CAPITA

RVR/W7/4

TRANSPORT AND WORKS ACT 1992
The Transport and Works (Inquiries Procedure) Rules 2004

THE PROPOSED ROTHER VALLEY RAILWAY (BODIAM TO ROBERTSBRIDGE JUNCTION) ORDER

REBUTTAL PROOF

Of

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ON BEHALF OF ROTHER VALLEY RAILWAY Ltd

FLOOD RISK

Contents

1. Introduction

1.1 Scope of Rebuttal Proof

1.1.1 This rebuttal addresses flood risk matters raised in the Proof of Evidence prepared by Chris Patmore (OBJ/1002/CP/1), it also addresses flood risk matters raised by Philip Clark (OBJ/1002/PJC/1), Andrew Highwood (OBJ/1002/AH/1) and Nigel Leigh and Charles Wyndham (OBJ/652 and OBJ/1035) in their respective Proofs of Evidence.

1.1.2 The purpose of this rebuttal proof is to respond to and address several points where evidence suggests the assumptions made in the Objectors Proof of Evidence are flawed or to provide further information where required to address concerns regarding flood risk that are misconceived.

2. Rebuttal to OBJ/1002/CP/1

2.1 Introduction

2.1.1 Chris Patmore, on behalf of The Hoad family of Parsonage Farm, and the Trustees and Executors of the Noel de Quincey Estate and Mrs Emma Ainslie of Moat Farm, presents an opinion on flood risk that can be summarised as:

(1) The development should not be permitted within Flood Zone 3b

(2) The Exception Test is not satisfied

(3) The increase in water depths on agricultural land will lead to longer periods of flooding

(4) Further sensitivity testing of the model should be undertaken

(5) The inaccuracies associated with LiDAR cast doubt on the predicted flood levels and potential benefits.

(6) The overtopping of the railway embankment by flood waters will increase the risk of movement and mobilisation of track ballast, with potential for blockage and disruption to flows.

(7) Additional land, outside of the Order, may be required for flood compensation storage.

(8) The Planning Conditions cannot be discharged within the land covered by the Order.

2.1.2 The following sections of this rebuttal proof address the points above demonstrating that the development is appropriate; the proposed railway is not predicted to increase the duration of flood events; sensitivity testing of the model has been undertaken; the assessment of impacts, including flood risk benefits is robust; and that further detailed design work, once access to the land is obtained, will address the concerns raised. The Key Conclusions drawn by Mr Patmore with respect to flood risk are addressed in detail below or in my Proof of Evidence (RVR/W7/1).

2.2 Key Conclusion 1 (OBJ/1002/CP/1, Paragraph 8.1.4)

2.2.1 This Key Conclusion drawn by Mr Patmore questions the application of the Sequential and Exception Test.

2.2.2 Planning Practice Guidance Flood Risk and Coastal Change, Paragraph: 034 Reference ID: 7-034-20140306 explains that it is the role of the local planning authority to decide whether a development is acceptable. The approval of Planning Permission in 2017, which considered the risk of flooding, deemed the development to be acceptable and that flood risk could be appropriately managed. PPG paragraph 033 states that “When applying the Sequential Test, a pragmatic approach on the availability of alternatives should be taken.” (Paragraph: 033 Reference ID: 7-033-20140306).

2.2.3 Paragraphs 2.4.9 and 2.4.10 of my Proof of Evidence (RVR/W7/1) summarises the view taken by the Local Planning Authority in 2017. The extension of the steam railway from Bodiam to Robertsbridge was identified as an employment development through policy EM8 of the Rother Local Plan 2006 and was a saved policy in the Local Plan Core Strategy (adopted 2014).

2.2.4 Mr Patmore fails to give any weight to the fact that a clear decision on the Sequential Test and Planning Permission has already been determined by the LPA, as the competent authority as part of the planning approval. This decision was not

challenged. As requested by the Inspector, the Exception Test has been reviewed as part of the update to the flood risk assessment, and it remains the case that the proposed scheme does provide wider sustainability benefits to the community and, furthermore, the development will be safe taking into account the vulnerability of its users, without increasing flood risk elsewhere.

2.2.5 The development has been categorised as Less Vulnerable, which was, in my professional opinion, a precautionary approach as the proposed scheme does not fall naturally into any of the vulnerability categories defined in the Planning Practice Guidance. In the normal course of events, railway infrastructure may be expected to fall within the 'Essential Infrastructure' category. The proposed scheme does not fall within the highly or more vulnerable categories. Neither does it 'clearly' fall within the less vulnerable category. In the evidence presented by Mr Patmore, paragraph 6.2.7 states that crossing the functional floodplain cannot be mitigated by simply increasing the level of the asset. I agree with this statement. The design of the scheme enables flood flow routes to be maintained and where possible the track elevation is proposed to be close to ground levels, indeed flooding to the track is accepted as part of the design to reduce the impact of the scheme on the functional floodplain. As a recreation facility the railway does not need to operate during times of flood and therefore may properly be considered water compatible.

2.2.6 As a leisure facility (although not a building) the conservative approach to categorising the development was taken and it was classified as a Less Vulnerable in the 2016 Flood Risk Assessment (Paragraph 3.2.2), but with an acknowledgement that it could fall into other categories such as Water Compatible.

