RVR/W4/1

Transport and Works Act 1992
The Transport and Works (Inquiries Procedure) Rules 2004

The Proposed Rother Valley Railway (Bodiam to Robertsbridge Junction) Order

Proof of Evidence of
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1 Introduction

1.1 Personal Details

1.1.1 My name is Jonathan Portlock and I am an Associate within the civil structures team of Ove Arup and Partners consulting engineers. I specialise in civil structures relating to railway and highway schemes and am acting on behalf of Rother Valley Railway Limited.

1.1.2 I hold a Master of Engineering degree in Civil Engineering from Durham University and a Master of Studies degree in Interdisciplinary Design for the Built Environment from the Cambridge University. I am a Chartered Member of the Institution of Structural Engineers and a Chartered Member of the Institution of Civil Engineers.

1.1.3 I have over twenty years' experience in structural design and over 10 years' experience of structural infrastructure design in the railway environment.

1.1.4 Specifically, I have experience of level crossing ground plans and risk assessments on existing light rail systems and experience of carrying out grade separation feasibility studies.

1.2 Details of involvement

1.2.1 This proof of evidence considers the work we (Arup) carried out to assess the feasibility of level and grade separated crossing of the A21(T). This evidence complements that of Mr Phil Hamshaw and Mr David Keay and should be read in conjunction with their proof of evidence, Mr Phil Hamshaw covering highway aspects and Mr David Keay covering the railway aspects.

1.2.2 This proof covers paragraph 2 of the Secretary of State's Statement of Matters:

> ***Paragraph 2 – the main alternative options considered by the promoter and the reasons for choosing the proposals comprised in the scheme:***

1.2.3 My involvement dates from November 2013 where we were asked to provide civils designs for the three level crossings to allow progression of the Road Safety Audits and discussions with Highways

Agency (predecessor body to Highways England) and the Local Authority.

1.2.4 These preliminary designs were completed in 2015.

1.2.5 In August 2018 Arup was commissioned to provide a feasibility options report for crossing the A21(T), for which I was the lead responsible person in Arup.

1.2.6 This report considered the technical engineering feasibility and provided budget cost estimates for comparison of methods for crossing the A21(T). Based on the information available we are confident that the costs outlined in the feasibility options report are accurate to enable the magnitude to be identified and a comparison to be made.

1.2.7 My evidence is focused around this piece of work.

1.3 Other Work

1.3.1 The work outlined below is not the subject of this evidence and where this work is relevant to objections to the proposed Order, it is addressed by Mr Hamshaw.

1.3.2 Arup undertook the preliminary design work on the crossings of Northbridge Street and Junction Road.

1.3.3 Arup have also undertaken work to redesign the highway alignment of the A21 to accommodate the level crossing.

1.3.4 Arup completed an Approval in principle "AiP" submission, doc ref **RVR 074-6**, to Highways England ("HE") insofar as related to the assessment of the existing highway embankment and flood culvert adjacent to the proposed A21 crossing.

1.3.5 Arup provided the Statement of Intent element of the geotechnical information to HE and at the time of writing are in the process of

providing the Preliminary Sources Study Report to support the crossing design for the A21 level crossing.

1.3.6 Arup provided a GG104 Safety Risk Assessment and a Departure in support of the level crossing of the A21.

2 Evidence Summary

2.1.1 My proof of evidence is concerned with addressing the engineering practicalities/feasibility of crossing the A21.

2.1.2 This Proof of Evidence describes how we normally address this type of work, how the work for the crossing was carried out, the competences of those carrying the work out and a summary of the report and its conclusions.

2.1.3 This Proof of Evidence should be read together with the A21(T) Crossing Options Feasibility Report reference REP/239025/R002 (**RVR 076**).

3 Methodology

3.1.1 The following describes how Arup typically go about reviewing feasibility of a number of crossing options for a railway / road crossing and how this was applied to the crossing of the A21(T) as part of this scheme. This method has been proved to be accurate and robust on previous schemes.

3.1.2 The review would undertake concept designs only. This would provide feasible forms of construction and concept geometry for a level crossing, a road over rail crossing, a rail over road crossing and a road over rail crossing with a raised road level.

