measures)				Proposed Hazard Scoring (with mitigation/control measures)			
			L	S	R	Justification / Control Measure	L	S	R	Details / Assumptions / Monitoring
Y1	Maintenance activities for the highway and highway related infrastructure (road crosses rail on bridge structure) require being in close proximity to the railway. Potential conflict between train and road worker.	Road Worker	5	3	15	Highways England maintenance activities are to be planned and a process created in collaboration with RVR. Maintenance activities to, where possible, be programmed to coincide with railway non-operational days or periods. Any necessary maintenance activities in close proximity to the carriageway should be carried out with appropriate traffic management (TM) in place and with the necessary controlled conditions. All works to be undertaken in accordance with DfT works guidance "Safety at Street Works and Road Works: A Code of Practice" (2013). Precise conditions and requirements are to be borne out of the discussions between RVR and Highways England.	2	4	8	Working group to be set up between relevant parties within HE and RVR to establish a process for highway maintenance activities with an interface with the railway environment.
Y2	Maintenance activities for railway related infrastructure require operatives being in close proximity to live lanes of traffic on the A21. Potential conflict between vehicle and RVR operatives.	Other Party (RVR)	5	3	15	RVR maintenance activities are to be planned and a process created in collaboration with Highways England. Offline access to be provided wherever possible and appropriate VRS provided to limit likelihood of errant vehicle incursion into the rail corridor. Any necessary maintenance activities in close proximity to the carriageway should be carried out with appropriate traffic management (TM) in place in accordance with Traffic Signs Manual (TSM) Chapter 8 and with the necessary controlled conditions. All works to be undertaken in accordance with DfT works guidance "Safety at Street Works and Road Works: A Code of Practice" (2013). Precise conditions and requirements are to be borne out of the discussions between RVR and Highways England.	2	4	8	Working group to be set up between relevant parties within HE and RVR to establish a process for railway/level crossing maintenance activities with an interface with the highway environment.
Y3	Maintenance activities for the crossing structure (bridge bearing replacement, replacing waterproofing etc.) require temporary closure of the A21 and increase traffic on less suitable diversionary routes. Potential issue surrounding queued vehicles on smaller roads and/or increased likelihood of risks due to hazardous features on diversionary routes.	Road User	2	4	8	Structure type to be constructed such that it would require minimal closure of the highway corridor to allow routine maintenance activities to take place. More involved maintenance to be possible without extensive (area and duration) closures being required. Highways England maintenance activities are to, where possible, be programmed to coincide with off-peak or non-holiday periods. Any necessary maintenance activities should be carried out with appropriate traffic management (TM) in place in accordance with Traffic Signs Manual (TSM) Chapter 8 and with the necessary controlled conditions. All works to be undertaken in accordance with DfT works guidance "Safety at Street Works and Road Works: A Code of Practice" (2013).	1	4	4	HE to liaise with RVR regarding any planned maintenance activities in the vicinity of the crossing as part of a stakeholder consultation process. Strategic diversion route to be developed in collaboration with Highways England. Process regarding emergency works and works by additional third parties (utility companies etc.) to be established.
Y4a	Increased risk to errant vehicles posed by the presence of the railway in cutting on the approach to the crossing. Potential conflict between errant vehicle and train.	Road User	3	3	9	The crossing approach and any associated infrastructure (parapets etc.) will be subject to the RRRAP process as part of the detailed design and a vehicle restraint systems (VRS) will be installed to cover any items deemed to require protection.	2	2	4	RRRAP process to be undertaken as part of the detailed design process.
Y4b	Increased risk to errant vehicles posed by the presence of the railway in cutting on the approach to the crossing. Potential conflict between errant vehicle and train.	Other Party (RVR)	3	3	9	The crossing approach and any associated infrastructure (parapets etc.) will be subject to the RRRAP process as part of the detailed design and a vehicle restraint systems (VRS) will be installed to cover any items deemed to require protection.	2	2	4	RRRAP process to be undertaken as part of the detailed design process.

Ref	Hazard Description	Affected Party	Proposed Hazard Scoring (without mitigation/control measures)				Proposed Hazard Scoring (with mitigation/control measures)			
			L	S	R	Justification / Control Measure	L	S	R	Details / Assumptions / Monitoring
Y4c	Increased risk to errant vehicles posed by the presence of the railway in cutting on the approach to the crossing. Potential for injury to rail passenger if train was to brake suddenly to avoid conflict between train and errant vehicle.	Other Party (Rail Passenger)	3	1	3	The crossing approach and any associated infrastructure (parapets etc.) will be subject to the RRRAP process as part of the detailed design and a vehicle restraint systems (VRS) will be installed to cover any items deemed to require protection.	2	1	2	RRRAP process to be undertaken as part of the detailed design process.

Table 14 - Rail Over Existing Highway - Safety Risk Assessment (SRA)

			Proposed Hazard Scoring (without mitigation/control measures)				Proposed Hazard Scoring (with mitigation/control measures)			
Ref	**Hazard Description**	**Affected Party**	**L**	**S**	**R**	**Justification / Control Measure**	**L**	**S**	**R**	**Details / Assumptions / Monitoring**
Z1	Maintenance activities for the highway and highway related infrastructure (road crosses rail on bridge structure) require being in close proximity to the railway. Potential conflict between train and road worker.	Road Worker	5	3	15	Highways England maintenance activities are to be planned and a process created in collaboration with RVR. Maintenance activities to, where possible, be programmed to coincide with railway non-operational days or periods. Any necessary maintenance activities in close proximity to the carriageway should be carried out with appropriate traffic management (TM) in place and with the necessary controlled conditions. All works to be undertaken in accordance with DfT works guidance "Safety at Street Works and Road Works: A Code of Practice" (2013). Precise conditions and requirements are to be borne out of the discussions between RVR and Highways England.	2	4	8	Working group to be set up between relevant parties within HE and RVR to establish a process for highway maintenance activities with an interface with the railway environment.
Z2	Maintenance activities for railway related infrastructure require operatives being in close proximity to live lanes of traffic on the A21. Potential conflict between vehicle and RVR operatives.	Other Party (RVR)	5	3	15	RVR maintenance activities are to be planned and a process created in collaboration with Highways England. Offline access to be provided wherever possible and appropriate VRS provided to limit likelihood of errant vehicle incursion into the rail corridor. Any necessary maintenance activities in close proximity to the carriageway should be carried out with appropriate traffic management (TM) in place in accordance with Traffic Signs Manual (TSM) Chapter 8 and with the necessary controlled conditions. All works to be undertaken in accordance with DfT works guidance "Safety at Street Works and Road Works: A Code of Practice" (2013). Precise conditions and requirements are to be borne out of the discussions between RVR and Highways England.	2	4	8	Working group to be set up between relevant parties within HE and RVR to establish a process for railway/level crossing maintenance activities with an interface with the highway environment.
Z3	Maintenance activities for the crossing structure (bridge bearing replacement, replacing waterproofing etc.) require temporary closure of the A21 and increase traffic on less suitable diversionary routes. Potential issue surrounding queued vehicles on smaller roads and/or increased likelihood of risks due to hazardous features on diversionary routes.	Road User	2	4	8	Structure type to be constructed such that it would require minimal closure of the highway corridor to allow routine maintenance activities to take place. More involved maintenance to be possible without extensive (area and duration) closures being required. Highways England maintenance activities are to, where possible, be programmed to coincide with off-peak or non-holiday periods. Any necessary maintenance activities should be carried out with appropriate traffic management (TM) in place in accordance with Traffic Signs Manual (TSM) Chapter 8 and with the necessary controlled conditions. All works to be undertaken in accordance with DfT works guidance "Safety at Street Works and Road Works: A Code of Practice" (2013).	1	4	4	HE to liaise with RVR regarding any planned maintenance activities in the vicinity of the crossing as part of a stakeholder consultation process. Strategic diversion route to be developed in collaboration with Highways England. Process regarding emergency works and works by additional third parties (utility companies etc.) to be established.
Z4	Increased risk to errant vehicles posed by the new crossing bridge abutments. Potential conflict between errant vehicle and structure.	Road User	3	3	9	The crossing approach and any associated infrastructure (parapets etc.) will be subject to the RRRAP process as part of the detailed design and a vehicle restraint systems (VRS) will be installed to cover any items deemed to require protection.	2	2	4	RRRAP process to be undertaken as part of the detailed design process.
Z5	Train crossing the bridge structure creates distraction for motorist on the A21.	Road User	3	3	9	Railway bridge structure to be designed and constructed using industry best practice.	3	3	9	

Summary

This SRA has identified the risks indicated in Table 11 as being introduced due to the activity being considered i.e. the operation of an AFBCL level crossing on the A21(T).

Each reasonably foreseeable hazard has been assessed prior to and following mitigation. All hazards are shown to have low risk value following mitigation. The appropriate action in accordance with GG104 (Table D.1) is to ensure assumed control measures are maintained and reviewed as necessary.

Following the mitigation described, the evaluation of the reasonably foreseeable risks has shown that the operation of an at-grade level crossing on the A21(T) would meet the objective of being **acceptable in terms of safety risk for all populations**. Specifically,

- **Road Users** – would not be disproportionally adversely affected in terms of safety risk and that the rate of collisions associated with the proposed level crossing should be no more than the baseline.
- **Road Workers** – risk during the operational and maintenance regimes would be managed so far as is reasonably possible.
- **Other Parties** – risk during the operational and maintenance regimes would be managed so far as is reasonably possible.