2.2.7 As the development did not 'clearly' fall into the categories specified in the Planning Practice Guidance it was deemed important to consider the elements of the Exception Test which is a method to demonstrate and help ensure that flood risk to people and property will be managed satisfactorily while allowing necessary development to go ahead in situations where suitable sites at lower risk of flooding are not available. Further details related to the Exception Test are provided in section 5.2 of the Flood Risk Assessment Addendum Report (RVR/70-07-00).

2.2.8 It should be noted that there is also a recognition within the Guidance on Flood risk assessments: climate change allowances[1] that a development may be appropriate even though it will not follow flood zone vulnerability categories. The 'Using peak river flow allowances for flood risk assessment' section of the Guidance states:

"In flood zone 3b for:

essential infrastructure – use the upper end allowance

highly vulnerable – development should not be permitted

more vulnerable – development should not be permitted

less vulnerable – development should not be permitted

water compatible – use the central allowance

If development is appropriate even though it will not follow flood zone vulnerability categories, use the upper end allowance."

2.2.9 Although the development cannot be 'clearly' categorised and arguably does not follow the flood zone vulnerability categories, the application of the Exception Test demonstrates that the proposed scheme will provide wider sustainability benefits to the community that outweigh flood risk, and that it will be safe for its lifetime, without increasing flood risk elsewhere. It is an established approach that the 'sustainability benefits to the community' are not limited to environmental benefits but include all benefits to the community including environmental, social and economic benefits.

2.2.10 Mr Patmore suggests in paragraph 6.2.16 of his evidence that the following statement in my evidence is incorrect: ***"Based on the tolerances of modelling and the consequences of variations in maximum flood levels between the baseline and 'with railway' scenarios, it is concluded that flood risk is not increased by the proposed railway***." I do not accept this. The assessment of flood risk recognises the small increases in flood levels at some locations. However, when assessing flood risk both the probability of flooding and the consequences should be considered. An increase in flood levels of up to 0.05 m on baseline flood depths (in the region of 1m at peak) will have negligible impact on the consequences of flooding taking into

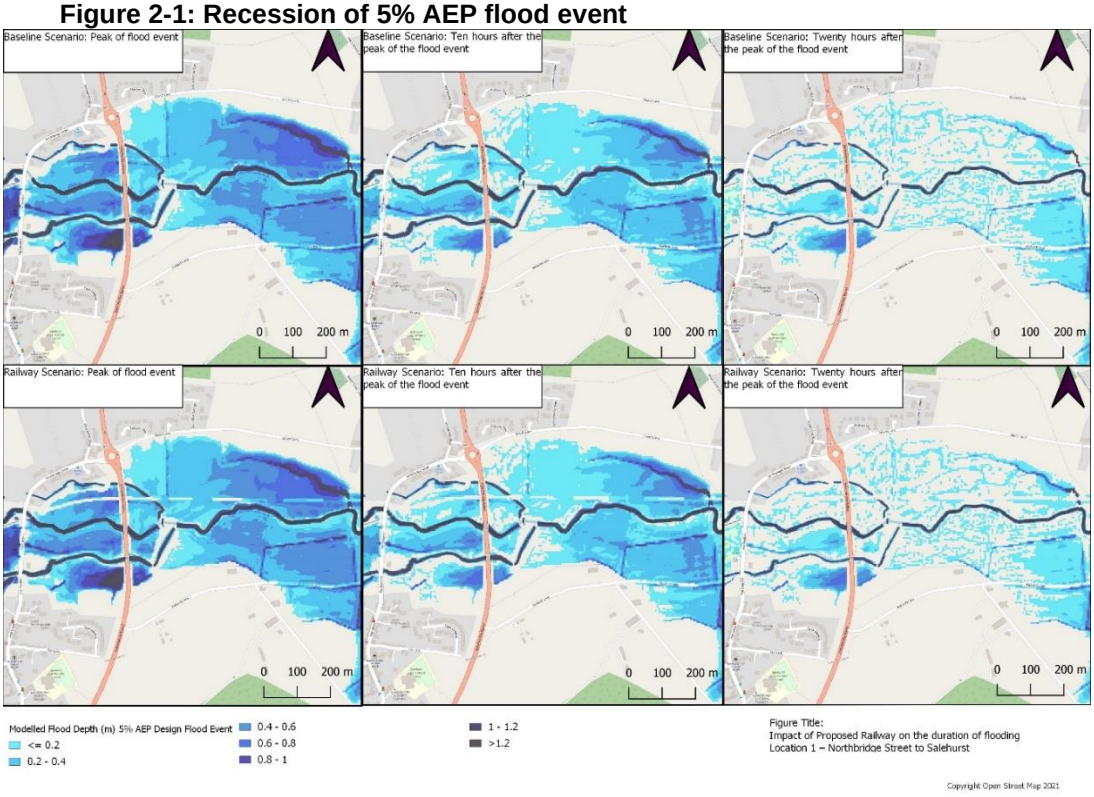
[1] https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

consideration the receptor. The probability of flood events is not increased by the proposed development and the flood modelling demonstrates that the extent of flooding is similar in both the Baseline and 'With Railway' scenarios and therefore receptors are not predicted to flood more frequently than in the existing situation. Therefore, it is concluded flood risk is not increased.

