



ROTHER VALLEY RAILWAY OBJ-1002-CP-7

DATE:	16 August 2021	CONFIDENTIALITY:	Public
SUBJECT:	Rother Valley Railways - review of new evidence - WATER		
PROJECT:	70047158	AUTHOR:	Chris Patmore
CHECKED:		APPROVED:	

REVIEW OF FLOOD COMPENSATION OPTIONS – ADDITIONAL RVR INFORMATION SUBMITTED TO THE INQUIRY ON 13 AUGUST 2021

This note has been prepared in response to the new information submitted including that on 13 August 2021 at the Public Inquiry (Ref. TWA/18/APP/02) and following the adjournment. It specifically addresses the following documents:

- INQ/138 RVR Note in response to Inspector's questions regarding INQ/131 and Chris Patmore's evidence INQ/132 in respect of flood compensation storage matters;
- INQ/149 RVR Letter to Inspector re land for compensation and mitigation, with indicative plan, 13 August 2021; and
- INQ/150 RVR – Capita Technical Note on Floodplain Compensation Storage, with Appendices, 13 August 2021.

I understand that INQ.149 and INQ/150 were issued following RVR's suggestion that it should consolidate the information presented during the Inquiry. Although this has largely been done within INQ/150, these documents also introduce entirely new areas of land that are not only outside the Order red line boundary and outside the original planning application boundary, but which have also never been previously referred to in evidence, and which are now said to offer the potential for flood compensation provision.

The following is a response to the points of clarification raised in the new documents, and also to the compensation areas now suggested.

Compensation - Principle

I begin by noting that although RVR has previously suggested that compensation for the loss of floodplain storage may not be required, this is not a matter which has been agreed by the EA. Moreover, Mrs Callaway's rebuttal evidence (para 2.10.3) states that, even at that stage, RVR had identified "a number of potential locations at the edge of the floodplain"; and INQ149 and INQ150 now indicate that RVR has gone to the expense of acquiring additional land specifically for the purposes of providing such compensation. In the circumstances, I believe it is now clear that RVR accepts that compensation for the loss of flood plain storage is at the very least a possible, and in reality a very likely requirement. I therefore do not consider the Secretary of State could safely proceed on the basis that compensation will not be required.

The RVR response to Costs Application note (INQ/148) contains the following statement (reiterated within INQ/150):

Paragraph 24 b)

In respect of floodplain storage:

“b. Location of floodplain storage (5.41 and 5.44). Floodplain storage is a matter which falls to be addressed under the planning conditions. RVR’s case has consistently been that it will be addressed in that way, once the detail of the final FRA has been settled with the EA following detailed design. The EA has expressed itself wholly satisfied on this approach. It is premature to determine (a) the extent and (b) the location of such storage. All that is required for the purposes of the Order is to show that there is no impediment to the delivery of the scheme – and to do that, it is not necessary to show the detailed design and location of such provision. The Landowners cannot complain that, when asked about these points in cross examination, RVR’s witnesses have given their answers;”

My comments on this are as follows:

POINT 1: “*wholly satisfied*” is putting words in the mouth of the EA. They have not expressed it in these terms in any correspondence. In any event, I consider it clear that the EA is approaching this issue on the basis that its own particular interest is protected by the conditions attached to the grant of planning permission. These conditions prevent the development from proceeding unless and until RVR has submitted a scheme which provides any compensation which may be required on a volume-for-volume, level for level basis. However, those conditions provide no comfort to the Landowners, since there is nothing in the TWA Order which would prevent RVR from exercising the power of compulsory purchase even before the conditions have been discharged. As explained below, the EA’s position does not address the question whether the need for compensation is likely to be an impediment to the delivery of the Scheme.

POINT 2: “*It is premature to determine (a) the extent and (b) the location of such storage. All that is required for the purposes of the Order is to show that there is no impediment to the delivery of the scheme – and to do that, it is not necessary to show the detailed design and location of such provision.*”

As I have repeatedly stated in my proof (OBJ/1002/CP-01 – Section 6.6) and in evidence, the EA is not and was not concerned with the boundary of the Order or indeed the planning application boundary when commenting to either WSP or RVR on the principle of flood storage compensation and where this could be provided. Just that in principle compensation can and should be provided on a level for level volume for volume basis and thereby conditioned it as such. However, there is a significant difference between what is technically feasible, and what RVR will in practice be able to deliver. If the compensation cannot be provided within the Order boundary or other land in the control of RVR, then planning Condition 11 simply cannot be met and the scheme is therefore not deliverable.

If further land is required outside the Order boundary it is therefore essential that the location, suitability and adequacy of such areas is identified at this stage. It is implicit in the introduction by the RVR team of new proposed compensation areas that RVR now accepts this.

Compensation – Volumes

I agree that, as stated in INQ/150 RVR: *“It was agreed that final calculations on volumes required for floodplain compensation are not possible until the detailed design is completed.”* and that *“The WSP calculations are high level”*.

In addition, I agree that (because the detailed information is not available to me) my initial calculations showing a loss of 11,000 cubic metres of flood plain storage on the land to the east of the A21 did not allow for the peak flood level for areas of the embankment above the predicted level nor the minimal difference between rail level and top of embankment.

I note that the new calculations undertaken by Capita (INQ/150) are more refined and have access to 3D modelling of the existing levels or the proposed railway alignment, that I do not have access to. Likewise, I do not have access to the predicted water levels at any given location to cross-check the values stated.

Overall, the Capita calculations suggest a reduction to my figures for the section of railway embankment to the east of the A21, but as can be seen in their calculations, it is only a reduction. The volume of new embankment and works within the anticipated flood water is perhaps reduced but far from eliminated. The calculations presented within INQ/150 still do not allow for ramps and access provision. In the circumstances, while I agree that the amount of compensation required will be less than 11,000 cubic metres for the section to the east of A21, I am not able to agree that the reduction will be to the extent of any of the figures presented in INQ/150. As noted above, the final calculation will depend upon the detailed design.

Compensation - Locations

As stated above, there was no evidence submitted prior to the Inquiry relating to potential compensation volumes or locations where this could be provided. Nor was this matter addressed by Mrs Callaway in either her main proof of evidence or her rebuttal. However, potential sites have now been identified. These confirm the point made in my proof of evidence that any compensation would have to be in areas which were at the edge of the floodplain, and remote from the railway line.

The first set of proposed areas (first identified by Mrs Callaway in re-examination, after having said in cross-examination that she was unaware of any document before the Inquiry which showed where compensation for the loss of flood plain might be provided) were taken from the ecological enhancement plans (INQ/74), of which the potential use of Area 1 was elaborated on within Mrs Callaway's note (INQ/114). This has been the only area discussed in depth until the new information provided within INQ/138 and INQ/150.

