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Flood Risk Assessment

Staverton Cereal Factory, Flood Resilience Measures

Prepared for:

CPUK
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Trowbridge,
BA14 6PG



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Glossary of Terms

Term	Definition
+CC	Return period inclusive for the predicted effects of Climate Change
1D	One-Dimensional
2D	Two-Dimensional
AMAX	A series containing the peak flows recorded at a gauge from each year
AOD	Above Ordnance Datum (0m sea level, Newlyn, UK)
Channel Cross Section	profile view of a river channel, normally obtained by surveying a line across the watercourse
Critical Storm	A storm that produces peak run off in the watershed
Culvert	A device used to channel water, similar to a pipe though may be larger
Defended	A scenario in which river defences are used
FEH	Flood Estimation Handbook
Fluvial	Referring to the processes associated with rivers and streams
FRA	Flood Risk Assessment
GIS	Geographic Information System
Hydraulic Model	The mathematical process of analysing the interaction of water and the connected environment
Hydrology	The calculation of catchment based flow rates
Inflow	Source of water within a modelled domain
FMP Software	One-Dimensional hydraulic model – Representation of watercourses
FMP-TUFLOW	Hydraulic program that dynamically links FMP and TUFLOW (1D-2D)
LiDAR	Light Detection And Ranging, remote sensing technology to measure distance typically used to obtain topographic data over a large area
Outflow	The method by which water may leave a modelled area
Overtopping	Where water has passed over a feature that might ordinarily prevent flow
f100	1% annual probability fluvial event
f1000	0.1% annual probability fluvial event
f100CC	1% annual probability fluvial event with an allowance for the predicted effects of climate change
QMED	The median of the set of annual maximum flow data (AMAX)
TUFLOW Software	Two-Dimensional hydraulic model – Representation of floodplain
Undefended	A scenario in which river defences are ignored

Table 1: *Table of definitions.*

1. Introduction

Edenvale Young Associates (EYV) were commissioned by Cereal Partners UK (CPUK) to undertake a Flood Risk Assessment (FRA) for the CPUK factory site located in Staverton. This work involved detailed fluvial hydraulic modelling to investigate local flood mechanisms and to provide an informed assessment of the current and future flood risks affecting the site. The site location is presented in Figure 1.1.

The primary aim of this FRA is to assess the flood risk to the existing factory and to outline proposals to improve the site's resilience to flooding. The assessment has been prepared in accordance with the requirements of the National Planning Policy Framework (NPPF), ensuring that flood risk is appropriately considered in the context of the proposed resilience enhancements. The scope of the FRA includes:

- A review of historical flood risk to the site.
- A review of published data and mapping on flood risk.
- National Planning Policy Framework (NPPF).
- A review of the Strategic Flood Risk Assessment for the area.
- Hydraulic modelling to assess flood resilience measures.

Hydraulic modelling has been undertaken using a bespoke ESTRY-TUFLOW model built for the purpose of this project. The model has been run for Pre and Post development scenarios for the 5% AEP (1 in 20 year), 1% AEP (1 in 100 year), 1% AEP (1 in 100 year with an allowance of 71% climate change on flows. A hydraulic modelling report – included as an appendix to this document – provides a detailed description of the modelling work that has been undertaken.

1.1 Appendices

The FRA should be read in conjunction with the following Appendices:

- Appendix A App:DevelopmentProposals – Development Proposals
- Appendix B App:ModelResults – Hydraulic Model Report

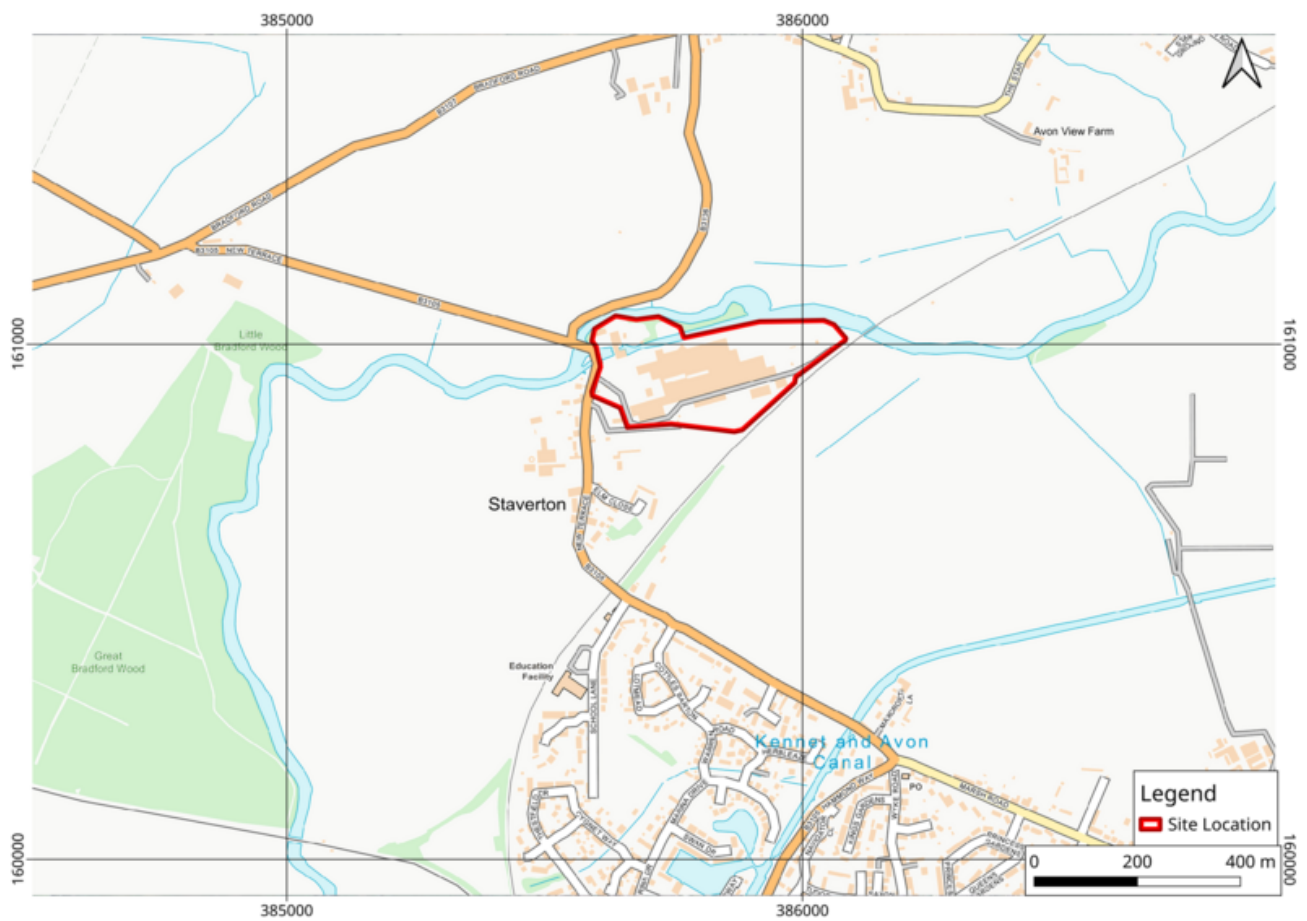


Figure 1.1: *Location of site*

CONTEXT

2. Site Details

2.1 Site Overview

The CPUK site is located to the south of the River Avon, which flows from east to west at Staverton, Trowbridge BA14 6PG. A general overview of the site and the key features which will be referred to in this report are shown in Figure 2.1. The site comprises a variety of industrial and packaging facilities and is bisected by a channel known as the Weston Cut. The main industrial buildings and service yards are located to the south of the site. The Mill Building spans the Weston Cut. This is labelled on Figure 2.1 as a Research building and is currently vacant.

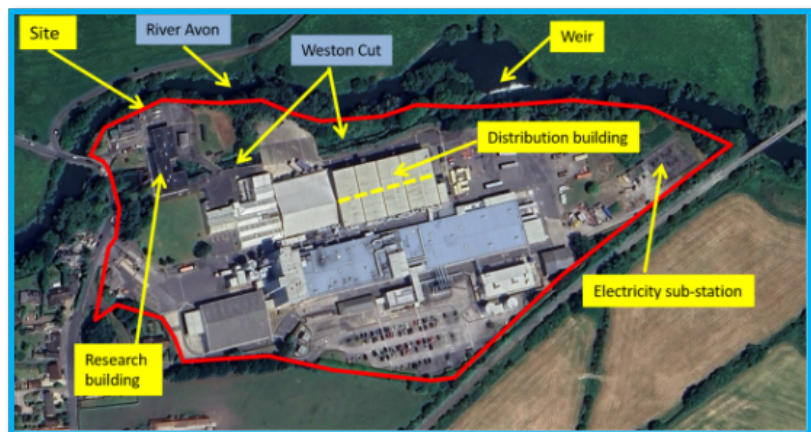


Figure 2.1: Site overview (Basemap: Google Earth)



Figure 2.2: Weston Cut looking up-stream



Figure 2.3: Weston Cut looking down-stream running under the Mill Building

A significant weir diverts flow from the River Avon into the Weston Cut, as shown in Figures 2.2 and 2.3. This channel was historically of use to industry within the site but is not longer used for any industrial purpose. During low flow conditions, this weir prioritises flow into the Weston Cut rather than the River Avon.