2.3 Key Conclusion 2 (OBJ/1002/CP/1, Paragraph 8.1.5 and 8.1.6)

2.3.1 In paragraph 8.1.6 Mr Patmore makes the assertion that greater flood depths (of up to 0.05 m) will ultimately lead to longer periods of flooding on agricultural land. The small increases in flood depth are predicted to occur in the more extreme flood events when flood depths in the baseline scenario are predicted to be in the region of 0.5 to 1.0 m. The predicted increases are very small and will only have very minor impact on the duration of flooding. This is supported by evidence from the flood modelling which shows that the flood recedes at a similar rate in both the Baseline and 'With Railway' scenario. This is demonstrated in Figure 2-1 below and the maps provided in Appendix 1 (RVR/W7/5-1) which show how the flood extent and depths are predicted to recede after the peak of the flood event.

Figure 2-1: Recession of 5% AEP flood event



2.3.2 Mr Patmore draws attention to a small area adjacent to the A21 which is predicted to experience an increase in flood depth (0.07 m to 0.15m) in the 'With Railway' scenario for a 1% AEP with 105% allowance for climate change flood event. The 1% AEP with 105% allowance for climate change flood depths, predicted in this area for both the Baseline and 'With Railway' scenario, are between 0.7 m and 1.2 m. It is accepted that the increases are more notable than other parts of the study area, however the increase is still small relative to the depth of flooding predicted on the land in the baseline scenario and as shown by the maps above does not significantly impact on the duration of the flooding. The consequences of the small increase in flood depth compared to the baseline are unlikely to be more severe due to the significant depth of flooding experienced in the baseline scenario. The land in this area is used for pasture and as such the impact is less sensitive to the depth of flooding than residential properties where damages are more sensitive to increasing depth of water. In addition to this it should be noted that the predicted increase in flood levels at this location in the 'With Railway' scenario is very small (less than 0.05m) in more frequent less extreme flood events, as demonstrated by the 5% AEP design flood event model results.

2.3.3 The 15m stretch of the High Street/Northbridge Street referred to in paragraph 6.2.29 of the evidence provided by Mr Patmore, where an increase in flood levels of over 0.1m is predicted in the 1% AEP with 105% allowance for climate change flood event, is within the section of road that is not accessible during a flood event due to the closure of flood gates at Northbridge Street (north of this location), and Robertsbridge, (south of this location). In my view this is not significant given that the road is not available as a safe access route for traffic or pedestrians once the flood gates are closed. The presence of the railway would not affect when it is necessary to close the flood gates.

2.3.4 In paragraph 8.1.6 Mr Patmore also draws attention to the properties (specifically Moat Farm) adjacent to the agricultural land identified at risk of flooding. He has concerns over the sensitivity of the impacts that are not addressed in the modelling or reporting. These concerns are repeated and addressed in response to Key Conclusion 3.

2.3.5 Mr Patmore also suggests in paragraph 8.1.6 that the NPPF Exception Test is not conclusively satisfied because "*In terms of addressing the NPPF Exception Test, this*

evidence is only showing minor areas of betterment and some of these are also within the "only" agricultural area. Not conclusively satisfying the Exception Test Part a) "the development would provide wider sustainability benefits to the community that outweigh the flood risk" as well as not conclusively demonstrating satisfying the Exception Test Part b) "the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall."

2.3.6 With respect to part (a) of the Exception Test Mr Patmore has interpreted wider sustainability benefits to be limited to environmental benefits and a reduction in flood risk, however wider sustainability benefits cover a range of potential benefits including economic benefits and social benefits such providing opportunities for leisure, recreation and promoting cultural and heritage experiences.

2.3.7 With respect to part (b) of the Exception Test, the test does require that the development will be safe for its lifetime, without increasing flood risk elsewhere. Reduction in flood risk is not a prerequisite to passing the test. It is accepted in the FRA that reduction in predicted flood levels are small in the 'With Railway' scenario.

2.3.8 The Exception Test is conclusively satisfied as discussed in section 2.2 above and in section 5.2 of the Flood Risk Assessment Addendum Report (RVR/70-07-00).

2.4 Key Conclusion 3 (OBJ/1002/CP/1, Paragraph 8.1.7)

2.4.1 Mr Patmore is concerned that "*There is a risk that if this sensitivity testing has not been undertaken the "With Railway" flood predictions in the FRA Addendum may not be robust.*"

2.4.2 As a point of clarification, a new model has not been developed. The 2016 model previously reviewed by the Environment Agency was updated. New flow estimation calculations were completed and applied to the flood model because of updates to the guidance for undertaking flow estimation calculation since the Environment Agency study in 2011 and the additional years of gauged data, also highlighted by Mr Patmore in paragraph 6.2.34. The updated flood flow estimation calculations have been reviewed and accepted by the Environment Agency (RVR/W7/2 – Appendix B).

2.4.3 Sensitivity testing models provides additional confidence in the results and improves the understanding of parameters a model is sensitive to. I appreciate Mr Patmore's point that in terms of the absolute flood level predicted the sensitivity of the model to parameters such as roughness mean that the maximum predicted flood level lies within a range and may be slightly higher or lower than the value quoted. However, the inherent uncertainty in modelling associated with the absolute maximum flood level is of less relevance when making the relative comparison of two scenarios as explained further in paragraph 2.5.6.