The application of control measures derived from a working group involving Highways England and RVR representatives may improve the post-mitigation scoring for these specific risks. A working group should be established between HE and RVR to develop an operational procedure and ongoing interface (points of contact, incident management etc.) All works are to be undertaken in accordance with DfT works guidance "Safety at Street Works and Road Works: A Code of Practice" (2013). At present, the exact maintenance requirements and regime for both the existing Highways England assets and the proposed RVR assets have not been confirmed. Once confirmed, these should be used as a basis with which to develop further controls for risks H25 and H26.

A Safety Control Review Group (SCRG) should be established to review the activity type categorisation and endorse the safety risk assessment.

7 Maintaining the Safety Risk Assessment

7.1 Document the SRA

This report documents the SRA and decision regarding the proposed operation of an AFBCL heritage railway level crossing on the A21 Robertsbridge Bypass.

7.2 Update the SRA

RVR in consultation with HE will need to review, and if necessary, update this report should there be any significant changes to the design of the scheme, safety analysis data and any assumptions made in this report.

The existing collisions in the vicinity of the location are currently only reported by severity and number of vehicles and casualties. Further details have been reviewed but do not suggest any causation factors associated with the proposed scheme. Should further details become available or the scheme not move to construction until after the existing PIA data becomes outdated, an update of this SRA may be necessary.

7.3 Assumption Validation and Monitoring

A current and updated copy of this SRA is to be included within or appended to the Health and Safety File to ensure that both contractors and maintainers are aware of the risks raised within the SRA.

The scheme will be subject to a monitoring period after opening to traffic, which will involve RVR working with the HE area operations and maintenance team and Regional Control Centre. Any incidents related to this activity would be identified through this monitoring. The nature and duration of the monitoring period is to be determined by Highways England however, as a minimum:

- Road Safety Audits at Stage 3 (end of construction) and Stage 4 (at least 12 months after opening to traffic) will be undertaken and provide evidence to support activity monitoring.
- RVR are required to monitor queue lengths for 3 years from opening as a formal planning condition (Planning Condition 18) from Rother District Council.

Three years from opening the safety objectives will be reviewed by RVR following the monitoring of the safety metrics and the SRA updated as appropriate with subsequent monitoring and review identified.

Subject Rother Valley Railway – A21(T) GG104 Risk Assessment

Date 24 June 2021 **Job No/Ref** REP-239025-R002

Arup Approvals

Version	Role	Name	Signature	Date
Rev G	Author	Edward Kell		24/06/21
	Checker	Laura O'Toole		24/06/21
	Approver	Jonathan Portlock		24/06/21

Appendix A – Scheme Drawings

239025-ARP-XX-XX-DR-CH-0001 - A21(T) Robertsbridge Bypass – General Arrangement

239025-ARP-XX-XX-DR-CH-0002 - A21(T) Robertsbridge Bypass – Road Markings

239025-ARP-XX-XX-DR-CH-0003 - A21(T) Robertsbridge Bypass - Traffic Signs Layout

239025-ARP-XX-XX-DR-CH-0010 - A21(T) Robertsbridge Bypass - Preliminary Longitudinal Section

239025-ARP-XX-XX-SK-CH-0001 - A21(T) Robertsbridge Bypass - SSD Assessment

A1

N

All earthworks extents based off a 2.5m verge and slope at 1:2.5. Requirement for an engineered slope and details TBC

Existing vegetation to be cut back to ensure the required visibility is achieved to road signs on approach to the level crossing.

Indicative extent of existing carriageway to be resurfaced to tie-in with level crossing system. Exact extent subject to confirmation through detailed design

400 x 400 x 60mm corduroy tactile paving on 30mm mortar bed. Saw cut existing highway and excavate 90mm deep

Earthworks tie in with proposed lineside structure and civils work. TBC

250m Visibility splay

8m x 3m LC monitor building

CCTV mast

Anti-trespass panels

PROPOSED/EXISTING LINE OF RAILWAY – taken from supplied information

Existing highway boundary fence to be taken down

Existing vegetation to be cut down to give 250m visibility along railway from a point 2m back from stop line.

Rail transition required upto level crossing

Drainage channel. Outfall to be determined

Mill Stream Flood

Duct chamber and 2 No. Ø100mm ducts over existing culvert pipe for cables to barrier and traffic signals.

Earthworks to be tied in to existing culvert head wall

Barrier details and installation by others. Barrier with skirt.

250m Visibility splay

0.65m widening of existing carriageway for proposed footway with Type E1 edging. Levels and falls to match existing carriageway.

Existing vegetation to be cut back to ensure the required visibility is achieved to road signs on approach to the level crossing.

All earthworks extents based off a 2.5m verge and slope at 1:2.5. Requirement for an engineered slope and details TBC

Anti-skid surfacing applied for 100m on approach to stop line

Anti-skid surfacing applied for 40m on approach to stop line

Existing vegetation to be cut back to ensure the required visibility is achieved to road signs on approach to the level crossing.

Existing eastern channel line to be retained. No alterations to eastern verge or embankments except at tie in with proposed rail corridor

0.65m widening of existing carriageway for proposed footway with Type E1 edging. Levels and falls to match existing carriageway

250m Visibility splay

Steel palisade fence 1.4m high Painted white.

Barrier details and installation by others. 4No. Barriers with arm skirts.

Existing highway boundary fence to be taken down

edilon)(sedra LC-H Heavy Rail 12m long level crossing system or similar approved. Installation by others

PROPOSED/EXISTING LINE OF RAILWAY – taken from supplied information

Rail transition required upto level crossing

Existing vegetation to be cut down to give 250m visibility along railway from a point 2m back from stop line.

Indicative line of culvert pipe

Mill Stream Flood

Duct chamber and 2 No. Ø100mm ducts over existing culvert pipe for cables to barrier and traffic signals.

250m Visibility splay

400 x 400 x 60mm corduroy tactile paving on 30mm mortar bed. Saw cut existing highway and excavate 90mm deep. Laid so bars run transversely across the direction of travel. Paving to start 400mm from the face of the barrier

Existing eastern channel line to be retained. No alterations to eastern verge or embankments except at tie in with proposed rail corridor

Existing vegetation to be cut back to ensure the required visibility is achieved to road signs on approach to the level crossing.

Indicative extent of existing carriageway to be resurfaced to tie-in with level crossing system. Exact extent subject to confirmation through detailed design

E1 2 1.5 0.4

Notes

1. All road markings and traffic signs are to be in accordance with the Traffic Signs Regulations and General Directions (2002) and the Traffic Signs Manuals.
2. For diagram numbers refer to the TSRGD.
3. For road markings refer to drawing 239035-ARP-XX-XX-DR-CH-0002
4. For traffic signs refer to drawing 239025-ARP-XX-XX-DR-CH-0003.
5. For construction details refer to drawing 239023-ARP-XX-XX-DR-CH-0004

Rev	Date	By	Chkd	Appd
P1	11/12/20	ER	EK	JP
Supersedes C.950.G.102				

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Client
Rother Valley Railway Limited

Project Title
Rother Valley Railway
Level Crossing Highway Design

Drawing Title
A21(T) Robertsbridge Bypass
General Arrangement

Scale at A1 1:100

Role Civils - Highways

Suitability S2 - Suitable for Information

Arup Job No **239025** Rev **P1**

Name
239025-ARP-XX-XX-DR-CH-0001

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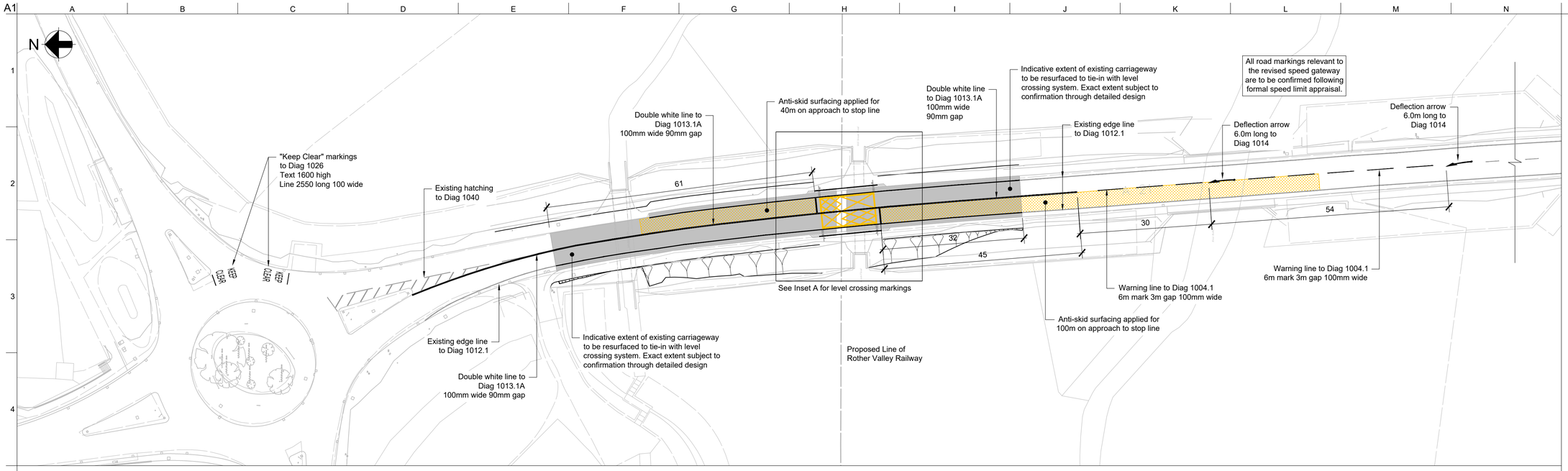