There are a series of hydraulic structures associated with the Weston Cut, including a bank of sluices beneath the Research Building. These sluices are fixed in a position agreed by the EA and not operated by CPUK. The hydraulic modelling report, included as Appendix B, provides a comprehensive overview of the structures on and in the vicinity of the site.

The site covers an area of just under 8 hectares, extending approximately 500m from east to west and 200m from north to south.

2.2 Proposed Development

CPUK previously commissioned EVY to provide flood risk advice following concerns about an apparent increase in flooding frequency at the site, particularly during the December 2012 flood event. During this event, shallow flooding (approximately 10mm) occurred within the disused Mill Building, which is located at a lower elevation than the main factory buildings situated to the south of the Weston Cut. This initial review also considered Environment Agency (EA) flood

mapping, which indicates that a significant portion of the site lies within an area at risk of flooding. However, the EA's current flood map is based on JFLOW modelling—a broad-scale approach that lacks the resolution required to accurately capture the local flood dynamics affecting the site.

Consequently, Edenvale Young has undertaken detailed fluvial hydraulic modelling for CPUK, which has been submitted to the EA to establish that it is 'fit for purpose'. The purpose of this modelling is to:

- Confirm the predicted flood risk to the site;
- Support enhancements to the site's resilience to flooding, including accounting for future climate change impacts, in recognition of the operational importance of the CPUK facility to Nestlé;
- Demonstrate that the installation of improved vehicle containment kerbs—introduced to enhance vehicle and pedestrian safety—does not result in an increased flood risk elsewhere during the Design Flood Event.

The proposed strategy to improve flood resilience comprises several elements:

- Replacement of existing kerbs with higher, vehicle-containment kerbs;
- Installation of sheet piling and a shallow flood defence across open land and around the electricity substation;
- Flood gates at access points, forming a continuous line of defence alongside the Weston Cut.

These measures are designed both to improve site safety and enhance the flood resilience of the factory. It is important to note that the main service yard will not be protected and will be allowed to flood during extreme events. The development proposal is shown in Figure 2.4.

The crest levels of the proposed defences are shown in Appendix A, and have been set at level of 32.0mAOD, this is a minimum of 300mm above the modelled 1% Annual Exceedance Probability (AEP) flood level, including a 71% allowance for climate change. This corresponds to the Upper End climate change allowance for the 2080s epoch, representing a precautionary approach.

Some localised areas of the site are predicted to flood under the Upper End climate change scenario. However, these areas remain outside the extent of flooding for the Central climate change allowance and do not displace floodwater during the Design Flood Event (DFE). As such, they are considered permissible under current flood risk guidance.

The flood extents and water levels referenced above have been determined using bespoke hydraulic modelling, as described in Section 5.

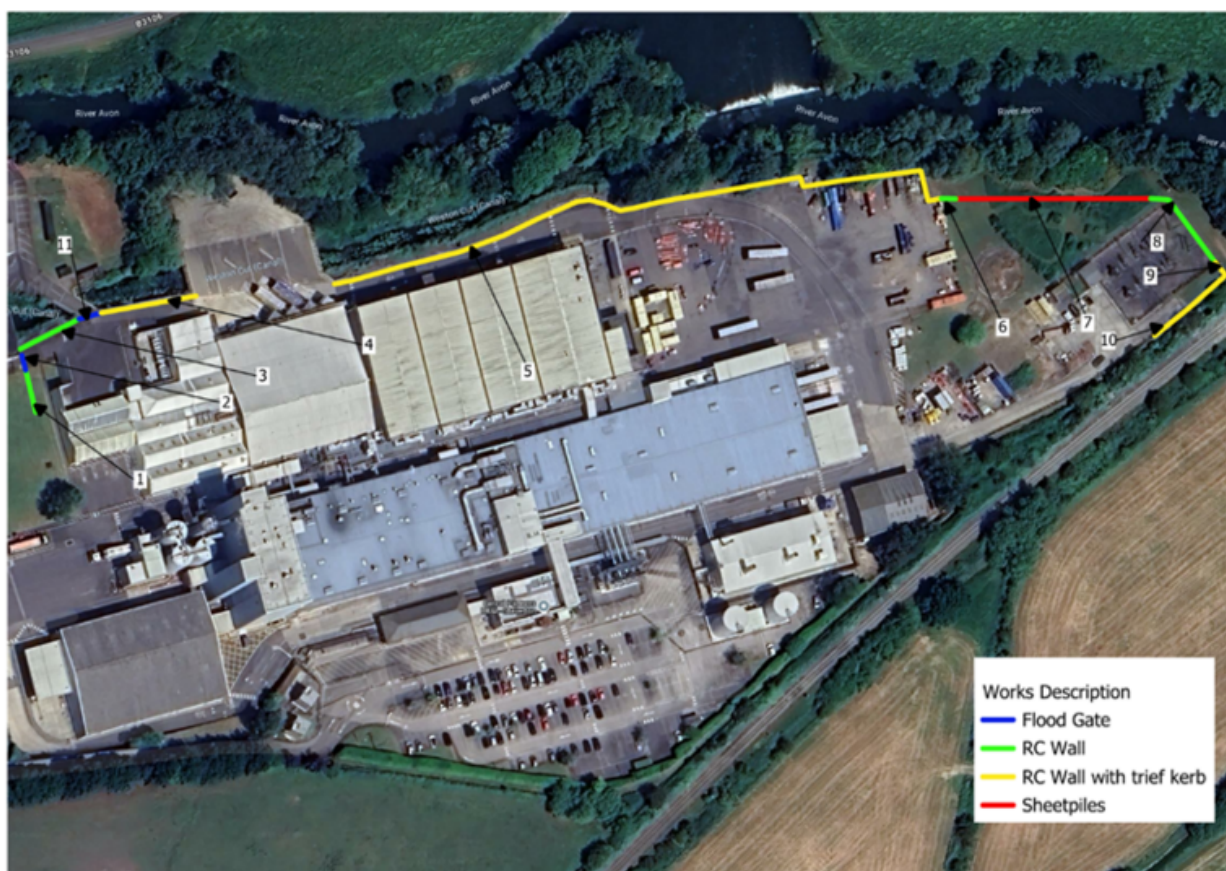


Figure 2.4: *Proposed Flood Defences*

DESK-BASED RESEARCH

3. Published Information

3.1 Environment Agency Data

Historic Flood Risk

The following documents have been assessed to understand historic flood events at the site.

- Environment Agency Product 4 (JFLOW outputs for the 1 in 100 and 1 in 1000 year events)
- The Level 1 Strategic Flood Risk Assessment (SFRA)
- Wiltshire Flood Risk Management Strategy (FRMS)
- Discussions with CPUK, which include photographic evidence of flooding obtained by CPUK

In response to a Product 4 enquiry, the EA confirmed that flooding had occurred at the site in 1925, 1979, 1982, 1900, 1999, 2012 and 2014. Their response also states that there is a "record of possible flooding pre 2012 for the area, however we are currently unable to confirm the date and source of this". This statement is somewhat unclear, but this FRA does not contest that the site has historically been subject to flooding. The EA's Historic Flood Map is shown in Figure 3.1.

It is understood that internal flooding to the Mill Building occurred in December 2012 causing damage to carpets, although this was relatively shallow, which confirms the expected order of magnitude of 10mm. There have also been several recent occasions where water levels have been a cause for concern to CPUK staff but have not resulted in flooding to the site, including November 2024, which was a record flood at Bradford on Avon, and did not flood the factory site. It did flood the B3105 at the entrance, but the water levels were lower than the ground levels in the site.

Both the SFRA and Wiltshire FRMS describe multiple flood events within the county, although the detail is insufficient to add anything to the information obtained from EA Product 4 data or discussions with CPUK.



Figure 3.1: Historical Flooding – Environment Agency.

Flood Zone Classification

Figure 3.2 shows the Flood Zone classification for the site. The mapping has been extracted from the UK Government's flood map for planning¹ and confirms that the majority of the site is shown to be within Flood Zone 2 and a small part of the site is within Flood Zone 3.

In this context, it should be noted that:

- Modelling used to derive the mapping does not include the presence of flood defences.
- The Flood Zones do not account for the impact of climate change.
- The EA's current flood map is based on JFLOW. The EA states that this data is not suitable for identifying whether an individual property will flood, for detailed decision making or for use in site specific Flood Risk or Strategic Flood Risk Assessments.