2.4.4 Sensitivity testing of model parameters has been undertaken for the downstream boundary, roughness, and flow. The results of the tests show that the influence of downstream boundary is limited to the downstream extent of the model, as reported in the 2021 modelling report (RVR/70-07-04).

2.4.5 A 20% change in roughness in both the 1D and 2D elements of the model translates to a variation in flood levels of up to +/- 0.15 m across the study area, as shown by the maps in Appendix 2 (RVR/W7/5-2). Downstream of Junction Road, an increase in roughness is predicted to have a slightly greater impact on predicted flood levels.

2.4.6 Sensitivity testing of flow was also undertaken and a 20% variation in flows translates to a +/- 0.15 m variation in predicted flood levels across most of the study area, as shown by the maps in Appendix 3 (RVR/W7/5). There are a few locations within the area shown on the maps where the range is slightly higher. Water levels are predicted to vary by up to +/- 0.2 m upstream of the A21 and in an area near Fowlbrook Wood. Upstream of The Clappers, Northbridge Street, predicted flood levels vary by +/- 0.3 m when the inflow is varied by 20%. These are normal tolerances observed when undertaking flood modelling.

2.4.7 The use of the 105% increase in flows as part of the adjustments for climate change was a precautionary estimate when compared to the provisional allowance of 65% to 80%, which it is anticipated will be published later this year. Therefore the 1% AEP with 105% allowance for climate change provides generous allowance for the uncertainty associated with climate change predictions and parameters within the model when identifying the receptors at risk.

2.4.8 Two blockage scenarios have been run to inform sensitivity of the predicted flood levels to blockages. This work was not requested by the Environment Agency as part

of the Flood Risk Assessment (RVR/W7/1, paragraph 4.5.2). The blockage scenario modelling is ongoing. The Baseline and 'With Railway' scenarios have been simulated with a partial blockage at the Junction Road Bridge and the A21 bridge respectively. The results indicate that the impact on flood levels is very similar and localised in both the Baseline and Proposed scenarios. The partial blockage of the Junction Road bridge resulted in an increase in predicted flood levels immediately upstream of Junction Road of 0.03m in both the Baseline and 'With Railway' scenarios. The difference reduced to approximately 0.01m approximately 400m upstream of the bridge.

2.4.9 The partial blockage of the A21 bridge resulted in an increase in predicted flood levels immediately upstream of Junction Road of 0.03m in both the Baseline and 'With Railway' scenarios. The difference reduced to approximately 0.01m approximately 200m upstream of the bridge.

2.4.10 The model results demonstrate that the impact of blockages to existing structures on the River Rother will remain the same following construction of the railway.

2.4.11 Once access to land is available, surveys will be carried out and the detailed design drawings of the structures will be completed. The flood model will be updated in consultation with the Environment Agency to inform the approvals process described in the protective provisions. I anticipate that blockage modelling will then be undertaken of structures to inform maintenance regimes.

2.4.12 It is not standard practise to undertake sensitivity testing of topography. The assumptions in the topography are discussed in relation to Mr Patmore's Key Conclusion 4 in section 2.5.

2.4.13 Model calibration is discussed in Section 5 of the 2021 modelling report (RVR/70-07-04).

2.4.14 The sensitivity testing undertaken suggests that the absolute value predicted for the maximum flood level within the study area for the 1% AEP design flood event falls within a range of +/- 0.2 m in both the Baseline and 'With Railway' scenario. This is within the normal tolerances for flood modelling.

2.4.15 As stated above, the variation in the absolute flood level is of less relevance when making the relative comparison of two scenarios and is explained further in paragraph 2.5.6.

2.5 Key Conclusion 4 (OBJ/1002/CP/1, Paragraph 8.1.8)

2.5.1 The evidence provided by Mr Patmore suggests that the use of LIDAR to define topography in the model, particularly along the river banks may lead to perceived containment within the river that is not present in reality. He suggests that the impact could be out of bank flows occur more frequently than the model predicts.

2.5.2 In fact, the representation of the river channel and banks in the model are informed by topographic survey, which is more accurate than LIDAR. Defence and bank levels were defined in the Environment Agency model based on topographic survey. LIDAR is used in the model to define the elevation of the floodplain. Significant out of bank flooding is predicted in all the design flood events presented in the Flood Risk Assessment.

2.5.3 It should be noted that an algorithm is used to process LIDAR data and filter trees and buildings to form a 'bare earth' DTM, rather than it simply being smoothed as suggested by Mr Patmore in paragraph 8.1.8. LIDAR products are produced by the Environment Agency Geomatics team, who specialise in providing high quality LIDAR survey, for the study of rivers and floodplain. The filtered LIDAR DTM is provided as open data on the Government website[2]. The specification for this LIDAR requires the absolute height error to be less than ±0.15m. This is the root mean squared error or RMSE. It quantifies the error or difference between the Ground Truth Survey and the LIDAR data.[3]

2.5.4 Although some sections of the river bank and floodplain are populated with trees, from satellite imagery and site visits it is evident that large areas of the floodplain are not heavily vegetated by trees and therefore concerns regarding the impact of trees on flood levels seem unwarranted in this case.