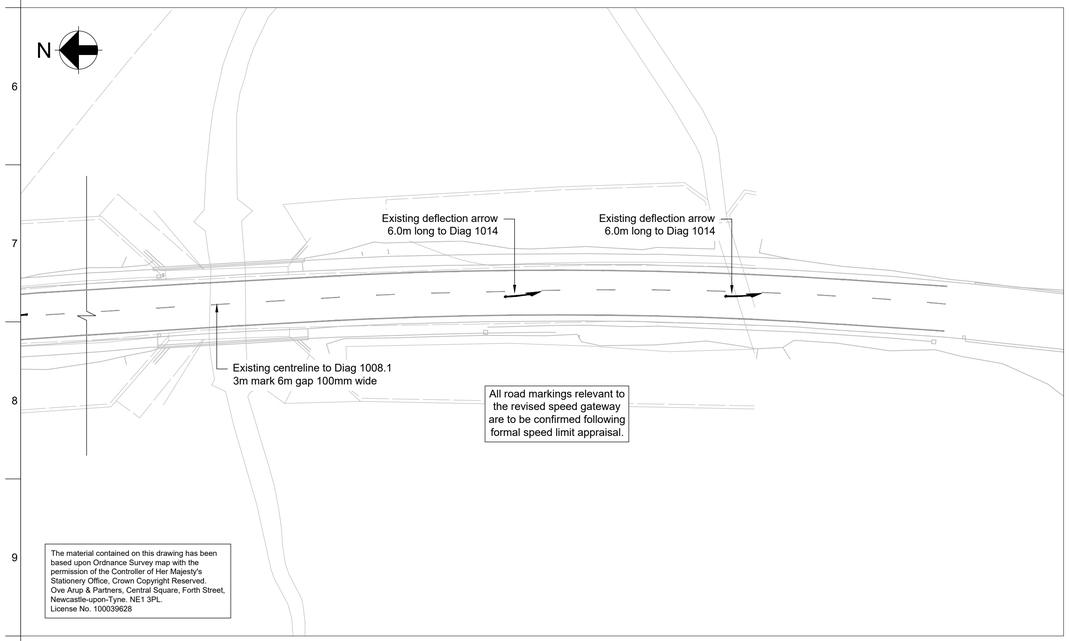

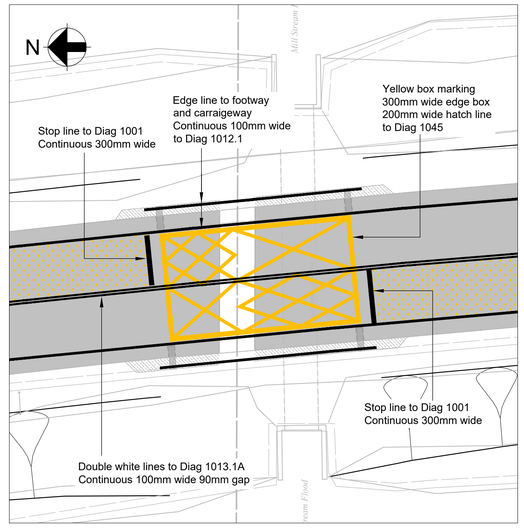

Inset A
Scale: 1:250

Notes

1. All road markings and traffic signs are to be in accordance with the Traffic Signs Regulations and General Directions (2016) and the Traffic Signs Manuals.
2. For diagram numbers refer to the TSRGD.
3. For traffic signs refer to drawing 239025-ARP-XX-XX-DR-CH-0003

Rev	Date	By	Chkd	Appd
P2	24/06/21	ER	EK	JP
	Markings revised following HE comment			
P1	11/12/20	ER	EK	JP
	Supersedes C.950.G.103			

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Client
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Project Title
Rother Valley Railway
Level Crossing Highway Design

Drawing Title
A21(T) Robertsbridge Bypass
Road Markings

Scale at A1 1:500

Role Civils - Highways

Suitability S2 - Suitable for Information

Arup Job No **239025** | Rev **P2**

Name
239025-ARP-XX-XX-DR-CH-0002

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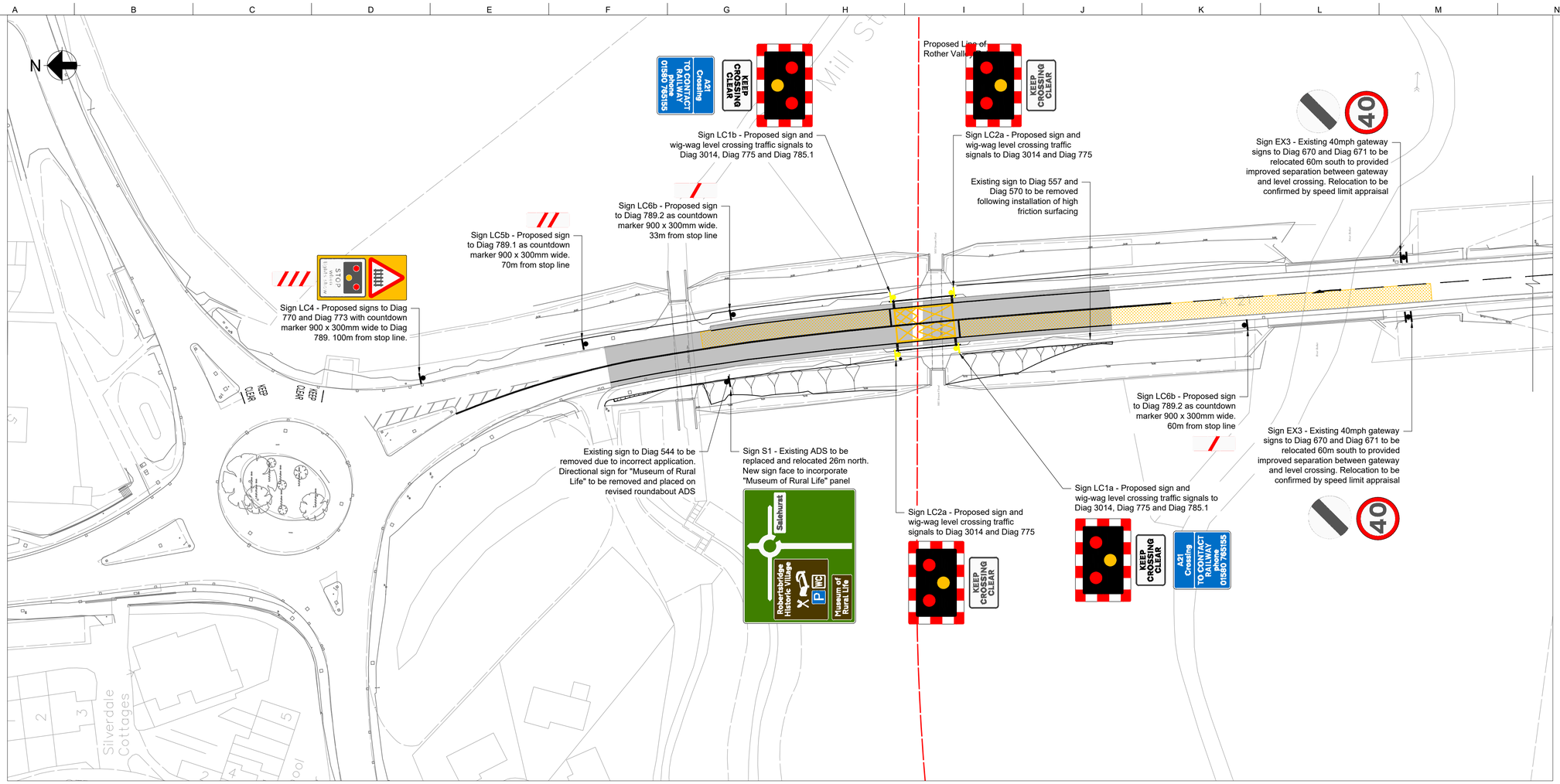

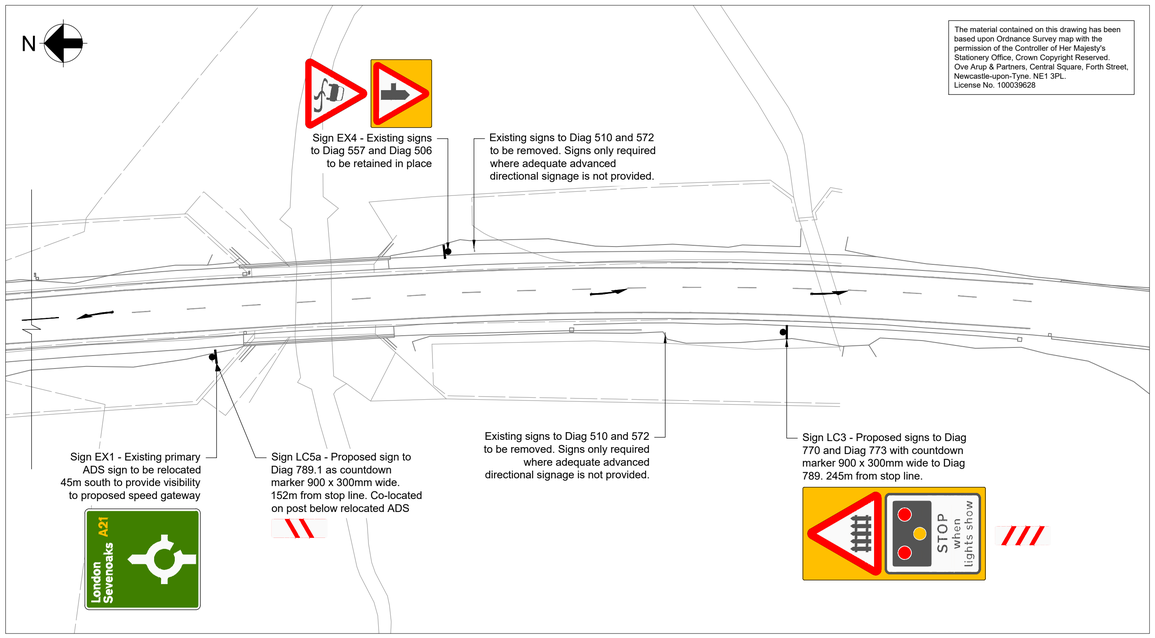

Notes

1. All road markings and traffic signs are to be in accordance with the Traffic Signs Regulations and General Directions (2002) and the Traffic Signs Manuals.
2. For diagram numbers refer to the TSRGD.
3. For road markings refer to drawing 239025-ARP-XX-XX-DR-CH-0002.
4. Post and foundation design for new signs and assessment of existing installations within the scheme extents is to be undertaken during detailed design.

