GeoSmart Information

# FloodSmart Plus

## Flood Risk Assessment

### Site Address

8 Bath Road
Melksham
Wiltshire
SN12 6LP

### Grid Reference

390475, 164045

### Report Prepared for

Maplecroft Estates Ltd

19 Willoway Lane,

Braunton,

Devon,

EX33 1BS

### Date

2022-05-30

### Report Status

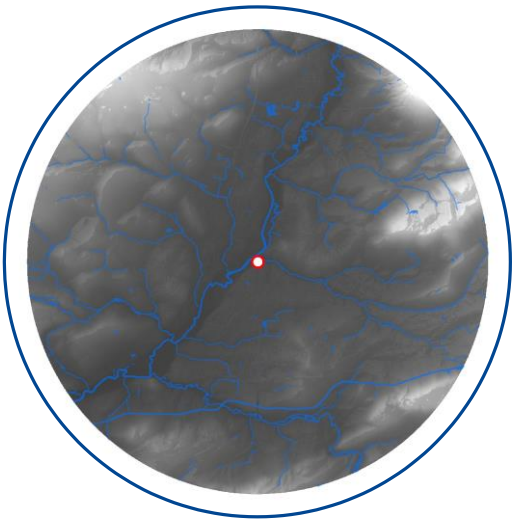
FINAL

### Site Area

0.012ha

### Report Reference

77113R1



## RISK - Very Low to High

The Site is located within a fluvial Flood Zone 3 (high probability). Taking into consideration the presence of defences, the risk of flooding from rivers and sea is classed as Medium-High.

The Site is at a Very Low-High risk of pluvial flooding and a Negligible risk of groundwater flooding.

The Site is at risk of reservoir flooding from the Corsham reservoir approximately 7km to the north west. Reservoir flooding is extremely unlikely to occur (EA, 2022).


### Report Author

Rebecca Conway

Consultant

### Report Checker

Jessica Bayliff

Senior Project Consultant

### Report Reviewer

David South

Senior Project Consultant

GeoSmart Information Ltd
Suite 9-11, 1st Floor, Old Bank Buildings,
Bellstone, Shrewsbury, SY1 1HU

[redacted]

www.geosmartinfo.co.uk



The Property Ombudsman Consumer Redress

COPSO ASSOCIATE MEMBER

SearchCode™

RIBA CPD PROVIDERS NETWORK

# 1. Executive summary

A review has been undertaken of national environmental data sets to assess the flood risk to the Site from all sources of flooding in accordance with the National Planning Policy Framework (NPPF) (2021) and National Planning Practice Guidance (NPPG) (2014). A site-specific flood risk assessment, to assess the flood risk to and from the development Site, is provided within this concise interpretative report written by an experienced GeoSmart consultant. Baseline flood risk and residual risks that remain after the flood risk management and mitigation measures are implemented are summarised in the table below.

## Site analysis

| Source of Flood Risk | Baseline | After Mitigation |
|---|---|---|
| River (fluvial) flooding | Medium-High | Low |
| Sea (coastal/tidal) flooding | N/A | N/A |
| Surface water (pluvial) flooding | Very Low-High | Very Low-Low |
| Groundwater flooding | Negligible | N/A |
| Other flood risk factors present | Yes | Yes |
| Is any other further work recommended? | Yes | Yes (see below) |

N/A = mitigation not required

### Summary of existing and proposed development

The Site is currently used within a commercial capacity as a two-storey office facility with associated access and car parking.

Development proposals comprise the conversion of the existing building into a three-bedroomed dwelling. Finished Floor Levels are raised 0.636m above ground levels on Site. Existing access and car parking will be retained. Site plans are included within Appendix A.

## Summary of flood risks

The flood risks from all sources have been assessed as part of this report and are as follows:

- According to the Environment Agency's (EA) Flood Map for Planning Purposes, the Site is located within a fluvial Flood Zone 3 (High probability).
- Although the Site is not located within an EA designated 'Area Benefitting from Defences", the Site benefits from the presence of flood defences, 60 m to the north east in fair condition, designed to provide a 1 in 30 year event standard of protection.
- The Site also benefits from the presence of flood defences, 115 m to the north in fair condition, designed to provide a 1 in 200 year event standard of protection.
- The Site is located 115m to the south east of the River Avon.
- According to the EA's Risk of Flooding from Rivers and Sea (RoFRS) map, which considers the type, condition and crest height of flood defences, the Site has a Medium-High risk of flooding from Rivers and the Sea.
- Modelled flood data obtained from the EA has been analysed in line with the most up to date guidance on climate change (EA, 2022), to confirm a maximum "design" flood level at the Site.

  During a 1 in 100 year plus 26% climate change allowance event the flood level at the Site would be 34.73 mAOD.

  During this event, flood depths in the area proposed for development could be between 0.23 to 0.73m. Flood mitigation measures are included in the next section.

  Emergency evacuation routes are available to the south. In the event of a flood, safe refuge can be taken on the 1st floor level.
- According to the EA's Risk of Flooding from Surface Water (pluvial) flood mapping, the Site is at a variable risk of pluvial flooding ranging from Very Low to High.
  - An area adjacent to the southern western boundary of the Site is affected during the High risk (>3.3% AEP) event with flood depths up to 0.6 m.
  - A small area within the south west of the Site is affected during the Medium risk (3.3 – 1% AEP) event with flood depths up to 0.6 m.
  - The south west and north east of the Site are affected during the Low risk (1- 0.1% AEP) event with flood depths up to 0.6 m on Site and up to 0.9 m adjacent to the south western boundary.
  - The rest of the Site is not impacted and is considered to be at Very Low risk of pluvial flooding
- Groundwater Flood Risk screening data indicates there is a Negligible risk of groundwater flooding at the surface in the vicinity of the Site during a 1 in 100 year event.
- The risk of flooding from artificial (man-made) sources such as reservoirs, sewers and canals has been assessed:

- The EA's Risk of Flooding from Reservoir map confirms the Site is at risk of reservoir flooding.
- Ordnance Survey (OS) data confirms there are no canals near to the Site.
- A sewer flooding history search was undertaken using the Strategic Flood Risk Assessment (JBA Consulting, 2019). This confirms no recorded incidences of sewer flooding at or within the vicinity of the Site

A risk has been identified from reservoirs, although the level of risk could not be determined.

- The risk to the development has been assessed over its expected 100 year lifetime, including appropriate allowances for the impacts of climate change. More extreme weather events could increase the risk to the Site from increases in river flooding and an increased potential for surface water flooding. Site specific assessment indicates risk to the Site will increase significantly and appropriate mitigation measures are proposed.

# Recommendations / Next steps

Recommendations for mitigation are provided below, based upon the proposed development and the flood risk identified at the Site.

- Whilst there is a risk of flooding from fluvial sources, where flood depths could be up to 0.73m in depth, it is recognised, from photographic evidence supplied by the client that Finished Floor Levels of the building are 0.636m above ground levels. To mitigate against remaining flood levels (up to 0.1m in depth) a series of standard mitigation measures should be employed. Measures should be employed above the existing Finished Floor Levels on Site. Measures include, but are not limited to:
  - Passive flood door systems;
  - Air brick covers (manual or automatic closing);
  - Non-return flap valves on sewer outfalls.
  - Sustainable Drainage Systems (SuDS) to store/intercept flood water;
- The mitigation measures detailed above for river flood risk are likely to be suitable for the relatively shallow flood depths which could be experienced in a 1 in 30 year and 1 in 100 year pluvial flood event. In addition, the regular maintenance of any drains and culverts surrounding/on the Site should be undertaken to reduce the flood risk.
- Occupants of the Site should be signed up to receive EA Flood Alerts and Flood Warnings.

GeoSmart recommend the mitigation measures discussed within this report are considered as part of the proposed development where possible and evidence of this is provided to the Local Planning Authority as part of the planning application.

# 2. Introduction

## Background and purpose

A site-specific flood risk assessment has been undertaken, to assess the flood risk to and from the development Site. This assessment has been undertaken by firstly compiling information concerning the Site and the surrounding area. The information gathered was then used to construct a 'conceptual site model', including an understanding of the appropriateness of the development as defined in the NPPF (2021) and the source(s) of any flood risk present. Finally, a preliminary assessment of the steps that can be taken to manage any flood risk to the development was undertaken.

This report has been prepared with reference to the NPPF (2021) and NPPG (2014).

"*The National Planning Policy Framework set out the Government's planning policies for England and how these are expected to be applied*" (NPPF, 2021).

The NPPF (2021) and NPPG (2014) promote a sequential, risk based approach to the location of development. This also applies to locating a development within a Site which has a variable risk of flooding.

"*This general approach is designed to ensure that areas at little or no risk of flooding from any source are developed in preference to areas at higher risk. The aim should be to keep development out of medium and high risk flood areas (Flood Zones 2 and 3) and other areas affected by other sources of flooding where possible*" (NPPG, 2014).

The purpose of this report is to provide clear and pragmatic advice regarding the nature and potential significance of flood hazards which may be present at the Site.

## Report scope

In accordance with the requirements set out within NPPG 2014 (Paragraph: 030 Reference ID: 7-030-20140306), a thorough review of a commercially available flood risk report and EA supplied data indicating potential sources of flood risk to the Site from rivers and coastal sources, surface run-off (pluvial), groundwater and reservoirs, including historical flood information and modelled flood extent. Appropriate measures are recommended to manage and mitigate the flood risk to the property.

Information obtained from the EA and a review of the Wiltshire Council Strategic Flood Risk Assessment (JBA Consulting, 2019) is used to ascertain local flooding issues and, where appropriate, identify information to support a Sequential and/or Exception test required as part of the NPPF (2021).

The existing and future flood risks to and from the Site from all flood sources is assessed in line with current best practice using the best available data. The risk to the development has been assessed over its expected lifetime, including appropriate allowances for the impacts of climate change. Residual risks that remain after the flood risk management and mitigation

measures are implemented, are considered with an explanation of how these risks can be managed to keep the users of the development safe over its lifetime.

An indication of whether the Site will potentially increase flood risk elsewhere is provided, including where the proposed development increases the building footprint at the Site. A drainage strategy to control runoff can be commissioned separately if identified as a requirement within this report.

# Report limitations

It is noted that the findings presented in this report are based on a desk study of information supplied by third parties. Whilst we assume that all information is representative of past and present conditions, we can offer no guarantee as to its validity and a proportionate programme of site investigations would be required to fully verify these findings.

The basemap used is the OS Street View 1:10,000 scale, however the Site boundary has been drawn using BlueSky aerial imagery to ensure the correct extent and proportion of the Site is analysed.

This report excludes consideration of potential hazards arising from any activities at the Site other than normal use and occupancy for the intended land uses. Hazards associated with any other activities have not been assessed and must be subject to a specific risk assessment by the parties responsible for those activities.

# Datasets

The following table shows the sources of information that have been consulted as part of this report:

### Table 1. Datasets consulted to obtain confirmation of sources of flooding and risk

| Source of flooding | Datasets consulted | | | |
|---|---|---|---|---|
| | Commercial Flood Maps | Local Policy & Guidance Documents* | Environment Agency (Appendix B) | OS Data |
| Historical | X | X | X | |
| River (fluvial) / Sea (tidal/coastal) | X | X | X | |

| Source of flooding | Datasets consulted | | | |
|---|---|---|---|---|
| | Commercial Flood Maps | Local Policy & Guidance Documents* | Environment Agency (Appendix B) | OS Data |
| Surface water (pluvial) | X | X | X | |
| Groundwater | X | X | | |
| Sewer | | X | | |
| Culvert/bridges | | X | | X |
| Reservoir | | X | X | |

*Local guidance and policy, referenced in Section 6, has been consulted to determine local flood conditions and requirements for flood mitigation measures.

# 3. Site analysis

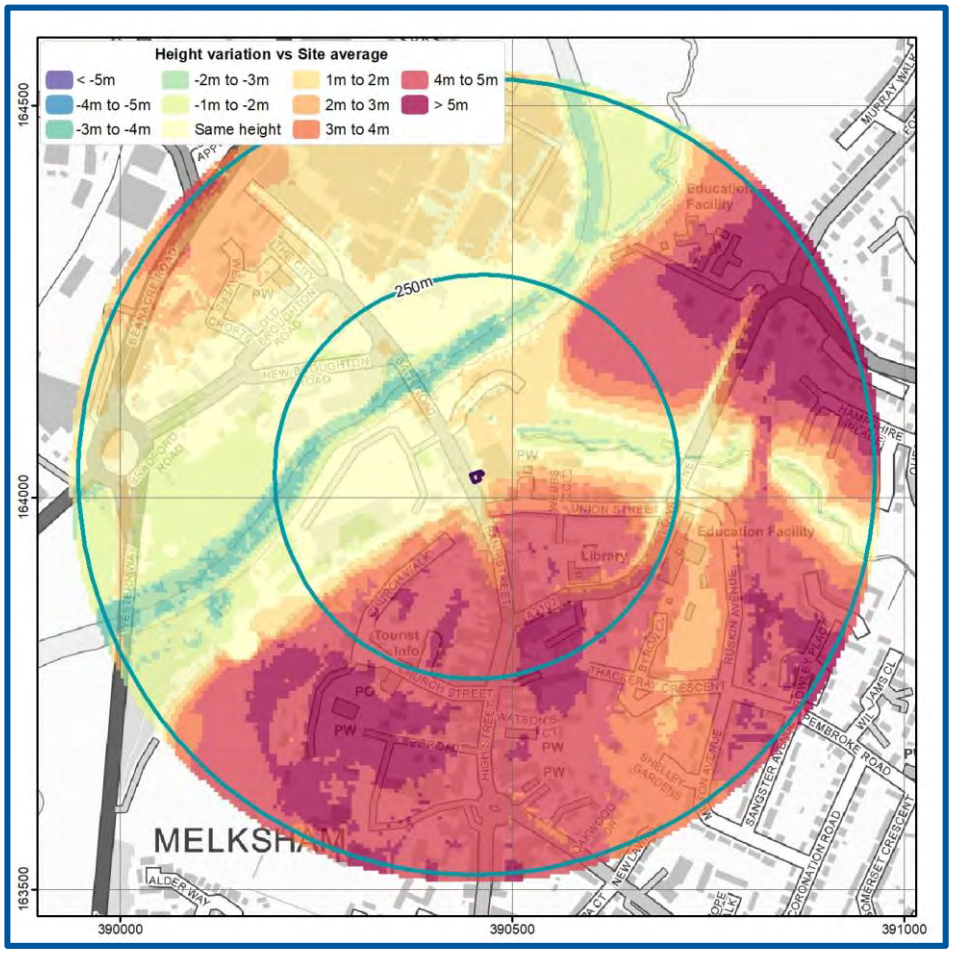
## Site information

The Site is located in Melksham in a setting of commercial land use at National Grid Reference ST 90475 64045. Site plans and drawings are provided in Appendix A.

According to OS data, using a 500 m buffer around the Site, the area is on a gentle slope (Figure 1). It is noted that to the north land rises to c. 35.9 m above Ordnance Datum (AOD). To the west land falls to c. 30.6 mAOD, to the east land rises to c. 41.5 mAOD and to the south falls to c. 38.8 mAOD.

The general ground levels on the Site are between 34.0 and 34.5 mAOD with the Site falling very gradually in a westerly direction. This is based on EA elevation data obtained for the Site to a 1 m resolution with a vertical accuracy of ±0.15 m (Appendix C).

Figure 1. Site Location and Relative Elevations (GeoSmart, 2022).




Contains Ordnance Survey data © Crown copyright and database right 2022

# Development

The Site is currently used within a commercial capacity as a two-storey office facility with associated access and car parking.