[2] https://data.gov.uk/search?q=LiDAR

[3] https://support.environment.data.gov.uk/hc/en-gb/articles/360009249652-What-is-the-vertical-accuracy-of-your-LIDAR-data-

2.5.5 Mr Patmore's evidence suggests that "*It may be that the predicted benefits have been overstated and that the predicted increase in flood levels understated."* This fails to recognise that the difference in predicted flood levels between the Baseline and 'With Railway' scenarios are a relative comparison with the same topographic information used in both scenarios.

2.5.6 When comparing Baseline and 'With Railway' scenarios the parameters that contribute to the uncertainties are constant between scenarios, so there is confidence in the relative differences predicted. For example, if the bank levels were all lowered by 0.15m, this change would be applied in both the Baseline and 'With Railway' scenario, so in terms of the relative difference in predicted flood levels any uncertainty in survey or LIDAR is less relevant.

2.6 Key Conclusion 5 (OBJ/1002/CP/1, Paragraph 8.1.9)

2.6.1 Mr Patmore's evidence makes much of the importance of blockage scenarios on existing and proposed structures. As stated in paragraph 2.4.8 blockage scenarios have already been undertaken for two key existing structures within the study area. I agree that blockage scenarios will be important for informing the maintenance regime for the structures under the railway and note that this will be undertaken as part of the work required to address Planning Condition 9, which includes "*Demonstration of sensitivity to culvert blockage is necessary to confirm the degree to which maintenance is required."* What I do not accept, is that the absence of specific detailed analysis at this stage means that the current information is inadequate. If that were the case, it would not have been possible for the railway to have obtained planning permission.

2.6.2 As stated in paragraph 2.4.11 once survey of the land within the TWAO is available and the detailed design drawings of the structures are complete the flood model will be updated. The Environment Agency have confirmed (RVR/W7/2 – Appendix B) that they require the model to be updated again to discharge the planning conditions.

2.7 Key Conclusion 6 (OBJ/1002/CP/1, Paragraph 8.1.10)

2.7.1 Mr Patmore suggests it would be prudent to apply the methodology of the EA residual uncertainty "freeboard" analysis to take account of inherent uncertainties in flood

modelling. This is misconceived. 'Freeboard' is normally applied to finished floor levels when considering developments such as a new building. The latest research from the Flood and Coastal Erosion Risk Management Research and Development Programme and Environment Agency, aims to help flood risk managers identify and manage uncertainty in their flood risk assessment and designs. The current advice on the use of this guide (Accounting for residual uncertainty: an update to the fluvial freeboard guide) for developers is that flood risk assessments to the Environment Agency should be submitted in accordance with local advice until advised to do otherwise[4]. The residual uncertainty guidance provides a methodology for determining an appropriate 'freeboard' to be applied to finished floor levels. It does not suggest that the allowance should be applied to the maximum predicted flood levels and extents when identifying receptors as part of a Flood Risk Assessment.

2.7.2 The freeboard is typically applied to the design (e.g. finished floor levels) of developments, such that the floor levels are set above the design flood level with an allowance for uncertainties. This is inappropriate here, as the levels of the railway have not been set to *prevent* flooding to the development, rather flooding has been accepted in the design. Therefore, the application of a freeboard to the railway elevation is not necessary in this context.

2.7.3 Mr Patmore also suggests that the design standard proposed for the scheme is limited and short term. This criticism is not borne out by the evidence. The design has been assessed against the 2080 epoch for climate change and therefore the long term impact of flooding to the railway and of the railway on flood risk have been considered.

2.7.4 Following liaison with the Environment Agency, the currently published climate change allowances were used in the 2021 addendum to the Flood Risk Assessment rather than the provisional allowances based on the latest UKCP18 climate change projections. As outlined in my Proof of Evidence (RVR/W7/1), paragraphs 4.3.3 to 4.3.6, this was a conservative approach because the Upper End allowance is

[4] https://www.gov.uk/flood-and-coastal-erosion-risk-management-research-reports/accounting-for-residual-uncertainty-an-update-to-the-fluvial-freeboard-guide

currently a 105% increase to the flood flows, but is likely to be reduced to between a 65% and 80% increase in flows based on the UKCP18 climate change projections.

2.8 Key Conclusion 7 (OBJ/1002/CP/1, Paragraph 8.1.11)

2.8.1 Paragraph 8.1.10 states that in order to address the modelling required to discharge Planning Condition 9 and 11 the impact of Climate Change needs to be determined and the impact of the proposed structures assessed in agreement with the Environment Agency. We agree with the statement. Capita has been acting for RVR in its engagement with the Environment Agency over many years now and I expect such engagement to continue regarding the modelling requirements for, and ultimately, the discharge of relevant planning conditions.

2.8.2 Paragraph 8.1.10 also states "*there is no evidence that the EA has accepted the new 2020 modelling or its results*." The extensive consultation and involvement of the Environment Agency in the 2016 modelling and 2021 updates is documented in section 4.2 of my Proof of Evidence (RVR/W7/1).