There are now a total of ten locations promoted for compensation: the four areas also proposed to mitigate the loss of trees (although two may not now being offered as potential compensation areas – discussed below), Salehurst Halt (INQ/138) and a further five locations on land to the south of the railway and River Rother.

The tree mitigation areas:

Area 1 – Area north of Robertsbridge Station

This area has been discussed at length within INQ/114 (and its addendum note INQ/131) with further explanatory text in INQ/138 produced in response to the Inspector's questions and queries raised in my submission INQ/132 which dealt with clarifications on the calculations and results contained within INQ/114.

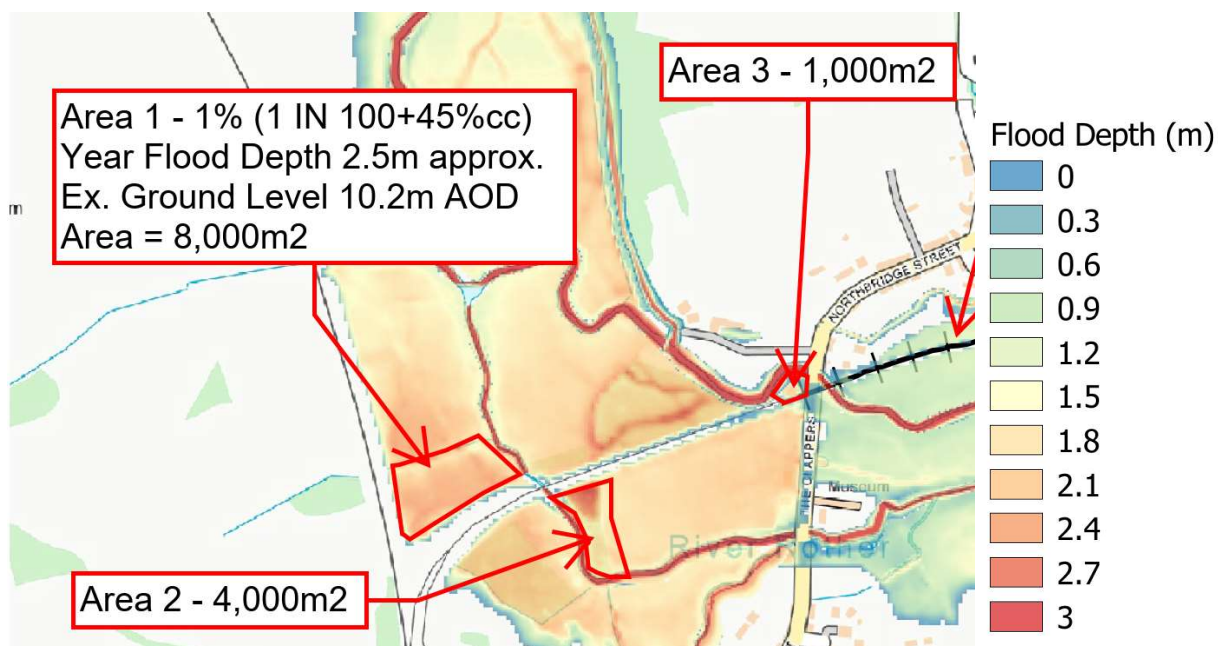
This is one of the largest compensation areas identified but is already within a modelled flood area. It is also high in the valley corridor such that the ground level is above much of the proposed track level and flood levels (particularly, the main section through Moat Farm). Track levels and existing ground levels are illustrated in Appendix A and B of this note. Mrs Callaway's notes now confirm that this area is only to deal with the new embankment to the west of A21.

Area 1 is already subject to predicted deep flooding in the 1% (1 in 100) year event with climate change (approximately 2.5m considering 45% climate change allowances) based on the Capita modelling (Appendix B and Figure 1 below). Further excavation downward would increase this depth – it is noted that this has been dismissed as an option.

Any excavation of Area 1 would also need to amend the river embankment and the public footpath that crosses the eastern edge of this area. I am not able to comment on any impact on tree planting or ecology of changes to this area.

Removing sections of the two adjacent existing railway embankments (including, significantly, a Network Rail line) could potentially undermine them structurally.

Figure 1: Extract from Capita drawing “Predicted Flood Depths with Railway – 1% AEP Design Flood Event with 45% allowance for climate change” annotated to show location of new compensation areas – Areas 1, 2 and 3



I would not consider this area able to provide all the compensation required. Some may be possible to balance out the western section of the embankment. But the location is too far up gradient to provide beneficial compensation for the section East of the A21.

As stated above, I do not have access to 3D modelling to confirm potential volumes available and at what level to be able to comment on the numbers presented in the tables contained within INQ/150.

Area 2

This area has the same type of constraints as Area 1 but is smaller in footprint and located in Flood Zone 3b. From the Capita flood depth mapping this area is already subject to some 3m plus of flooding. This significantly impedes its ability to provide more storage

I would not consider this area able to provide any significant amount of the compensation required.

It is noted that this area does not appear on the later inquiry document INQ/150 (Figure 1: *Locations available and being considered for the provision of floodplain compensation storage*). It is therefore not clear to me whether this area is still even relied upon, it is not indicated on the plan contained as Figure 1 of INQ/150.

Area 3

This, again, has the same type of constraints as Area 1 but is significantly smaller in footprint and also located in Flood Zone 3b. From the Capita flood depth mapping this area is already subject to between 1 and 2m of flooding. This significantly impedes its ability to provide storage

I would not consider this area able to provide any significant amount of the compensation required.