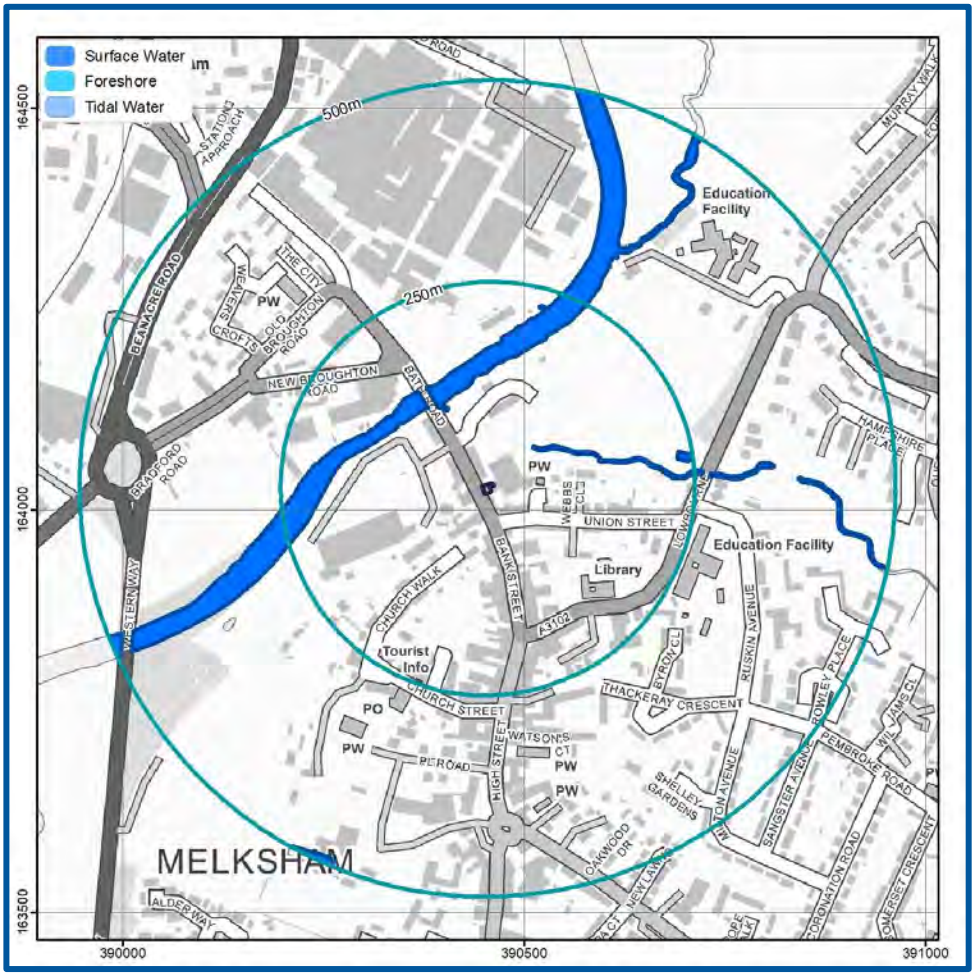
Development proposals comprise the conversion of the existing building into a three-bedroomed dwelling. Finished Floor Levels are raised 0.636m above ground levels on Site. Existing access and car parking will be retained. Site plans are included within Appendix A.

The effect of the overall development will result in an increase in number of occupants and/or users of the building and will result in the change of use, nature or times of occupation. According to Table 2 of the NPPG (2014), the vulnerability classification of the existing development is Less Vulnerable and proposed development is More Vulnerable. The estimated lifespan of the development is 100 years.

# Hydrological features

According to Ordnance Survey (OS) mapping included in the following figure, there are numerous surface water features within 500 m of the Site.

Figure 2. Surface water features (EA, 2022)




Contains Ordnance Survey data © Crown copyright and database right 2022
Environment Agency copyright and database rights 2022

An unnamed stream is located approximately 60m to the north east of the Site at a lower elevation.

The River Avon is approximately 115m to the north west of the Site at a lower elevation.

# Proximity to relevant infrastructure

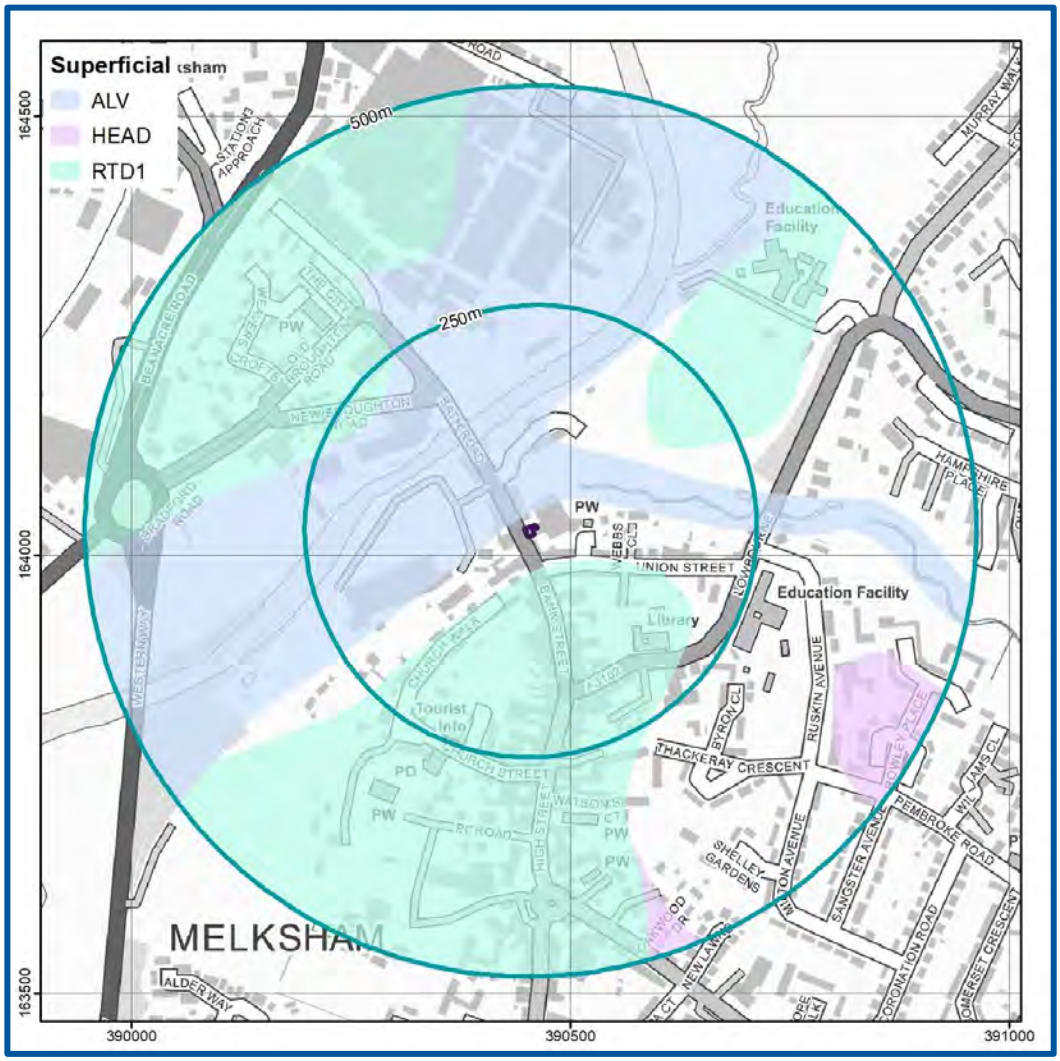
A highway bridge on the A3102 over the River Avon is located approximately 115m to the north west of the Site at a lower elevation.

A bridge on the A350 over the River Avon is located approximately 475m to the south west of the Site at a lower elevation.

# Hydrogeological features

British Geological Survey (BGS) mapping indicates that there are no underlying superficial deposits (EA, 2022).

Figure 3. Superficial Geology (BGS, 2022)




Contains Ordnance Survey data © Crown copyright and database right 2022
Contains British Geological Survey materials © NERC 2022

BGS mapping indicates the underlying bedrock geology (Figure 4) consists of the Oxford Clay Formation (OXC) (BGS, 2022) and is classified as a Unproductive Strata (EA, 2022).

Figure 4. Bedrock Geology (BGS, 2022)




Contains Ordnance Survey data © Crown copyright and database right 2022
Contains British Geological Survey materials © NERC 2022

The Site does not lie within a groundwater Source Protection Zone (SPZ) (EA, 2022).

A review of the BGS borehole database (BGS, 2022) indicates there are no relevant boreholes within the vicinity of the Site from which the mapped geology can be confirmed.

The hydrogeological characteristics suggest there is unlikely to be a shallow groundwater table beneath the Site.

# 4. Flood risk to the development

## Historical flood events

According to the EA's historical flood map (Figure 5) and the Wiltshire SFRA, historical flood events have been recorded in the vicinity of the Site. Events occurred in the vicinity of the Site in 1925, 1932, 1960, 1968, 1974, 1979, 1992 and 1999 as a result of the channel capacity being exceeded (and a lack of raised flood defences) (EA, 2022 and JBA Consulting, 2019). Flood events in 1925 and 1932 affected the Site (JBA Consulting, 2019).

The purpose of historical flood data is to provide information on where and why flooding may have occurred in the past. The absence of any recorded events does not mean flooding has never occurred on-Site or that flooding will never occur at the Site.

Figure 5. EA historic flood map (EA, 2022)




Contains Ordnance Survey data © Crown copyright and database right 2022
Environment Agency copyright and database rights 2022

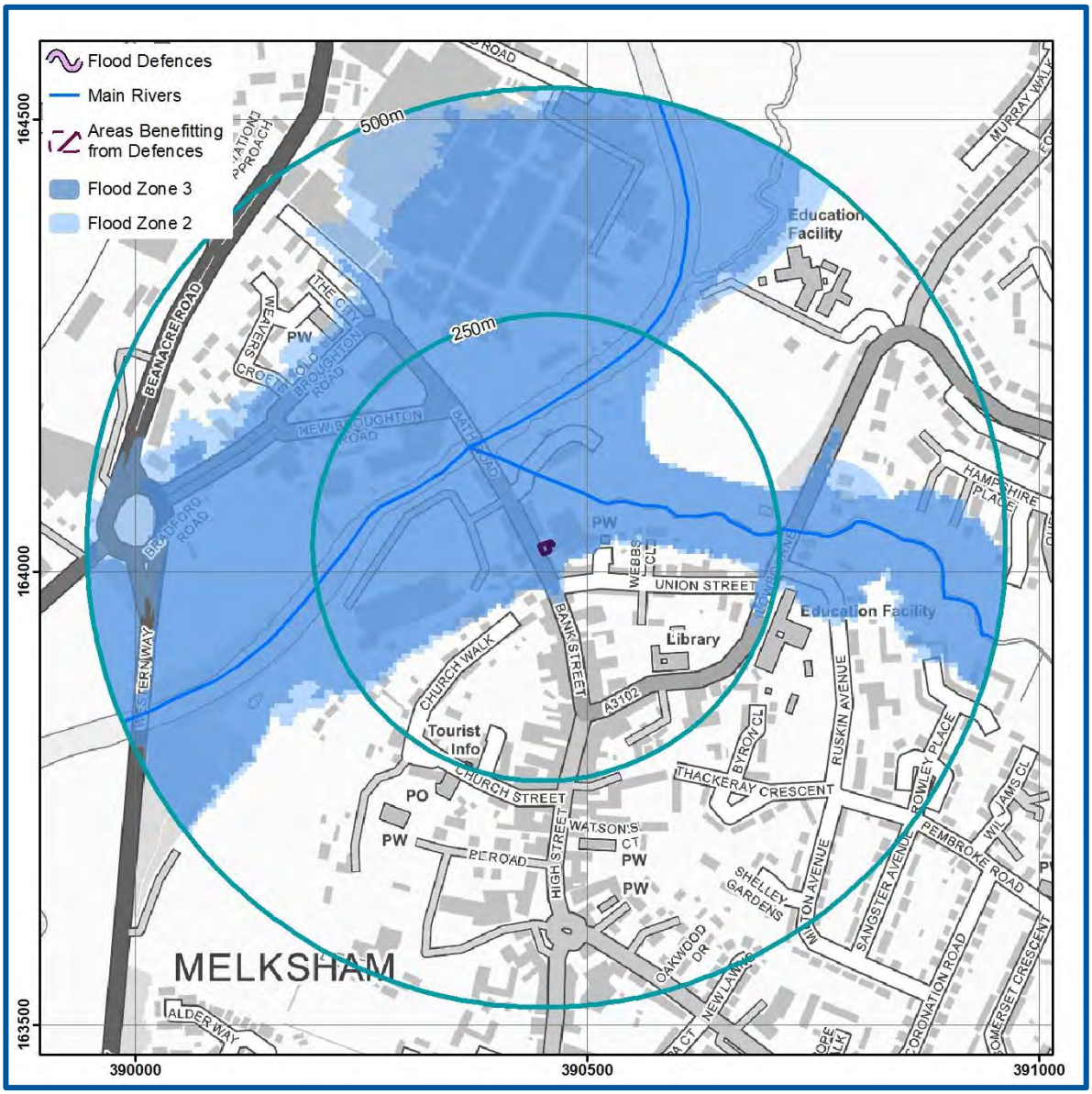
# Rivers (fluvial) / Sea (coastal/tidal) flooding

The predominant risk at the Site is from flooding from rivers, termed as fluvial flooding. The Site is located in an inland location and the risk of flooding from coastal and tidal processes are therefore considered to be Negligible.

River (fluvial) flooding occurs during times of heavy rainfall or snow melt when watercourses' capacity can be exceeded, over topping the banks and flood defences.

According to the EA's Flood Map for Planning Purposes (Figure 6), the Site is located within fluvial Flood Zone 3 and is therefore classified as having a High probability of fluvial flooding from the River Avon. The Site lies approximately 35 m to the north of the nearest land outside Flood Zones 2 and 3.

Figure 6. EA Flood Map for Planning Purposes (EA, 2022)




Contains Ordnance Survey data © Crown copyright and database right 2022
Environment Agency copyright and database rights 2022

## Guidance

As defined in the NPPF (2021):

Ignoring the presence of any defences, land located in a Flood Zone 3 is considered to have High probability of flooding with a 1 in 100 year or greater annual probability of fluvial flooding or a 1 in 200 or greater annual probability of coastal flooding in any one year.

Development of "Water-Compatible" and "Less Vulnerable" land uses are suitable for this zone with "More Vulnerable" and "Essential Infrastructure" requiring an Exception test to be passed prior to development taking place. (see glossary for terminology).

# Flood defences

Guidance

Sites that are located close to flood defences are likely to be zones where rapid inundation will occur in the event of the flood defences being overtopped or breached. A Site located close to flood defences (within 250 m) may require a more detailed FRA subject to local topography.

- The Site is not in an EA designated area which benefits from flood defences.

Information from the EA relating to the nearest flood defences is outlined below.

- The nearest and most applicable flood defences are approximately 60m to the north east of the Site in the form of high ground on the banks of an unnamed drainage ditch. The defences were last inspected by the EA in 2020 and their current condition is classified as "fair (Condition Grade: 3)". The defences are designed to protect up to a 1 in 30 year event.
- High ground flood defences are also located approximately 115m to the north of the Site on the banks of the River Avon. The defences were last inspected by the EA in 2020 and their current condition is classified as "fair (Condition Grade: 3)". The defences have a maximum crest height of 34.4mAOD and are designed to protect up to a 1 in 200 year event.