2.9 Key Conclusion 8 (OBJ/1002/CP/1, Paragraphs 8.1.12 to 8.1.14)

2.9.1 Key conclusion 8 raises concerns regarding the potential movement and mobilisation of track ballast and other materials during a flood event. The detailed design of the track bed and structures will be undertaken once surveys have been completed. There are design options available to minimise scour and damage to the track bed, which will enable Planning Condition 9 to be addressed. It is worth noting that the railway will be operated by KESR, which has many years' experience of operating within the Rother Valley.

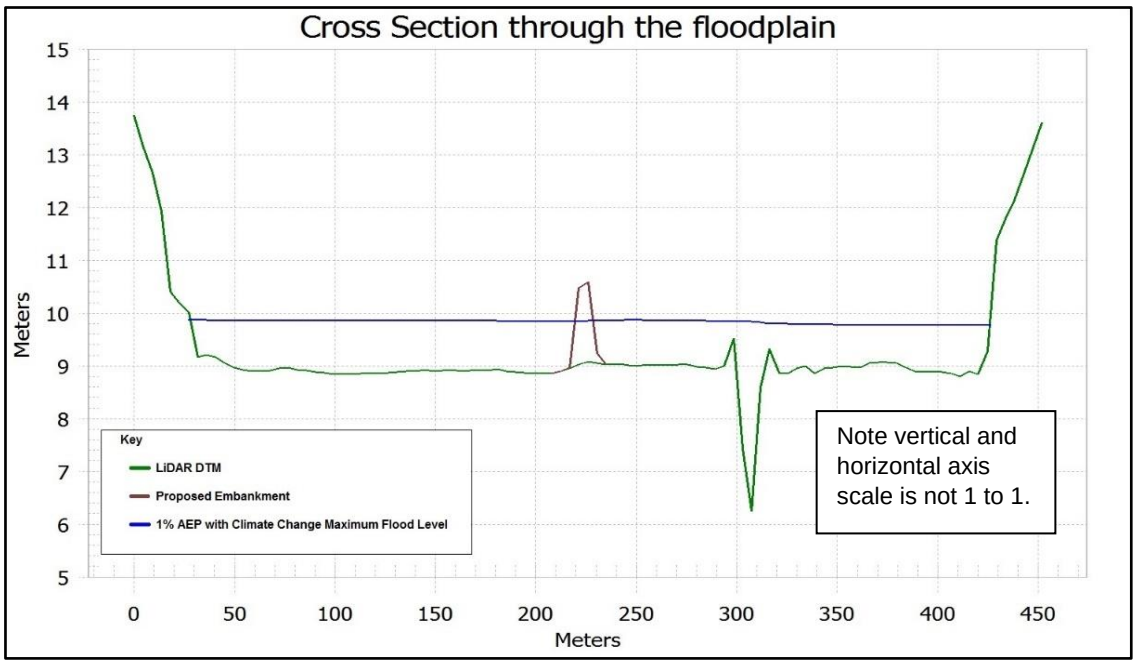
2.9.2 A technical note on the maintenance and repair of the track has been prepared by Gardner Crawley and is included in Appendix 4 (RVR/W7/5 - 4).

2.10 Key Conclusion 9 (OBJ/1002/CP/1, Paragraph 8.1.13 and 8.1.14)

2.10.1 The requirement for and provision of floodplain storage compensation is a matter for the Environment Agency (and local planning authority) as outlined in section 4.13 of my Proof of Evidence (RVR/W7/1).

2.10.2 The proposed embankment passes through the middle of the floodplain. The floodplain is wide and relatively flat as shown by the typical cross section shown below in Figure 2-2, taken from the LiDAR DTM downstream of the A21.

Figure 2-2: Typical section through the floodplain downstream of the bifurcation, east of the A21



2.10.3 If required, floodplain storage compensation would need to be provided at the extremities of the floodplain and not immediately adjacent to the proposed embankment. A number of potential locations at the edge of the floodplain have been identified but ultimately this is a matter for compliance with planning conditions requiring analysis of requirements and approval of proposals by the Environment Agency.

2.10.4 The minutes of the meeting between WSP and the Environment Agency in 2018, provided in Appendix A5 of Mr Patmore's Proof of Evidence (OBJ/1002/CP/2 - Part 1), state in point 2.2 that *"The Environment Agency confirmed that the nature and extent of the required floodplain compensation was not submitted as part of the planning application. However, the Environment Agency took the view that a solution was feasible and that this could be demonstrated as part of the discharge of a pre-commencement planning condition (Condition 9)."*

2.10.5 I agree with the view of the Environment Agency.

2.11 Key Conclusion 10 (OBJ/1002/CP/1, Paragraph 8.1.15)

2.11.1 In terms of Surface Water flooding events, the culverts and sections of viaduct included in the proposals to maintain connectivity across the floodplain for fluvial flooding will also provide flow paths for surface water. The Flood Risk from Surface Water maps published on the GOV.UK[5] website shows the extent, depth and velocity for Low, Medium and High risk. From these maps it is evident that where the main flow paths are intercepted by the proposed railway, culverts or viaducts are included within the design.