Rev	Date	By	Chkd	Appd
P2	24/06/21	ER	EK	JP
	Markings revised following HE comment			
P1	11/12/20	ER	EK	JP
	Supersedes C.950.G.104			

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Client
Rother Valley Railway Limited

Project Title
Rother Valley Railway
Level Crossing Highway Design

Drawing Title
A21(T) Robertsbridge Bypass
Proposed Traffic Signs

Scale at A1: 1:500

Role: Civils - Highways

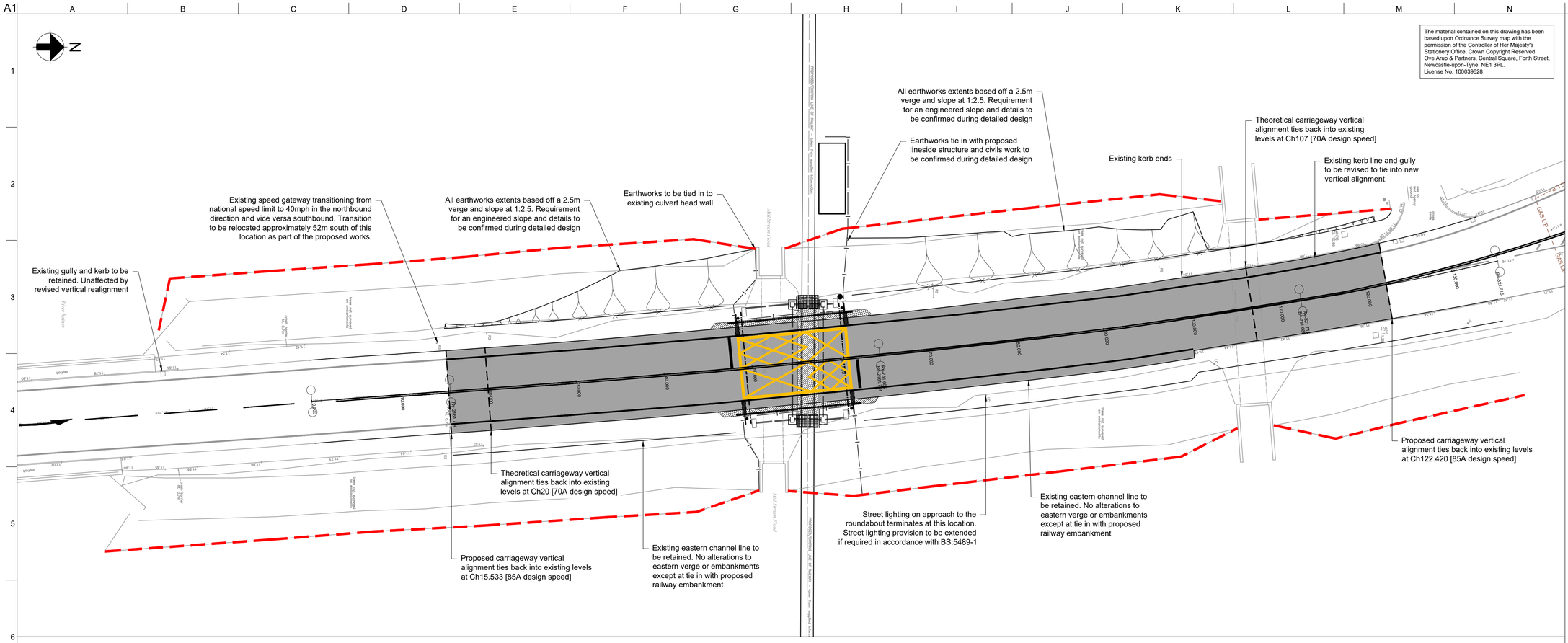
Suitability: S2 - Suitable for Information

Arup Job No: 239025

Rev: P2

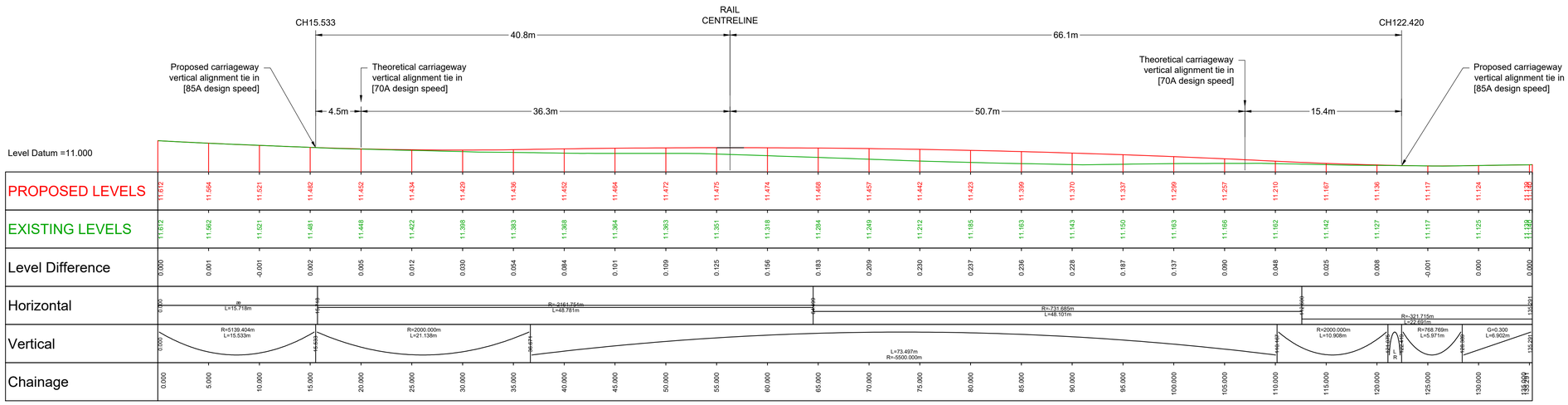
Name
239025-ARP-XX-XX-DR-CH-0003

Do not scale



Plan View

SCALE: 1:250



Notes

1. All works to be in accordance with The Specification for Highway Works (MCHW).
2. All dimensions are in metres unless noted otherwise. Please do not scale from this drawing.
3. This drawing is to be read in conjunction with the other scheme drawings.
4. For associated cross sections refer to drawings 239025-ARP-XX-XX-DR-CH-0020 through to 239025-ARP-XX-XX-DR-CH-0026
5. For general arrangement refer to drawing 239025-ARP-XX-XX-DR-CH-0001
6. For level crossing construction details refer to drawing 239025-ARP-XX-XX-DR-CH-0004

Legend

Existing Highway Boundary

Rev	Date	By	Chkd	Appd
P3	24/06/21	ER	EK	JP
	Markings revised following HE comment			
P2	14/05/21	ER	EK	JP
	Vertical profile amended			
P1	14/04/21	ER	EK	JP
	Supersedes C.950.G.201			

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Client
Rother Valley Railway Limited