# Model data

As the Site is located within the EA's fluvial floodplain, modelled flood elevation data was obtained from the EA and has been used to assess flood risk and to provide recommendations for mitigation for the proposed development.

Defended modelled flood data from Melksham SoP Study (EA, 2013) has been taken from the nearest node point (14.25) located within the channel of the River Avon and has been used to assess flood risk[1]. The data is provided in the table below and is included within Appendix B.

[1] The accuracy of the modelled flood levels are not known. These are dependent on the accuracy of input datasets such as LiDAR data, used to model the impacts of flooding within the 2D domain. Confirmation of the accuracy of the modelled flood data can be obtained separately from the Environment Agency.

Table 2. EA modelled flood level data- defended

| Ground levels at the Site (mAOD) | Defended Modelled Flood Levels (mAOD) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 1 in 2 year | 1 in 5 year | 1 in 10 year | 1 in 20 year | 1 in 50 year | 1 in 100 year | 1 in 100 year plus 20% CC | 1 in 1000 year |
| 34.0 and 34.5 | 33.38 | 33.66 | 33.82 | 33.99 | 34.22 | 34.39 | 34.67 | 35.06 |
| Flood depths | N/A | N/A | N/A | N/A | 0-0.22 | 0-0.39 | 0.17-0.67 | 0.56-1.06 |

*N/A: no flooding on Site

# Climate change factors

The EA's *Flood risk assessments: climate change allowances* guidance (Published 19 February 2016 and updated 27 May 2022) has been used to inform a suitable increase in peak river flows for the proposed development.

The updated guidance confirms 'More Vulnerable' developments are required to undertake a Basic assessment approach.

As the Site is located within the Avon Bristol and North Somerset Management Catchment and the proposed development is classed as More Vulnerable, where the proposed lifespan is approximately 100 years, the Central (26%) allowance has been used to determine a suitable climate change factor to apply to river data.

A stage / discharge (level/flow) relationship graph (Appendix B) has been produced using the EA's modelled flood flow and level data. The climate change allowances have been derived as a proportion of the 100 year peak flow to the 1 in 1000 year event, using the Flood Studies Report (1975) growth curves.

For the Severn Region, the 1 in 1000 year event flow is approximately 62% greater than the 1 in 100 year flow, therefore the following flood levels apply.

Table 3. Defended flood levels plus climate change allowances

| 1 in 100 year plus 26% allowance for climate change flood level (mAOD) |
|---|

| | |
|---|---|
| 34.73 | |
| Flood depths (m) | 0.23-0.73 |

# Flood risk including the benefit of defences

The type and condition of existing flood defences influence the 'actual' risk of fluvial flooding to the Site, albeit the long-term residual risk of flooding (ignoring the defences) should be considered when proposing new development.

According to the EA's Risk of Flooding from Rivers and the Sea (RoFRS) mapping (Figure 7), which considers the crest height, standard of protection and condition of defences, the flood risk from Rivers and the Sea is Medium-High.

Figure 7. Risk of Flooding from Rivers and Sea map (EA, 2022)



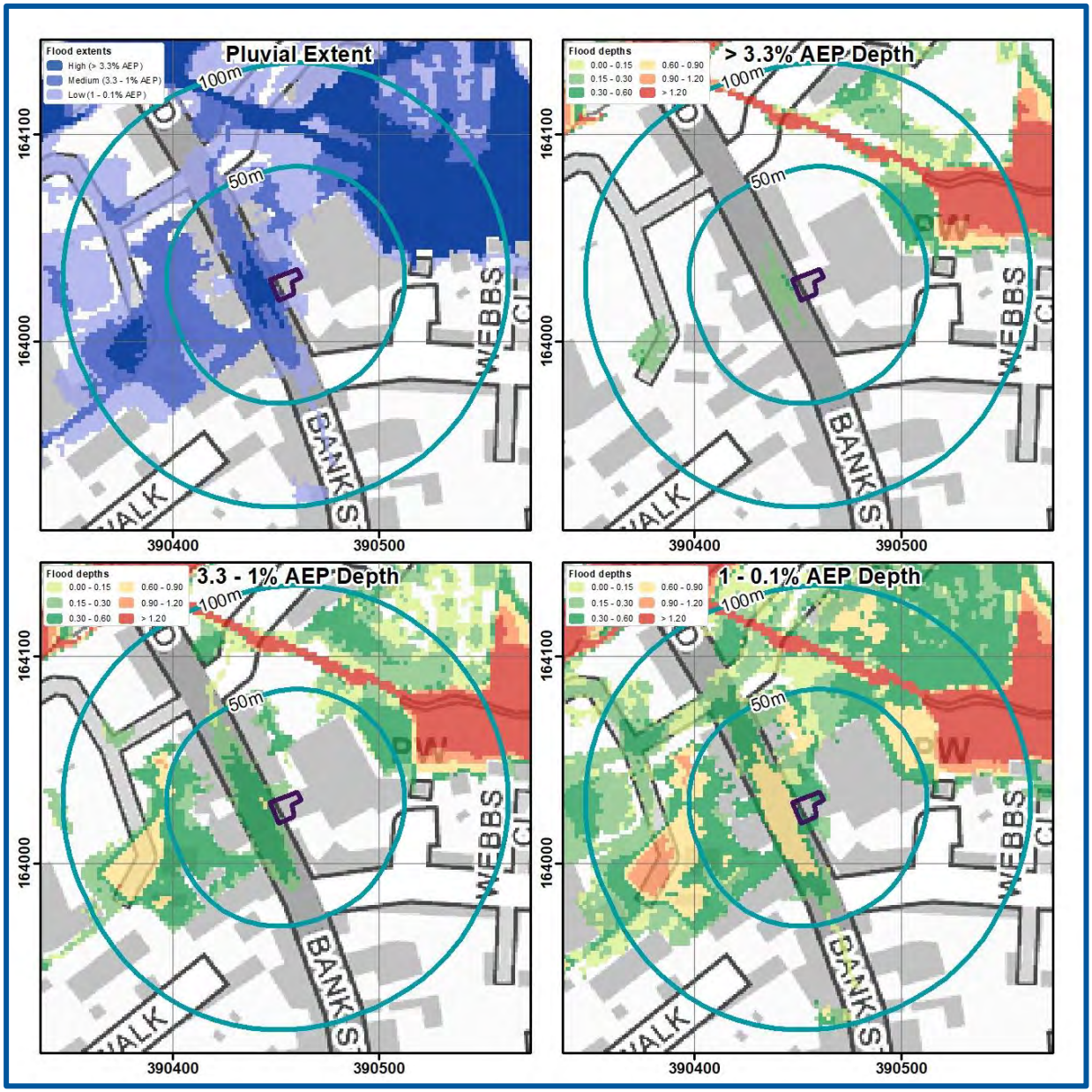

Contains Ordnance Survey data © Crown copyright and database right 2022
Environment Agency copyright and database rights 2022

# Surface water (pluvial) flooding

Surface water flooding occurs when intense rainfall exceeds the infiltration capacity of the ground and overwhelms the drainage systems. It can occur in most locations even at higher elevations and at significant distances from river and coastal floodplains.

- According to the EA's Risk of Flooding from Surface Water (pluvial) flood mapping (Figure 8), the Site is at a variable risk of pluvial flooding ranging from Low to High.

Figure 8. EA Surface water flood risk map (EA, 2022)




Contains Ordnance Survey data © Crown copyright and database right 2022
Environment Agency copyright and database rights 2022

Figure 8 confirms the extent and depth of flooding during a number of return events. This confirms the following:

- An area adjacent to the southern western boundary of the Site is affected during the High risk (>3.3% AEP) event with flood depths up to 0.6 m.
- A small area within the south west of the Site is affected during the Medium risk (3.3 – 1% AEP) event with flood depths up to 0.6 m.
- The south west and north east of the Site are affected during the Low risk (1- 0.1% AEP) event with flood depths up to 0.6 m on Site and up to 0.9 m adjacent to the south western boundary.
- The rest of the Site is not impacted and is considered to be at Very Low risk of pluvial flooding

**Guidance**

According to EA's surface water flood risk map the Site is at:

- Very Low risk - chance of flooding of less than 1 in 1000 (0.1%).
- Low risk - chance of flooding of between a 1 in 1000 & 1 in 100 (0.1% and 1%).
- Medium risk - chance of flooding of between a 1 in 100 and 1 in 30 (1% and 3.3%).
- High risk - chance of flooding of greater than 1 in 30 (3.3%).

## Guidance

According to EA's surface water flood risk map the following advisory guidance applies to the Site:

Flood Depth

- 0.15 to 0.3 m - Flooding would: typically exceed kerb height, likely exceed the level of a damp-proof course, cause property flooding in some areas
- 0.3 to 0.9 m - Flooding is likely to exceed average property threshold levels and cause internal flooding. Resilience measures are typically effective up to a water depth of 0.6 m above floor level.

Analysis of OS mapping, ground elevation data and the EA's pluvial flow route mapping in the 1 in 1000 year event confirms the Site is located on a potential overland flow route during a Low risk scenario.

During this event the majority of of flow velocities are less than 0.25 m/s. The flows could potentially affect the buildings and access routes to the Site.

The Site may potentially transmit overland flows off-Site in a north easterly and southerly direction and therefore surface water drainage systems should be designed appropriately to manage the run-off.

The SFRA states that 387 properties in Melksham are at risk of surface water flooding but does not specify which properties are at risk (JBA Consulting, 2019).

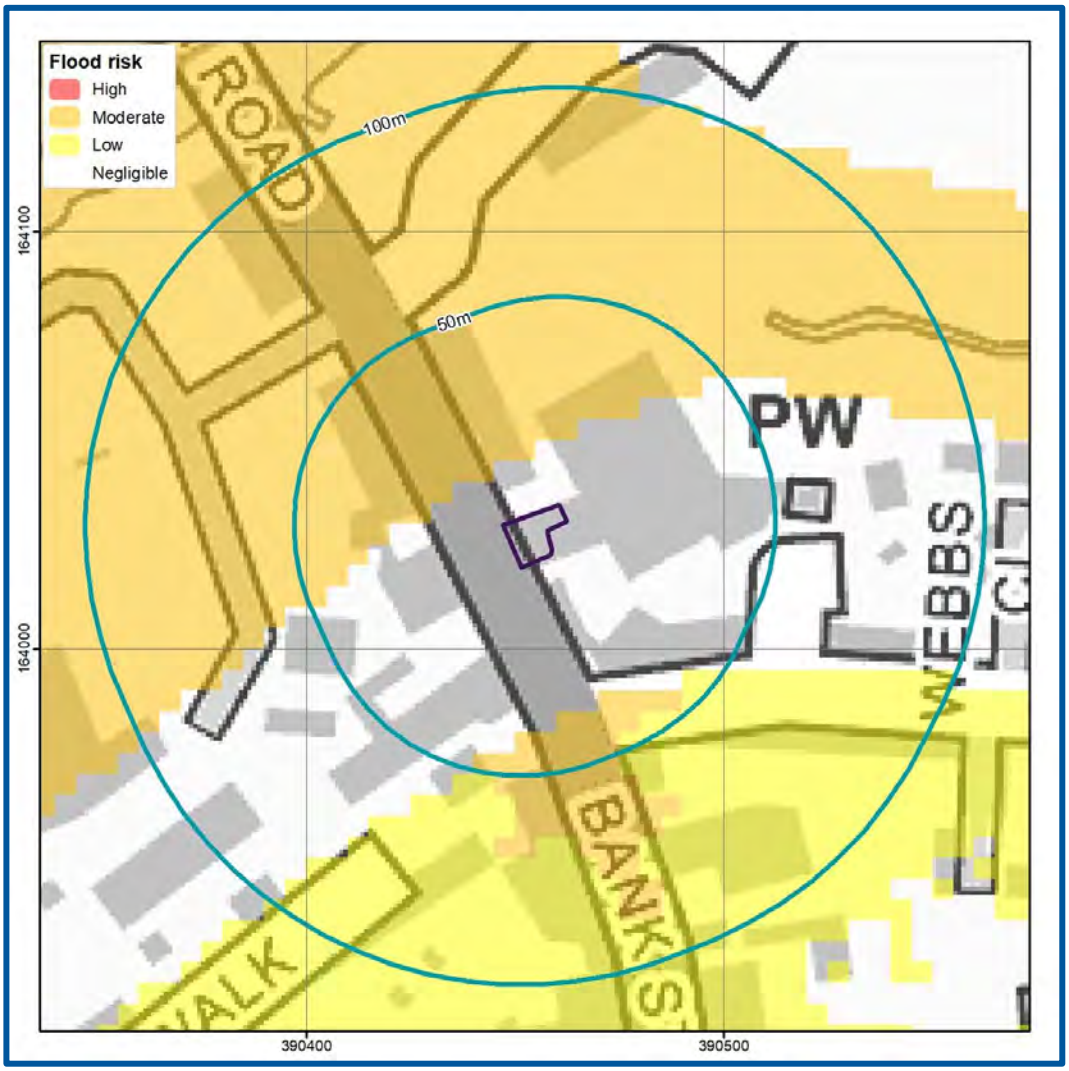
The Site is susceptible to overland flow and/or surface water flooding which may be increased as a result of climate change.

# Groundwater flooding

Groundwater flooding occurs when sub-surface water emerges from the ground at the surface or into Made Ground and structures. This may be as a result of persistent rainfall that recharges aquifers until they are full; or may be as a result of high river levels, or tides, driving water through near-surface deposits. Flooding may last a long time compared to surface water flooding, from weeks to months. Hence the amount of damage that is caused to property may be substantially higher.

Groundwater Flood Risk screening data (Figure 9) indicates there is a Negligible risk of groundwater flooding at surface in the vicinity during a 1 in 100 year event.

Figure 9. GeoSmart GW5 Groundwater Flood Risk Map (GeoSmart, 2022)




Contains Ordnance Survey data © Crown copyright and database right 2022
Contains British Geological Survey materials © NERC 2022

Mapped classes combine likelihood, possible severity and the uncertainty associated with predicting the subsurface system. The map is a national scale screening tool to prompt site-specific assessment where the impact of groundwater flooding would have significant adverse consequences. Mapping limitations and a number of local factors may reduce

groundwater flood risk to land and property even where it lies within mapped groundwater flood risk zones, which do not mean that groundwater floods will occur across the whole of the risk area

The SFRA does not indicates any reported incidents of historical ground water flooding within 20 m of the Site but table 2-1 does identify between 100-500 properties in Melksham to be at risk of groundwater flooding (JBA Consulting, 2019).

A site-specific assessment has been undertaken to refine the groundwater risk screening information on the basis of site-specific datasets (see Section 3) including the EA's fluvial and tidal floodplain data (where available) to develop a conceptual groundwater model. The risk rating is refined further using the vulnerability of receptors including occupants and the existing and proposed Site layout, including the presence of basements and buried infrastructure. The presence of any nearby or on-Site surface water features such as drainage ditches, which could intercept groundwater have also been considered.

On the basis of the site-specific assessment the groundwater flood risk is considered to be Negligible.

**Guidance**

Negligible Risk - There will be a remote possibility that incidence of groundwater flooding could lead to damage to property or harm to other sensitive receptors at, or near, this location.

Climate change predictions suggest an increase in the frequency and intensity of extremes in groundwater levels. Rainfall recharge patterns will vary regionally resulting in changes to average groundwater levels. A rise in peak river levels will lead to a response of increased groundwater levels in adjacent aquifers subject to the predicted climate change increases in peak river level for the local catchment.

The impact of climate change on groundwater levels beneath the Site is linked to the predicted risk in both peak river levels and the variation in rainfall recharge which is uncertain.

Based on the available evidence the resulting increase to groundwater flood risk is not considered significant.