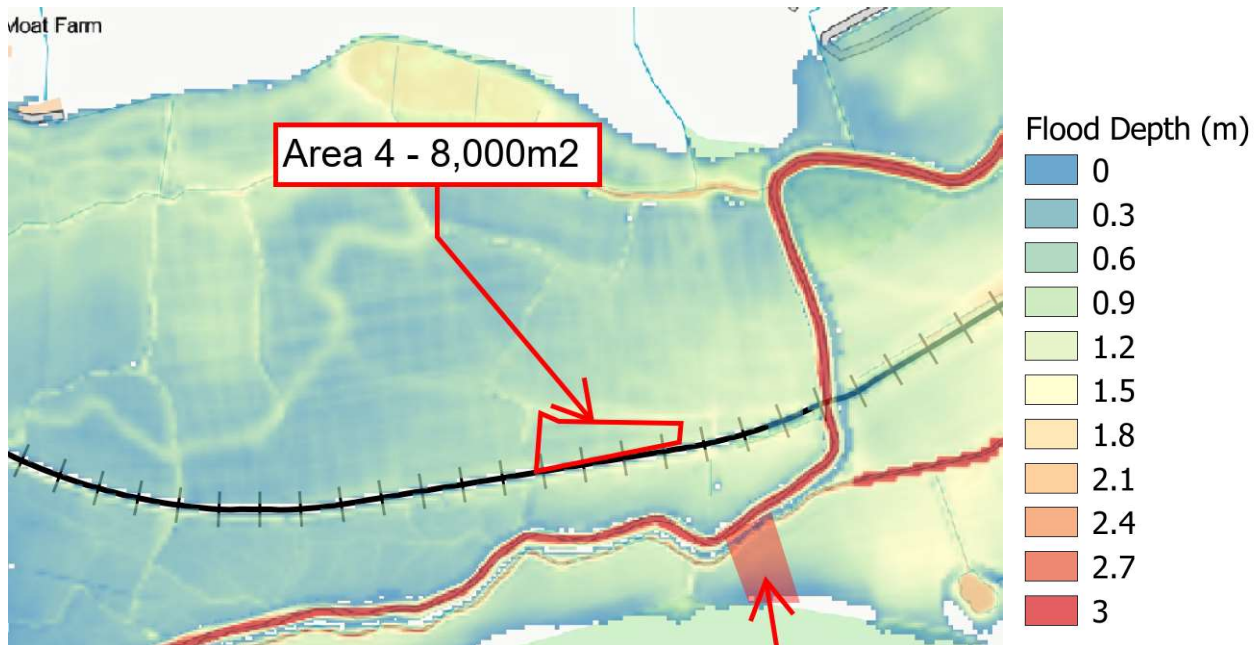
It is also noted that this area does not appear on the later inquiry document INQ/150 (Figure 1: *Locations available and being considered for the provision of floodplain compensation storage*). It is therefore not clear to me whether this area is still even relied upon, it is not indicated on the plan contained as Figure 1 of INQ/150.

Area 4

This area is the only area previously promoted as possible compensation for the length of embankment from the A21 eastward.

Located within Flood Zone 3b and subject to predicted flood depths of approximately 1m (Figure 2), this is a flat area that would be inundated during all flood events and is below most of the embankment levels. It may be able to provide a small amount of additional benefit to areas at the extreme eastern end of the route, but I do not consider it is capable of providing compensation for the majority of the embankment east of the A21.

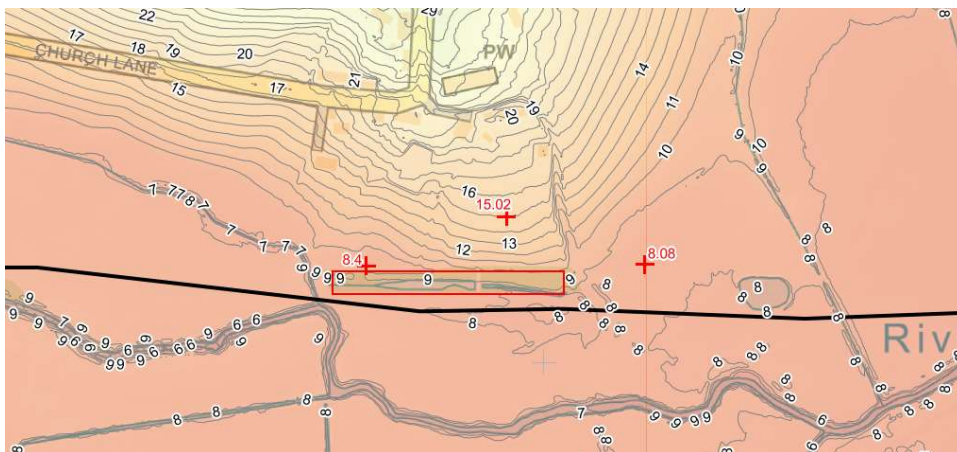
Figure 2: Extract from Capita drawing “Predicted Flood Depths with Railway – 1% AEP Design Flood Event with 45% allowance for climate change” annotated to show location of new compensation areas – Area 4



Salehurst Halt

This area was mentioned within INQ/138 as a potential edge of flood plain compensation area but not in any great detail. No information is available on the extent of land being offered at the notation Figure 1 of INQ/138 only shown a line at this location. This is a liner feature (Figure 3) in an area shown to be benefiting from the addition of the railway embankment (see Figure 4 below). Although it is at similar elevations to the track levels close to this site as a result of the creation of the railway is unlikely to offer any significant volumes.

