Our ref: P680020-FRA L04
Your ref: 21/02286/F

11th October 2022

Cherwell District Council
Planning & Development Services
Bodicote House White Post Road
Bodicote
Banbury
OX15 4AA

Re: Construction of a coffee unit with drive-thru facility and indoor seating with associated access, car parking, landscaping and servicing parking. Land North West of Launton Road roundabout adjoining Skimmingdish Lane, Caversfield

Please find attached a copy of the updated Flood Risk Assessment for the above application site. This letter and associated FRA report has been produced to reflect the consultation responses from the Environment Agency (dated 2nd September 2022, Environment Agency Ref: WA/2021/129266/04-L03) and our replies and updates since the original submission included as Section 4 of the FRA (680020-R1(03)-FRA, October 2022).

In summary the consultation was received issued on the following dates

Correspondence Date	Location	Overview
27th March 2020	Appendix F of FRA (680020-R1(03)-FRA, October 2022	Environment Agency email noting the modelling had been deemed fit for purpose to support the planning application
13th September 2021	Appendix G of FRA (680020-R1(03)-FRA, October 2022	Environment Agency Ref: WA/2021/129266/01-L01 - The principal point for the objection was that the submitted FRA fails to 'Provide appropriate mitigation for the loss of flood storage to ensure the development does not increase the risk of flooding to the site and the surrounding area.'
13th October 2021	Appendix G of FRA (680020-R1(03)-FRA, October 2022	RSK Ref: P680020-FRA L01 - This letter provided further details of the flood compensation scheme based on the principles previously agreed with the Environment Agency.
9th December 2021	Appendix H of FRA (680020-R1(03)-FRA, October 2022	Environment Agency (Environment Agency Ref: WA/2021/129266/02-L01) - The reason of the objection was an increase of floodplain attenuation from that previously agreed and they were unable to interpret the submitted cross

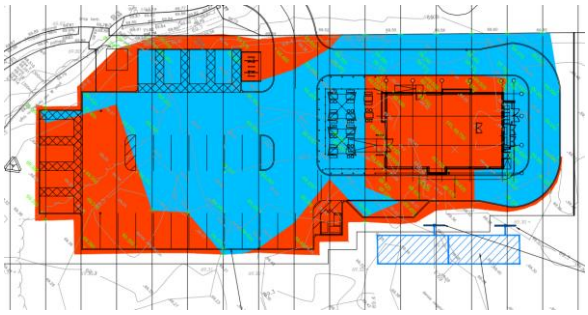
Correspondence Date	Location	Overview
		section plans for the proposed attenuation volume tanks and groundworks.
24th December 2021	Appendix H of FRA (680020-R1(03)-FRA, October 2022	RSK Ref: P680020-FRA L02 - The letter response submitted details the findings of the updated modelling and floodplain compensation results and provides further detail on the drawings and cross sections as required by the Environment Agency to allow easier interpretation.
6th April 2022	Appendix I of FRA (680020-R1(03)-FRA, October 2022	Environment Agency Ref: WA/2021/129266/03-L01 - maintaining the objection asking for the model files to be submitted for a formal review and additional details on the drawings and floodplain calculations.
7th April 2022	Email submission	RSK – Revised model files (4%CC simulation based on approved model) submitted to EA.
11th July 2022	FRA 680020-R1(02)	RSK FRA 680020-R1(02) submitted addressing EA comments
12th August 2022	Appendix J of FRA (680020-R1(03)-FRA, October 2022	Environment Agency email – model review response - further comments had been made on the 4% climate change flood simulation submission
31st August 2022	Appendix J of FRA (680020-R1(03)-FRA, October 2022	RSK email – addressed points raised in the Environment Agency's email on the 4% climate change simulation
3rd September 2022	Appendix K of FRA (680020-R1(03)-FRA, October 2022	Environment Agency Ref: WA/2021/129266/04-L03 - maintaining the objection asking for additional details on the drawings and floodplain calculations
October 2022	FRA 680020-R1(03)	RSK response – Letter ref: P680020_FRA_L04 and Flood Risk Assessment 680020 R1(03) addressing the comments from the Environment Agency dated 3rd September with results updated to include the 6%CC simulation event results.