# Flooding from artificial sources

Artificial sources of flood risk include waterbodies or watercourses that have been amended by means of human intervention rather than natural processes. Examples include reservoirs (and associated water supply infrastructure), docks, sewers and canals. The flooding mechanism associated with flood risk from artificial sources is primarily related to breach or failure of structures (reservoir, lake, sewer, canal, flood storage areas, etc.).

## Sewer flooding

The SFRA does not state that the area surrounding the Site is at risk from sewer flooding (JBA Consulting, 2019) and the local water company did not respond within the timeframe of this report.

### Guidance

Properties classified as "at risk" are those that have suffered, or are likely to suffer, internal flooding from public foul, combined or surface water sewers due to overloading of the sewerage system either once or twice in the ten year reference period. Records held by the sewage utility company provide information relating to reported incidents, the absence of any records does not mean that the Site is not at risk of flooding.

## Canal failure

According to Ordnance Survey (OS) mapping, there are no canals within 500 m of the Site.

## Water supply infrastructure

Water supply infrastructure is comprised of a piped network to distribute water to private houses or industrial, commercial or institution establishments and other usage points. In urban areas, this represents a particular risk of flooding due to the large amount of water supply infrastructure, its condition and the density of buildings. The risks of flooding to properties from burst water mains cannot be readily assessed.

If more information regarding the condition and history of the water supply infrastructure within the vicinity of the Site is required, then it is advisable to contact Wessex Water.

## Culverts and bridges

The blockage of watercourses or structures by debris (that is, any material moved by a flowing stream including vegetation, sediment and man-made materials or refuse) reduces flow capacity and raises water levels, potentially increasing the risk of flooding. High water levels can cause saturation, seepage and percolation leading to failure of earth embankments or other structures. Debris accumulations can change flow patterns, leading to scour, sedimentation or structural failure.

Bridges have been identified within 500 m of the Site.

However, these structures are a significant distance upstream and downstream from the Site and are unlikely to represent a flood risk to the Site in the event of a blockage.

Initial investigation indicates the Local authority is responsible for maintenance of the infrastructure.

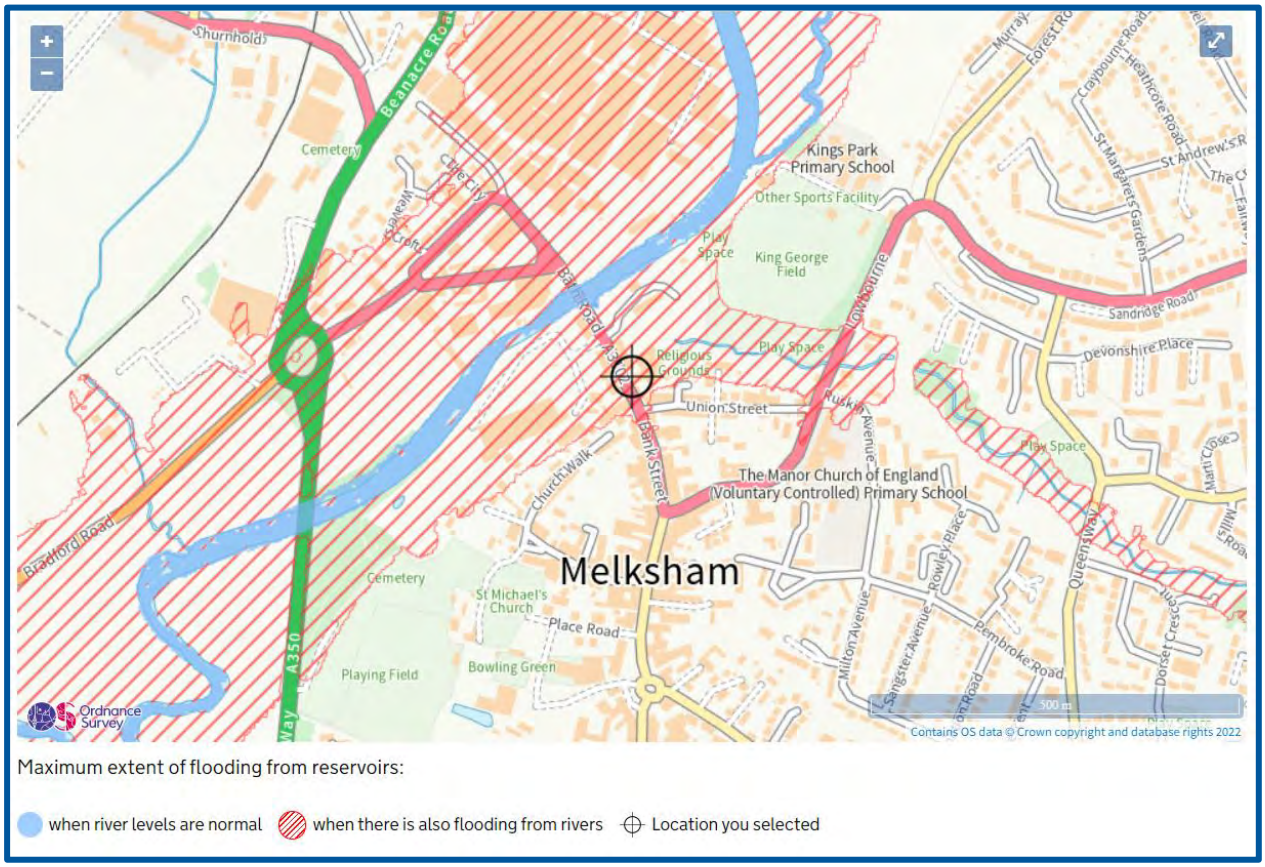
The SFRA has not identified any historic drainage issues within the Site area (JBA Consulting, 2019).

## Reservoir flooding

According to the EA's Risk of Flooding from Reservoir mapping the Site is at risk of flooding from reservoirs, when there is also flooding from rivers (Figure 10) (EA, 2022).

The Site is considered to be at risk of flooding from the Corsham Reservoir, located approximately 7km to the north west of the Site.

Figure 10. EA Risk of Reservoir Flooding (EA, 2022)




Contains Ordnance Survey data © Crown copyright and database right 2022
Environment Agency copyright and database rights 2022

### Guidance

The risk of reservoir flooding is related to the failure of a large reservoir (holding over 25,000 $m^3$ of water) and is based on the worst-case scenario. Reservoir flooding is extremely unlikely to occur (EA, 2022).

# 5. Flood risk from the development

## Floodplain storage

The development is located within a fluvial Flood Zone, but does not involve an increase in building footprint, compensatory flood storage is therefore not required.

## Drainage and run-off

The development proposals are for a change of use and will not involve the alteration of any external features (or any changes to existing impermeable and permeable areas), an estimation of surface water runoff is not considered to be required.

Any changes to the existing drainage system will be undertaken in accordance with best practice and that care will be taken to ensure the new development does not overload/block any existing drainage or flow pathways to/from the Site.

A Very Low-High surface water risk has been identified on Site, therefore special consideration should be made when proposing a SuDS strategy.

# 6. Suitability of the proposed development

The information below outlines the suitability of proposed development in relation to national and local planning policy.

## National policy and guidance

The aims of the national planning policies are achieved through application of the Sequential Test and in some cases the Exception Test.

**Guidance**

**Sequential test:** The aim of this test is to steer new development towards areas with the lowest risk of flooding (NPPF, 2021). Reasonably available sites located in Flood Zone 1 should be considered before those in Flood Zone 2 and only when there are no reasonably available sites in Flood Zones 1 and 2 should development in Flood Zone 3 be considered.

**Exception test:** In some cases, this may need to be applied once the Sequential Test has been considered. For the exception test to be passed it must be demonstrated that the development would provide wider sustainability benefits to the community that outweigh flood risk and a site-specific FRA must demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

Suitability of the proposed development, and whether the Sequential and Exception Tests are required, is based on the Flood Zone the Site is located within and the flood risk vulnerability classification of the existing and proposed development. Some developments may contain different elements of vulnerability and the highest vulnerability category should be used, unless the development is considered in its component parts.

This report has been produced to assess all development types, prior to any development. The vulnerability classification and Flood Zones are compared within Table 4 overleaf (Table 3 of the NPPG (2014)).

As the Site is located within Flood Zone 3a and the proposed development is defined as More Vulnerable; the proposals are acceptable, but may be subject to the Sequential and Exceptions Test.

However, the application is considered a 'Change of Use' of the existing building from commercial to residential and in line with Paragraph 168 of the NPPF (2021), it may not be subject to the Sequential or Exception Tests.

Paragraph 168 of the NPPF (2021) states: *"Applications for some changes of use should not be subject to the sequential or exception tests but should still meet the requirements for site-specific flood risk assessments.*

Footnote 56 of the NPPF (2021) states: *This includes changes of use; except for changes of use to a caravan, camping or chalet site, or to a mobile home or park home site, where the sequential and exception tests should be applied as appropriate".*

Table 4. Flood risk vulnerability and flood zone 'compatibility (taken from NPPG, 2014)

| Flood risk vulnerability classification | | Essential infrastructure | Water compatible | Highly vulnerable | More vulnerable | Less vulnerable |
|---|---|---|---|---|---|---|
| Flood Zone | Zone 1 – low probability | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Zone 2 – medium probability | ✓ | ✓ | Exception test required | ✓ | ✓ |
| | Zone 3a - high probability | Exception test required | ✓ | X | Exception test required* | ✓ |
| | Zone 3b – functional flood plain | Exception test required | ✓ | X | X | X |

*As the development proposals are for the change of use of the existing building the Sequential and Exception Tests are not required.

# EA Flood Risk Standing Advice for vulnerable developments located in Flood Zones 2 or 3

For all relevant vulnerable developments (i.e. more vulnerable, less vulnerable and water compatible), advice on the points should be followed:

- Surface water management;
- Access and evacuation; and
- Floor levels.

## *Surface water management*

Plans for the management of surface water need to meet the requirements set out in either the local authority's:

- Surface water management plan where available; OR
- Strategic flood risk assessment.

They also need to meet the requirements of the approved building regulations Part H: drainage and water disposal. Read section H3 rainwater drainage.

Planning permission is required to use a material that can't absorb water (e.g. impermeable concrete) in a front garden larger than 5m$^2$.

## *Access and evacuation*

Details of emergency escape plans should be provided for any parts of a building that are below the estimated flood level:

Plans should show:

- Single storey buildings or ground floors that don't have access to higher floors can access a space above the estimated flood level, e.g. higher ground nearby;
- Basement rooms have clear internal access to an upper level, e.g. a staircase;
- Occupants can leave the building if there's a flood and there's enough time for them to leave after flood warnings.

## *Floor levels*

The following should be provided:

- Average ground level of the building; and
- Finished floor level of the lowest habitable room in the building.

Ground floor levels should be a minimum of whichever is higher of:

- 0.3 m above the general ground level of the Site; OR
- At least 0.6 m above the estimated river or sea flood level[2].

If you cannot raise floor levels above the estimated flood level, you need to consider extra flood resistance and resilience measures.

## *Extra flood resistance and resilience measures*

Follow the extra flood resistance and resilience requirements for developments in flood risk areas where ground floor levels are lower than the estimated flood level for the Site.

[2] This is 0.6 m above the 1 in 100 year fluvial or 1 in 200 year tidal flood events. The 0.6 m is split into a 0.3 m freeboard allowance for climate change and 0.3 m allowance for the inaccuracies in the EA's flood modelling. Where the climate change flood level is known, a 0.3 m allowance should be added to the climate change flood level to allow for the inaccuracies in the EA's flood modelling.

## Water depth up to 0.3 m

The design of the building or development should keep water out as much as possible. You should use materials that have low permeability (materials that water cannot pass through, for example, impermeable concrete).

## Water depth from 0.3 m to 0.6 m

The design of the building or development should keep water out (unless there are structural concerns) by:

- using materials with low permeability to at least 0.3 m
- using flood resilient materials (for example lime plaster) and design (for example raised electrical sockets)
- making sure there's access to all spaces to enable drying and cleaning

## Water depth above 0.6 m

The design of the building or development should allow water to pass through the property to avoid structural damage by:

- using materials with low permeability to at least 0.3 m
- making it easy for water to drain away after flooding
- making sure there's access to all spaces to enable drying and cleaning

# Local policy and guidance

For this report, several documents have been consulted for local policy and guidance and relevant information is outlined below:

## *Wiltshire Core Strategy (Wiltshire Council, 2015):*

### Core Policy 67

### Flood Risk

Development proposed in Flood Zones 2 and 3 as identified within the Strategic Flood Risk Assessment will need to refer to the Strategic Housing Land Availability Assessment when providing evidence to the local planning authority in order to apply the sequential test in line with the requirements of national policy and established best practice.

All new development will include measures to reduce the rate of rainwater run-off and improve rainwater infiltration to soil and ground (sustainable urban drainage) unless site or environmental conditions make these measures unsuitable.

### Core Policy 68

### Water resources

Development must not prejudice the delivery of the actions and targets of the relevant River Basin or Catchment Management Plan and should contribute towards their delivery where possible.

Non-residential development will be required to incorporate water efficiency measures. Developers will be expected to submit details of how water efficiency has been taken into account during the design of proposals.

Development proposals within a Source Protection Zone, Safeguard Zone or Water Protection Zone must assess any risk to groundwater resources and groundwater quality and demonstrate that these would be protected throughout the construction and operational phases of development.

## *Wiltshire Council Level 1 Strategic Flood Risk Assessment (JBA Consulting, 2019):*

### 2.3.1 Bristol Avon

- In the Bristol Avon CFMP area, around a third of the people at risk of a 1% annual probability (AEP) flood are in Bristol. Although a substantial area is at risk from fluvial flooding, surface water and groundwater flooding are also recognised. Utilising a 20% increase in peak flow in all watercourses, it is estimated that by 2011, around 20,000 properties will be at risk from a 1% AEP flood. The number of properties at risk in significant settlements in the Bristol Avon CFMP area within Wiltshire is summarised in Table 2-1.

  Table 2-1 Indicative number of properties at risk within Wiltshire (Bristol Avon)

| CFMP Area | Locations | Indicative number of properties at risk |
|---|---|---|
| Bristol Avon | Melksham | 100 to 500 |
| | Bradford-on-Avon, Calne, Malmesbury, Trowbridge | 50 to 100 |
| | Chippenham | 25 to 50 |

- Melksham: Policy 4- “We are already managing the flood risk effectively, but we may need to take further actions to keep pace with climate change."

### 2.10 Surface Water Management Plans (SWMPs)

Table 2-7 Number of "at risk" properties in 10 highest ranking settlements

| Settlement | Rank | Number of Properties at Risk | Settlement | Rank | Number of Properties at Risk |
|---|---|---|---|---|---|
| Salisbury | 1 | 1,476 | Warminster | 6 | 751 |
| Chippenham | 2 | 1,192 | Calne | 7 | 652 |
| Westbury | 3 | 1,174 | Corsham | 8 | 642 |
| Trowbridge | 4 | 935 | Bradford on Avon | 9 | 445 |
| Devizes | 5 | 866 | Melksham | 10 | 387 |

### 4.4 Fluvial flood risk

### Recommendations for Flood Zone 3a

Development in Flood Zone 3a is significantly constrained by flood risk. Highly Vulnerable development is not permitted within this zone and More Vulnerable development and Essential Infrastructure are only permitted subject to demonstration that the sequential test is passed and that the Exception Test can be passed. 'Less vulnerable' development is acceptable subject to demonstration that the sequential test is passed.

- An FRA is required for all developments within this zone.

  It should be demonstrated that flood defences provide an acceptable standard of protection, including an allowance for climate change for the lifetime of the development.