Project Title
Rother Valley Railway
Level Crossing Highway Design

Drawing Title
A21(T) Robertsbridge Bypass
Preliminary Longitudinal Section

Scale at A1 V1:50 ; H1:250

Role Civils - Highways

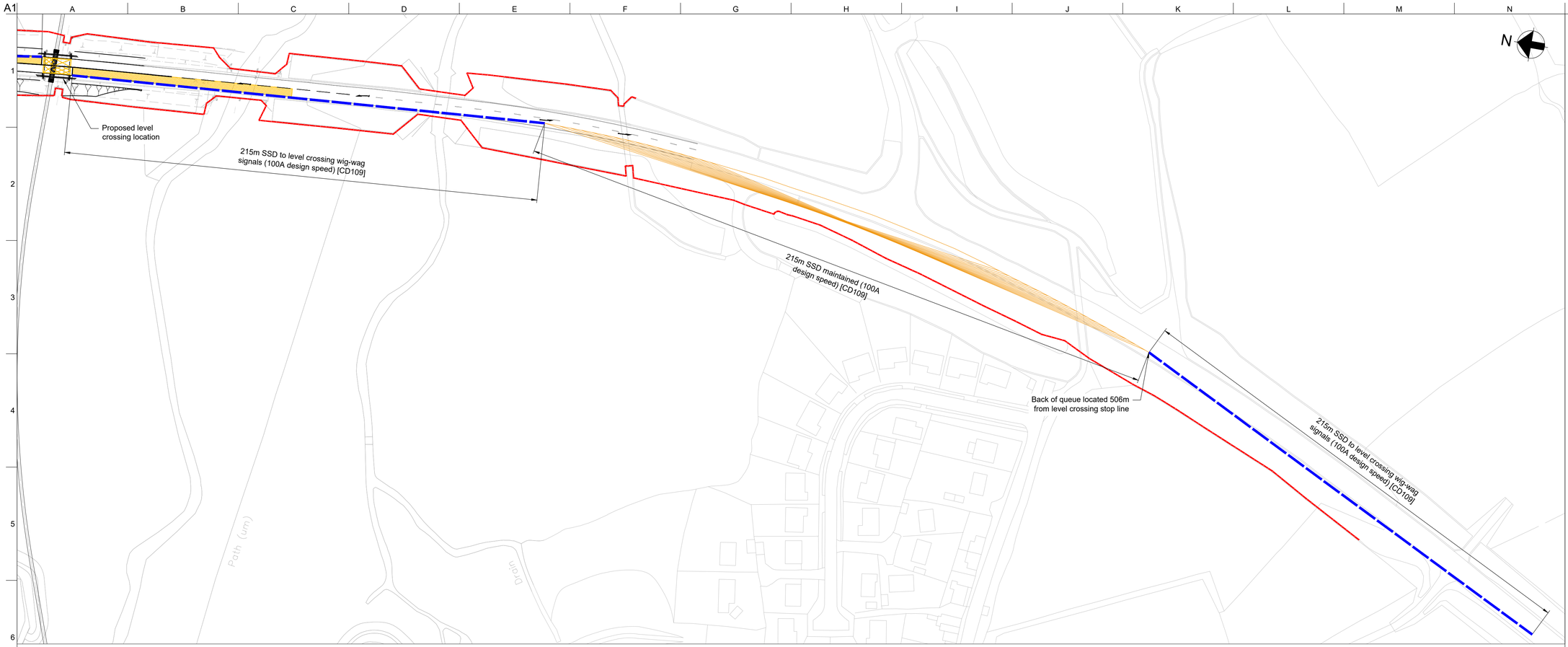
Suitability S2 - Suitable for Information

Arup Job No 239025

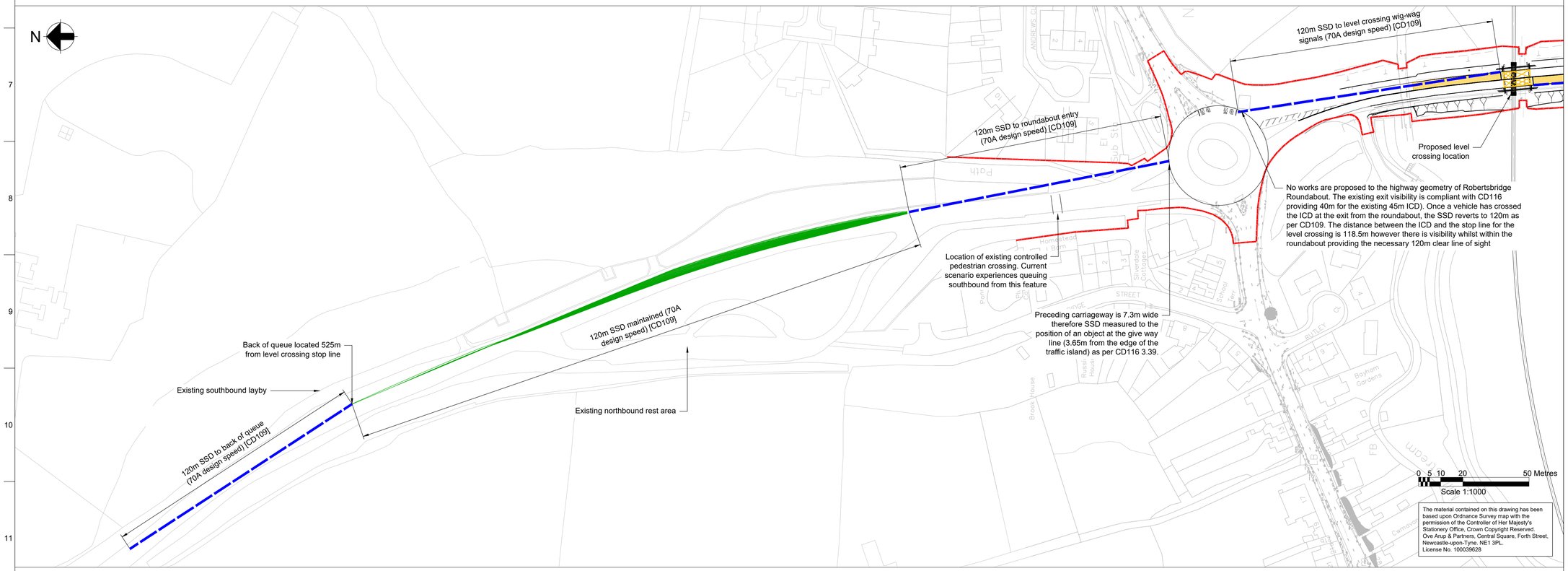
Rev P3

Name 239025-ARP-XX-XX-DR-CH-0010

A1



A21 Northbound Approach



A21 Southbound Approach

Do not scale

Notes

1. Visibility splays undertaken outside of the extents of topographical survey have used Ordnance Survey mapping as a means of estimating the existing highway alignment.
2. Visibility splays have been formed in accordance with DMRB guidance, principally CD109 Highway Link Design and CD116 Geometric Design of Roundabouts.
3. Visibility within the existing roundabout circulatory itself has not been assessed.
4. For road marking and traffic sign diagram numbers refer to drawings 239025-ARP-XX-XX-DR-CH-0002 and 239025-ARP-XX-XX-DR-CH-0003.
5. All vegetation within visibility splays to be cleared

Legend

- Highway Boundary
- Stopping Sight Distance (SSD)
- 215m forward visibility envelope from back of queue
- 120m forward visibility envelope from back of queue

Rev	Date	By	Chkd	Appd
P1	24/06/21	ER	EK	JP
	Issued for information			

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Client
Rother Valley Railway Limited

Project Title
Rother Valley Railway
Level Crossing Highway Design

Drawing Title
A21(T) Robertsbridge Bypass
SSD Assessment

Scale at A1 1:1000

Role Civils - Highways

Suitability S2 - Suitable for Information

Arup Job No 239025

Rev P1

Name
239025-ARP-XX-XX-SK-CH-0001

Appendix B – Summary of NMU Data

Doc Ref: PH/JN/ITL14477-015

i-Transport LLP
85 Gresham Street, London, EC2V 7NQ

Tel: 020 3705 9215

Technical Note

Project No: ITL14477
Project Title: Rother Valley Railway
Title: Summary of NMU Data
Ref: PH/JN/ITL14477-015
Date: 20 October 2020

SECTION 1 NMU SURVEY DATA

1.1.1 Various data sources can be considered as to the propensity for pedestrians, cyclists and horse riders passing the location of the proposed level crossing.

1.2 2012/2013 Manual Counts

1.2.1 Table 1.1 provides a summary of the non-motorised user (NMU) data collected prior to planning permission being granted. Data was collected by manual count with members of the RVR project team on-site.

Table 1.1 – Summary of NMU Data collected prior to Planning Permission

Date	Location / Survey Type	Northbound Count			Southbound Count			Total
		Peds	Cycles	Equestrian	Peds	Cycles	Equestrian	
Wednesday 14th November 2012	Near Robertsbridge Roundabout* / Manual Count	0	0	0	0	0	0	0
Sunday 13th January 2013	Near Robertsbridge Roundabout* / Manual Count	0	6	0	0	0	0	6
Sunday 13th June 2013	Near Robertsbridge Roundabout* / Manual Count	0	2	0	1	6	0	9

Note - *Unclear if north or south of roundabout or turning of flows at roundabout and whether they routed to/from the level crossing location

1.3 ATC Data

1.3.1 Additional data has subsequently been collected via Automatic Traffic Counters (ATCs) located adjacent to the location of the proposed level crossing. It should be noted that ATCs cannot record pedestrian and equestrian movements and are not reliable for collecting cycle movements. These are subsequent to planning permission being granted and are to inform the Transport and Works Act Order (TWAO).

1.3.2 Table 1.2 – 1.4 summarise ATC data collected in March and April 2019 and March 2020.

Table 1.2 – Summary of March 2019 ATC Data

Date	Location / Survey Type	Northbound Count			Southbound Count			Total
		Peds	Cycles	Equestrian	Peds	Cycles	Equestrian	
Monday 4th March 2019	Level Crossing Location / ATC		2			2		4
Tuesday 5th			0			5		5
Wednesday 6th			0			2		2
Thursday 7th			3			3		6
Friday 8th			3			1		4
Saturday 9th			1			4		5
Sunday 10th			1			0		1
Monday 11th			2			4		6
Tuesday12th			1			0		1
Wednesday 13th			4			4		8
Thursday 14th			3			2		5
Friday 15th			1			3		4
Saturday 16th			1			3		4
Sunday 17th			0			8		8
Monday 18th March 2019			3			3		6

Table 1.3 – Summary of April 2019 ATC Data

Date	Location / Survey Type	Northbound Count			Southbound Count			Total
		Peds	Cycles	Equestrian	Peds	Cycles	Equestrian	
Monday 15th April 2019	Level Crossing Location / ATC		0			0		0
Tuesday 16th			0			2		2
Wednesday 17th			2			5		7
Thursday 18th			2			3		5
Friday 19th			5			6		11
Saturday 20th			3			3		6
Sunday 21th			2			0		2
Monday 22nd			2			4		6
Tuesday 23rd			2			5		7
Wednesday 24th			0			6		6
Thursday 25th			0			5		5
Friday 26th			1			5		6
Saturday 27th			1			1		2
Sunday 28th			0			1		1
Monday 29th			3			6		9

Date	Location / Survey Type	Northbound Count			Southbound Count			Total
		Peds	Cycles	Equestrian	Peds	Cycles	Equestrian	
Tuesday 30th			4			7		11
Wednesday 1st May 2019			1			5		6

Table 1.4 – Summary of March 2020 ATC Data

Date	Location / Survey Type	Northbound Count			Southbound Count			Total
		Peds	Cycles	Equestrian	Peds	Cycles	Equestrian	
Tuesday 17th March 2020	Level Crossing Location / ATC		1			5		6
Wednesday 18th			3			1		4
Thursday 19th			5			4		9
Friday 20th			0			1		1
Saturday 21st			1			0		1
Sunday 22nd			2			3		5
Monday 23rd			3			0		3

1.3.3 Based on the ATC data, it would suggest frequent cycle activity is occurring along the A21 where the proposed level crossing is located. However, as traditional ATCs are unreliable at recording cycle flows, video surveys have been reviewed.