Figure 3: LIDAR level data for Salehurst Halt



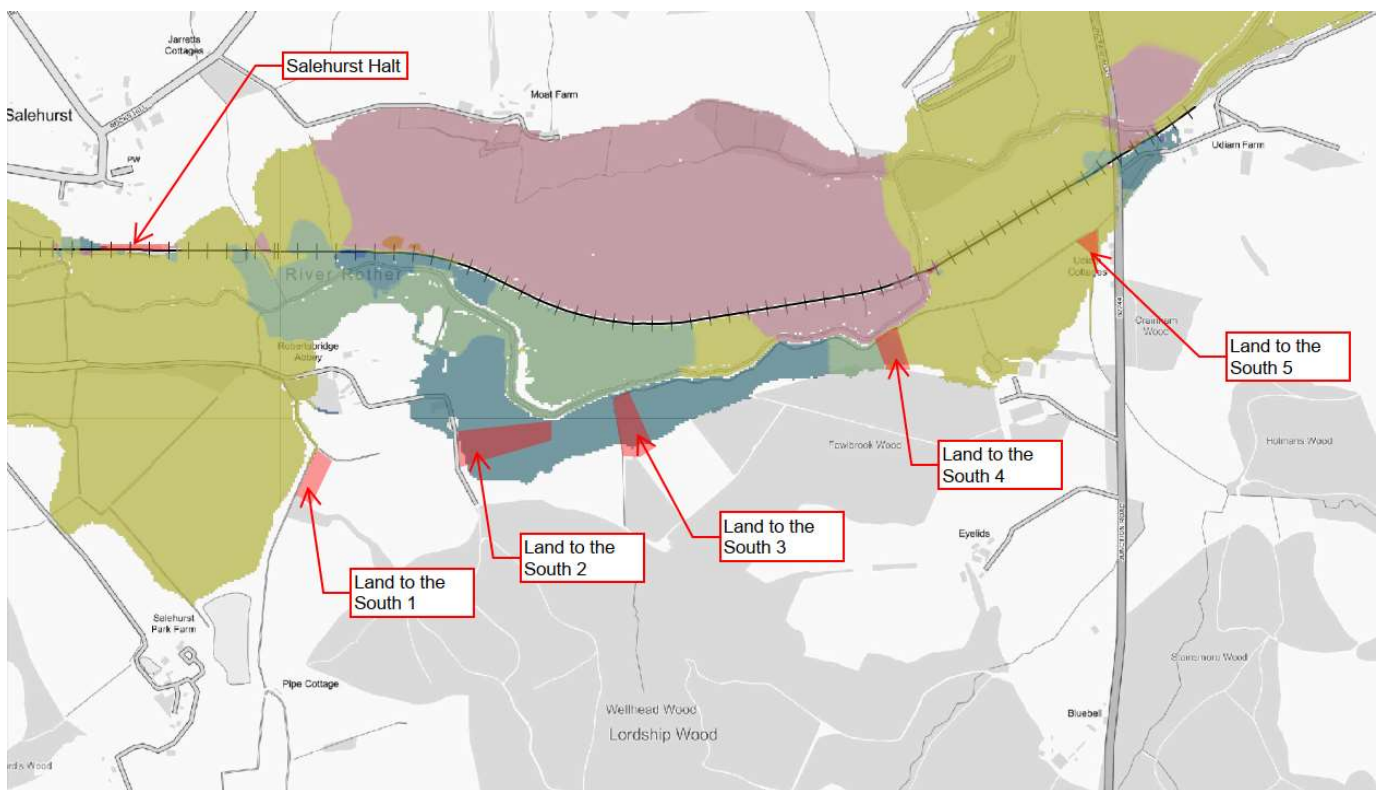
New Proposed Areas

The letter from Winckworth Sherwood to Ian Jenkins dated 13 August 2021(INQ/149) puts forward five new areas (under the control of New House Farm Bodiam Ltd).

This new land is all to the south of the new railway line and south of the River Rother. I have plotted these onto a copy of the Capita drawings for the “Predicted Flood Depths with Railway” taken from Appendix G of the updated FRA (RVR/70-07-03) and reproduced in this note as Appendix A (5% AEP Design Flood Event) and Appendix B (1% AEP Design Flood Event with 45% allowance for climate change).

Appendix C is also attached and is an extract from Appendix B of the FRA (RVR/70-07-02) showing the difference in predicted water level mapping. This drawing shows that all the new locations (labelled Land to the South 1 to 5) are within areas predicted to benefit from the introduction of the railway embankment or areas outside the flood extents. An extract from this plan is shown below as Figure 4.

Figure 4: Extract from Capita drawing “Difference in predicted Maximum Water Level” annotated to shown location of new compensation areas



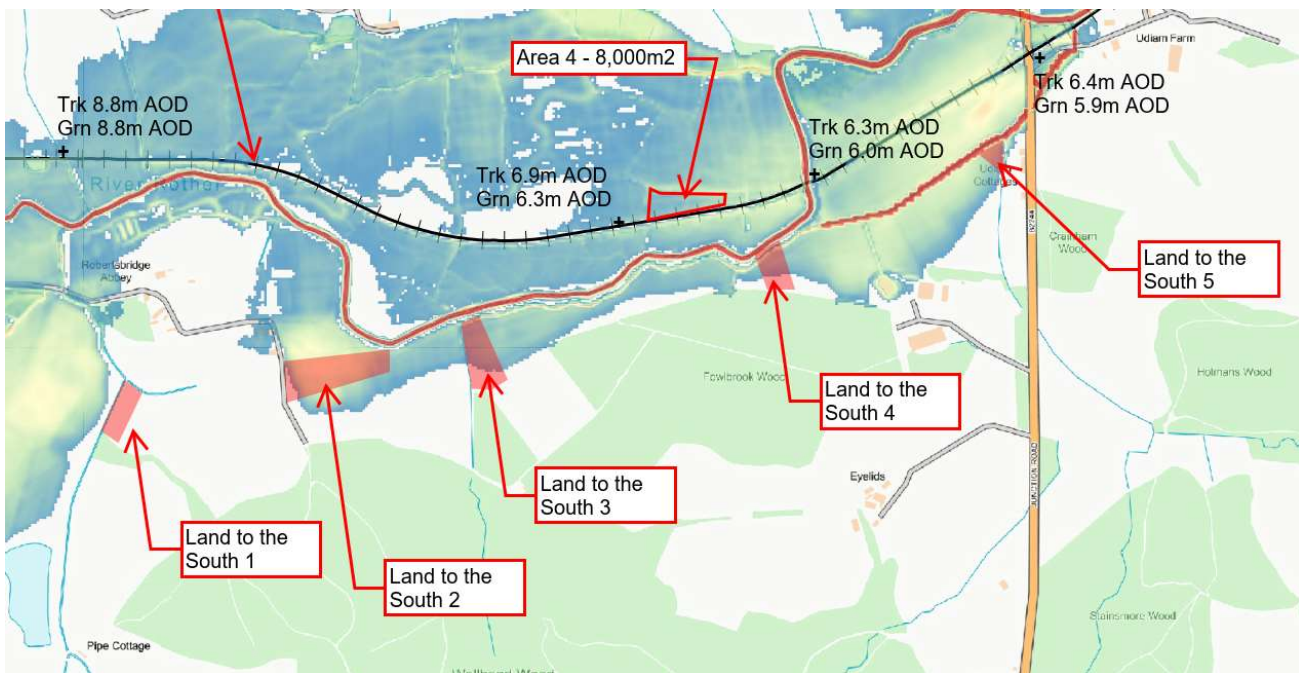
As my proof of evidence suggested was likely to be the case, these new locations are all outside the Order boundary, and outside the area covered by the planning permission. Although this is not a matter on which I am qualified to express a definitive view, it seems to me that the extraction and removal of significant volumes of earth could amount to an engineering operation for which planning permission would also be needed.

At first glance the locations shown also acknowledge that compensation should be provided at locations close to the edge of the floodplain rather than in areas that are already subject to flooding and in some cases deep flooding. These locations would be more typical of areas that should be offered for compensation.

A significant point to note is that the flood modelling has always predicted that the area to the north of the new railway embankment close to these compensation areas would be subject to deeper flooding with the area to the south benefiting from lower depths. This suggests that the modelling is predicting that with the introduction of the embankment water is being diverted to and/or is held back to the north of the new embankment.

There is no detailed flow pathway analysis to demonstrate the propagation of flood waters during flood events available at present. But, as the flow is generally west to east along the Rother valley, the proposed locations of the compensation as shown would be downstream of the main impacted area (Moat Farm) with the embankment acting as a barrier between the two sides. As a result, and in advance of detailed testing, it is likely that these areas will have little if any impact on the water levels at Moat Farm. In simple terms, the sites would all appear to be on the wrong side of the embankment to provide compensation in the location where it is needed.