3.1.3 The basis for the designs would be the existing topography and any topographical constraints to be applied to the new infrastructure.

3.1.4 For the crossing of the A21(T) the basis was the original A21(T) topographical survey along with the topographical surveys of Northbridge Street and Junction Road. This is a reasonable approach given the lack of works in recent times in each of these areas.

3.1.5 The railway constraints for a grade separated solution were the Northbridge Street and Junction Road crossings with the clearance above or below the A21(T) being the key design requirement.

3.1.6 The highway constraints were maintaining a compliant alignment taking on board existing vertical and horizontal alignment and the roundabout to the north.

3.1.7 A concept vertical alignment design is produced for each grade separated option taking account of 3.1.5 and 3.1.6 above.

3.1.8 The extents of suspended structures or buried route are then determined from comparison of existing levels with proposed levels.

3.1.9 Works to any existing assets and the extent of new assets can then be determined, including support locations, spans, depths etc. From these parameters, geometry and magnitude is determined.

3.1.10 Following determination of concept quantities, costs are applied to the works. Costs are based on data from recent projects, industry standard rates and market rates for overheads and profits. The costs are based on the delivery of the works by appropriately sized Contractors in the current market.

3.1.11 For the crossing of the A21(T) we looked at the potential vertical gradient for the railway to cross over the road. This identified the extents of suspended railway track. A design proposal for embankments, foundations, piers, deck and trackbed was proposed. This option required no changes to the road alignment.

3.1.12 We next looked at the potential vertical gradient for the railway to go under the road. This was also shown to be achievable with no changes to the road alignment. The extent of suspended highway and railway cuttings was determined and sized, including the bridge across the railway and the retaining walls parallel to the railway.

3.1.13 We also looked at a further option for railway under road with a raised highway to reduce the cutting required. The infrastructure for raising the highway and for lowering the railway was identified and sized.

3.1.14 Based on the feasible designs produced as described above, along with the level crossing designs developed by Arup on behalf of RVR, a cost estimate was developed for each option. We produced the estimates using the methods described in 3.1.10.

3.1.15 Once the works cost estimates were complete, we applied risk/optimism bias appropriate to the level of detail of design carried out. The level of detail of the design is concept only therefore industry standard is to apply a risk or optimism bias allowance to cover any unknowns. This was applied as a percentage uplift in line with typical values applied at this stage of a project.

3.1.16 The level crossing option requires less major civils work and is more able to be carried out by RVR with in house resource, comprising of experienced volunteers and minor works contractors. Those works defined as “HE Works” in the proposed protective provisions for HE (i.e. the level crossing works and other works within the A21 corridor) are to be carried out by HE approved contractors, which may include suitably experienced volunteer workers. RVR have obtained quotes

where applicable and used their extensive experience of civil works on the K&ESR to develop the level crossing costs. This therefore provides a good level of confidence in the cost estimate for this option. This estimate was also included in our comparison.

5 Summary of A21(T) Crossing Options Feasibility Report

5.1.1 The following summarises the outcome of the feasibility study carried out during 2018/19 by Ove Arup and Partners (Arup). For further detail please refer to report reference REP/239025/R002, A21(T) Crossing Options Feasibility Report (**RVR 076**).

5.1.2 The options assessment has considered the feasibility and (industry standard) construction costs of each crossing option to provide a "like for like" comparison between the option.

5.1.3 The purpose of the assessment was to establish whether there was gross disproportion in terms of the alternative crossing options when compared with an at-grade crossing.

5.1.4 In addition, the assessment considered the actual cost estimate for delivery of the level crossing, as worked up by RVR for the purposes of the planning consent, granted in March 2017, and the application for Transport and Works Order submitted in April 2018. It is noted that it is not possible to advance a similar worked up costing for the other three crossing options because RVR would not be equipped to design and construct them "in-house" given the significant nature of the civil works involved i.e. viaduct or tunnel structure. Therefore, a further comparison was made between the fully worked up costs of implementation of Option 1 by RVR and the "industry standard" costs of Options 2 to 4.

5.1.5 The cost estimate for the level crossing option takes into account that works within the A21(T) corridor will be carried out be an approved contractor. However, as explained in paragraph 3.1.16 above, the protective provisions that RVR has negotiated with HE, specifically allow for volunteer contractors.