1.4 Review of Video Survey

1.4.1 A manual classified turning count and video survey was also undertaken on 17th March 2020, i.e. the same day as the ATC was recording, focused on the pedestrian crossing and Robertsbridge Roundabout. The video footage has been reviewed in detail and it can be concluded;

- No pedestrians, cyclists or equestrians are recorded in the section of the A21 where the crossing is proposed (between the hours of 0700 and 1900 on 17th March 2020)
- When compared to the ATC data from the 17th March 2020, which suggests three pedal cycles were recorded between 0700 and 1900 (and an additional two outside of these times) – the ATC

has erroneously recorded cycle movements as passing along the A21 as no movements across the area the level crossing is proposed have been noted; and

- Some cyclists are recorded at the Robertsbridge Roundabout with a total of 10 movements across the day. Four of these movements are each east to west and west to east, i.e. passing between Church Lane and Northbridge Street via the roundabout. The other two movements are north – west and west – north, i.e. one cyclist passing along the A21 and turning into Northbridge Street and another cyclist returning from Northbridge Street back to the A21.

Appendix C – Accident Analysis Note

Doc Ref: PH/JN/LC/LM/ITL14477-008

i-Transport LLP
85 Gresham Street, London, EC2V 7NQ

Tel: 020 3705 9215

Technical Note

Project No: ITL14477
Project Title: Rother Valley Railway
Title: Accident Analysis Note
Ref: PH/JN/LC/LM/ITL14477-008 TN
Date: 11 March 2020

SECTION 1 OVERVIEW

1.1.1 Rother Valley Railway Limited (RVR) has appointed i-Transport LLP to provide transport and highways advice in relation to a Transport and Works Act Order (TWAO) to construct, operate and maintain a new railway between Bodiam and Robertsbridge, East Sussex. It is intended that the existing heritage railway operation between Tenterden and Bodiam, the Kent and East Sussex Railway (KESR), would operate over the extension to allow services between Robertsbridge and Tenterden.

1.1.2 RVR would be the infrastructure manager of the railway extension who build the new track. KESR would be the operator of services over those tracks.

1.1.3 Whilst the proposals to reintroduce the railway between Bodiam and Robertsbridge have planning consent (*planning ref: RR/2014/1608/P*), the Transport and Works Act (TWA) process is separate to this and an Order (TWAO) must be made to allow the proposals to be implemented.

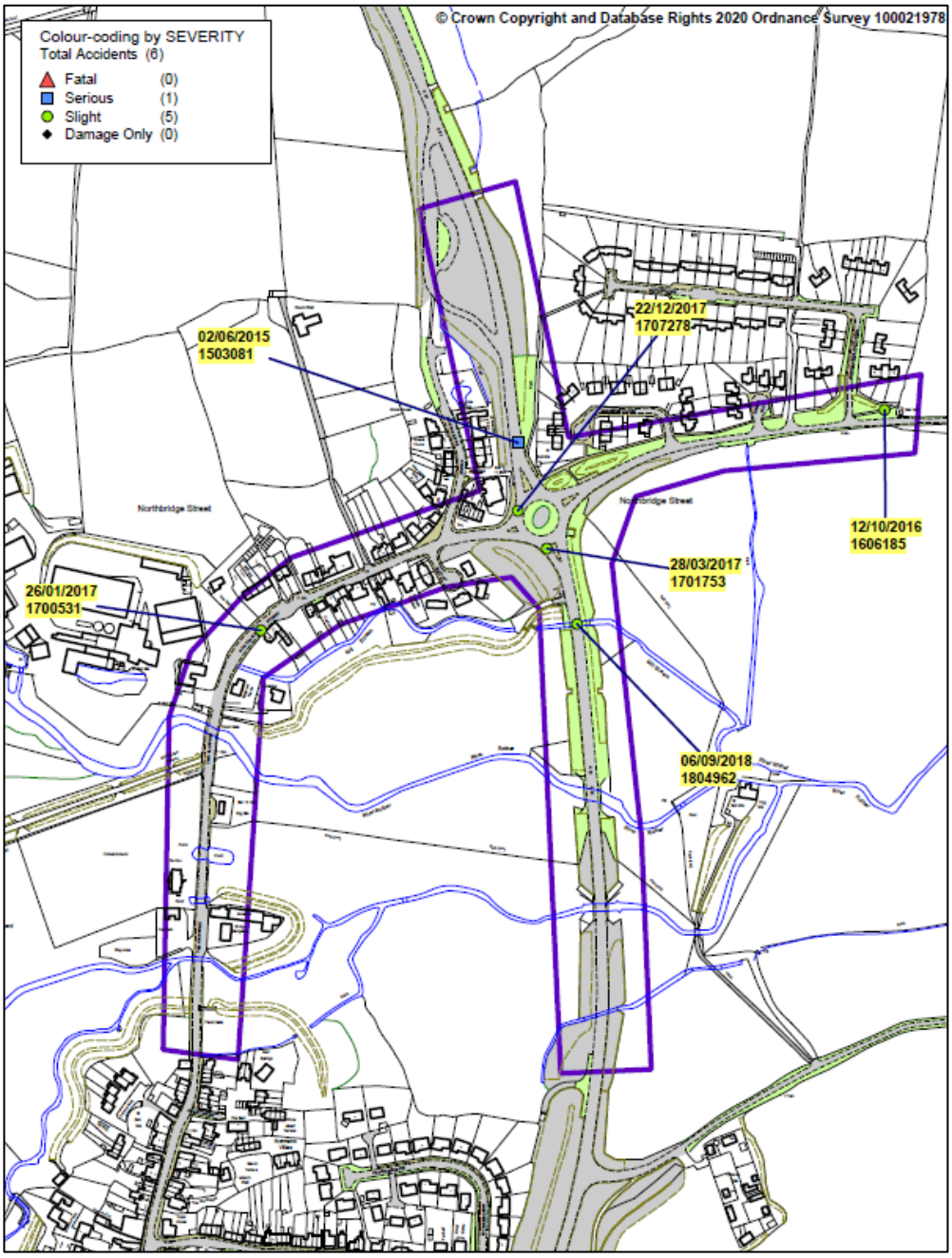
1.1.4 The extension of the railway requires the introduction of three level crossings, one of which would be located on the A21, part of the Strategic Road Network. Highways England (HE), are responsible for the Strategic Road Network.

1.1.5 HE have raised concerns with the proposed level crossing on the A21. i-Transport LLP have been liaising with HE to determine their concerns and provide further information and context with a view to reaching an agreed position. This note forms part of a series of information notes being prepared to provide clarity on a number of matters. This note sets out a review of the accident statistics recorded for the a21 in the vicinity of the proposed level crossing.

SECTION 2 ROAD SAFETY REVIEW

2.1.1 Personal Injury Accident (PIA) data has been obtained from 'Sussex Safer Roads Partnership' which operates on behalf of Sussex Police for the highway network in the vicinity of the site. For the most recently available five-year period (01/02/2015 – 31/01/2020), a total of four accidents were recorded on the section of the A21 in the vicinity of the proposed crossing; three were slight and one was serious. **Image 1.1** below shows the location, severity and date of each PIA. The full PIA data is provided at Appendix A.

Image 1.1: A21, PIA Plot



Source: Sussex Safer Roads

2.1.2 The serious injury accident involved a single car travelling south on the A21. It occurred when the driver crossed over into the northbound carriageway and collided with a lamppost. It was noted that the driver was under the influence of alcohol and fatigued. The road surface was dry, and the weather was recorded as fine. It happened at 19:38 during daylight on the 2nd June 2015 and streetlights were present.

2.1.3 Two of the slight injury accidents occurred at the A21 Robertsbridge Roundabout. One was a rear end shunt as a car slowed on the approach to the roundabout whilst a 3.5t goods vehicle behind failed to stop in time. The road surface was dry and the weather was recorded as fine. It happened at 17:45 during daylight on the 28th March 2017; street lighting was present. The second involved a single car travelling northbound on the A21. It occurred when the driver lost control of their vehicle upon exiting the roundabout and collided with the safety barriers protecting the footpath. The road surface was wet and the weather was recorded as raining without high winds. It happened at 05:00 during darkness on the 22nd December 2017 with street lighting present.

2.1.4 The third slight injury accident occurred on the A21 south of the Robertsbridge Roundabout and involved three vehicles. It occurred when a car travelling southbound went over a bump causing the caravan that it was towing, to detach and cross over the northbound carriageway into an oncoming 7.5t goods vehicle and a 3.5t goods vehicles. The road surface was dry and the weather was recorded as fine. It happened at 12:07 during daylight on the 6th September 2018 and street lighting also present.