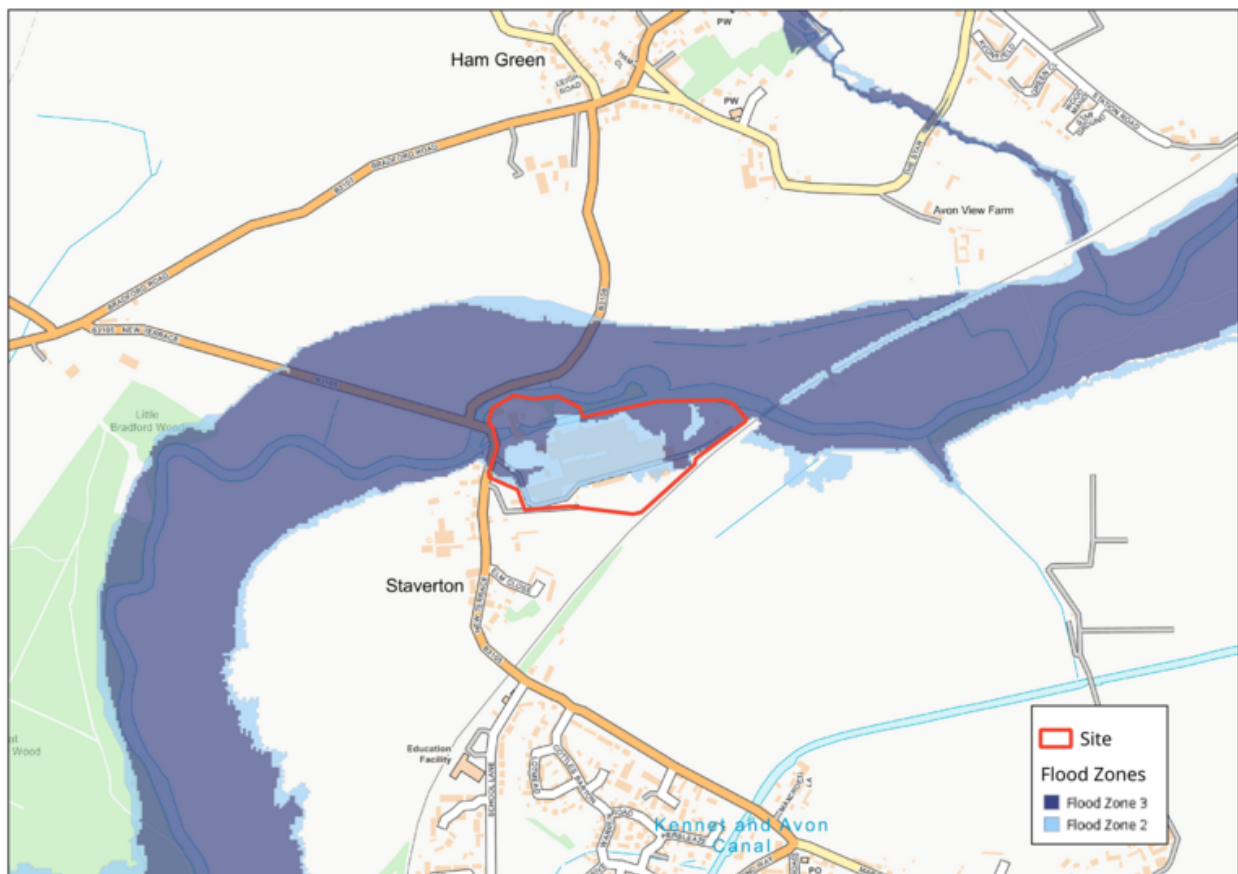


Figure 3.2: Flood Zones 2 and 3 – Environment Agency.

¹<https://flood-map-for-planning.service.gov.uk/>

Surface Water Flood Risk

Surface water flooding occurs following intense rainfall events, when water is unable to infiltrate the ground or cannot discharge to a watercourse. Figure 3.3 shows the extent of the surface water flood risk on the site in the present day. Figure 3.4 shows surface water flood risk to the site between 2040 and 2060. The mapping shows some surface water accumulation between buildings on the southern portion of the site, although in both the present day and future scenarios the mapping indicates that this will be less than 30cm deep. Flooding of this depth is predicted to be in an event which has a low chance risk of occurring – this is a chance of between 0.1% and 1% chance in a given year.

Importantly it should be recognised that the surface water mapping is broad-scale and does not take into account detailed topographic features on the site. It also does not include the existing site drainage system. It must be also noted that the EA predicted surface water flooding does not affect the local highway network.

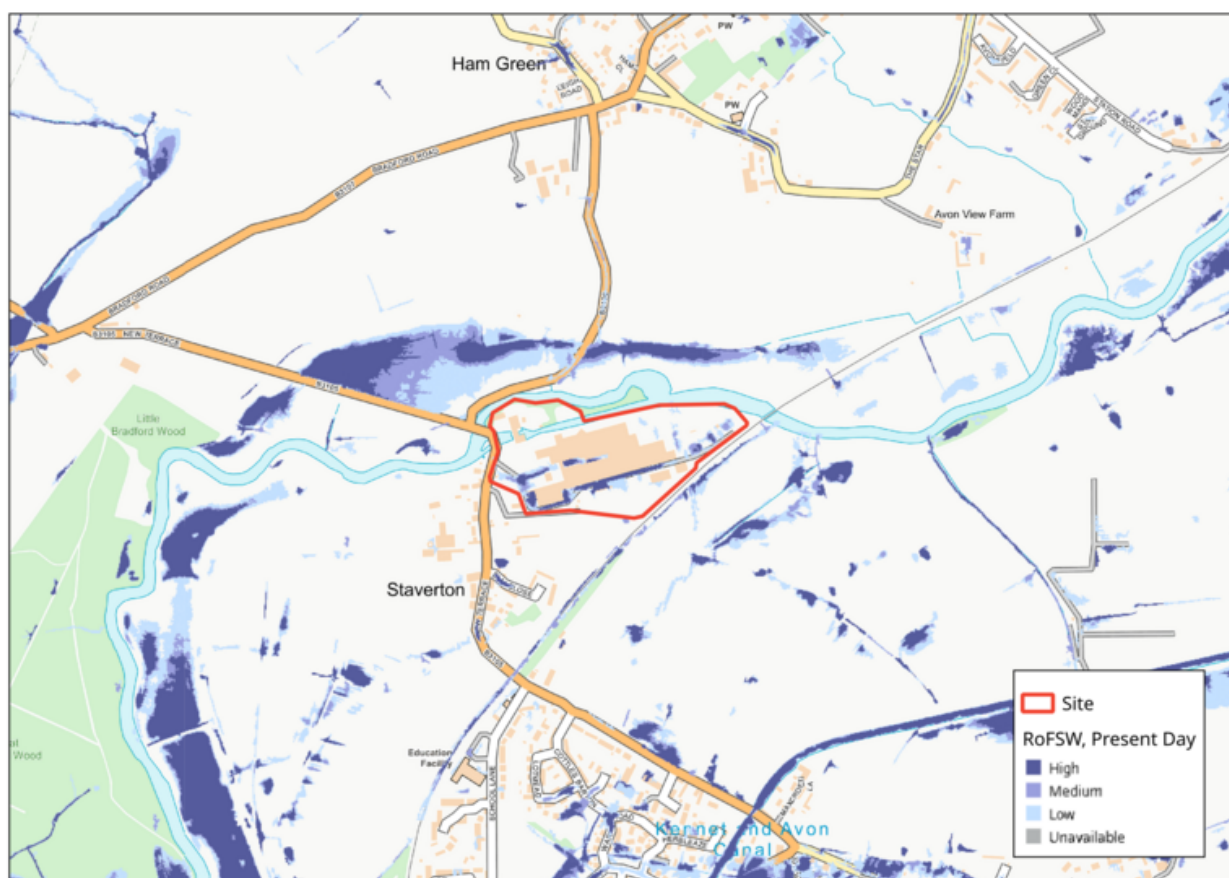


Figure 3.3: Surface water flood risk in the present day

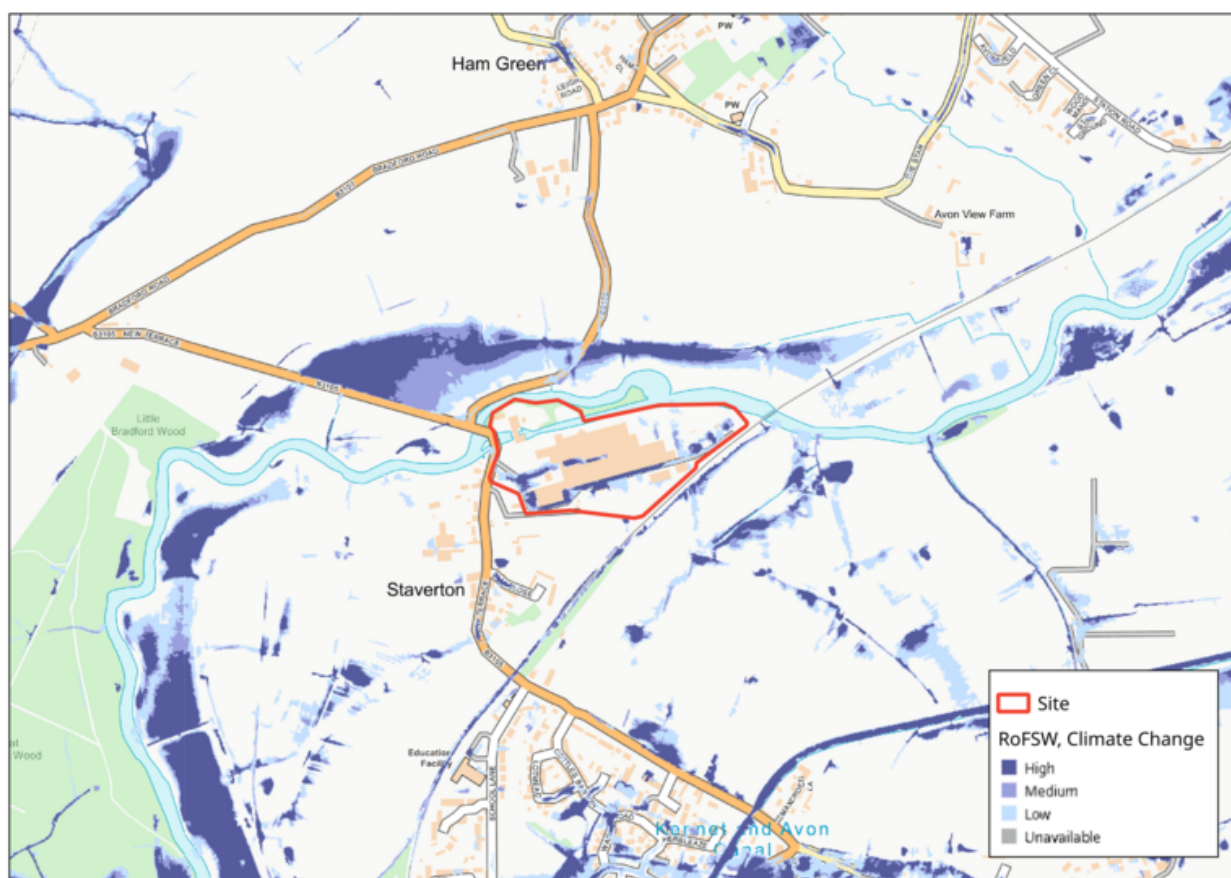


Figure 3.4: Surface water flood risk between 2040 and 2060

Reservoir Flood Risk

A copy of the Reservoir Inundation mapping is shown in Figure 3.5. This shows that the site is within an area considered at risk on a 'wet day', which is the flood extent should a reservoir fail concurrently with a fluvial flood event. The site is outside of the 'dry day' reservoir inundation flood extent. It is noted that the predicted extent of reservoir flooding appears to terminate abruptly immediately downstream of Staverton. This pattern is unusual and may warrant further investigation to understand whether it is a limitation underlying the modelling used to generate the reservoir flood extent.