  Residual risks should be assessed, and the Environment Agency consulted regarding whether there is a need for a breach analysis to map a rapid inundation zone.

- The layout of buildings and access routes should adopt a sequential approach, steering buildings towards areas of lowest risk within the site. Where rapid inundation zones have been identified, development should be avoided in these areas.
- Development should not impede flow routes, reduce floodplain storage or consume flood storage in a 'flood cell' within a defended area. If the development does result in a loss of storage, compensatory floodplain storage should be provided on a 'level for level' and 'volume for volume' basis.
- If existing defences are to be upgraded as part of the development, an assessment should be undertaken to ensure it does not result in an increase in flood risk elsewhere.
- Development design should incorporate mitigation measures, to manage any flood risk to the development, including residual risk for the lifetime of the development. FFLs should typically be 600mm above the 1 in 100-year (1% AEP) flood level, plus an allowance for climate change.
- It is recommended that all types of new development behind flood defences is avoided, where possible, due to the residual risks of breach and overtopping
- Consideration should be given to the type of building that will be permitted, for example single-storey buildings and basements should be avoided.

**Guidance**

Strategic Flood Risk Assessments are carried out by local authorities, in consultation with the Environment Agency, to assess the flood risk to the area from all sources both now and in the future due to climate change. They are used to inform planning decisions to ensure inappropriate development is avoided (NPPF, 2021).

# Environment Agency pre-application response:

The EA (2022) was contacted as part of this FloodSmart report in order to obtain site-specific feedback on the proposed development.

However, a response was not received within the timeframe of this report.

# 7. Resilience and mitigation

Based on the flood risk identified at the Site, the national and local policies and guidance and proposed development, the mitigation measures outlined within this section of the report are likely to help protect the development from flooding.

## Sea (coastal/tidal) flood mitigation measures

As the Site is not identified as being at risk of flooding from the sea, mitigation measures are not required.

## Rivers (fluvial) flood mitigation measures

The Site is located within an area which is affected by flooding from rivers, the following table confirms the flood depths associated with the area proposed for development.

**Table 5. Flood levels compared to ground levels on Site**

| Ground levels at the Site (mAOD) | Modelled Flood Levels (mAOD) | | | | |
|---|---|---|---|---|---|
| | 1 in 20 year | 1 in 50 year | 1 in 100 year | 1 in 100 year plus 26% CC | 1 in 1000 year |
| 34.0 and 34.5 | 33.99 | 34.22 | 34.39 | 34.73 | 35.06 |
| Flood depths | N/A | 0-0.22 | 0-0.39 | 0.23-0.73 | 0.56-1.06 |

### Raising minimum floor levels

The vulnerability classification of the Site and the Flood Zone means proposals for the Site fall under the EA's Flood Risk Standing Advice (FRSA) for more vulnerable developments, which requires ground floor finished floor levels to be a minimum of whichever is higher of:

- 0.3 m above the general ground level of the Site; OR
- At least 0.6 m above the estimated river or sea flood level[3].

[3] This is 0.6 m above the 1 in 100 year fluvial or 1 in 200 year tidal flood events. The 0.6 m is split into a 0.3 m freeboard allowance for climate change and 0.3 m allowance for the inaccuracies in the EA's flood modelling. Where the climate change flood level is known, a 0.3 m allowance should be added to the climate change flood level to allow for the inaccuracies in the EA's flood modelling.

Photographic evidence, provided by the client confirms Finished Floor Levels are raised 0.636m above ground levels on Site (Figure 11) and although the flood level is higher, as the proposed development is for change of use, it is not feasible to raise the finished floor levels further.

Figure 11. Photographic evidence of raised Finished Floor Levels on Site (provided by client)




## Additional Mitigation

As flood depths on Site could range between 0.23 and 0.73m during a 1 in 100 year + 26% climate change allowance event, Finished Floor Levels on Site would not act to prevent all flooding on Site. Consequently, it may be appropriate to adopt a water exclusion strategy for further flood depths (up to 0.3 m) in line with the EA's Standing Advice. A water exclusion strategy, using avoidance and resistance measures, is appropriate where floods are expected to last for short durations. Exclusion strategies should be employed above the existing Finished Floor Levels on Site. Potential water exclusion strategies include:

- Passive flood door systems;
- Temporary flood barriers;
- Non-return flap valves on sewer outfalls.
- Sustainable Drainage Systems (SuDS) to store/intercept flood water;

Avoidance and resistance measures are unlikely to completely prevent floodwater entering a property, particularly during longer duration flood events. Therefore, it is recommended that the following flood resilience measures are also considered.

- Flood resilient materials and designs:

- Use of low permeability building materials up to 0.3 m such as engineering bricks (Classes A and B) or facing bricks;
- Hard flooring and flood resilient metal staircases;
- The use of internal lime plaster/render or where plasterboards are used these should be fitted horizontally instead of vertically and/or using moisture resistant plasterboard at lower levels;
- Water, electricity and gas meters and electrical sockets should be located above the predicted flood level;
- Communications wiring: wiring for telephone, TV, Internet and other services should be protected by suitable insulation in the distribution ducts to prevent damage.

If these mitigation measures are implemented this could reduce the flood risk to the development from Medium-High to Low.

# Surface water (pluvial) flood mitigation measures

The mitigation measures detailed above for river and sea flood risk are likely to be suitable for the relatively shallow flood depths which could be experienced in the 1 in 30 and 1 in 100 year pluvial flood events.

In addition, the regular maintenance of any drains and culverts surrounding/on the Site should be undertaken to reduce the flood risk.

If these mitigation measures are implemented this could reduce the flood risk to the development from Very Low-High to Very Low-Low.

# Groundwater flood mitigation measures

As the Site is not identified as being at risk of groundwater flooding, mitigation measures are not required.

# Reservoir flood mitigation measures

According to EA information, the nearest reservoir is situated approximately 7km to the northwest of the Site.

There would be a relatively high rate and onset of flooding associated with a reservoir breach, it is therefore unlikely that safe access could be achieved unless a long warning period was provided. Therefore, occupants should get to the highest level of the building as possible and contact the emergency services.

As residential areas of the development will be located on the first floor, safe refuge could be provided for residents in the event of a reservoir breach.

# Other flood risk mitigation measures

As the Site is not identified as at risk from other sources, mitigation measures are not required.

# Residual flood risk mitigation measures

The risk to the Site has been assessed from all sources of flooding and appropriate mitigation and management measures proposed to keep the users of the development safe over its lifetime. There is however a residual risk of flooding associated with the potential for failure of mitigation measures if regular maintenance and upkeep isn't undertaken. If mitigation measures are not implemented or maintained, the risk to the development will remain as the baseline risk.

# Further flood mitigation information

More information on flood resistance, resilience and water entry can be found here: http://www.planningportal.gov.uk/uploads/br/flood_performance.pdf

www.knowyourfloodrisk.co.uk

# Emergency evacuation - safe access / egress and safe refuge

Emergency evacuation to land outside of the floodplain should be provided if feasible. Where this is not possible, 'more vulnerable' developments and, where possible, development in general (including basements), should have internal stair access to an area of safe refuge within the building to a level higher than the maximum likely water level. An area of safe refuge should be sufficient in size for all potential users and be reasonably accessible to the emergency services.

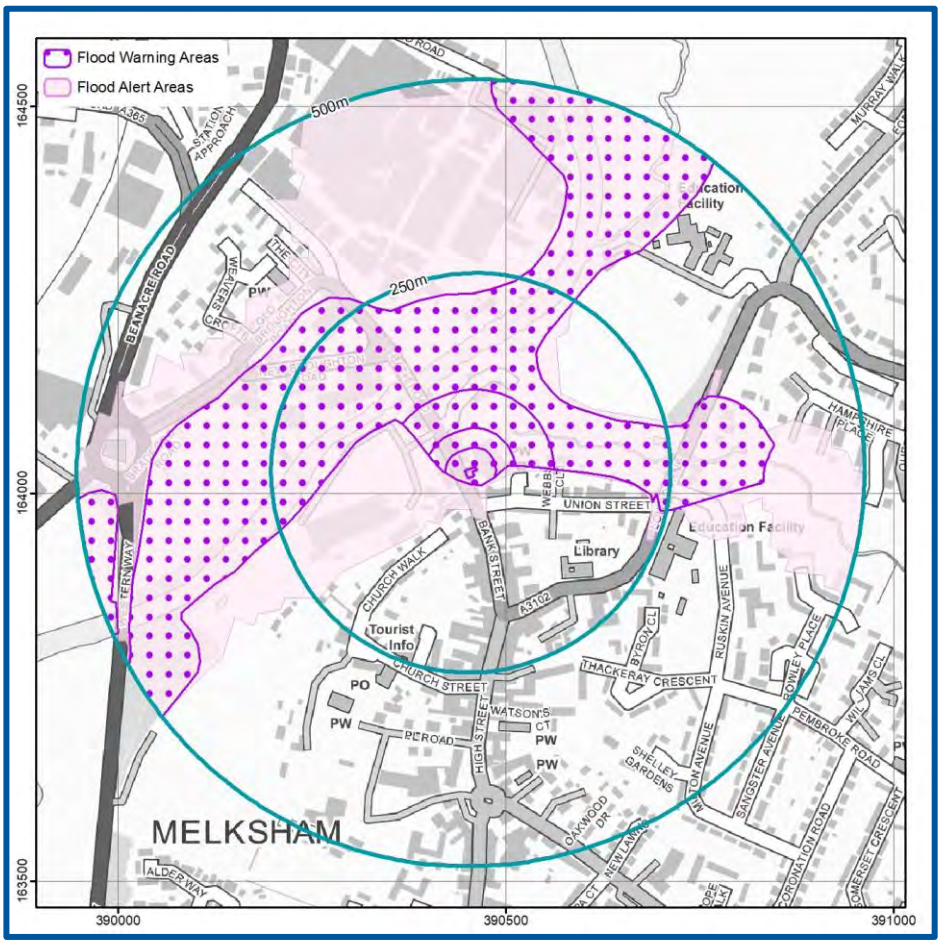
Emergency evacuation from the development and the Site should only be undertaken in strict accordance with any evacuation plans produced for the Site, with an understanding of the flood risks at the Site including available mitigation, the vulnerability of occupants and preferred evacuation routes.

## Flood warnings

The EA operates a flood warning service in all areas at risk of flooding; this is available on their website: https://www.gov.uk/check-flood-risk. The Site is located within an EA Flood Alerts and Warning coverage area (ref: 112WAFTMBA and ref: 112FWFAVN40A respectively) so is able to receive alerts and warnings (Figure 12). All warnings are also available through the EA's 24 hour Floodline Service 0345 988 1188.

The EA aims to issue Flood Warnings 2 hours in advance of a flood event. Flood Warnings can provide adequate time to enable protection of property and evacuation from a Site, reducing risk to life and property.

Figure 12. EA Flood Warning Coverage for the local area (EA, 2022).




Contains Ordnance Survey data © Crown copyright and database right 2022
Environment Agency copyright and database rights 2022

## Emergency evacuation

Where possible, a safe access and egress route with a 'very low' hazard rating from areas within the floodplain to an area wholly outside the 1 in 100 year flood event including an allowance for climate change should be demonstrated.

Based on the EA's Flood Zone Map the closest dry evacuation area within Flood Zone 1 is along Bath Street (c.35 m south – direct measurement). It is advised that evacuation from the premises would be the preferred option in a flood event if safe to do so. It is recommended that residents prepare to evacuate as soon as an EA Flood Warning is issued in order to completely avoid flood waters.

## On-Site refuge

Evacuation should be the primary action in preference, however safe refuge could be sought at first floor level in a worst-case scenario as the residential areas of the development are situated on the first floor.

## Other relevant information

A Flood Warning and Evacuation Plan (FWEP) is recommended, and occupants should be signed up to receive EAs Flood Alerts and Warnings.

Registration to the Environment Agency's flood warning scheme can be done by following this link: https://www.gov.uk/sign-up-for-flood-warnings.

It is recommended that main communication lines required for contacting the emergency services, electricity sockets/meters, water supply and first aid stations and supplies are not compromised by flood waters. Where possible these should all be raised above the extreme flood level.

# 8. Conclusions and recommendations

## Table 6. Risk ratings following implementation and subsequent maintenance of mitigation measures

| Source of Flood Risk | Baseline | After Mitigation |
|---|---|---|
| River (fluvial) flooding | Medium-High | Low |
| Sea (coastal/tidal) flooding | N/A | N/A |
| Surface water (pluvial) flooding | Very Low-High | Very Low-Low |
| Groundwater flooding | Negligible | N/A |
| Other flood risk factors present | Yes | Yes |

The table below provides a summary of where the responses to key questions are discussed in this report. Providing the recommended mitigation measures are put in place it is likely that flood risk to this Site will be reduced to an acceptable level.

## Table 7. Summary of responses to key questions in the report

| | |
|---|---|
| Key sources of flood risks identified | Fluvial and pluvial (surface water) (see Section 4). |
| Are standard mitigation measures likely to provide protection from flooding to/from the Site? | Yes (see Section 7). |
| Is any further work recommended? | Yes (See Section 7 and executive summary for full details). |

# 9. Further information

The following table includes a list of additional products by GeoSmart:

| Additional GeoSmart Products | | | |
|---|---|---|---|
| ✓ | Additional assessment:<br>SuDSmart Report |  | The SuDSmart Report range assesses which drainage options are available for a Site. They build on technical detail starting from simple infiltration screening and work up to more complex SuDS Assessments detailing alternative options and designs.<br>Please contact info@geosmartinfo.co.uk for further information. |
| ✓ | Additional assessment:<br>EnviroSmart Report |  | Provides a robust desk-based assessment of potential contaminated land issues, taking into account the regulatory perspective.<br>Our EnviroSmart reports are designed to be the most cost effective solution for planning conditions. Each report is individually prepared by a highly experienced consultant conversant with Local Authority requirements.<br>Ideal for pre-planning or for addressing planning conditions for small developments. Can also be used for land transactions.<br>Please contact info@geosmartinfo.co.uk for further information. |

# 10. References and glossary

## References

**British Geological Survey (BGS) (2022).** Geology of Britain Viewer. Accessed from: http://mapapps.bgs.ac.uk/geologyofbritain/home.html on 28/06/2022.

**Defra/Environment Agency (2005).** Flood Risk Assessment Guidance for New Development. *Phase 2 Framework and Guidance for Assessing and Managing Flood Risk for New Development – Fill Documentation and Tools*. R & D Technical Report FD232-/TR2.

**Environment Agency [EA] (2021).** Flood risk assessments: climate change allowances. Accessed from: https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances on 28/06/2022.

**Environment Agency [EA] (2022).** Flood map for planning. Accessed from https://flood-map-for-planning.service.gov.uk/ on 28/06/2022.

**Environment Agency [EA] (2022).** Long term flood risk assessment for locations in England. Accessed from https://flood-warning-information.service.gov.uk/long-term-flood-risk on 28/06/2022.

**Environment Agency [EA] (2022).** MagicMap. Accessed from: http://magic.defra.gov.uk/MagicMap.aspx on 28/06/2022.

**GeoSmart (2022).** GeoSmart groundwater flood risk (GW5) map (version 2.4).

**JBA Consulting (2019).** Strategic Flood Risk Assessment. Accessed from: https://www.wiltshire.gov.uk/media/5691/Strategic-Flood-Risk-Assessment-Level-1/pdf/Wiltshire_Council_Level_1_SFRA_v5.0.pdf?m=637459765054370000 on 28/06/2022.