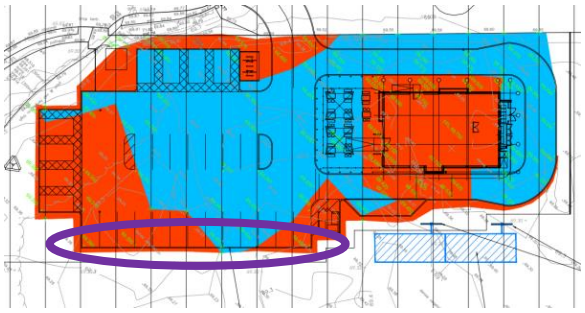
Section 4 of the FRA details the previous consultation responses from the Environment Agency and the responses to each consultation.

Following the recent comments from the Environment Agency (dated 2nd September 2022), the previously agreed and accepted model files have been updated to reflect the requirement for a 6% increase in flows due to the uncertainties in climate change, the previous submission included a 4% allowance. This has had a minimal impact on flood levels on the site, nevertheless these revised flood levels have been utilised to update the attached drawings and associated flood compensation calculations. As previously noted the model review based on 6% climate change should not be a complex task as the only variation to the agreed model files (approved by the EA on the 27th March 2020) is the river inflows with the latest climate change allowances included.

The following is an extract from the revised flood risk assessment and summarises the latest comments from the Environment Agency (dated 2nd September 2022, Environment Agency Ref: WA/2021/129266/04-L03) and the responses that have resulted from those comments.

Environment Agency Comment	RSK Response
Further to our previous response of 06 April 2022, we received the flood risk modelling undertaken by the applicant to determine the expected climate change flood level being used to inform the Flood Risk Assessment (FRA) for this development. On 12 August we advised both your Authority and RSK that the modelling was not considered suitable to inform the FRA and provided detailed comments on our concerns and how to overcome them. The FRA has been compiled using fluvial modelling which is yet to be deemed suitable to inform the FRA. The applicant should address the concerns and actions we highlighted on 12 August 2022 and return any additional information requested to enable a further review.	The original model being "fit for purpose" approval by the EA has been provided in the EA email dated 27th March 2020 (included in **Appendix F** of the FRA). The subsequent climate change model files were uploaded to the Environment Agency system on the 7th April 2022.
It is still difficult to understand if the scheme would be hydraulically connected. For example, from comparing the spreadsheet values and the Layout Plan, it appears that the 2.88m^3 of proposed volume between 69.16-69.26mAOD on the main development site would not be accessed until a flood level of approximately 69.30-69.33mAOD is reached. No commentary on this has been provided, but it appears that sufficient compensation is provided for this lowest slice (69.16-69.26mAOD) by lowering areas of raised land outside the main development site as shown on the Flood Volumes Section Layout Plan. We request	Drawing reference 220029_FV100_P7 and 220029_FV107_P3 (Extract below) show the site and the wider area floodplain offset and gain. The blue areas show where additional floodplain volume is created and the red where levels have been raised and volume is offset.