The location of the reservoirs which pose a risk of flooding are not known, but the Wiltshire SFRA recognises that they are governed by the Reservoirs Act 1975 and are on a register held by the EA. The SFRA goes on to say, in Section 5.8, that due to the inspection and maintenance requirements the risk of reservoir flooding is very low.

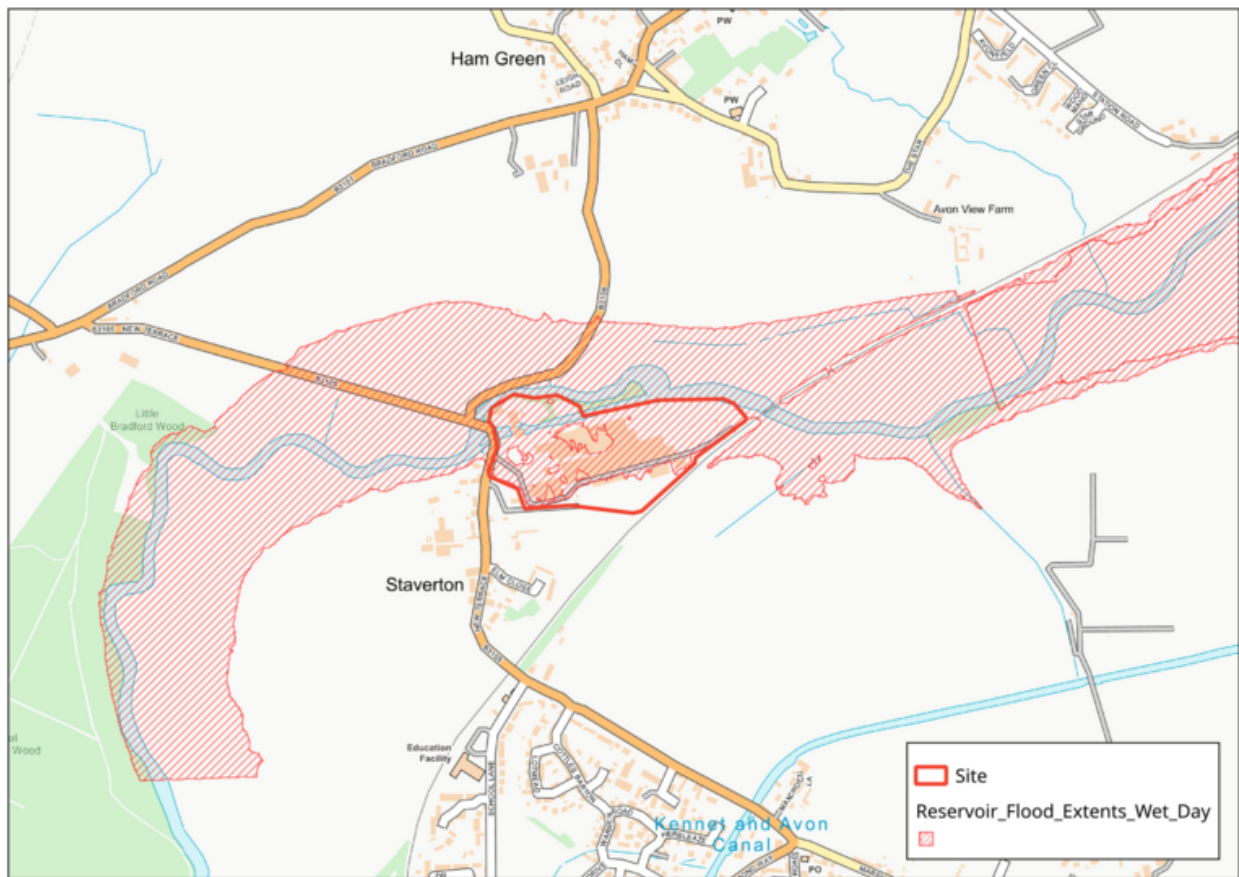


Figure 3.5: Reservoir Inundation - Environment Agency.

3.2 Strategic Flood Risk Assessment

Strategic Flood Risk Assessment

Wiltshire Council have undertaken a Strategic Flood Risk Assessment (SFRA) to inform local planning policy in relation to flood risk. This includes the following documents which have been downloaded from the Local Authority's website:

- Wiltshire Council Level 1 Strategic Flood Risk Assessment. November 2024. JBA Consulting

Wiltshire Council also provide an online Data Explorer², which allows for a higher resolution assessment of the mapping associated with the SFRA.

The SFRA has been reviewed in the context of this study and information has been used where applicable to inform the findings and recommendations of this FRA. It can be confirmed that:

- The site is within an area which is classified as being susceptible to groundwater emergence.
- Residual flood risk should be assessed as a result of overtopping or breaching of defences.
- The site is located within a Flood Warning Area³ and Flood Alert Area⁴

Flood Risk Mapping

Functional Flood Plain

The Wiltshire Council Level 1 SFRA states that the functional floodplain should be defined as:

"land which allows water to flow in times of flood with an AEP of 3.3% (1 in 30 years)."

The document notes that this is not shown by the EA Flood Zones and therefore can only be identified where detailed hydraulic modelling exists. Some locations within Wiltshire have hydraulic models which include this return period, but in many other locations the SFRA has made use of a 'proxy' result. This is the case for the site in Staverton. Figure 3.6 shows the Flood Zone 3b 'proxy' flood extent obtained from the Wiltshire SFRA Data Explorer.

Importantly, the SFRA also states that: *"Further definition of Flood Zone 3b may be required...within a site-specific Flood Risk Assessment. This should always be evidence with detailed hydraulic modelling supported by the appropriate model review process."*

This means that, whilst the site is shown to be located partially with Flood Zone 3b in accordance with the LLFA's proxy mapping, there is acknowledgement that detailed hydraulic modelling can be used

²<https://wiltscouncil.maps.arcgis.com/apps/webappviewer/index.html?id=28c00215d87b468a9a0cd79c63d3d270>

³Bristol Avon from Challymead Bridge to Bathford Bridge not including Bradford on Avon. Including Whaddon, Staverton, Avoncliff, Limpley Stoke and Claverton

⁴(Mid River Avon and Tributaries including Melksham and Bradford on Avon)

to refine the extents of Flood Zone 3b. This FRA does not seek to undertake a Flood Map Challenge, but it should be borne in mind that detailed hydraulic modelling of the site has been undertaken and submitted to the EA for a charged for service to confirm that the modelling is 'fit for purpose'.