**Ministry of Housing, Communities & Local Government (2014).** Planning Practice Guidance (NPPG). Flood Risk and Coastal Change. Accessed from http://planningguidance.planningportal.gov.uk/blog/guidance/flood-risk-and-coastal-change/ on 28/06/2022.

**Ministry of Housing, Communities & Local Government (2021).** National Planning Policy Framework (NPPF). Accessed from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf on 28/06/2022..

**Ordnance Survey Mapping (2022).** © Crown copyright. All rights reserved. Licence number AL 100054687. For full terms and conditions visit: www.ordnancesurveyleisure.co.uk

**Survey Open Data (2022).** Accessed from: http://www.geostore.com/environment-agency/survey.html#/survey/tandc on 28/06/2022.

**Wiltshire Council (2015)** Wiltshire Core Strategy. Accessed from https://www.wiltshire.gov.uk/media/372/Wiltshire-Core-Strategy-adopted-2015/pdf/Wcs.pdf?m=637099399373530000 on 28/06/2022.

GeoSmart Information

# Glossary

## General terms

| | |
|---|---|
| BGS | British Geological Survey |
| EA | Environment Agency |
| GeoSmart groundwater flood risk model | GeoSmart's national groundwater flood risk model takes advantage of all the available data and provides a preliminary indication of groundwater flood risk on a 50m grid covering England and Wales. The model indicates the risk of the water table coming within 1 m of the ground surface for an indicative 1 in 100 year return period scenario. |
| Dry-Island | An area considered at low risk of flooding (e.g. In a Flood Zone 1) that is entirely surrounded by areas at higher risk of flooding (e.g. Flood Zone 2 and 3) |
| Flood resilience | Flood resilience or wet-proofing accepts that water will enter the building, but through careful design will minimise damage and allow the re-occupancy of the building quickly. Mitigation measures that reduce the damage to a property caused by flooding can include water entry strategies, raising electrical sockets off the floor, hard flooring. |
| Flood resistance | Flood resistance, or dry-proofing, stops water entering a building. Mitigation measures that prevent or reduce the likelihood of water entering a property can include raising flood levels or installation of sandbags. |
| Flood Zone 1 | This zone has less than a 0.1% annual probability of river flooding |
| Flood Zone 2 | This zone has between 0.1 and 1% annual probability of river flooding and between 0.1% and 0.5 % annual probability sea flooding |
| Flood Zone 3 | This zone has more than a 1% annual probability of river flooding and 0.5% annual probability of sea flooding |
| Functional Flood Plain | An area of land where water has to flow or be stored in times of flood. |
| Hydrologic model | A computer model that simulates surface run-off or fluvial flow. The typical accuracy of hydrologic models such as this is ±0.25m for estimating flood levels at particular locations. |
| OS | Ordnance Survey |
| Residual Flood Risk | The flood risk remaining after taking mitigating actions. |
| SFRA | Strategic Flood Risk Assessment. This is a brief flood risk assessment provided by the local council |

| | |
|---|---|
| SuDS | A Sustainable drainage system (SuDS) is designed to replicate, as closely as possible, the natural drainage from the Site (before development) to ensure that the flood risk downstream of the Site does not increase as a result of the land being developed. SuDS also significantly improve the quality of water leaving the Site and can also improve the amenity and biodiversity that a Site has to offer. There are a range of SuDS options available to provide effective surface water management that intercept and store excess run-off. Sites over 1 Ha will usually require a sustainable drainage assessment if planning permission is required. The current proposal is that from April 2014 for more than a single dwelling the drainage system will require approval from the SuDS Approval Board (SABs). |

## Aquifer Types

| | |
|---|---|
| Principal aquifer | These are layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. |
| Secondary A aquifer | Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. |
| Secondary B aquifer | Predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. |
| Secondary undifferentiated | Has been assigned in cases where it has not been possible to attribute either category A or B to a rock type due to the variable characteristics of the rock type. |
| Unproductive Strata | These are rock layers or drift deposits with low permeability that has negligible significance for water supply or river base flow. |

## NPPF (2021) terms

| | |
|---|---|
| Exception test | Applied once the sequential test has been passed. For the exception test to be passed it must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk and a site-specific FRA must demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall. |
| Sequential test | Aims to steer new development to areas with the lowest probability of flooding. |
| Essential infrastructure | Essential infrastructure includes essential transport infrastructure, essential utility infrastructure and wind turbines. |

| | |
|---|---|
| Water compatible | Water compatible land uses include flood control infrastructure, water-based recreation and lifeguard/coastal stations. |
| Less vulnerable | Less vulnerable land uses include police/ambulance/fire stations which are not required to be operational during flooding and buildings used for shops/financial/professional/other services. |
| More vulnerable | More vulnerable land uses include hospitals, residential institutions, buildings used for dwelling houses/student halls/drinking establishments/hotels and sites used for holiday or short-let caravans and camping. |
| Highly vulnerable | Highly vulnerable land uses include police/ambulance/fire stations which are required to be operational during flooding, basement dwellings and caravans/mobile homes/park homes intended for permanent residential use. |

# Data Sources

| | |
|---|---|
| Aerial Photography | Contains Ordnance Survey data © Crown copyright and database right 2022<br>BlueSky copyright and database rights 2022 |
| Bedrock & Superficial Geology | Contains British Geological Survey materials © NERC 2022<br>Ordnance Survey data © Crown copyright and database right 2022 |
| Flood Risk (Flood Zone/RoFRS/Historic Flooding/Pluvial/Surface Water Features/Reservoir/ Flood Alert & Warning) | Environment Agency copyright and database rights 2022<br>Ordnance Survey data © Crown copyright and database right 2022 |
| Flood Risk (Groundwater) | GeoSmart, BGS & OS<br>GW5 (v2.4) Map (GeoSmart, 2022)<br>Contains British Geological Survey materials © NERC 2022<br>Ordnance Survey data © Crown copyright and database right 2022 |
| Location Plan | Contains Ordnance Survey data © Crown copyright and database right 2022 |
| Topographic Data | OS LiDAR/EA<br>Contains Ordnance Survey data © Crown copyright and database right 2022<br>Environment Agency copyright and database rights 2022 |

# 11. Appendices

GeoSmart Information

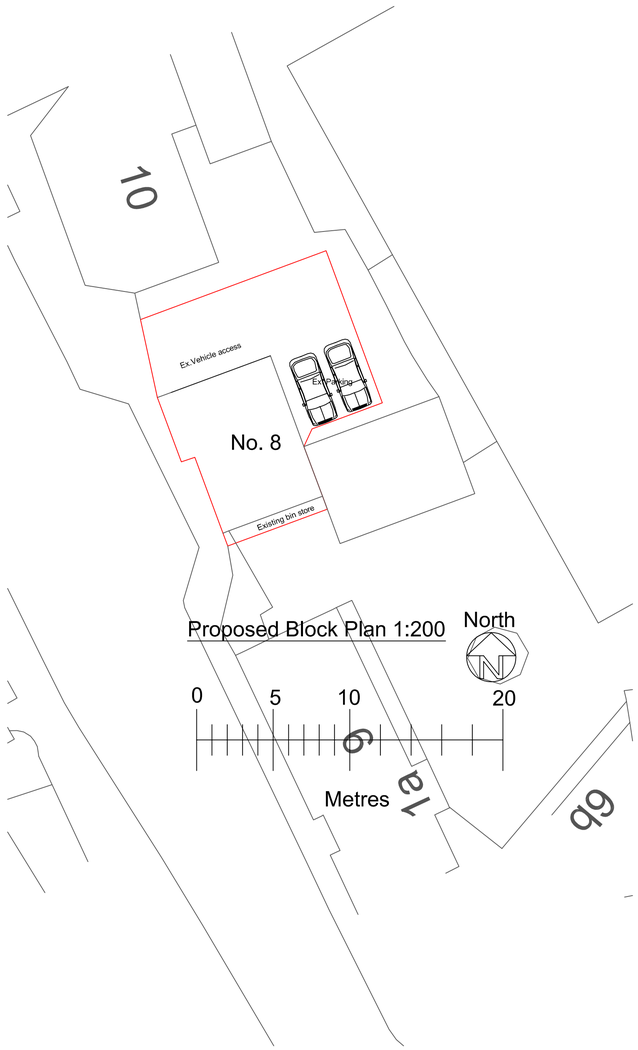
# Appendix A

## Site plans

DRAWINGS BASED ON TOPOGRAPHY & SITE BOUNDARY LIMITS INFORMATION PROVIDED BY OTHERS, IF ONSITE DISCREPANCIES ARISE, BRING TO A HARLOW & SONS ATTETNTION IMMEDIATELY

IF IN DOUBT,ASK - DO NOT SCALE - CHECK ON SITE DIMENSIONS.
SITE DIMENSIONS TO BE CHECKED PRIOR TO START - DISCREPANCIES TO BE RAISED WITH A HARLOW & SON

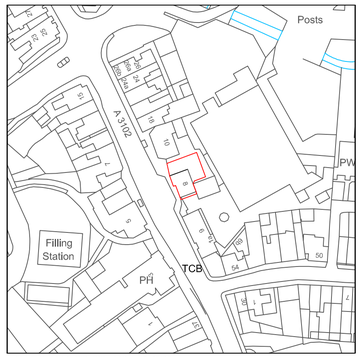
All DIMENSIONS ARE TO STRUCTURAL ELEMENTS & NOT TO APPLIED FINISHES




Proposed Block Plan 1:200 North

0 5 10 20

Metres




Location Plan 1:1250 North

20 0 20 40 60 80 100

Metres

Draft plans for your initial thoughts/comments.

Please scribble any changes you wish for on the plans.

I have shown the red line over the access for the parking, as we have to do this for planning, as it shows how the cars enter and exit, but as you don't own it, we will have to serve notice on the owner of this land when we do the planning application - can you see if you can find out the owners details

Thanks

Then either post back to me, or call me to discuss, or take a pic and email me, which ever you prefer.

Thanks

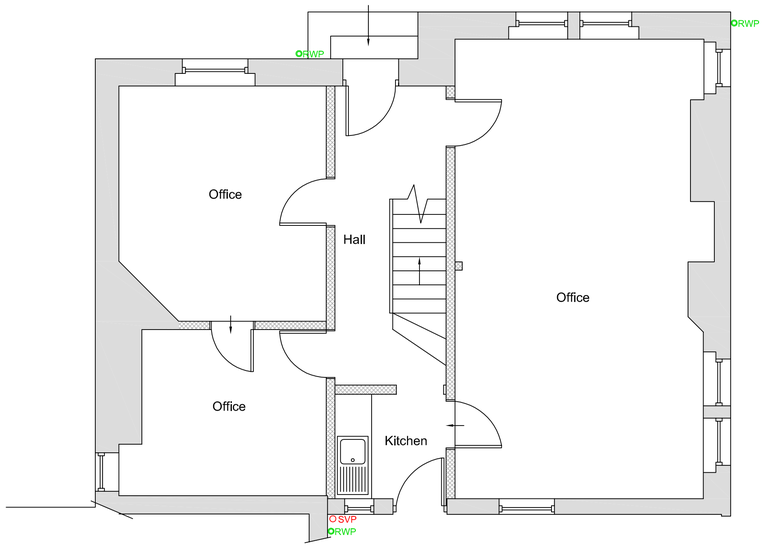
| | | |
|---|---|---|
| Drawn by | A Harlow & Son 01225 938329 | |
| Proposed Conversion from Offices to A Single Residential Dwelling at<br>8 Bath Road<br>Melksham<br>Wiltshire<br>SN12 6LP<br><br>A1 Papersize | | |
| Scale | 1:200, 1:1250 | Drawing No AH2022/45 |
| Date | 20th May 2022 | Sheet 2 of 2 |

This drawing cannot be copied or given to third parties without the written permission of A Harlow & Son

DRAWINGS BASED ON TOPOGRAPHY & SITE BOUNDARY LIMITS INFORMATION PROVIDED BY OTHERS, IF ONSITE DISCREPANCIES ARISE, BRING TO A HARLOW & SONS ATTETNTION IMMEDIATELY

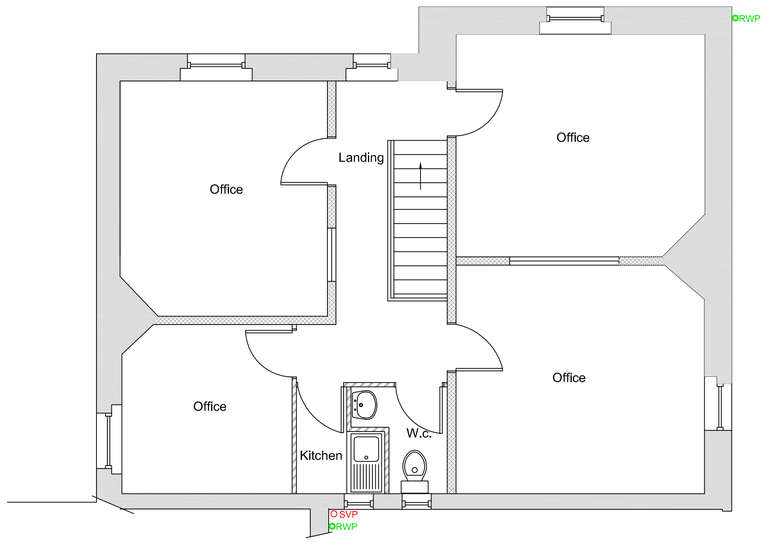
IF IN DOUBT,ASK - DO NOT SCALE - CHECK ON SITE DIMENSIONS.
SITE DIMENSIONS TO BE CHECKED PRIOR TO START - DISCREPANCIES TO BE RAISED WITH A HARLOW & SON

All DIMENSIONS ARE TO STRUCTURAL ELEMENTS & NOT TO APPLIED FINISHES




Existing Ground Floor Plan 1:50

0 1 2 3 4 5
Metres




Existing First Floor Plan 1:50

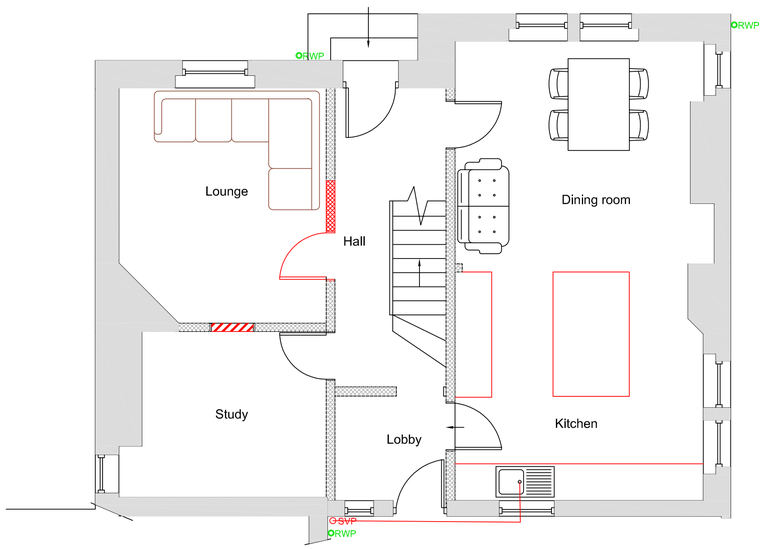
0 1 2 3 4 5
Metres

Draft plans for your initial thoughts/comments.

Please scribble any changes you wish for on the plans.