Environment Agency Comment	RSK Response
that further clarity is provided on this and how the compensation is hydraulically linked at other levels/slices. This can be shown by including plan/s which clearly mark the extents of each compensation slice so we can visually see how they are hydraulically connected. These extents should be based on the exact areas the applicant is lowering for each slice. It is not possible to view the individual compensation slices in the applicant's submitted plans.	 It can be seen from the spreadsheet that for each 100mm increment between 69.09m AOD and 69.69m AOD there is additional floodplain storage, once the flood level reaches 69.69m AOD, there is a displacement of floodplain for this 100mm increment, hence the requirement for additional attenuation at this level – in the form of the storage tanks. The level for level compensation is being provided in the underground tanks with the inlets set at the required level to provide the level for level compensation and allows for hydraulic connectivity to the floodplain when the flood levels reach these inlets (see above extract). It can also be seen from the cross sections that the flood levels enter the car park, so whilst there is some displaced floodplain volume in some areas, there remains a hydraulic connectivity between all sections of the site and the flood zone, therefore the plans and associated calculations show a true representation of the situation. **It can be seen from the spreadsheet and the associated additional attention tanks that at all flood level increments, there is an increase in floodplain volume as a result of the development.** In terms of hydraulic connectivity, the flood extent in the area encompasses the site, therefore any displaced volume in this location will retain a hydraulic connectivity to the flood plain and the watercourse either by the way of overland flow through the car park or by way of the drainage system.

Environment Agency Comment	RSK Response
	 The previous drawings submitted to support this application showed a kerb aligned along the eastern side of the car park. Following the consultation with the EA, we have assessed the situation and removed the kerb from the development proposals (highlighted location in the above extract) to aid in the hydraulic connectivity between the site and the flood plain. The boundary of the car park will now be defined by a knee rail, ensuring optimum hydraulic connectivity. No impediment to ingress of flood water – water level will rise and flow into site in between sections 9 and 15 (highlighted location in the above extract). Further to this the control device and flood compensation tank are located within the flood plain at the agreed levels so as to ensure hydraulic connectivity is maintained. The individual plans outlined below contain the relevant cross sections throughout the development. The plans and the associated spreadsheet (below) clearly illustrate the impact of the scheme with respect to the flood compensation at the site.

Total Volume Difference by level				
Levels			Volume Difference	
Top (m)	Bottom (m)	Height (m)	(m3)	Notes
69.69	69.59	0.1	12.27	Displaced Flood Volume contained within tank
69.59	69.49	0.1	15.29	Displaced Flood Volume contained within tank
69.49	69.39	0.1	-47.62	Volume Gained
69.39	69.29	0.1	-47.08	Volume Gained
69.29	69.19	0.1	-10.22	Volume Gained
69.19	69.09	0.1	-0.31	Volume Gained

*Positive figures indicate flood volume to be attenuated.

*Negative figures indicate an increase in flood compensation volume.

Environment Agency Comment	RSK Response
	A slice by slice plan would not add significant detail above and beyond the plans submitted as up to the level of 69.49mAOD there is a surplus of 105m3 storage created as a result of the scheme, with the levels from 69.49mAOD to 69.69mAOD accommodated within the flood compensation tanks. The following plans have been provided to with respect to the compensation plans (included as **Appendix L** of the FRA) Drawing 220029/FV100_P7 FLOOD VOLUMES SECTION LAYOUT PLAN. Drawing 220029/FV101_P9, FLOOD VOLUMES SECTIONS 1 OF 3 Drawing 220029/FV102_P9, FLOOD VOLUMES SECTIONS 2 OF 3 Drawing 220029/FV103_P9, FLOOD VOLUMES SECTIONS 3 OF 3 Drawing 220029/FV105_P4, SECTION 13 Drawing 220029_FV107_P3, Site Plan
	The appended spreadsheet (Bicester Flood Volume Calculations Flood Level 69.69 as included in **Appendix L** of the FRA) details the volumes to be attenuated and created at 0.1m 'segments'. It can be seen from the attached drawings and the associated spreadsheet that the level for level volume of flood water to be offset due to the development, if unmitigated, is 27.55m^3 but only when flood levels range from 69.49mAOD to 69.69mAOD. It is this volume (27.55m^3) that will be offset and attenuated in the tank system, offering the required level for level flood compensation as previously agreed. As stated above, the scheme will offer 30m^3, of attenuation in the tanks, thus offering additional flood risk benefits of the scheme. Whilst the EA's requirement is for level for level compensation, there is an additional floodplain volumetric benefit from the scheme where there is a net gain in floodplain volume by 105.23m^3 up to a flood level of 69.49mAOD (see table below) and it's when

<table>
<tr><th>Environment Agency Comment</th><th>RSK Response</th></tr>
<tr><td></td><td>the flood levels reach between 69.49mAOD and 69.69mAOD that the attenuation tanks are required to provide the level for level compensation.