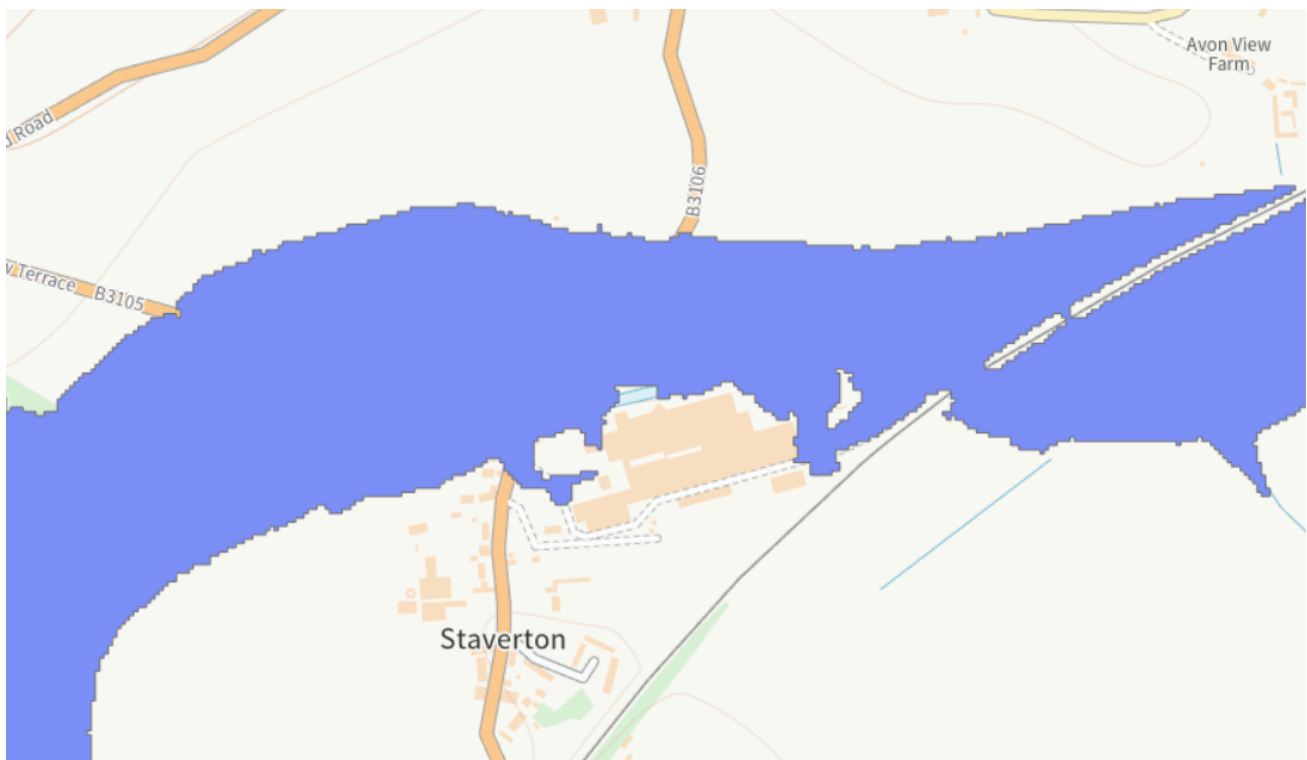


Figure 3.6: Flood Zone 3b based on the SFRA Data Explorer. This Flood Zone is not in agreement with the detailed modelling results

Sewer Flooding

The SFRA lists instances of sewer flooding within various postcodes throughout the county. There are no instances of flooding noted within the BA14 6xx postcode in which the site is located. Furthermore, CPOK has no record of sewer flooding on the site, and no surface water sewers enter from outside the site (ie passing under the railway). In terms of foul sewers, two 150mm dia sewers enter the site from nearby housing and lead to the Wessex Water treatment works in the southwest corner of the site, which then drains to the River Avon. This is maintained routinely by Wessex Water and no problems have been reported. If it spills it will flow westwards onto the B3105.

Groundwater Flooding

Groundwater emergence mapping is included in the SFRA and indicates that there is a possibility of groundwater emergence in the south eastern part of the site. This is shaded orange in Figure 3.7 below, replicated from the Wiltshire Council SFRA . The western and northern portions of the site have negligible risk from groundwater flooding. This area is shaded blue on the image below. A very small area of red shading indicates that groundwater may emerge at significant rates, but this area is coincident with the Weston Cut.

The Wiltshire SFRA notes that the groundwater mapping is intended for general, broadscale assessments rather than single locations. The nature of the proposed flood mitigation measures are such that groundwater flood risk is not considered a significant issue.

No groundwater flooding has been noted on the site.

-  This zone is deemed as having a negligible risk from groundwater flooding due to the nature of the local geological deposits.
-  Flooding from groundwater is not likely.
-  There is a risk of flooding to subsurface assets but surface manifestation of groundwater is unlikely.
-  Within this zone there is a risk of groundwater flooding to surface and subsurface assets.
-  There is the possibility of groundwater emerging at the surface locally.
-  Within this zone there is a risk of groundwater flooding to both surface and subsurface assets.
-  Groundwater may emerge at significant rates and has the capacity to flow overland and/or pond within any topographic low spots.

Figure 3.8: Groundwater emergence legend

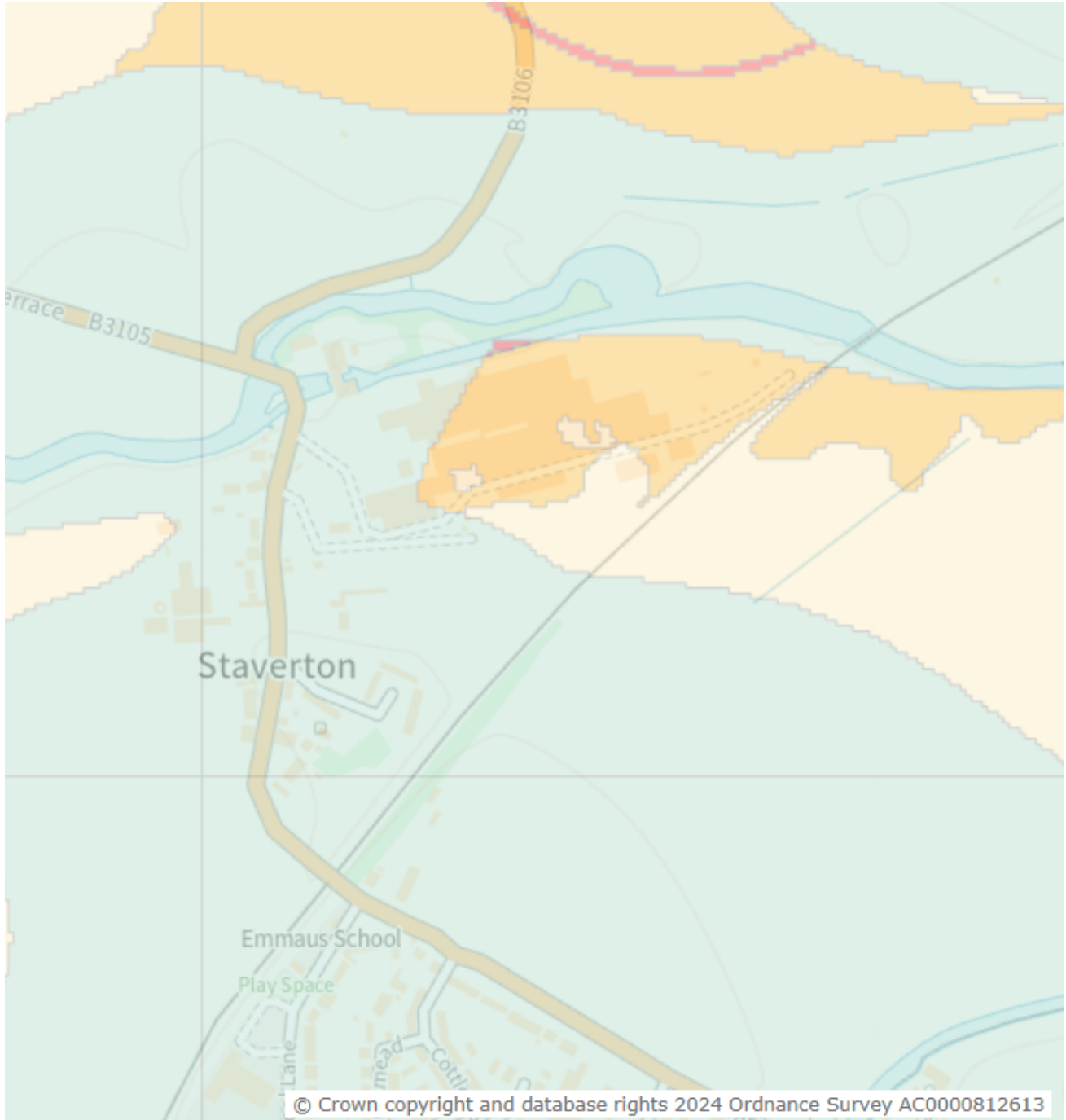


Figure 3.7: Groundwater emergence mapping

4. National Planning Policy

4.1 Overview

The National Planning Policy Framework (NPPF) clauses 161 to 186 detail the policy associated with flooding, giving risk-based approach for managing flood risk. This includes:

- Sequential Testing – Clause 175
- Exception Testing – Clauses 177 to 179

These issues are discussed in more detail in subsequent sections.

4.2 The Sequential Test

The Sequential Test is used to, where possible, steer development to sites at a lesser risk of flooding. This document does not explicitly address the Sequential Test, but given that the proposal is for a series of flood mitigation measures designed to protect the CPUK site, the implication is that they cannot be located elsewhere and therefore the proposals pass the Sequential Test.

4.3 Vulnerability

Flood Risk Vulnerability is determined by the use of the development and falls into one of five classifications which ranges from Essential Infrastructure to Water Compatible. These classifications are used to determine whether a proposed development is compatible with the flood zone in which it is located. Annex 3 of the NPPF and Table 2 of the Flood Risk and Coastal Change Guidance gives the Flood Risk Vulnerability for a range of different types of development.

The proposed interventions are a series of flood control measures, including raised kerbs, banks and flood gates. These are regarded as being **Water Compatible** in accordance with Table 2 of the NPPF shown in Table 4.1. Furthermore, as a commercial site this is categorised as Less Vulnerable in Annex 3 of the NPPF, the site is the appropriate flood risk to inform the Design Flood Event is therefore 'Central'.

4.4 The Exception Test

Table 2 of the Flood Risk and Coastal Change Guidance is reproduced as Table 4.1. This shows whether a particular type of development (i.e vulnerability) is compatible with the flood zone in which it is located. As noted above, the site is located partially within Flood Zone 3b and considered to be Water Compatible. Table 3 confirms that:

- Water Compatible development is acceptable within Flood Zone 3b.