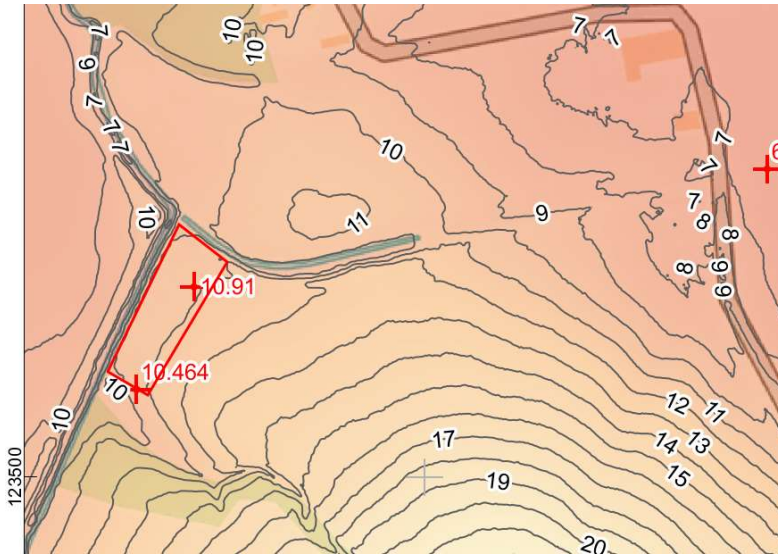
Figure 5: Extract from Capita drawing “Predicted Flood Depths with Railway – 1% AEP Design Flood Event with 45% allowance for climate change” annotated to shown location of new compensation areas



Land to the South 1

This is the only area of land identified that is outside the identified flood extents. Figure 6 below has been produced using LIDAR data to review the levels of this area in relation to the railway embankment.

Figure 6: LIDAR level data for Land to the South 1



This shows the land in this area to be at elevations of between 10.46 and 10.91m AOD. Reference to the embankment levels (Appendix A) shows that without extensive excavation this area would only be able to address the higher embankments to the west of A21.

The elevation of the land is also evident when reviewing against the predicted flood mapping produced by Capita. For compensation to be functional it has to be hydraulically connected directly to the existing flood extents. This area is potentially linked to the flooded areas by the watercourses to the north and west. Without detailed topography it is not possible to determine if these features are sufficiently deep to allow flood waters to reach this compensation area.

From mapping provided in INQ/149, this land is at the extreme western end of “Lot 3”. As such it is not clear if the landowner offering this land has control over the watercourse should any modifications be required to enable the free flow of flood waters at appropriate depths.

Land to the South 2

Figure 7 shows the land in this area to be at elevations of between 6.27 and 6.34m AOD. With reference to the embankment levels (Appendix A) this may be able to offer some compensation for the extreme eastern end of the railway embankment.

However, it should be noted that with reference to the Google Map imagery (Figure 8) it is clear that this area is susceptible to waterlogging and frequent flooding already. Below is an extract from the current aerial photography with an image taken in 2021 showing this area to be flooded (note that a wider view of the site shows this to be one of only a few areas shown waterlogged).

I would suggest that this area offers very little opportunity for acting as an area of compensation.

Figure 7: LIDAR level data for Land to the South 2

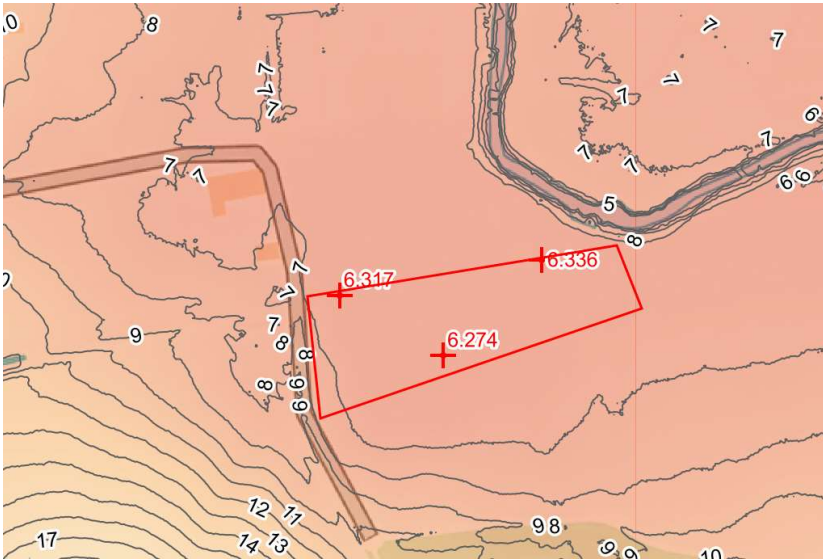
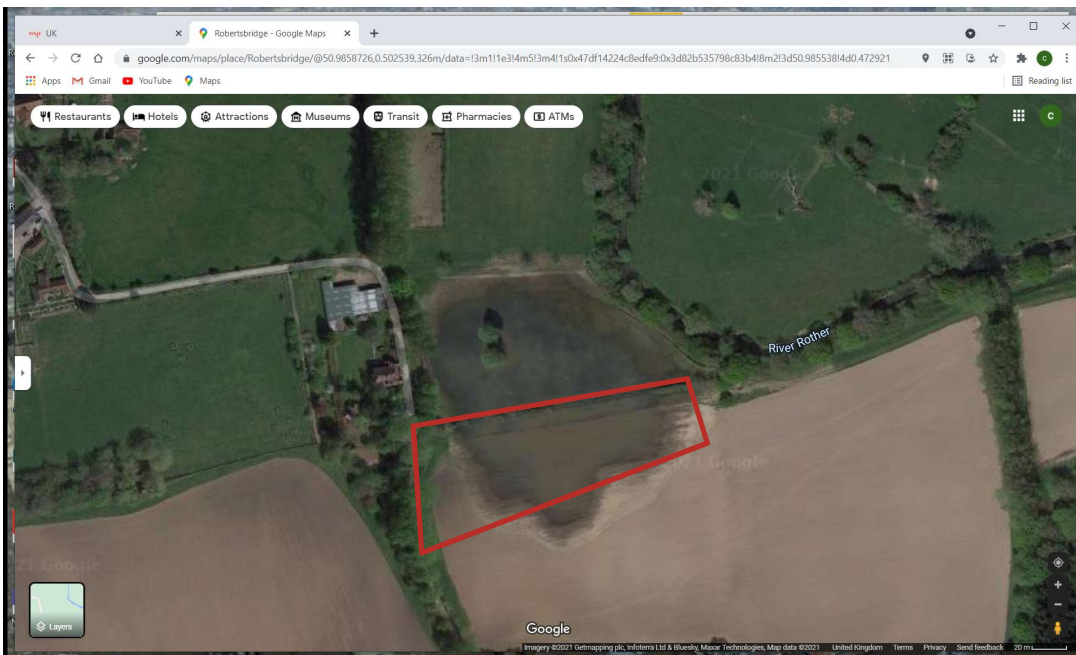