<table>
<tr><th colspan="5">Total Volume Difference by level</th></tr>
<tr><th colspan="3">Levels</th><th>Volume Difference (m3)</th><th></th></tr>
<tr><th>Top (m)</th><th>Bottom (m)</th><th>Height (m)</th><th></th><th>Notes</th></tr>
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<tr><td>69.19</td><td>69.09</td><td>0.1</td><td>-0.31</td><td>Volume Gained</td></tr>
</table>
*Positive figures indicate flood volume to be attenuated.
*Negative figures indicate an increase in flood compensation volume.

For flood depths up to 69.49mAOD, the flood compensation strategy offers 105m^3 of storage (increase in flood compensation volume as noted in above spreadsheet extract), with a further 8.2% surplus (as part of the attenuated flood compensation volume in the above spreadsheet extract) provided in the events up to the 100 year plus 6% climate change event (levels between 69.49,AOD and 69.69mAOD).

The approach is in line with the current iteration of the NPPF and PPG.</td></tr>
<tr><td>It is our understanding that two storage tanks are proposed to provide compensation for the highest ‘slice’. The inlets/openings to these tanks are proposed at 69.535 and 69.635mAOD, and it appears that each tank would have a 15m^3 capacity (total 30m^3). By setting the lower opening at 69.535m AOD, it appears this would provide mitigation for the 69.46-69.56mAOD slice, and not the 69.56-69.66mAOD slice where it is required. We request that the applicant provides clarification on why this is and discusses whether this should opening be raised.</td><td>See above, the tables on the spreadsheet and section drawings (Appendix L of the FRA) have been revised to reflect this with levels now raised to 69.69mAOD</td></tr>
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The flood compensation proposals have progressed on the basis that there should be no further objections on the application. These proposals include the updated flood compensation details

based on the flood levels produced from the updated hydraulic model results. Based on the above and the enclosed revised FRA, it can be clearly seen that, when using the Environment Agency's latest climate change allowances (6% allowance), the level of flood compensation required to be provided is reduced to 27.55m^3 to below that previously agreed with the Environment Agency during extensive pre-app discussions. Notwithstanding this fact, the flood compensation to be offered by the scheme will include a tank with a capacity of 30m^3 (this is in excess of that required), thereby offering a reduction / betterment of 2.45m^3 (8.2%) in offsite flood risk on 1:100 plus 6% climate change. There is also a considerable flood storage betterment of 105.23m^3 in the 1:100 flood risk. This should therefore be supported by the Environment Agency as seen as an opportunity to offer wider flood risk benefits.

The fluvial model provided as part of the FRA was approved by the EA and deemed fit for purpose by the EA on the 27th March 2020 and correspondence to confirm the same is attached in the FRA - Appendix F.

We have provided plans showing that the scheme is hydraulically connected at all levels contained within Appendix L of the FRA.

The proposed scheme provides POSITIVE flood storage of up to a max capacity of 105.23m3 at all 100mm incremental levels up to a flood level of 69.49mAOD.

Only at 100 year plus climate change events is there volume displacement of 27.55m^3 at which point this is accommodated for within the scheme provided attenuation of 30m^3 – providing 8.2% additional capacity, being a further benefit.

All matters pertaining to the development have been cleared and planning approved by resolution, subject to final clearance of the FRA, whereby the scheme shows POSITIVE flood benefits at all levels.

On the basis of the above, I ask you to review the revised flood risk assessment which has been set out to clearly illustrate the consultation responses with the Environment Agency. The revised FRA 680020 R1(03) should address all the concerns raised by the Environment Agency.

We trust this information is sufficient for your immediate needs, however please do not hesitate to contact the undersigned if you require any further information.

Yours sincerely

RSK LDE LIMITED

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