APPENDIX A. PIA DATA

Northbridge Street – I-Transport –

Collision report 01/02/2015 – 31/01/2020

Date produced
05 March 2020

The information included in this report is provided for analysis and is based on the data provided by Sussex Police. Some of the data included in this report is subjective and as such is not considered suitable for general release. In view of this it should not be transmitted to any other person in its original form, including in any report which may be available to the public. If you have any doubt regarding how this data may be used other than for analysis please contact SSRP for advice.

Sussex Safer Roads
PARTNERSHIP

Safer Roads
Safer Communities
Sharing the Responsibility

Produced by Sussex Safer Roads Partnership on behalf of Sussex Police

Data regarding personal injury collisions is recorded by Sussex Police in accordance with the DfT Stats 19 requirements. The data is subsequently used by Sussex Safer Roads Partnership for monitoring and planning. While every effort is made to ensure that this data is accurate, it is subject to change should further information become available.

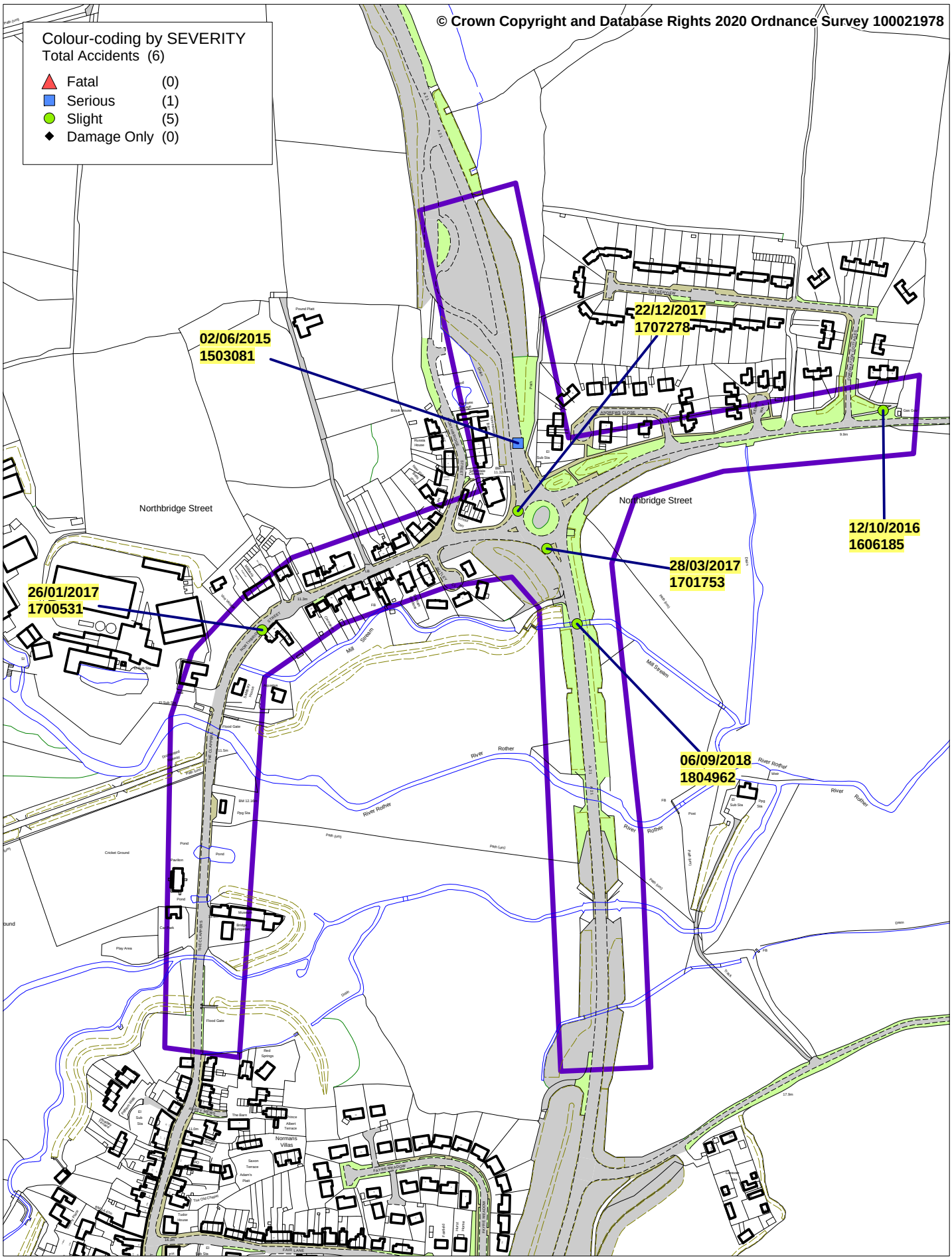
This data may not be fully validated and while every effort is made to ensure its accuracy any statistics provided may not match those published elsewhere.

Sussex Safer Roads Partnership does not hold collision data either where there are no recorded casualties or the incident has not been reported to Sussex Police.

For further information:

web: www.sussexsaferroads.gov.uk

email: data@sussexsaferroads.gov.uk



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Sussex Safer Roads PARTNERSHIP

Northbridge Street, Robertsbridge
Collision Dates 01/02/2015 - 31/01/2020
i-Transport

SCALE	1 : 4000
DATE	05/03/2020
DRAWING No.	
DRAWN BY	

Details of Personal Injury Accidents for Period - **01/02/2015** **to** **31/01/2020** (60) months

Selection:
Selected using Manual Selection

Notes:

			Vehicles					Casualties		
Police Ref.	Day	Location Description	Veh No / Type / Manv / Dir / Class					Sex / Age / Sev		
	Date									
Road No.	Time									
2nd Road No.	D/L									
Grid Ref.	R.S.C									
	Weather									
	Speed									
	Account of Accident									
Causation Factor:										

1503081	Tuesday	A21 LONDON ROAD	Veh 1	Car	Going ahead	N	to S	Dri	M	60	Serious
	02/06/2015	ROBERTSBRIDGE 61M NORTH OF U	Veh 1	Car	Going ahead	N	to S	FSP	F	52	Slight
R1: A 21	1938hrs	NORTHBRIDGE OUTSIDE AT									
	Daylight:street lights present										
E 574,066	Dry										
N 124,268	Fine without high winds										
	60 mph										

Causation Factor:		**Participant:**	**Confidence:**
1st:	Impaired by alcohol	Vehicle 1	Possible
2nd:	Fatigue	Vehicle 1	Very Likely

VEH 1 TRAVELLING SOUTH ON A21 DRIVER TIRED AFTER ARRIVING BACK FROM ABROAD THE DAY BEFORE, THEN TAKING WIFE TO HOSPITAL FOR CANCER SURGERY. VEHICLE ONE CROSSES CARRIAGEWAY AND STRIKES LAMP POST AND TREE CAUSING FRACTURED ARM TO DRIVER.

1606185	Wednesday	U CHURCH LANE ROBERTSBRIDGE	Veh 1	Car	Going ahead	E	to W	Dri	M	88	Slight
	12/10/2016	28M EAST OF U CORONATION	Veh 2	Car	Parked	0	to 0				
R1: U	2223hrs	COTTAGES OUTSIDE OF 24	Veh 3	Car	Parked	0	to 0				
	Darkness: no street lighting										
E 574,357	Dry										
N 124,294	Fine without high winds										
	30 mph										

Causation Factor:		**Participant:**	**Confidence:**
1st:	Impaired by alcohol	Vehicle 1	Very Likely

THE DRIVER OF V1 HAS LEFT THE SALEHURST HALL PH AND DRIVEN WESTBOUND ON CHURCH LANE TOWARD THE A21. DUE TO HIS INTOXICATED STATE, HE HAS COLLIDED WITH V2 AND V3 WHICH HAVE BEEN PARKED UNATTENDED ON THE VERGE, AND CAUSED DAMAGE TO BOTH, MOVING THEM FROM T
HEIR ORIGINAL POSITION AND BLOCKING THE ROAD.

1701753	Tuesday	A21 ROBERTSBRIDGE AT JUNCTION	Veh 1	Goods < 3.5t	Stopping	S	to N				
	28/03/2017	OF U NORTHBRIDGE STREET	Veh 2	Car	Stopping	S	to N	Dri	F	48	Slight
R1: A 21	1745hrs										
R2: U	Daylight:street lights present										
E 574,089	Dry										
N 124,184	Fine without high winds										
	40 mph										

Causation Factor:		**Participant:**	**Confidence:**
1st:	Careless/Reckless/In a hurry	Vehicle 1	Possible
2nd:	Failed to look properly	Vehicle 1	Possible
3rd:	Failed to judge other persons path or speed	Vehicle 1	

V2 SLOWED AND CAME TO A STOP AT A ROUNDABOUT, DRIVER OF V1 FAILED TO STOP IN TIME AND WENT INTO REAR OF V2.

Details of Personal Injury Accidents for Period - **01/02/2015** **to** **31/01/2020** (60) months

Selection:
Selected using Manual Selection

Notes:

			Vehicles							Casualties		
Police Ref.	Day	Location Description	Veh No	Type	Manv	Dir	Class			Sex	Age	Sev
	Date											
Road No.	Time											
2nd Road No.												
Grid Ref.	D/L											
	R.S.C											
	Weather											
	Speed											
	Account of Accident											
Causation Factor:												

1707278	Friday	A21 NORTHBRIDGE ROUNDABOUT	Veh 1	Car	Going ahead RH bend	SE	to	N	Dri	M	26	Slight
	22/12/2017	ROBERTSBRIDGE AT JUNCTION OF										
R1: A 21	0500hrs	U NORTHBRIDGE STREET										
R2: U	Darkness: street lights present a											
E 574,066	Wet/Damp											
N 124,214	Raining without high winds											
	40 mph											

Causation Factor:		**Participant:**	**Confidence:**
1st:	Loss of control	Vehicle 1	Very Likely
2nd:	Slippery road (due to weather)	Casualty 1	Very Likely
3rd:	Rain, sleet, snow, or fog	Vehicle 1	

V1 ENTERED INTO ROUNDABOUT TRAVELLING NORTHBOUND. ROAD CONDITIONS WERE WET AND DARK. V1 LOST CONTROL EXITING THE ROUNDABOUT AND WENT THROUGH THE SAFETY BARRIERS PROTECTING THE FOOTPATH.