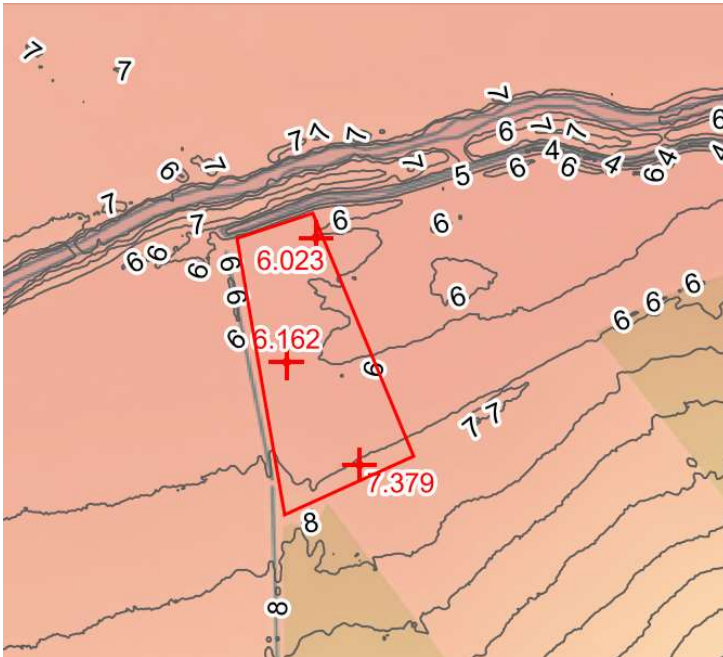
Figure 8: Extract from Google maps for Land to the South 2 (extracted 19th August 2021)



Land to the South 3

This site is partially within the flood zones and partially outside. This would be a typical compensation arrangement. It is possible that the southern edge of this area may be able to provide some compensation volume as the land rises.

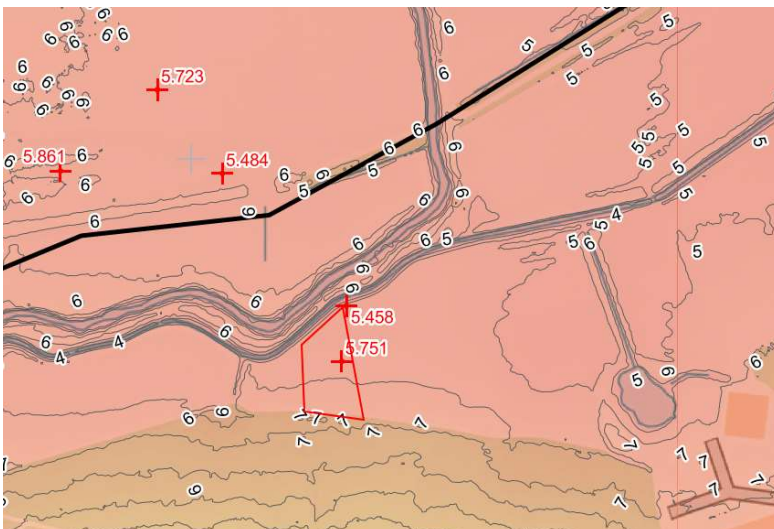
Figure 9: LIDAR level data for Land to the South 3



Land to the South 4

This site is also partially within the flood zones and partially outside. This would be a typical compensation arrangement. Although smaller than site 3, it is possible that the southern edge of this area may be able to provide some element of compensation volume as the land rises.

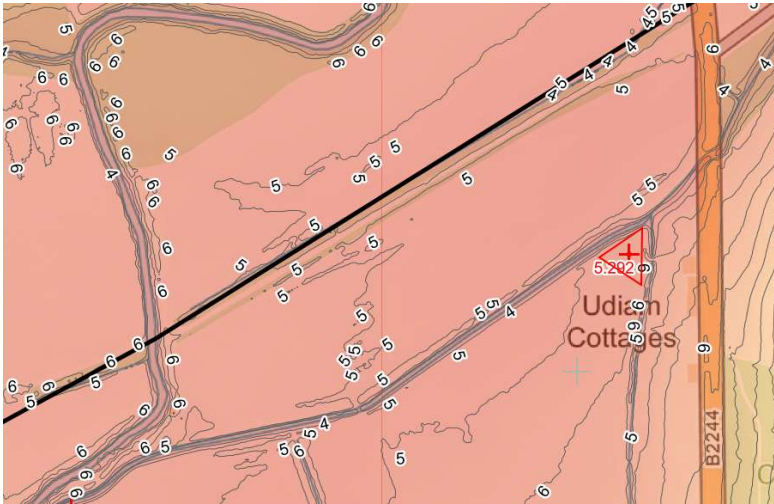
Figure 10: LIDAR level data for Land to the South 4



Land to the South 5

This is the smallest of the sites is totally within the flood zones. Due to its location in the flood plain, its elevations which are at the lowest point of the route (levels below the lowest ground level along the route) and its relative size, this site will offer little in the way of storage compensation volume.

Figure 11: LIDAR level data for Land to the South 5



Summary

Although I do not have access to the detailed 3D modelling of Capita and RVR, I consider that the fact that we have moved from a starting point where RVR was not indicating any areas for potential flood storage compensation to a point where some nine areas have been identified demonstrates the need for this to be reviewed in detail. The fact that since the adjournment of the inquiry RVR have acquired additional land specifically for flood compensation suggests that they accept that compensation is likely to be required and also that the areas previously proposed during the course of the inquiry were unlikely to be suitable and/or provide all necessary compensation.

The above high-level review also shows that, even with this number of locations, there are potentially significant inherent barriers to them being able to provide anything more than minimal compensation volumes.

There appears to be a large volume available within the tables provided in INQ/150 but no corresponding identification of where these volumes come from.