5.1.6 Option 1, involving an at-grade level crossing, introduces the fewest engineering challenges and is likely to involve the least disruption during construction. This option formed part of the design for the

railway that received planning permission in March 2017. Construction costs for this option are the lowest.

5.1.7 Option 2 looks at the feasibility of taking the rail beneath the existing road whilst maintaining the existing road alignment. Principal engineering and approval challenges are around the railway being placed below the level of the adjacent River Rother. Mitigation of this is likely to require a long length of waterproof trough structure, with significant engineering challenges, including maintenance of water flow paths during flood events and long-term pumping requirements. Disruption to local residents and road users is likely to be most significant with this option and it would require significant additional land from third party landowners. Clearly, given the line of route across the flood plain and the assessment carried out for the proposed scheme, flood risk is an issue in this location and there must be considerable doubts about the acceptability of this approach to the EA and others.

5.1.8 Option 3 considers the potential to take the rail over the existing road. This scheme introduces a sizeable length of elevated viaduct structure which will have significant impact on cost and would be visually highly intrusive, which may not be acceptable to consultees. Construction duration for this option is also likely to enhance the difficulties around gaining acceptance for this option from the relevant authorities. Again, this option would require significant additional land take from third party landowners.

5.1.9 Option 4, involving vertical realignment of the existing highway will result in a series of engineering works for both the road and rail. This option is rail under road, but with a raised highway alignment to reduce the extent and depth of cuttings. The benefits over options 2 and 3 are that overall the infrastructure has level changes closer to the existing ground level, thus creating a shallower trough and a lower viaduct. It does however introduce both a trough and a viaduct, with similar considerations to those noted above. Similar to the level crossing option, extension of existing 40mph speed restrictions close to the roundabout are likely to be required for this option. To construct

this option would involve longer temporary highway diversions and an overall longer construction duration than the other options.

5.1.10 At the time of the Arup study, RVR had already undertaken significant work on the project in the anticipation of Option One. As referred to above, following detailed studies and designs, extensive discussion and liaison with all the key authorities, RVR has full Planning Approval for this Option. Paragraph 6.7.1 of the report to the Rother District Council planning committee in March 2017 recorded that "Bridges and/or tunnels are not a feasible option in this case and in the circumstances, the installation of a barrier-operated rail crossing over each of the roads is proposed in the application." RVR has the engineering expertise to construct the level crossing option and has a detailed cost estimate, utilising quotes from existing sub-contractors. It is understood that RVR has already purchased a proportion of the key materials needed, as described in an RVR Cost Estimate provided in RVR 076.

5.1.11 Using industry standard allowances, Option 1 is some £4.5M cheaper than the least expensive alternative option (Option 4), rendering those other options very significantly more expensive in the context of the overall £5.3 million costs of building this single track railway (as set out in RVR's Estimate of Costs submitted with its application for TWAO). If one compares Option 4 with the actual costs of the level crossing delivered by a combination of experienced volunteers and contractors, then the difference is £9.8M (a ratio of 7.5:1).

5.1.12 The ORR concluded (in para 35 of its SoC) that it would be grossly disproportion to grade separate the junction between the railway and the A21(T) and that a tolerably safe level crossing could be created.

6 Conclusions

6.1.1 Our feasibility study has shown that all options are technically feasible to construct but have varying challenges.

6.1.2 The work carried out by Arup was conducted by competent people and using industry recognised methods. It is reasonable to assume that the outcomes of the study are accurate.

6.1.3 The study demonstrates that grade separating the junction would be grossly disproportionate. The ORR's expert panel was satisfied that this was the case. Therefore, a level crossing is the appropriate solution to crossing the A21(T) from a construction challenge and cost perspective.

7 Declaration

7.1.1 I hereby declare as follows:

(i) This proof of evidence includes all facts which I regard as being relevant to the opinions that I have expressed and that the Inquiry's attention has been drawn to any matter which would affect the validity of that opinion.

(ii) I believe the facts that I have stated in this proof of evidence are true and that the opinions expressed are correct.

(iii) I understand my duty to the Inquiry to help it with matters within my expertise and I have complied with that duty.

Jonathan Portlock