Common development types Flood Risk Vulnerability:

- Essential Infrastructure – Essential transport infrastructure (including mass evacuation routes)
- Highly Vulnerable – Base-ment dwellings; operational police and ambulance stations
- More Vulnerable – Housing, halls of residence and hospitals
- Less Vulnerable – Shops, restaurants, cafes and offices
- Water Compatible – Flood control infrastructure, water-based recreation, nature conservation and biodiversity

- There is no requirement for an Exception Test, but the proposals should meet the additional requirements set out below.

Flood Zone	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Comp. Vulnerable
Zone 1	Yes	Yes	Yes	Yes	Yes
Zone 2	Yes	Exception Test	Yes	Yes	Yes
Zone 3a	Exception Test	No	Exception Test	Yes	Yes
Zone 3b	Exception Test*	No	No	No	Yes*

Table 4.1: Flood Zone and Vulnerability Compatibility (Table 2 of NPPF)

It must be emphasised that, even where proposed flood resilience measures are classified as water-compatible, the appropriate Design Flood Event (DFE) for assessing their performance and potential impacts is the Central climate change allowance DFE, not Flood Zone 3b.

**In Flood Zone 3b (functional floodplain) essential infrastructure that has to be there and has passed the Exception Test, and water-compatible uses, should be designed and constructed to:*

- *remain operational and safe for users in times of flood*
- *result in no net loss of floodplain storage*
- *not impede water flows and not increase flood risk elsewhere*

This FRA seeks to demonstrate that these requirements can be met.

4.5 Additional Requirements

In addition to the above requirements, Clause 181 of the NPPF states that:

When determining any planning applications, local planning authorities should ensure that flood risk is not increased elsewhere. Where appropriate, applications should be supported by a site-specific flood-risk assessment. Development should only be allowed in areas at risk of flooding where, in the light of this assessment (and the sequential and exception tests, as applicable) it can be demonstrated that:

- *within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location;*
- *the development is appropriately flood resistant and resilient such that, in the event of a flood, it could be quickly brought back into use without significant refurbishment;*
- *it incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate;*
- *any residual risk can be safely managed; and*

- *safe access and escape routes are included where appropriate, as part of an agreed emergency plan.*

It should be noted that, due to the nature of the proposals in this instance, many of the above requirements are not applicable. Furthermore, the flood modelling has shown that there is safe access within the factory site, above the level at which flooding is shown to be a risk.

4.6 Climate Change

Climate Change Epoch	Percentage
Central 2080s	26%
Higher Central 2080s	39%
Upper End 2080s	71%

Table 4.2: *Climate Change Allowances for Flow from EA Flood Risk Assessments: climate change allowances, peak river flow map.*

Technical Guidance for climate change gives the flow allowances appropriate to the development. The allowances have been extracted from the EA's Peak River Flow Map¹. The percentage to be applied is dependent on the development type and life span of the development. The relevant information is summarised below:

- Development Type: Water Compatible Flood Risk Infrastructure.
- Development Lifespan – 100 years

Table 4.2 shows the climate change allowances for fluvial flow which are applicable to the scheme. For Water Compatible development in all Flood Zones, the Central allowance should be used to inform the Design Flood Level. For the purpose of this study, however, the Upper End allowance has been used in order that a precautionary approach is applied.

¹<https://environment.data.gov.uk/hydrology/climate-change-allowances/river-flow?mgmtcatid=3005>

BESKPOKE ANALYSIS

5. Hydraulic Modelling and Hydrology

5.1 Overview

A bespoke hydrological analysis and hydraulic modelling exercise were undertaken for the purpose of this study. This is described in a separate hydraulic modelling report which is included as Appendix B and provides details on the hydrological analysis. The hydraulic model and report have been submitted to the EA to seek acceptance that it is 'fit for purpose' as part of the chargeable advice. The 1% AEP event plus 26% and 71% allowances for climate change are presented below for the baseline model scenario. The 1% AEP plus 71% allowance for climate change is larger than the modelled 0.1% AEP event.

5.2 Baseline Model Results

Figures 5.1 to 5.5 below show the modelled flood extents in the Baseline case for a range of return periods.

5.3 Proposed Model Scenario

It is not necessary to model a post-development scenario as the proposed mitigation measures are located outside of the 1% AEP plus 26% allowance for climate change extent. Modelling this scenario would result in no change to the flood extents or levels as the defences would not interact with the flood water. This is shown in Figure 5.6.

The heights of the proposed defences are 32.0mAOD and are based on the 1% AEP plus 71% allowance for climate change level with a minimum of 300mm freeboard. This represents a precautionary approach, given that the Central climate change allowance is considered as the Design Flood.

5.4 Results Summary

In the 3.33% AEP event, the majority of the site is flood free, with inundation only of the very north west corner of the site. This building is known as the Chambourcy Building, it is located outside the area being protected. There are no current proposals to change this area.

In the 1% AEP event, the area around the Mill Building is flooded, including some of the open parking areas along the northern boundary of the site adjacent to the River Avon. Based on a building threshold level of 31.14mAOD, the Mill Building would not be inundated in this event. This pattern of flooding is largely replicated in the 1% AEP plus allowance for climate events; the extent of flooding increases somewhat, but is constrained to the area to the north of the Weston Cut. Only in the event where a 71% allowance for climate is applied do water levels exceed the threshold of the Mill Building

(predicted water level of 31.26m AOD 1 in 100 + 71% climate change level).

Throughout all events, the model shows that the southern portion of the site remains flood free.