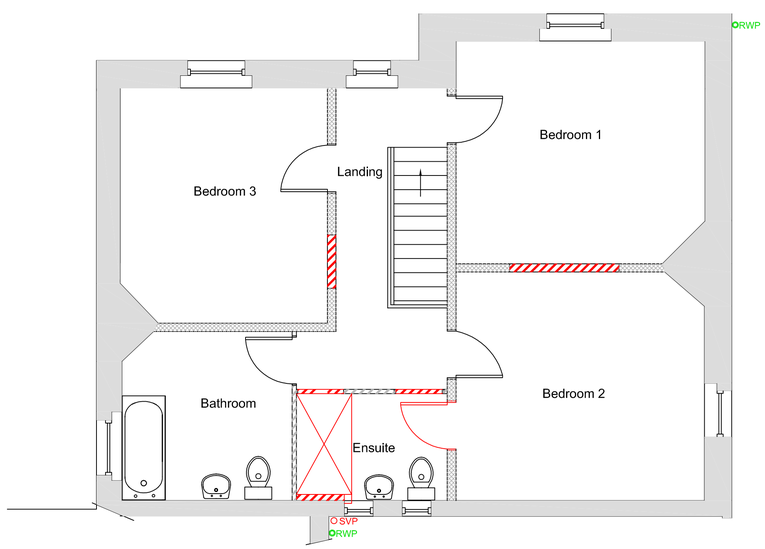
Indicative layout shown, I didn't want to show a 4 bedroom proeprty, as this triggers more parking requirements for planning, hence why I wanted to keep as a 3 bedroom proeprty as it will be easier to get through planning

The only downside is the flood risk - which the specialist will justify and the lack of garden/outside amenity space, but we can try to argue town centre premises don't have outside generally, and local public park close by for residents to use




Proposed Ground Floor Plan 1:50

0 1 2 3 4 5
Metres




Proposed First Floor Plan 1:50

0 1 2 3 4 5
Metres

This drawing cannot be copied or given to third parties without the written permission of A Harlow & Son

| | |
|---|---|
| Drawn by | A Harlow & Son 01225 938329 |

Proposed Conversion from Offices to A Single Residential Dwelling at
8 Bath Road
Melksham
Wiltshire
SN12 6LP

A1 Papersize

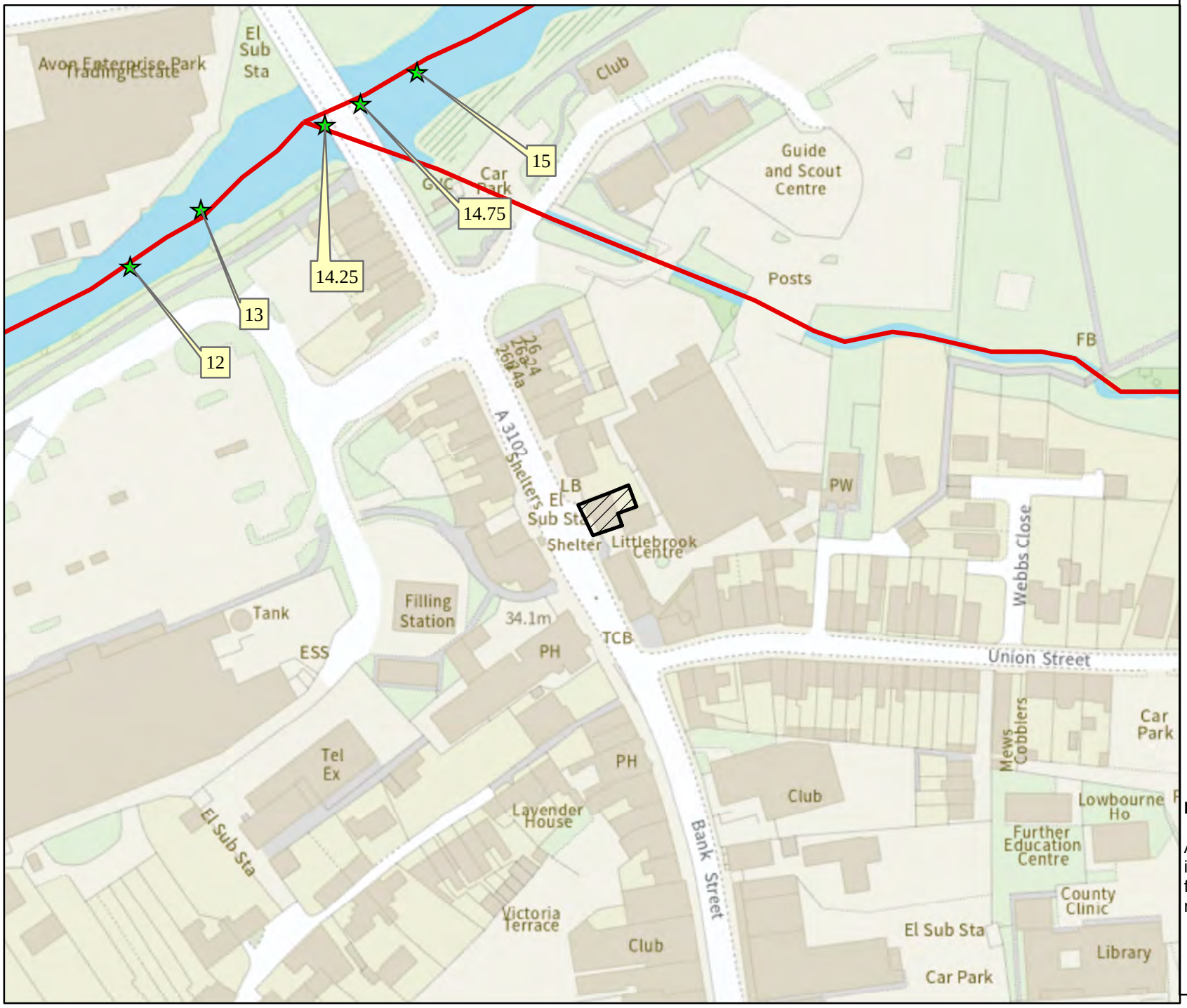
| | | |
|---|---|---|
| Scale | 1:50 | Drawing No AH2022/45 |
| Date | 20th May 2022 | Sheet 1 of 2 |

GeoSmart Information

# Appendix B

# Environment Agency data

# Node location map centred on ST 90454 64027 - created 21/06/2022 [Ref: 267117-WX]




Environment Agency

## Scale:1:1,500 At A3

N
W
E
S

## Legend

### M_TYPE

- 1D_RiverSection
- 2D_RiverSection
- Interpolate
- Replicate
- Reservoir
- 267117_WX_site_boundary
- Main Rivers

**Modelled Flood Level Nodes**

A table that references the node locations/unique identifiers is also attached, giving associated flood levels, NGRs and further information for the river channel and model.

© Environment Agency copyright and / or database rights 2019. All rights reserved. © Crown Copyright and database right 2019. All rights reserved. Ordnance Survey licence number 100026380.

**TITLE** Chippenham & Calne Mapping & Modelling Study 2016
**MODEL DATE** 08/11/2016
**SOFTWARE** Flood Modeller Pro-TUFLOW

**SCENARIO** Defended

| NODE | 1221_10015d | 1221_10033 | 1221_10051 | 1221_9887d | 1221_9890 | 1221_9922d | 1221_9926 | 1221_9933d | 1221_9940 | 1221_9964 | 1221_9976 | 1221_9989 | 1221f_00000 | 1221f_00035 | 1221f_00046d | 1222_0037i |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WATERCOURSE | Avon and tributaries | Avon and tributaries | Avon and tributaries | Avon and tributaries | Avon and tributaries | Avon and tributaries | Avon and tributaries | Avon and tributaries | Avon and tributaries | Avon and tributaries | Avon and tributaries | Avon and tributaries | Avon and tributaries | Avon and tributaries | Avon and tributaries | Avon and tributaries |
| 2YR Level | 67.69 | 67.71 | 67.69 | 67.50 | 67.49 | 67.55 | 67.55 | 67.57 | 67.57 | 67.64 | 67.67 | 67.68 | 67.69 | 67.70 | 67.70 | 67.71 |
| 2YR Flow | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD |
| 5YR Level | 67.86 | 67.88 | 67.85 | 67.62 | 67.60 | 67.68 | 67.70 | 67.72 | 67.73 | 67.80 | 67.85 | 67.85 | 67.85 | 67.87 | 67.87 | 67.88 |
| 5YR Flow | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD |
| 10YR Level | 67.98 | 68.01 | 67.98 | 67.71 | 67.68 | 67.78 | 67.81 | 67.83 | 67.85 | 67.93 | 67.97 | 67.98 | 67.98 | 67.99 | 68.00 | 68.01 |
| 10YR Flow | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD |
| 20YR Level | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD |
| 20YR Flow | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD |
| 20YR 20%CC Level | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD |
| 20YR 20%CC Flow | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD |
| 25YR Level | 68.16 | 68.19 | 68.16 | 67.81 | 67.76 | 67.88 | 67.99 | 68.01 | 68.04 | 68.11 | 68.16 | 68.16 | 68.16 | 68.17 | 68.18 | 68.19 |
| 25YR Flow | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD |
| 30YR Level | 68.19 | 68.22 | 68.19 | 67.82 | 67.77 | 67.90 | 68.03 | 68.05 | 68.08 | 68.15 | 68.19 | 68.19 | 68.19 | 68.21 | 68.21 | 68.22 |
| 30YR Flow | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD |
| 50YR Level | 68.36 | 68.38 | 68.35 | 67.89 | 67.82 | 67.97 | 68.20 | 68.22 | 68.25 | 68.31 | 68.35 | 68.36 | 68.35 | 68.37 | 68.38 | 68.38 |
| 50YR Flow | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD |
| 75YR Level | 68.48 | 68.50 | 68.48 | 67.93 | 67.85 | 68.02 | 68.32 | 68.34 | 68.38 | 68.44 | 68.47 | 68.48 | 68.48 | 68.49 | 68.50 | 68.51 |
| 75YR Flow | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD |
| 100YR Level | 68.55 | 68.57 | 68.54 | 67.96 | 67.87 | 68.06 | 68.39 | 68.41 | 68.45 | 68.51 | 68.54 | 68.55 | 68.54 | 68.56 | 68.57 | 68.58 |
| 100YR Flow | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD |
| 100YR 20%CC Level | 68.80 | 68.80 | 68.78 | 68.08 | 67.95 | 68.19 | 68.62 | 68.63 | 68.69 | 68.75 | 68.77 | 68.78 | 68.78 | 68.79 | 68.80 | 68.86 |
| 100YR 20%CC Flow | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD |
| 100YR 30%CC Level | 68.94 | 68.94 | 68.91 | 68.17 | 68.03 | 68.30 | 68.76 | 68.76 | 68.82 | 68.88 | 68.91 | 68.93 | 68.91 | 68.91 | 68.93 | 69.06 |
| 100YR 30%CC Flow | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD |
| 100YR 40%CC Level | 69.01 | 69.01 | 68.98 | 68.25 | 68.12 | 68.36 | 68.82 | 68.83 | 68.91 | 68.95 | 68.98 | 68.99 | 68.98 | 69.00 | 69.01 | 69.18 |
| 100YR 40%CC Flow | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD |
| 100YR 85%CC Level | 69.19 | 69.19 | 69.14 | 68.46 | 68.39 | 68.55 | 68.99 | 69.00 | 69.08 | 69.10 | 69.13 | 69.15 | 69.14 | 69.18 | 69.18 | 69.35 |
| 100YR 85%CC Flow | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD |
| 200YR Level | 68.77 | 68.78 | 68.75 | 68.06 | 67.94 | 68.17 | 68.60 | 68.61 | 68.66 | 68.72 | 68.75 | 68.75 | 68.75 | 68.76 | 68.77 | 68.82 |
| 200YR Flow | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD |
| 200YR 20%CC Level | 69.02 | 69.01 | 68.99 | 68.25 | 68.12 | 68.37 | 68.83 | 68.83 | 68.91 | 68.96 | 68.98 | 68.99 | 68.99 | 69.00 | 69.01 | 69.19 |
| 200YR 20%CC Flow | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD |
| 500YR Level | 69.05 | 69.04 | 69.01 | 68.28 | 68.15 | 68.39 | 68.85 | 68.86 | 68.93 | 68.98 | 69.00 | 69.02 | 69.01 | 69.03 | 69.03 | 69.21 |
| 500YR Flow | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD |
| 1000YR Level | 69.15 | 69.16 | 69.13 | 68.44 | 68.35 | 68.51 | 68.96 | 68.96 | 69.05 | 69.09 | 69.11 | 69.11 | 69.13 | 69.15 | 69.14 | 69.33 |
| 1000YR Flow | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD |
| 1000YR 20%CC Level | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD |
| 1000YR 20%CC Flow | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD |
| TIDE 200YR | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD |
| TIDE 1000YR | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD |
| Eastings | 399946 | 399955 | 399969 | 399839 | 399845 | 399870 | 399876 | 399883 | 399890 | 399908 | 399921 | 399934 | 399954 | 399951 | 399951 | 399978 |
| Northings | 171023 | 171002 | 170981 | 171045 | 171047 | 171046 | 171045 | 171044 | 171042 | 171027 | 171026 | 171023 | 170990 | 170972 | 170960 | 171036 |

**SCENARIO** **Undefended**

| NODE | 1221_10015d | 1221_10033 | 1221_10051 | 1221_9887d | 1221_9890 | 1221_9922d | 1221_9926 | 1221_9933d | 1221_9940 | 1221_9964 | 1221_9976 | 1221_9989 | 1221f_00000 | 1221f_00035 | 1221f_00046d | 1222_0037i |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WATERCOURSE | Avon and tributaries | Avon and tributaries | Avon and tributaries | Avon and tributaries | Avon and tributaries | Avon and tributaries | Avon and tributaries | Avon and tributaries | Avon and tributaries | Avon and tributaries | Avon and tributaries | Avon and tributaries | Avon and tributaries | Avon and tributaries | Avon and tributaries | Avon and tributaries |
| 2YR Level | 67.69 | 67.71 | 67.69 | 67.50 | 67.49 | 67.55 | 67.55 | 67.57 | 67.57 | 67.64 | 67.67 | 67.68 | 67.69 | 67.70 | 67.70 | 67.71 |
| 2YR Flow | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD |
| 5YR Level | 67.86 | 67.88 | 67.85 | 67.62 | 67.60 | 67.68 | 67.70 | 67.72 | 67.73 | 67.80 | 67.85 | 67.85 | 67.85 | 67.87 | 67.87 | 67.88 |
| 5YR Flow | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD |
| 10YR Level | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD |
| 10YR Flow | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD |
| 20YR Level | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD |
| 20YR Flow | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD |
| 20YR 20%CC Level | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD |
| 20YR 20%CC Flow | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD |
| 25YR Level | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD |
| 25YR Flow | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD |
| 30YR Level | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD |
| 30YR Flow | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD |
| 50YR Level | 68.36 | 68.38 | 68.35 | 67.89 | 67.82 | 67.97 | 68.20 | 68.22 | 68.25 | 68.31 | 68.35 | 68.36 | 68.35 | 68.37 | 68.38 | 68.38 |
| 50YR Flow | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD |
| 75YR Level | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD |
| 75YR Flow | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD |
| 100YR Level | 68.55 | 68.57 | 68.54 | 67.96 | 67.87 | 68.06 | 68.39 | 68.41 | 68.45 | 68.51 | 68.54 | 68.55 | 68.54 | 68.56 | 68.57 | 68.58 |
| 100YR Flow | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD |
| 100YR 20%CC Level | 68.80 | 68.80 | 68.78 | 68.10 | 67.97 | 68.21 | 68.63 | 68.64 | 68.70 | 68.75 | 68.78 | 68.78 | 68.78 | 68.79 | 68.80 | 68.86 |
| 100YR 20%CC Flow | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD |
| 100YR 30%CC Level | 68.91 | 68.92 | 68.94 | 68.22 | 68.09 | 68.31 | 68.73 | 68.73 | 68.82 | 68.91 | 68.92 | 68.91 | 68.94 | 68.91 | 68.90 | 69.04 |
| 100YR 30%CC Flow | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD |
| 100YR 40%CC Level | 69.03 | 69.02 | 69.00 | 68.31 | 68.20 | 68.40 | 68.85 | 68.85 | 68.93 | 68.97 | 68.99 | 69.01 | 69.00 | 69.02 | 69.02 | 69.21 |
| 100YR 40%CC Flow | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD |
| 100YR 85%CC Level | 69.20 | 69.21 | 69.18 | 68.51 | 68.43 | 68.58 | 69.01 | 69.01 | 69.10 | 69.13 | 69.15 | 69.16 | 69.18 | 69.20 | 69.19 | 69.37 |
| 100YR 85%CC Flow | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD |
| 200YR Level | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD |
| 200YR Flow | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD |
| 200YR 20%CC Level | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD |
| 200YR 20%CC Flow | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD |
| 500YR Level | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD |
| 500YR Flow | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD |
| 1000YR Level | 69.16 | 69.17 | 69.13 | 68.46 | 68.38 | 68.53 | 68.98 | 68.97 | 69.05 | 69.10 | 69.12 | 69.13 | 69.13 | 69.15 | 69.15 | 69.33 |
| 1000YR Flow | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD |
| 1000YR 20%CC Level | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD |
| 1000YR 20%CC Flow | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD |
| TIDE 200YR | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD |
| TIDE 1000YR | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD | NMD |
| Eastings | 399946 | 399955 | 399969 | 399839 | 399845 | 399870 | 399876 | 399883 | 399890 | 399908 | 399921 | 399934 | 399954 | 399951 | 399951 | 399978 |
| Northings | 171023 | 171002 | 170981 | 171045 | 171047 | 171046 | 171045 | 171044 | 171042 | 171027 | 171026 | 171023 | 170990 | 170972 | 170960 | 171036 |

