

TECHNICAL NOTE

Job Name: North Littlehampton
Job No: 332510715
Note No: TN004
Date: April 2022
Prepared By: Alex Wray
Subject: Response to Environment Agency Objection dated 24th January 2022

This Technical Note (TN) has been prepared to set out the response to the Environment Agency's (EA's) Flood Risk Objection to the *Approval of Reserved Matters Following Outline Consent LU/47/11/ (Amended under LU/182/15/PL) For The Formation Of The Central Wetland Area And The Construction Of The Central Spine Road Running Across The Central Wetland Area, Linking Up Phase 5 And 2B (Also Known As Phase 4). Central Wetland Area Hampton Park Toddington Lane Littlehampton BN17 7PL.* in their letter dated 24th January 2022.

The EA's letter of objection (24/01/22) is included in **Appendix A**.

A meeting was held with the EA on the 15th March 2022 to discuss the objection in more detail and to provide an initial responses on the points made.

The six specific flood risk points put forward by the EA together with the comments made during the meeting with the EA are addressed separately below.

It is noted that Stantec's Technical Note 39878/TN003 Rev A (dated 29th September 2021) and associated Central Wetland Area (CWA) design, reviewed by the EA as part of this application, was developed to discharge the existing conditions for an outline planning application. It is not a FRA, however it supports the previous FRA dated February 2011.

Item 1: Confirmation of Data Used

EA Comment

The defended 0.1% AEP flood level has been used to calculate flood plain compensation, instead of the undefended level, which is best practice; especially considering the modelling used is over 10 years old and no additional modelling has been undertaken to establish the impacts of climate change. We would therefore request to use the undefended 0.1% AEP flood level of 2.90m AOD for the flood plain compensation calculations.

Project Team Response

The use of this data was justified within Stantec's TN003, which identified that the EA had been consulted on the approach and data used to develop the CWA. Following the meeting with the EA, further clarification was requested from the Project Team.

Stantec's TN003 which was submitted and reviewed as part of the EA's response above.

Appendix C, within the TN003, details the 2017 liaison between Peter Brett Associates (PBA), now Stantec, and the EA regarding the appropriate flood levels to use for the floodplain compensation at the site.

During this liaison, the EA confirmed that provided the defended 1 in 100 plus climate change scenario was used within the originally approved Feb 2011 Flood Risk Assessment (FRA) calculations then the defended 1 in 1000 year would be appropriate for the assessment in the current proposals, in the absence of suitable climate change flood levels (+45% as per the guidance at the time) available from the EA's 2010 modelling.

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PBA confirmed that the defended 1 in 100 plus climate change scenario was indeed used in the original analysis.

During the meeting of the 15th March 2022, the EA requested that it be confirmed if the 2011 FRA used the defended flood levels.

Stantec have completed a further review of the flood levels used in the 2011 FRA.

The 2011 FRA states that the defended 1 in 100 plus climate change scenario was used to support the analysis. This has been identified by comparing the 2011 modelling outputs with the levels identified in the text of the 2011 FRA.

Based on this proposed defended 1 in 1000 year flood level of 2.38mAOD is deemed to be agreed with the EA (as per the 2017 liaison) as an appropriate flood level to assess the flood compensation scheme.

In accordance with the EA's comments during the meeting of the 15th March 2022, it is considered that the response is suitable for the EA to remove the objection and this comment to be resolved.

It should be noted that the EA's latest climate change guidance (October 2021) recommends a 2080s Central allowance of +25% for the River Arun / Black Ditch, lower than the +45% allowance agreed in 2017 .

In summary, the defended 1 in 1000 year flood level of 2.38mAOD is the agreed design flood level to use in the flood compensation analysis.

Item 2: Difference between overall CWA Storage Volume

EA Comment

The flood plain compensation proposed with this planning application will only create 324m³ additional storage, which is considerably lower than the 27,300m³ proposed at the outline planning application, which was one of the reasons of the removal of the Environment Agency (EA) initial objection.

Project Team Response

The proposals in TN003 demonstrate that they provide an overall net increase in floodplain capacity, and therefore are in accordance with the requirements of the NPPF.

The reduction in overall flood plain compensation from the original FRA has been driven by the amendment of the design flood level (see response to point 1), which reflected significant gains at the upper bands, and the natural iteration of the masterplan following the outline planning application.

During the meeting 15/03/22, the EA requested further confirmation on change between the 2011 FRA and the latest proposals.

Since the discussions held on 15th March a review of the latest ground model has been completed. In particular, this focussed on the low-level ditches which had previously not been included in the volumetric analysis as their design had not been finalised.

The recent review of the latest proposals has allowed the refinement of the analysis to include the final CWA form, including the free-flowing low-level drainage ditches. Within this analysis, minor corrections to the triangulation within the ground model have been made to better reflect the proposals has been made.

The recent review of the latest proposals has allowed the refinement of the analysis to include the final CWA form, including the free-flowing low-level drainage ditches. This analysis also identified that there were minor corrections to be made to the triangulation of the ground model. The result of this has now been included in the table below as well as on our revised drawing 39878/4001/008 Rev. D and identifies modifications at all bands.