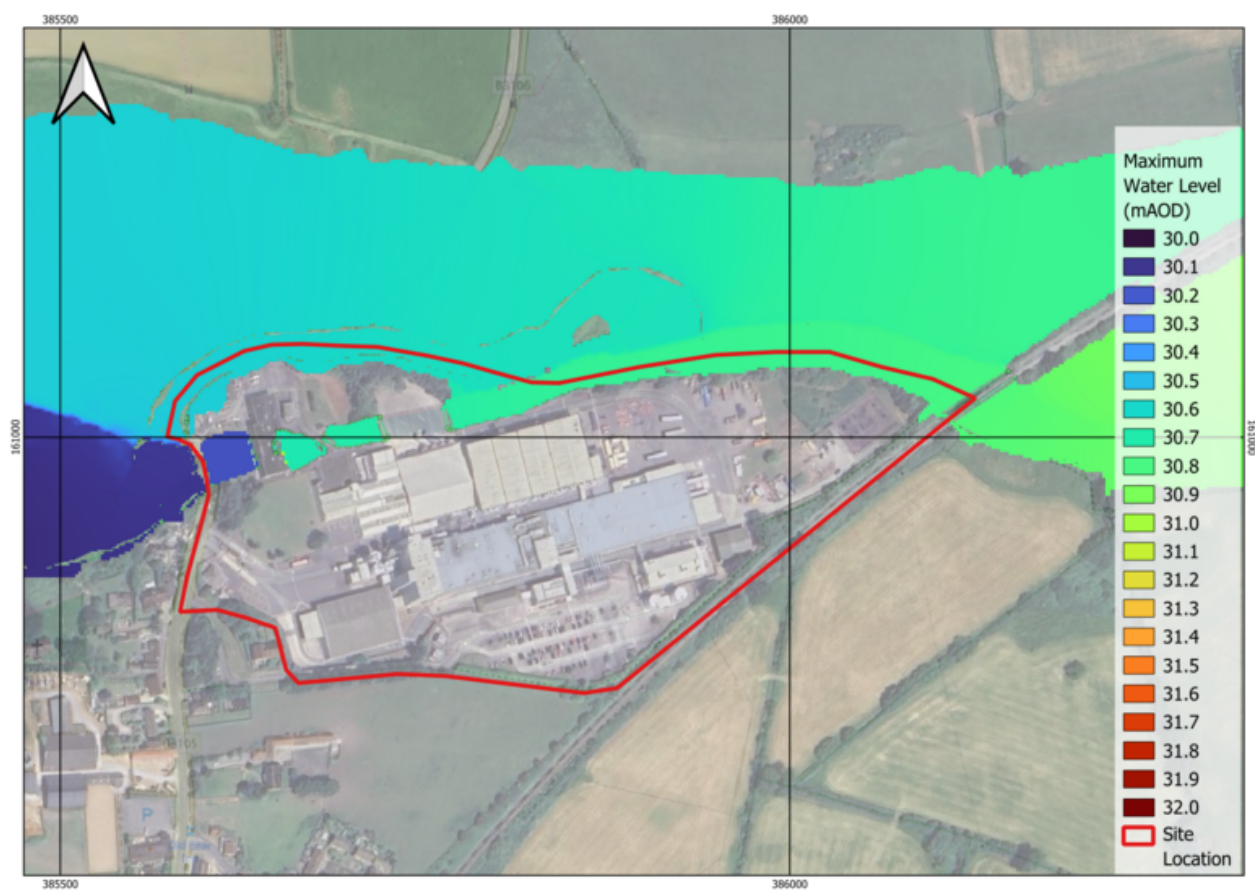


Figure 5.1: Maximum modelled flood extent in the 5% AEP event

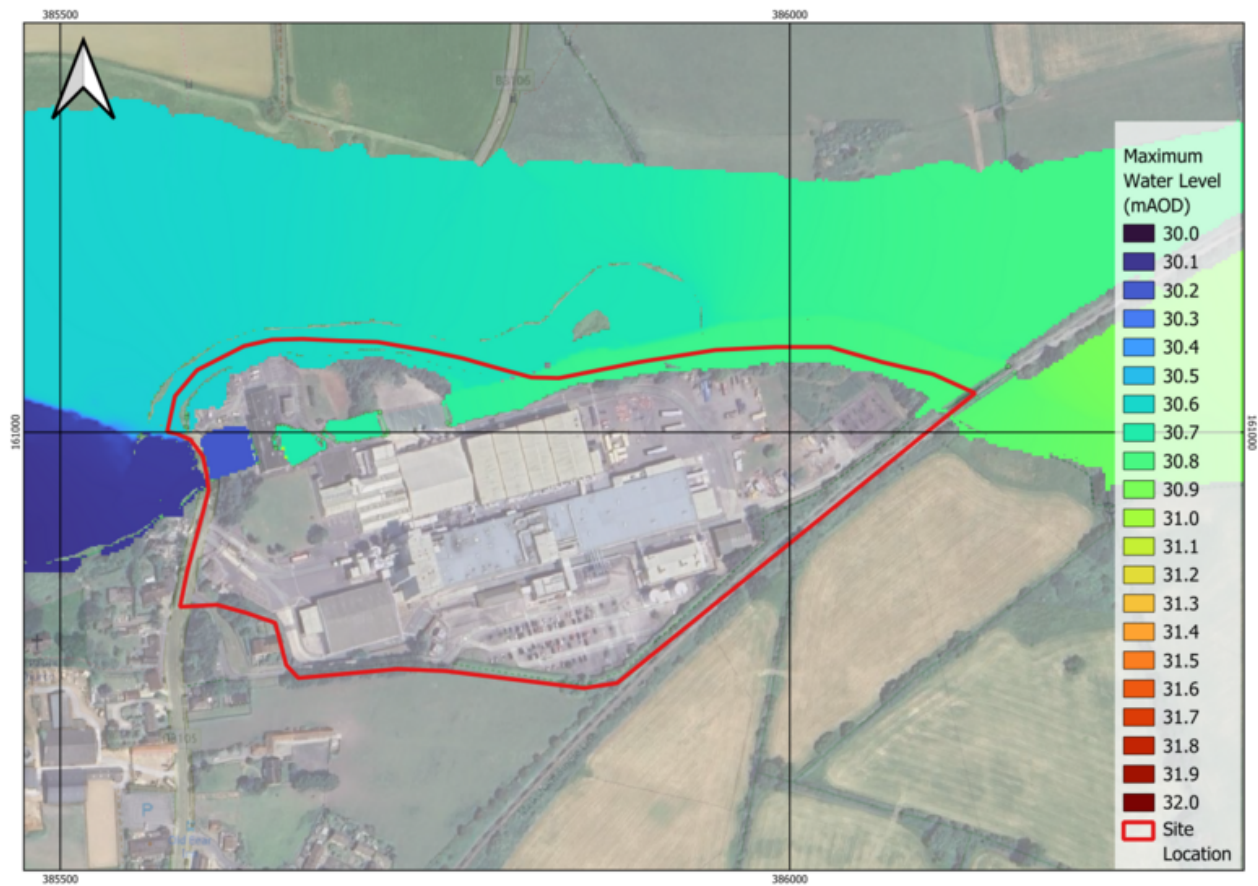


Figure 5.2: Maximum modelled flood extent in the 3.33% AEP event



Figure 5.3: Maximum modelled flood extent in the 1% AEP event

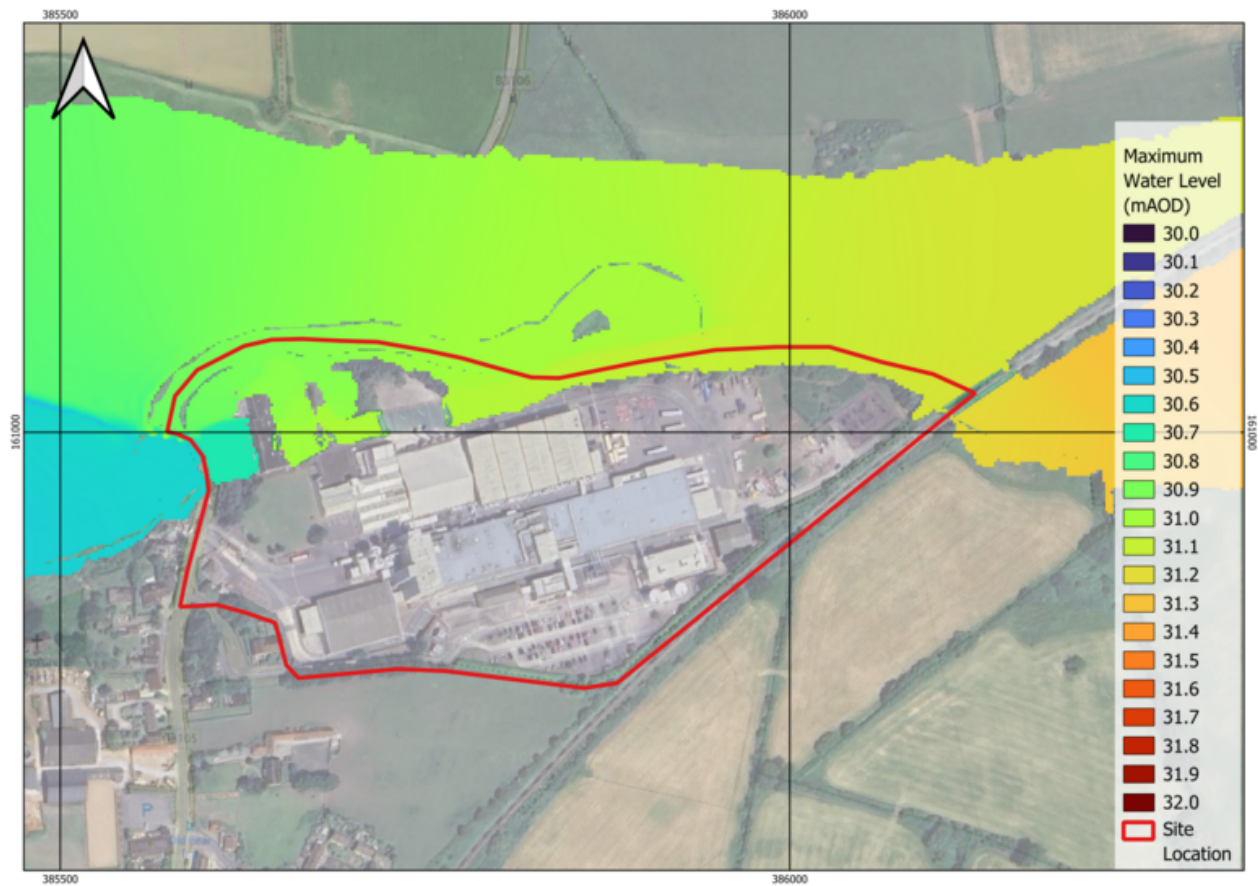


Figure 5.4: Maximum modelled flood extent in the 1% AEP event plus 26% allowance for climate change

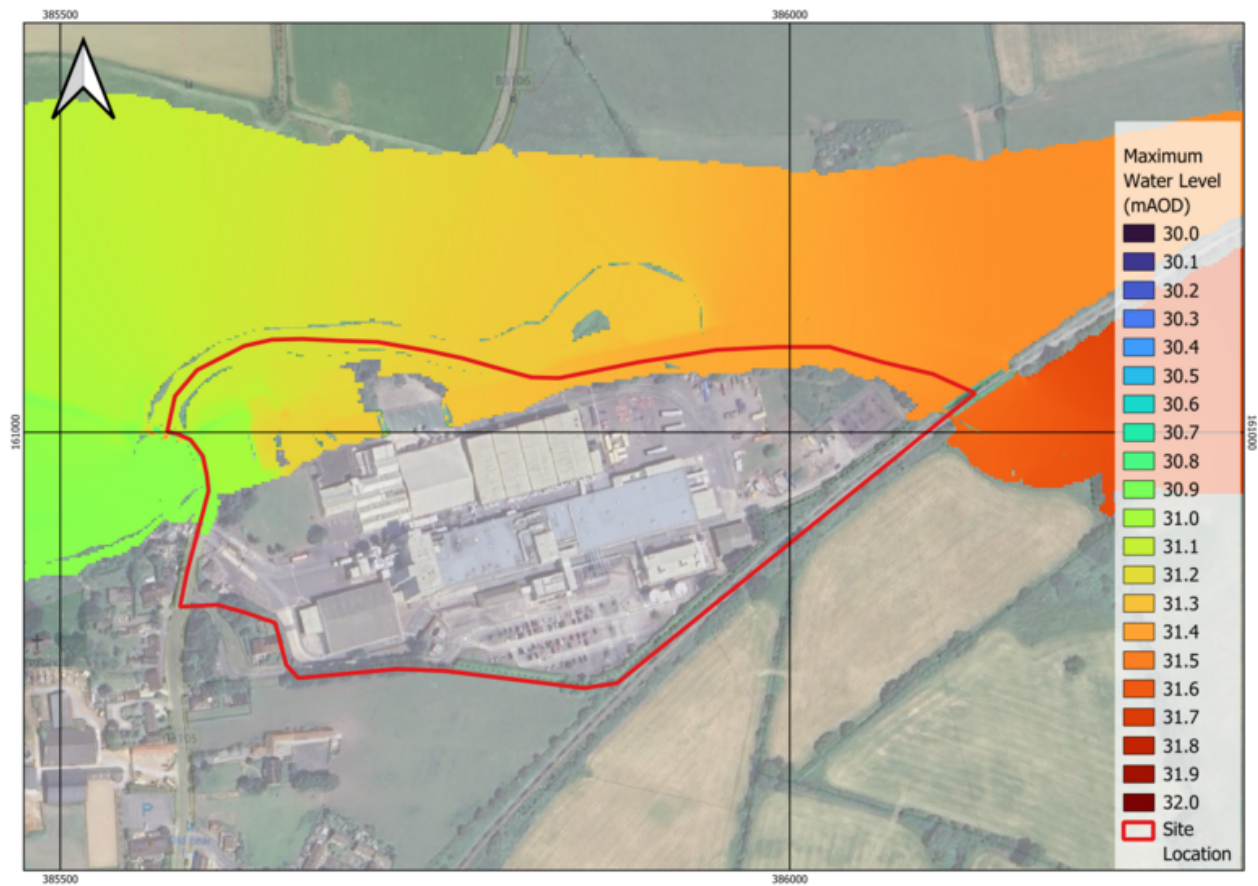


Figure 5.5: Maximum modelled flood extent in the 1% AEP event plus 71% allowance for climate change