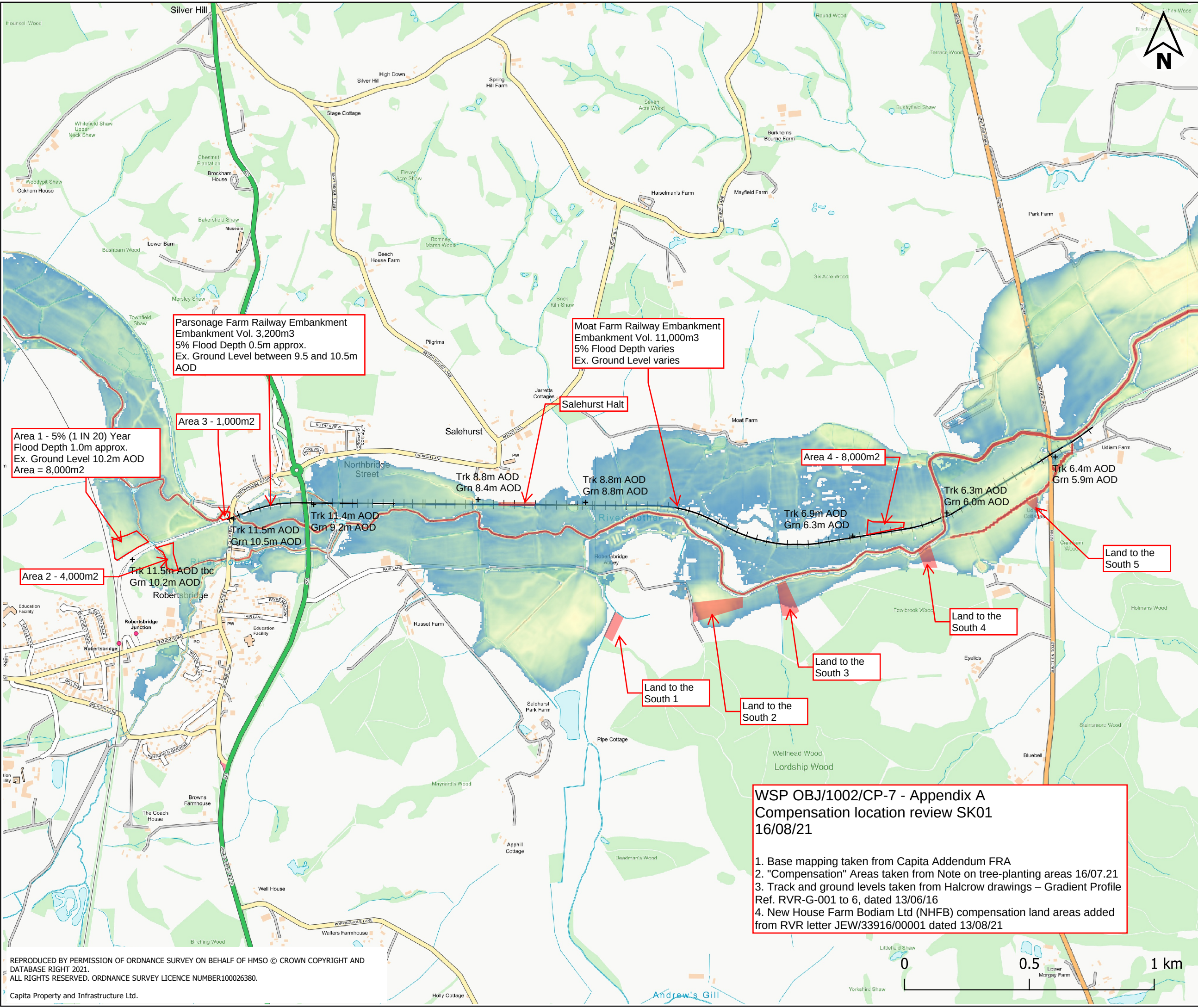
Further, there are large areas proposed to be excavated, but no indication of where that material could be transferred to (as it cannot be located within areas identified as flood plain). Likewise, it does not appear as if any consideration has been given to the need for planning permission for any such engineering operations.

The new locations outside the Order boundary and the planning application boundary only emphasise that this is a significant issue that cannot be left to the potential discharge of a condition that may not actually ultimately be capable of being discharged.



Appendix A

Track and ground levels with Compensation locations – 5% flood extents (functional flood plain)



Legend

Flood Depth (m)

0
0.3
0.6
0.9
1.2
1.5
1.8
2.1
2.4
2.7
3

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
Rother Valley Railway LTD

Project
Rother Valley Railway
Public Inquiry

Drawing
Predicted Flood Depths with Railway

5% AEP Design Flood Event

Scale at A3 1:14000	Drawn CJ	Checker SC	Approver SC
Project No CS101008	Date 3/3/2021		
Drawing Identifier	Revision P03		

CAPITA

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Parsonage Farm Railway Embankment
Embankment Vol. 3,200m3
5% Flood Depth 0.5m approx.
Ex. Ground Level between 9.5 and 10.5m
AOD

Moat Farm Railway Embankment
Embankment Vol. 11,000m3
5% Flood Depth varies
Ex. Ground Level varies

Area 1 - 5% (1 IN 20) Year
Flood Depth 1.0m approx.
Ex. Ground Level 10.2m AOD
Area = 8,000m2

Area 3 - 1,000m2

Area 2 - 4,000m2

Area 4 - 8,000m2

Land to the
South 5

Land to the
South 4

Land to the
South 3

Land to the
South 1

Land to the
South 2

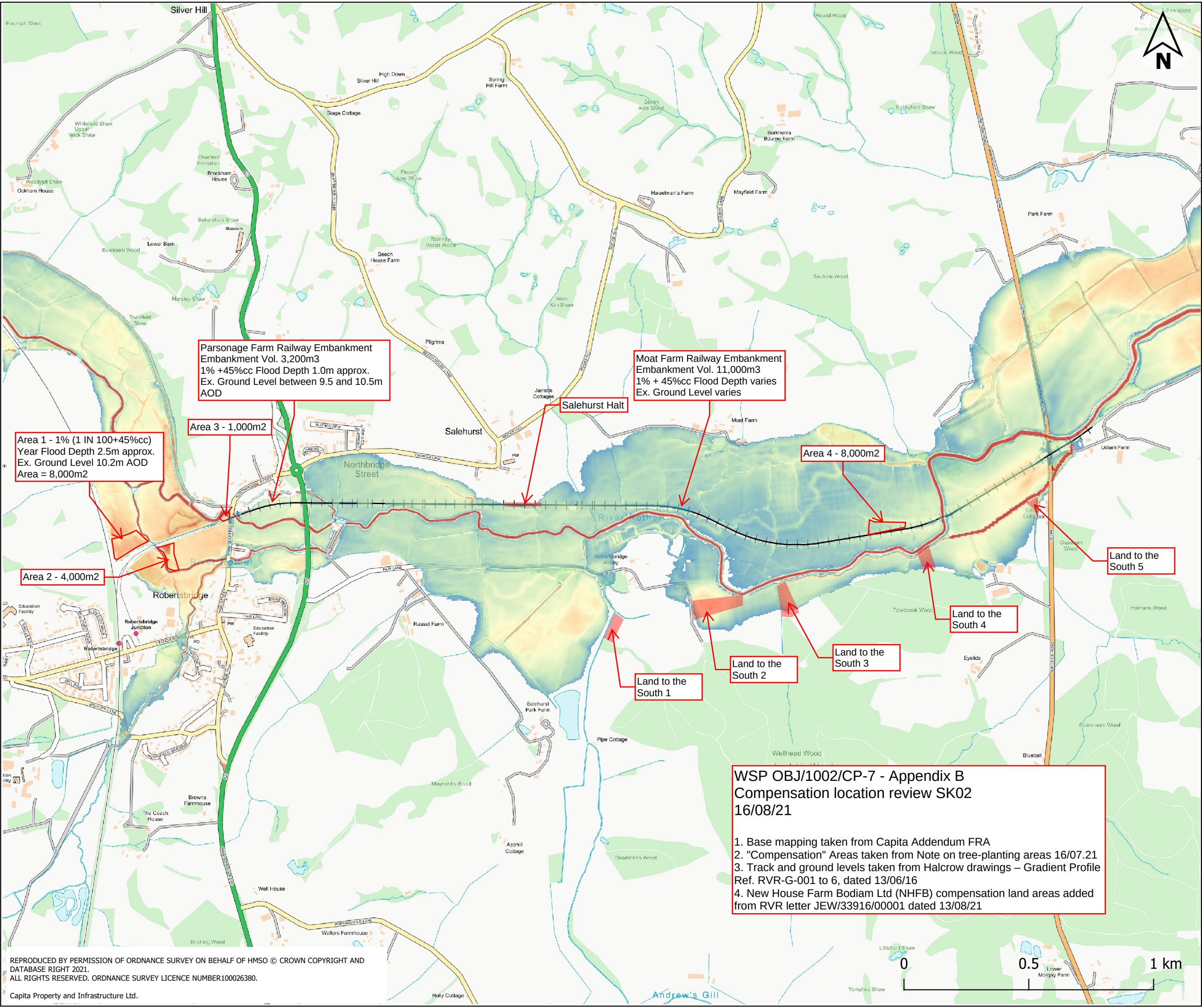
WSP OBJ/1002/CP-7 - Appendix A
Compensation location review SK01
16/08/21