2.11.2 Mr Patmore's evidence also raises concerns that the railway embankment may result in waterlogging. The Lambert & Foster, Report on the Agricultural Impact on Parsonage Farm, Redlands Farm and Moat Farm, Robertsbridge of the Reinstatement of the Rother Valley Railway (RVR/67), considers land drainage in section 2.11. The report recognises that some land drainage work may be required to redirect existing drainage systems. Paragraph 2.11.1 confirms that the discharge pipe for field 4 would remain. Paragraph 2.11.3 confirms that works would be carried out under TWAO powers to ensure the continued operation of the drainage system in field 6 (see Appendix 6 of the Report on the Agricultural Impact).

2.12 Key Conclusion 11 (OBJ/1002/CP/1, Paragraph 8.1.16)

2.12.1 Paragraph 8.1.16 relates to groundwater. Most of the proposed railway construction is above ground and therefore will have a minimal impact on groundwater flows. Where sheet piling is required the impacts will be fully assessed through ground investigation, as part of the detailed design phase, once access to site is available for surveys. Condition 14 of the Planning Permission specifically relates to piling and risk to groundwater.

2.12.2 The impacts on land drainage have been addressed in section 2.11 above.

[5] https://flood-warning-information.service.gov.uk/long-term-flood-risk/map?easting=574828&northing=124249&map=SurfaceWater

2.13 Key Conclusion 12 (OBJ/1002/CP/1, Paragraph 8.1.17 and 8.1.18)

2.13.1 Mr Patmore expresses concern that there is a lack of detail regarding maintenance plans and risks associated with the blockage of structures. As explained in section 2.6 further work will be undertaken to address the Planning Conditions once access to the land is obtained. It is accepted that the risk of culvert blockage will need to be managed and that structures along the proposed railway will need to be maintained. It is envisaged that access for culvert maintenance will be from the railway as is the case elsewhere along the line and further information is provided by the Technical Note in Appendix 4, produced by Gardner Crawley (RVR/W7/5 - 4). The technical note also confirms that routine track safety patrols monitor the culverts and any concerns are reported and log on the maintenance database for action.

2.13.2 Mr Patmore purports to cast doubt on whether culverts and bridge structures will be maintained. He does not mention the requirements as to protective works and maintenance within the Protective Provisions For the Protection of Drainage Authorities and the Environment Agency (Schedule 8, Part 3, item 20) (RVR/01), which requires drainage works to be maintained in good repair and condition and free from obstruction and which provides “step-in” rights (paragraph 20(2)) for the Environment Agency in the event of default.

2.14 Key Conclusion 13 (OBJ/1002/CP/1, Paragraph 8.1.19 and 8.1.20)

2.14.1 Mr Patmore appears to consider that, despite the fact that detailed design of the railway will follow the making of the TWAO, RVR should nevertheless already have in place a maintenance programme and specific access for each structure. He also refers to the Environment Agency’s Statement of Case but does not mention that the Environment Agency determined that it was able to withdraw its objection to the proposed Order. Access for maintenance will be taken into account at the design stage. It is the Environment Agency that will, through the application of the protective provisions, approve the detailed designs for the railway including the culvert and bridge structures and the buffer strip required by the planning conditions.

2.15 Key Conclusion 14 (OBJ/1002/CP/1, Paragraph 8.1.21)

2.15.1 Planning Condition 6 of the application RR/2014/1608/P states that no development shall take place until a construction environmental management plan (CEMP) has been submitted to and approved in writing by the Local Planning Authority. The CEMP shall include details of b) measures to be used during the development in order to minimise environmental impacts of the works; h) all necessary pollution prevention methods. The CEMP will consider the storage of potentially polluting materials during the construction phase and mitigate as appropriate.

2.16 Key Conclusion 15 (OBJ/1002/CP/1, Paragraph 8.1.22)

2.16.1 As stated in planning condition 10 of the application RR/2014/1608/P a method statement for works to/close to flood defences and over/ under and in the vicinity of the main river must be submitted and agreed with the Local Planning Authority prior to development taking place. Methods, monitoring and responsibilities will be contained in the method statement.

2.17 Conclusion

2.17.1 The concerns raised in OBJ/1002/CP/1 have been addressed or will be addressed as part of ongoing work in relation to the Planning Conditions.

3. Rebuttal to OBJ/1002/AH/1

3.1 Introduction

3.1.1 Andrew Highwood makes statements regarding the potential for increased severity of impacts from flooding following the construction of the proposed railway, without providing evidence that flood risk will be increased. Some of these concerns have been addressed above in response to Mr Patmore's Proof of Evidence and others are addressed in my Proof of Evidence (RVR/W7/1).

3.2 Concerns raised regarding flood risk

3.2.1 In Paragraph 7.2.5 Mr Highwood suggests that the raised railway embankment would give rise to a number of detrimental impacts during flood events to both arable and cattle parts of the farming business. And in paragraph 7.6, 8.21 and 11.5 he assumes that it will take longer for water to recede. The Flood Risk Assessment demonstrates that where there is a small predicted increase in flood levels, this is negligible when compared to the baseline flood depths. Further discussion regarding the impact of the railway on predicted flood levels and duration is provided in section 2.3 above. The model results demonstrate that in the 'With Railway' scenario the flood events simulated will recede at a similar rate to the existing situation. The statement made by Mr Highwood in section 8.21, that "*At this point in the river it is currently very rare for a flood event to extend for long enough to damage the crops",* would therefore remain valid following construction of the railway.