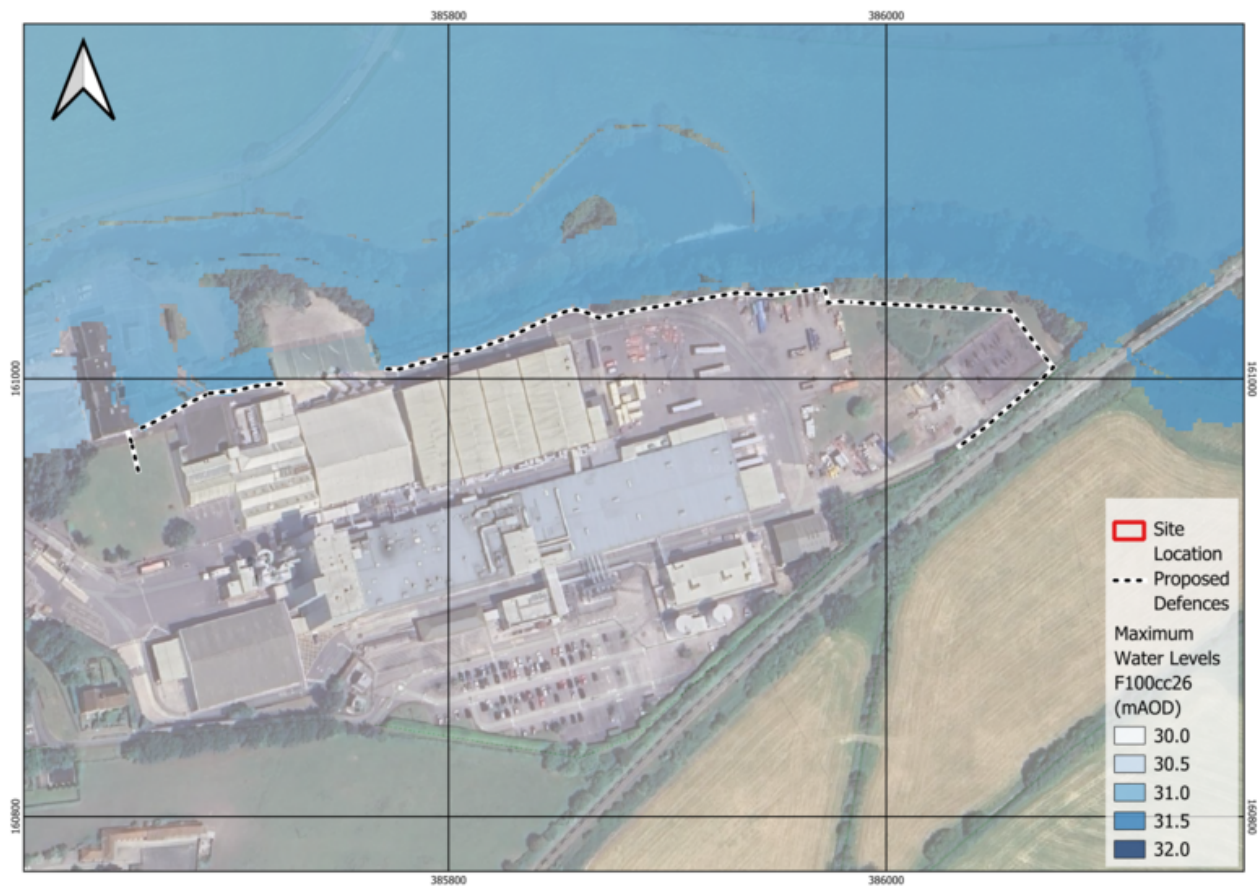


Figure 5.6: Maximum modelled flood extent in the 1% AEP event plus 26% allowance for climate change with proposed defences outline

SUMMARY

6. Flood Risk Overview

6.1 Fluvial Flood Risk

The site is shown to be at risk of flooding from the River Avon in large events and has been subject to historic flooding. Bespoke hydraulic and hydrological modelling has been undertaken which shows that the southern portion of the site is flood free in the Design Flood Event, but there is flood risk to the area north of the Weston Cut including the Mill Building and Chambourcy Building. A flood resilience strategy has been proposed to protect the southern site against extreme events. The northern site will not be modified.

6.2 Pluvial Flood Risk

There is some risk of surface water flooding shown within the site, although this is typically of a comparatively shallow depth it has not been experienced by CPUK. The EA mapping which shows this does not include existing site drainage, nor a detailed representation of site topography.

The flood resilience features proposed in this document are minor, linear features that would not may have the effect of altering overland run-off routes on and from the site. Whilst the available model results show a limited area of water accumulation between buildings, this may be because other areas of the site are subject to only very shallow depths of water during a rainfall event which are not shown on the mapped outputs.

It is advised that further consideration is given to this at the detailed design stage, and features such as non-return valves are installed in order that ponding does not occur on the landward side of the proposed measures. It may be prudent to undertaken an assessment of the existing site drainage and the direction of overland flow to better inform such features.

6.3 Flooding from Other Sources

There have been no known instances of sewer flooding at the site. Whilst the groundwater emergence mapping indicates that there may be a risk of groundwater flooding to surface or subsurface features. Given the nature of the proposals that are set out in this FRA, this is not considered to be a significant risk.

The site is at risk of reservoir inundation should failure of the reservoir occur at the same time as fluvial flooding but as the Wiltshire SFRA states this is a low risk.

OVERVIEW

7. Compliance with Local and National Policy

7.1 Compliance with the NPPF

In this instance, the proposed measures are Water Compatible and have been located outside of the modelled 1% AEP plus 26% allowance for climate change. They will therefore result in no loss of floodplain storage during an event larger than the Design Flood, or increase flood risk elsewhere. During the fluvial Design Flood they will not increase flood risk elsewhere as there will be no interaction with flood water.

As the proposal is precautionary for flood resilience measures, they will inherently remain operational during times of flood.

It is acknowledged that installation of these measures may have an impact on overland flow from surface water, with the potential for ponding of water behind the modifications. Given that there is already a drainage system on-site, this is unlikely to be significant. Consideration of this during the detailed design phase will allow for the inclusion of flapped valves and similar features to allow water to drain away and not enter the site through the pipes.

7.2 Compliance with Local Policy

As the proposed measures are located outside of the 1% AEP plus 26% allowance for climate change flood extent. Although the SFRA requests that residual flood risk is assessed, this means that undertaking a breach analysis would be of no benefit in this instance.

8. Summary

8.1 Conclusions

An FRA has been undertaken in respect to proposed flood risk resilience measures for CPUK due to their concern over the EA's published Flood Risk Mapping. However, these are based on JFLOW and do not result from a site-specific assessment. CPUK wish to improve vehicle and pedestrian safety with kerbing and provide precautionary reduction in flood risk. Modelling was undertaken to demonstrate that this kerbing would be safe, without increasing flood risk elsewhere. The following conclusions can be drawn:

- Kerb replacement is proposed at the CPUK site in Staverton, Wiltshire to provide precautionary flood resilience measures.
- The site has been subject to historic flooding and it is shown to have been subject to fluvial flooding, but CPUK have no record of this affecting the southern part of the site.
- Review of Environment Agency and local data indicate that the site is at low risk of surface water flooding.
- The site is in an area of possible groundwater emergence and reservoir inundation. Neither of these risks of flooding are considered relevant to the current proposals.
- Flood control infrastructure is proposed to protect the existing buildings on the site in extreme events. This is considered as Water Compatible development and is appropriate to protect the site – the buildings FFL are above the predicted flood level and defences.
- Site-specific hydrological and hydraulic modelling has been undertaken to provide a detailed picture of fluvial flood risk at the site and to inform the placement and height of the proposed flood control infrastructure.
- It has been demonstrated that the proposed measures will meet the requirements of the NPPF, subject to the recommendations set out below.

8.2 Recommendations

Recommendations have been made within the FRA and are summarised below.

- Vehicle and pedestrian measures can be installed as set out on the drawings without increasing flood risk elsewhere.
- The mitigation strategy allows for flooding to the service yard to occur in large events and continue to the Mill Building. However, the Mill Building and Chambourcy building are vacant. It would therefore be prudent to produce a flood response plan. This should also include information on what would trigger the closure of flood gates.

- Maintenance of the existing drainage system must be done regularly and non-return valves/tide flaps to the drainage outfalls should be installed.
- The new kerbs will allow water to overtop in the exceedance event before the factory floor is affected by surface water flooding. Information from the SFRA suggests that the site may be susceptible to groundwater emergence which could impact infiltration and this should be borne in mind.



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