1. Base mapping taken from Capita Addendum FRA
2. "Compensation" Areas taken from Note on tree-planting areas 16/07.21
3. Track and ground levels taken from Halcrow drawings – Gradient Profile Ref. RVR-G-001 to 6, dated 13/06/16
4. New House Farm Bodiam Ltd (NHFB) compensation land areas added from RVR letter JEW/33916/00001 dated 13/08/21



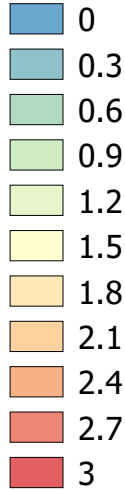
Appendix B

Track and ground levels with Compensation locations – 1% flood extents + 45% climate change allowance



Legend

Flood Depth (m)



Purpose of Issue

S2 - Issued for Information

Classification

Commercial in Confidence

Client

Rother Valley Railway LTD

Project

Rother Valley Railway
Public Inquiry

Drawing

Predicted Flood Depths with Railway

1% AEP Design Flood Event with 45%
allowance for climate change

Scale at A3	Drawn	Checker	Approver
1:14000	CJ	SC	SC

Project No	Date
CS101008	3/3/2021

Drawing Identifier	Revision
	P03

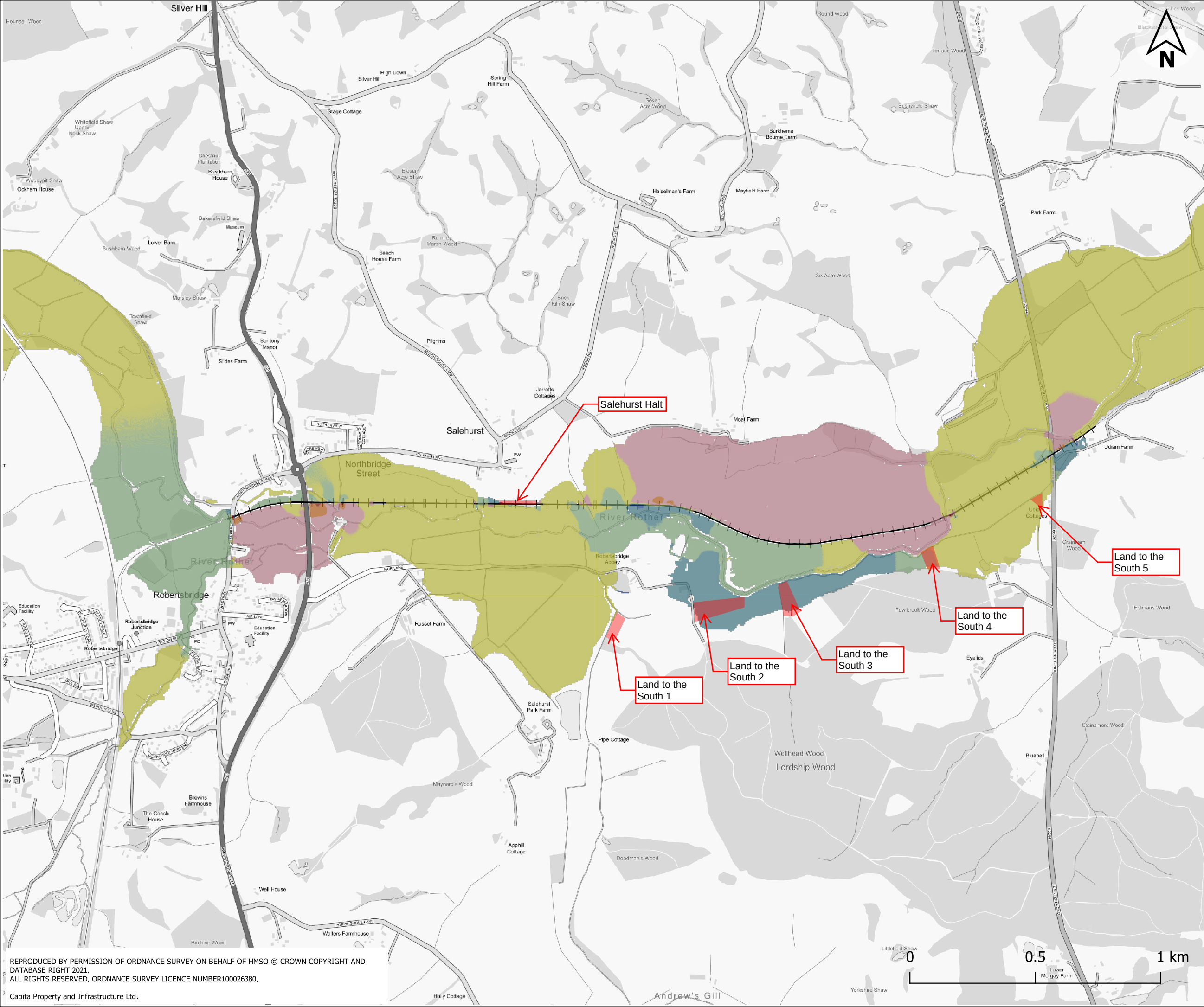
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Appendix C

Capita drawing "Difference in predicted Maximum Water Level" annotated to shown location of new compensation areas



Legend

Water Level Difference (m)

- <-0.1
- 0.1 to -0.05
- 0.05 to -0.01
- 0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.1
- >0.1

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
Rother Valley Railway LTD

Project
Rother Valley Railway
Public Inquiry

Drawing
1% AEP with 45% allowance for climate change
Design Flood Event

Difference in predicted Maximum Water Level

Scale at A3	Drawn	Checker	Approver
1:14000	CJ	SC	SC
Project No	Date		
CS101008	4/3/2021		
Drawing Identifier	Revision		

P03

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