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Table 1 - Revised Flood Compensation Table

Level Band (mm below 1 in 1000 year flood level)	Volumes as previously submitted (m ³)	Final volumes with CWA ditches included (m ³)
0-100	-2114.31	-1403.22
100-200	-1511.09	-772.41
200-300	-1048.14	-288.5
300-400	-577.79	174.76
400-500	37	691.67
500-600	800.29	1352.76
600-700	1500.98	2074.41
700-800	2172.35	2754.89
800-900	1245.95	1784.16
900-1000	881.67	1404.56
1000-1100	-646.79	-214.54
1100-1200	-261.74	122.01
1200-1300	-96.48	257.71
1300-1400	-57.77	255.38

As a result of the update, the current design shows significant overall gains in storage of 8193m³ across the site, which is closer to the original FRA figure.

Item 3: Location of Flood Compensation

EA Comment

It looks like the majority of the compensatory storage area is within Flood Zones 2 and 3. This is an inappropriate location for a compensatory storage area as this land would be expected to flood in the design event. Digging down into this land would not provide the designed compensation volume as the soil would be saturated and area would be expected to fill with water anyway. Compensatory storage areas should be providing flood storage outside of design flood extent.

Stantec Response

The majority of the compensatory storage area is within the proposed central wetland area (CWA) and proposed playing field area which is not currently within the defended Flood Zones 2 or 3.

The Product 4 data provided in Appendix B of TN003 extracted on 11th April 2016 shows Flood Zone 2 and 3 flooding to the playing fields, not the CWA. This has been accounted for within the calculations

Where there is compensatory storage proposed within the existing flood zones, these ground levels are being reduced. This does provide compensatory storage volume and is commonly accepted by the EA.

During the meeting of the 15th March 2022, the EA confirmed that they were satisfied with the project team's response.

Item 4: Level-for-Level compensation

EA Comment

The calculations provided in table 1 of the Technical Note show loss of storage at the lower and higher levels. To be an acceptable compensation scheme, the volume of flood gained in each particular slice should be greater than the volume lost for that same slice.

Stantec Response

Please refer to Table 1 in Section 2 of this report.

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Following the review of the ground model and proposals outlined in our response to point 2 above, the level-for-level losses at the low levels have been updated. With regards to the principal concern at the lower levels, the revised analysis shows gains in the lowest bands with a small loss within a single band. Table 2 below shows the cumulative flood storage for all bands as a result of the flood compensation, demonstrating positive storage throughout.

Table 2 - Cumulative Flood Storage

Level Band (mm below 1 in 1000 year flood level)	Final volumes with CWA ditches included (m ³)	Cumulative Flood Storage (m ³)
0-100	-1403.22	+8193.64
100-200	-772.41	+9596.86
200-300	-288.5	+10369.27
300-400	174.76	+10657.77
400-500	691.67	+10483.01
500-600	1352.76	+9791.34
600-700	2074.41	+8438.58
700-800	2754.89	+6364.17
800-900	1784.16	+3609.28
900-1000	1404.56	+1825.12
1000-1100	-214.54	+420.56
1100-1200	122.01	+635.1
1200-1300	257.71	+513.09
1300-1400	255.38	+255.38

.As discussed in the call on the 15th March, the original FRA was accepted on the basis that it did not provide a level-for-level compensation scheme. We have eliminated all but one band of loss within the lower bands and have reduced the losses at the lower risk higher bands significantly.

We would also note that all of these higher band losses fall between the levels of 1.83 and 2.38mAOD about that at these higher band levels there is a significant cumulative net gain in storage of over 8000m³.

Item 5: Freely draining proposals

EA Comment

The compensation area should be completely free filling and draining and should not use culverted or piped entry routes. This is to ensure the compensation area can fill and drain under gravity and so will be available should back to back flood events occur. It is not clear how the proposed flood compensation area will fill and drain.

Stantec Response

As discussed in meeting on 4th February 2022, design team should review lowering upstream footpath and provision of boardwalks in discrete locations to replace culverts to the south of the CWA.

During the meeting of the 15th March 2022, the EA confirmed that they were satisfied with the project team's approach.

Example boardwalk bridges / crossings for the CWA were sent to Arun DC / EA on the 17th February 2022.

Item 6: CWA Crossings

EA Comment

Unsatisfactory information in regard to the watercourse crossings have been submitted.

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In our previous responses we stated that the EA will always request road crossings to be of a clear span variety, for the purposes of flood flow. Also, the soffit level should be set at least 600mm above the undefended 1% AEP plus the appropriate allowance for climate change. In this case it appears that defended levels have been considered. Furthermore, culvers have been proposed as a means of crossing for the footpaths which are against EA policy. It'll also be useful if evidence of discussions about the arch crossing can be provided to confirm this was agreed as an appropriate means of crossing.

Stantec Response

Road Bridge Crossing

Within EA permitting for clear span bridges they define a clear span bridge as 'a clear span bridge, being a bridge that requires no bed or bank reinforcement and no support in the watercourse'. We would argue that the precast arch solution proposed meets this description

Drawing 39878_4001_001B provided in Appendix B of TN003 shows the soffit of the road crossing is currently shown 1100mm above the defended 0.1% AEP flood level (2.38m AOD). If the modelled undefended 1% + CC level (2.47m AOD) was used then this reduces to 1010mm.

Culvert Crossings

Culvert crossings are to be reviewed in accordance with our response to comment 5 above.

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Appendix A

EA objection letter HA/2022/123851/01-L01 Dated 24th January 2022