1804962	Thursday	A21 ROBERTSBRIDGE 320M SOUTH	Veh 1	Car	Going ahead	N	to	S				
	06/09/2018	OF U NORTHBRIDGE STREET	Veh 2	Goods > 7.5t	Going ahead	S	to	N	Dri	F	23	Slight
R1: A 21	1207hrs		Veh 3	Goods < 3.5t	Going ahead	S	to	N				
	Daylight:street lights present											
E 574,113	Dry											
N 124,124	Fine without high winds											
	60 mph											

Causation Factor:		**Participant:**	**Confidence:**
1st:	Poor or defective road surface	Vehicle 1	Very Likely

V1 TRAVELLING SOUTHBOUND TOWING A CARAVAN,WENT OVER BUMP IN CARRIAGEWAY AND CARAVAN HAS DETATCHED FROM THE VEHICLE AND CROSSED INTO THE NORTHBOUND CARRIAGEWAY WHERE IT HIT V2 AND V3.

1700531	Thursday	U NORTHRIDGE STREET ROBERTS	Veh 1	Car	Going ahead RH bend	SW	to	E	Dri	M	31	Slight
	26/01/2017	BRIDGE 214M WEST OF A21	Veh 2	Car	Parked	0	to	0				
R1: U	1035hrs	OUTSIDE 34 NORTHBRIDGE STREET	Veh 3	Car	Parked	0	to	0				
	Daylight:street lights present											
E 573,862	Frost/Ice											
N 124,119	Fine without high winds											
	30 mph											

Causation Factor:		**Participant:**	**Confidence:**
1st:	Slippery road (due to weather)	Vehicle 1	Very Likely
2nd:	Careless/Reckless/In a hurry	Vehicle 1	Possible
3rd:	Driver using mobile phone	Vehicle 1	

DURING DAY TIME MORNING VEHICLE ONE BEING DRIVEN EAST ON SINGLE CARRIAGE WAY HAS SKIDDED INTO ON COMING LANE AND IMPACTED OFF SIDE WITH PARKED VEHICLE 2 AND HOUSE TO FRONT CAUSING DAMAGE WALL OF HOUSE TO COLLAPSE. VEHICLE 2 WITH THE FORCE OF THE IMPACT H
AS BEEN SHUNTED INTO THE FRONT OF VEHICLE THREE.

---

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Appendix D – KESR Railway Operations

Doc Ref: PH/JN/ITL14477-014

i-Transport LLP
85 Gresham Street, London, EC2V 7NQ

Tel: 020 3705 9215

Technical Note

Project No: ITL14477
Project Title: Rother Valley Railway
Title: KESR Railway Operations
Ref: PH/JN/ITL14477-014
Date: 22 September 2020

SECTION 1 OVERVIEW

1.1.1 Rother Valley Railway Limited (RVR) has appointed i-Transport LLP to provide transport and highways advice in relation to a Transport and Works Act Order (TWAO) to construct, operate and maintain a new railway between Bodiam and Robertsbridge, East Sussex.

1.1.2 It is intended that the existing heritage railway operation between Tenterden and Bodiam, the Kent and East Sussex Railway (KESR), would operate over the extension to allow services between Robertsbridge and Tenterden.

1.1.3 RVR would be the infrastructure manager of the railway extension who build the new track. KESR would be the operator of services over those tracks.

1.1.4 Whilst the proposals to reintroduce the railway between Bodiam and Robertsbridge have planning consent (*planning ref: RR/2014/1608/P*), the Transport and Works Act (TWA) process is separate to this and an Order (TWAO) must be made to allow the proposals to be implemented.

1.1.5 The extension of the railway requires the introduction of three level crossings, one of which would be located on the A21, part of the Strategic Road Network. Highways England (HE), are responsible for the Strategic Road Network.

1.1.6 To assist HE in understanding the intended operation of the extension and associated level crossings, this technical note has been prepared to clarify the existing KESR operation as well as the intended operation once RVR complete the railway extension. The majority of information set out below was previously presented in i-Transport technical note ITL14477-004 issued on 4th May 2020 . It is important that the expected operation is properly understood as it has provided the basis for the traffic assessments of the impact on the proposed level crossing.

SECTION 2 RAILWAY OPERATIONS

2.1 A21 Level Crossing

2.1.1 It is important to note that should the TWAO be made, this would establish the principle/authority for the heritage railway to cross the A21 at grade. However, the precise nature of the level crossing type and its control system will be subject to final approval by the Office for Rail and Road (ORR). This is secured through the Level Crossing Order process, made under the Level Crossings Act 1983.

2.1.2 At present, it is agreed between RVR and HE that for the purposes of assessment the type of level crossing proposed is an 'Automatic Full Barrier Controlled Locally' level crossing (AFBCL). RVR fully intend to install a crossing of this type.

2.1.3 This type of crossing provides full barrier closure of the carriageway and includes Obstacle Detection equipment. The crossing is automatically activated by an approaching train. The inclusion of obstacle detection means the crossing is not confirmed as clear until the obstacle detection technology has confirmed that to be the case, at which point the exit barriers of the crossing close.

2.1.4 The expected barrier downtime (when vehicles are prevented from travelling along the A21) has been the subject of considerable discussion and analysis. RVR consider the downtime would be no more than 64 seconds. HE consider that 72 seconds is a typical maximum. Therefore, it has been agreed to undertake traffic modelling for both scenarios.

2.1.5 The crossing speed of the train across the A21 level crossing will be limited to 10mph in both directions.

2.2 Railway Timetable

Days Per Month

2.2.1 The KESR does not offer services every day of the year. Indeed, it operates on approximately 50% of days annually with service days reduced in 2020 compared to 2019 (even prior to the travel restrictions as a result of Covid-19). A summary of days of operation is shown in Table 2.1 overleaf.

Table 2.1 – KESR Days of Operation

Month	2019	2020[1]
January	1 (New Year's Day)	1 (New Year's Day)
February	7	7
March	5	1
April	22	13
May	24	21
June	22	21
July	24	22
August	31	31
September	21	20
October	11	13
November	1	1
December	11	11
TOTAL DAYS	**180**	**162**

Source: KESR

1. Confirmed timetable before Covid restrictions.

2.2.2 It is important to recognise that level crossing closures will not occur on every day of the week nor every week of the year. For example, for six months of the year, the railway operates on less than half of the days within the month and for three months of the year, on just a single day within that month.

2.2.3 It is important to view the impact of the level crossing of traffic along the A21 in the context of the number of days services operate.

Trains per Day

2.2.4 The 2020 KESR timetable offers three options for services between Tenterden and Bodiam each day it operates as follows:

- the BLUE timetable: 4 departures from Tenterden to Bodiam and 4 return journeys to Tenterden;
- YELLOW timetable: 5 departures from Tenterden and 5 return journeys from Bodiam to Tenterden; and
- GREEN timetable: 5 departures from Tenterden and 5 return journeys from Bodiam to Tenterden

(the difference between Yellow and Green is the train engine used for services – steam or diesel)

2.2.5 These timetables would be operated on the extended route to Robertsbridge. Thus, on the days the blue timetable operates, the level crossing would close just eight times across a day. On yellow and green timetable days, the level crossing would close 10 times across a day.

2.2.6 A Gold Timetable, that did operate in 2019 was the busiest offering of trains, with eight timetabled services each way, comprising of three steam trains or two steam trains and one diesel train. Whilst this is no longer directly offered by KSER (i.e. as a published timetable), the same service pattern was proposed for a special timetable on the weekend of the 16th and 17th May 2020 (to coincide with the 1940s event).

2.2.7 On these special event days (of which there are few within a calendar year) eight trains per day can be expected. This would see the level crossing close 16 times across a day. On all other days the railway operates, the level crossing would close between 8 and 10 times a day.

2.2.8 Accordingly, on the days the Blue timetable operates, the barriers would be closed for 8.5minutes across a whole day, increasing to 10.5minutes across a whole day on Yellow and Green timetable operation. On days the railway operates a special timetable, the crossing would be closed for a total of 17minutes across a whole day.

2.2.9 The planning permission restricts the use of the level crossing over the A21 between the hours of 09.00 and 17.00 daily. Thus, avoiding the typically busiest periods on the road network.

2.2.10 It is important to understand the low frequency of the railway operation and its restricted operational hours when considering the impact of the use of the crossing to traffic flow on the A21.

Train Type

2.2.11 The KESR has a range of steam and diesel engines and passenger carriages. Maximum train length is 115mmade up of five passenger carriages (98.5m) and steam locomotive (16.5m). This has been assumed when estimating the expected downtime.,

2.2.12 However, during 2019 and timetabled for 2020 only one train per day will be a maximum of 115m during operation, with other trains of shorter length. Train lengths are therefore regularly less than 115m (achieved by attaching less passenger carriages), with consequent reductions in barrier downtime.

2.2.13 It is important understand the basis for calculating the downtime is worst case when considering the impact to traffic of a level crossing on the A21.