3.2.2 A large number of culverts have been proposed as part of the scheme, and maintenance regimes will be determined as part of the operational management of the railway.

3.2.3 To clarify, the railway is not predicted to increase the risk, duration of inundation, or frequency of flood events as suggested in paragraph 7.5 and 11.5.

3.2.4 In section 14, and paragraphs 22.1.4, 22.2.1, 22.3.7, and 22.5.5, Mr Highwood reiterates points made by Mr Patmore. These concerns have been discussed and addressed in section 2 above.

4. Rebuttal to OBJ/1002/PJC/1

4.1.1 Section 7.5 of Mr Clark's Proof of Evidence refers to the diversion of public footpath SAL/31/1.

4.1.2 The diversion of the footpath under the bridge has potential to result in occasional inconvenience to users during times of high flow. The risk to users in times of high flows can be mitigated through appropriate signage. This approach is applied in public places, for example to warn user of public carparks that there is a risk of flooding.

4.1.3 The detailed design of the structure will take into account relevant design and safety requirements.

4.1.4 It is worth noting that the existing footpath crosses the Mill Stream and the River Rother to the south via footbridges. During times of flood sections of the footpath are not currently accessible. The model results indicate that the location of the footbridge crossing at the Mill Stream is one of the first locations out of bank flooding is predicted to occur in this area.

5. Rebuttal to OBJ/652 and OBJ/1035

5.1 Introduction

5.1.1 The joint statement submitted by Nigel Leigh (OBJ/652) and Charles Wyndham (OBJ/1035) expresses concerns regarding the risk of flooding and the flood modelling carried out by RVR. These have been addressed below.

5.2 Section 1

5.2.1 Section 1 of the statement identifies historic flooding (2009) in the Robertsbridge Abbey area, including flooding to the access road. The photographic evidence referred to in the statement aids in verifying the model flood extents as explained in my proof of evidence (RVR/W7/1 paragraph 4.7.6). The properties are on higher land and are not within the predicted flood extents.

5.3 Section 2

5.3.1 Section 2 relates to the following extract that the statement quotes from correspondence from Rother Valley Railway on 29th April *'….it has been possible to demonstrate that the reinstatement of RVR would have no significant effect on the flooding of Robertsbridge and the surrounding areas'.* The statement lists concerns regarding the flood modelling which are rebutted below.

5.3.2 The modelling has been revisited and updated since 2013, with updates made to inform the 2016 Flood Risk Assessment and subsequently to inform the 2021

Addendum to the Flood Risk Assessment. The recent updates included the application of the currently published climate change allowances for peak flows.

5.3.3 Flood modelling is an established tool used by the Environment Agency and other organisations for flood forecasting, to design flood alleviation schemes, to define flood maps and to understand the impact of proposed developments. The inherent uncertainties are well understood. The models solve established equations and the Environment Agency have benchmarked[6] the commonly used software for 2D flood modelling including TUFLOW, which has been used in the Rother Valley Railway modelling. The first objective of the Environment Agency benchmarking project was to provide evidence to ensure that 2D hydraulic modelling packages used for flood risk management, by the Environment Agency and their consultants, are capable of adequately predicting the variables upon which flood risk management decisions are based and the second was to provide a data set against which such packages can be evaluated by their developers in the future. More recent versions of TUFLOW software have undergone further benchmarking to demonstrate the accuracy of TUFLOW software[7] Drawing a comparison between the efficacy of deterministic flood modelling and the statistical modelling undertaken as part of the pandemic is not valid, due to the very different input data sets and techniques applied.

5.3.4 The statement also draws attention to the unpredictable nature of weather and uncertainties in forecasting the weather. Although flood forecasting models rely on weather forecasts, the design event flood modelling undertaken for flood mapping, flood alleviation design and to investigate the impact of proposed developments on flood risk is not based on weather forecasts. The inflows to the model are design flood events, which are based on analysis of catchment characteristics and historic gauge data of flood events. The flood estimation calculation methods are well established in the UK and the inflows used in the recent 2021 modelling were reviewed and approved by the Environment Agency (correspondence provided in RVR/W7/2, Appendix B).

[6] https://www.gov.uk/government/publications/benchmarking-the-latest-generation-of-2d-hydraulic-flood-modelling-packages
[7] https://wiki.tuflow.com/index.php?title=TUFLOW_Benchmarking

5.4 Conclusion

5.4.1 Extensive modelling has been undertaken to investigate the impact of the proposed railway on flood risk.

5.4.2 Paragraph 4.7.6 of my proof of evidence (RVR/W7/1) summarises the model results in the Robertsbridge Abbey area, which predict there will be no change in flood risk.

6. Schedule of Appendices

6.1.1 Appendices are provided in RVR/W7/5

Appendix Reference	Name
RVR/W7/5-1	Appendix 1 - Impact of Proposed Railway on the Duration of Flooding
RVR/W7/5-2	Appendix 2 – Sensitivity of modelled water levels to variation in roughness parameters
RVR/W7/5-3	Appendix 3 – Sensitivity of modelled water levels to variation in flow
RVR/W7/5-4	Appendix 4 – Rother Valley Railway: Technical Note – Track Maintenance