| | | |
|---|---|---|
| **Level of confidence** | **Moderate** | The model was produced to assess our flood risk management assets and the results are fit for this purpose. We have MODERATE confidence in its input data, and subsequently its results. The reason that we have MODERATE confidence in the model and its results is because the model requires verification against a known flood event. You will need to contact our Partnership and Strategic Overview Team to discuss whether the flood levels from this model are suitable for your FRA or whether they require you to carry out further work to update the modelling. |
| **NMD** | No Modelled Data | |
| **UNITS** | LEVELS: | mAOD |
| | FLOW: | cumecs |

**TITLE** Melksham SoP Study 2013
**MODEL DATE** 01/07/2013
**SOFTWARE** HEC-RAS

**SCENARIO** Defended

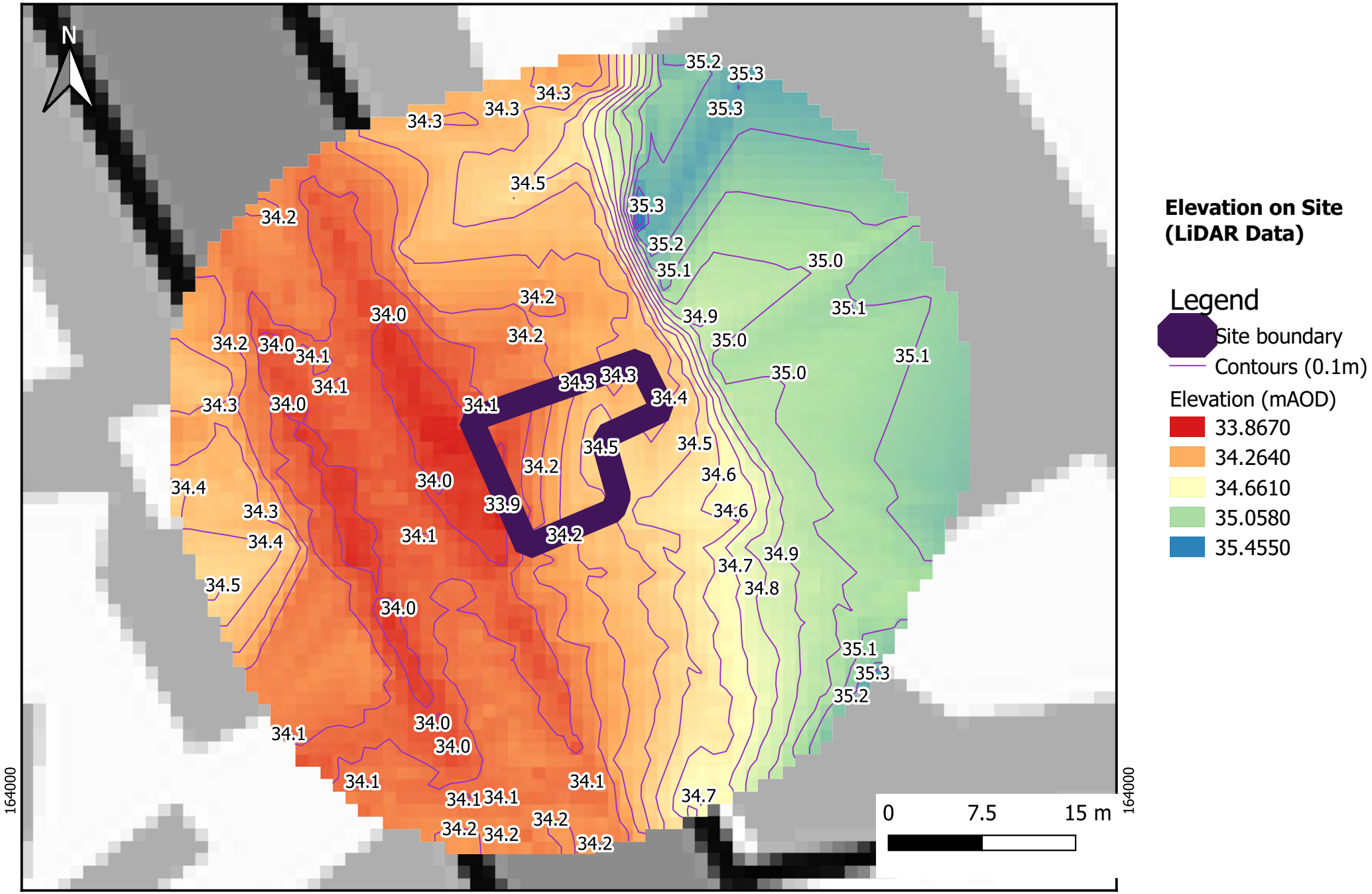
| NODE | 12 | 13 | 14.25 | 14.75 | 15 |
|---|---|---|---|---|---|
| WATERCOURSE | Bristol Avon | Bristol Avon | Bristol Avon | Bristol Avon | Bristol Avon |
| 2YR Level | 33.31 | 33.37 | 33.38 | 33.42 | 33.42 |
| 2YR Flow | 76.92 | 76.95 | 76.95 | 76.95 | 76.95 |
| 5YR Level | 33.55 | 33.65 | 33.66 | 33.72 | 33.72 |
| 5YR Flow | 100.93 | 100.93 | 100.93 | 100.93 | 100.93 |
| 10YR Level | 33.69 | 33.81 | 33.82 | 33.89 | 33.89 |
| 10YR Flow | 116.92 | 116.92 | 116.92 | 116.92 | 116.92 |
| 20YR Level | 33.83 | 33.98 | 33.99 | 34.08 | 34.08 |
| 20YR Flow | 134.91 | 134.91 | 134.91 | 134.91 | 134.91 |
| 20YR 20%CC Level | 34.01 | 34.21 | 34.22 | 34.34 | 34.34 |
| 20YR 20%CC Flow | 161.89 | 161.89 | 161.89 | 161.89 | 161.89 |
| 25YR Level | NMD | NMD | NMD | NMD | NMD |
| 25YR Flow | NMD | NMD | NMD | NMD | NMD |
| 30YR Level | NMD | NMD | NMD | NMD | NMD |
| 30YR Flow | NMD | NMD | NMD | NMD | NMD |
| 50YR Level | 34.00 | 34.20 | 34.22 | 34.33 | 34.33 |
| 50YR Flow | 160.89 | 160.89 | 160.89 | 160.89 | 160.89 |
| 75YR Level | 34.08 | 34.30 | 34.32 | 34.45 | 34.45 |
| 75YR Flow | 173.88 | 173.88 | 173.88 | 173.88 | 173.88 |
| 100YR Level | 34.14 | 34.37 | 34.39 | 34.53 | 34.53 |
| 100YR Flow | 182.87 | 182.88 | 182.88 | 182.88 | 182.88 |
| 100YR 20%CC Level | 34.36 | 34.64 | 34.67 | 34.85 | 34.86 |
| 100YR 20%CC Flow | 219.85 | 219.85 | 219.85 | 219.85 | 219.86 |
| 100YR 30%CC Level | NMD | NMD | NMD | NMD | NMD |
| 100YR 30%CC Flow | NMD | NMD | NMD | NMD | NMD |
| 100YR 40%CC Level | NMD | NMD | NMD | NMD | NMD |
| 100YR 40%CC Flow | NMD | NMD | NMD | NMD | NMD |
| 100YR 85%CC Level | NMD | NMD | NMD | NMD | NMD |
| 100YR 85%CC Flow | NMD | NMD | NMD | NMD | NMD |
| 200YR Level | 34.29 | 34.55 | 34.58 | 34.75 | 34.75 |
| 200YR Flow | 207.86 | 207.86 | 207.86 | 207.86 | 207.86 |
| 200YR 20%CC Level | NMD | NMD | NMD | NMD | NMD |
| 200YR 20%CC Flow | NMD | NMD | NMD | NMD | NMD |
| 500YR Level | NMD | NMD | NMD | NMD | NMD |
| 500YR Flow | NMD | NMD | NMD | NMD | NMD |
| 1000YR Level | 34.75 | 35.03 | 35.06 | 35.37 | 35.38 |
| 1000YR Flow | 278.81 | 278.81 | 278.81 | 278.85 | 278.84 |
| 1000YR 20%CC Level | NMD | NMD | NMD | NMD | NMD |
| 1000YR 20%CC Flow | NMD | NMD | NMD | NMD | NMD |
| TIDE 200YR | NMD | NMD | NMD | NMD | NMD |
| TIDE 1000YR | NMD | NMD | NMD | NMD | NMD |
| Eastings | 390320 | 390340 | 390375 | 390385 | 390401 |
| Northings | 164097 | 164113 | 164137 | 164143 | 164152 |

| | | |
|---|---|---|
| **Level of confidence** | **Moderate** | The model was produced to assess our flood risk management assets and the results are fit for this purpose. We have MODERATE confidence in its input data, and subsequently its results. The reason that we have MODERATE confidence in the model and its results is because the model requires verification against a known flood event. You will need to contact our Partnership and Strategic Overview Team to discuss whether the flood levels from this model are suitable for your FRA or whether they require you to carry out further work to update the modelling. |
| **NMD** | No Modelled Data | |
| **UNITS** | LEVELS: | mAOD |
| | FLOW: | cumecs |

GeoSmart Information

# Appendix C

# Environment Agency LiDAR ground elevation data




**Elevation on Site (LiDAR Data)**

Legend

- Site boundary
- Contours (0.1m)

Elevation (mAOD)

- 33.8670
- 34.2640
- 34.6610
- 35.0580
- 35.4550

# Disclaimer

This report has been prepared by GeoSmart in its professional capacity as soil, groundwater, flood risk and drainage specialists, with reasonable skill, care and diligence within the agreed scope and terms of contract and taking account of the manpower and resources devoted to it by agreement with its client and is provided by GeoSmart solely for the internal use of its client.

The advice and opinions in this report should be read and relied on only in the context of the report as a whole, taking account of the terms of reference agreed with the client. The findings are based on the information made available to GeoSmart at the date of the report (and will have been assumed to be correct) and on current UK standards, codes, technology and practices as at that time. They do not purport to include any manner of legal advice or opinion. New information or changes in conditions and regulatory requirements may occur in future, which will change the conclusions presented here.

This report is confidential to the client. The client may submit the report to regulatory bodies, where appropriate. Should the client wish to release this report to any other third party for that party's reliance, GeoSmart may, by prior written agreement, agree to such release, provided that it is acknowledged that GeoSmart accepts no responsibility of any nature to any third party to whom this report or any part thereof is made known. GeoSmart accepts no responsibility for any loss or damage incurred as a result, and the third party does not acquire any rights whatsoever, contractual or otherwise, against GeoSmart except as expressly agreed with GeoSmart in writing.

For full T&Cs see http://geosmartinfo.co.uk/terms-conditions

# Important consumer protection information

This search has been produced by GeoSmart Information Limited, Suite 9-11, 1st Floor, Old Bank Buildings, Bellstone, Shrewsbury, SY1 1HU.

Tel: 01743 298 100

Email: info@geosmartinfo.co.uk

GeoSmart Information Limited is registered with the Property Codes Compliance Board (PCCB) as a subscriber to the Search Code. The PCCB independently monitors how registered search firms maintain compliance with the Code.

## The Search Code:

- provides protection for homebuyers, sellers, estate agents, conveyancers and mortgage lenders who rely on the information included in property search reports undertaken by subscribers on residential and commercial property within the United Kingdom.
- sets out minimum standards which firms compiling and selling search reports have to meet.
- promotes the best practice and quality standards within the industry for the benefit of consumers and property professionals.
- enables consumers and property professionals to have confidence in firms which subscribe to the code, their products and services.
- By giving you this information, the search firm is confirming that they keep to the principles of the Code. This provides important protection for you.

## The Code's core principles

Firms which subscribe to the Search Code will:

- display the Search Code logo prominently on their search reports.
- act with integrity and carry out work with due skill, care and diligence.
- at all times maintain adequate and appropriate insurance to protect consumers.
- conduct business in an honest, fair and professional manner.
- handle complaints speedily and fairly.
- ensure that products and services comply with industry registration rules and standards and relevant laws.
- monitor their compliance with the Code.

GeoSmart Information

## Complaints

If you have a query or complaint about your search, you should raise it directly with the search firm, and if appropriate ask for any complaint to be considered under their formal internal complaints procedure. If you remain dissatisfied with the firm's final response, after your complaint has been formally considered, or if the firm has exceeded the response timescales, you may refer your complaint for consideration under The Property Ombudsman scheme (TPOs). The Ombudsman can award up to £5,000 to you if the Ombudsman finds that you have suffered actual financial loss and/or aggravation, distress or inconvenience as a result of your search provider failing to keep to the Code.

*Please note that all queries or complaints regarding your search should be directed to your search provider in the first instance, not to TPOs or to the PCCB.*

## TPOs contact details:

The Property Ombudsman scheme

Milford House

43-55 Milford Street

Salisbury

Wiltshire SP1 2BP

[redacted]

You can get more information about the PCCB from www.propertycodes.org.uk.

Please ask your search provider if you would like a copy of the search code

## Complaints procedure

GeoSmart Information Limited is registered with the Property Codes Compliance Board as a subscriber to the Search Code. A key commitment under the Code is that firms will handle any complaints both speedily and fairly. If you want to make a complaint, we will:

- Acknowledge it within 5 working days of receipt.
- Normally deal with it fully and provide a final response, in writing, within 20 working days of receipt.
- Keep you informed by letter, telephone or e-mail, as you prefer, if we need more time.
- Provide a final response, in writing, at the latest within 40 working days of receipt.
- Liaise, at your request, with anyone acting formally on your behalf.

If you are not satisfied with our final response, or if we exceed the response timescales, you may refer the complaint to The Property Ombudsman scheme [redacted]

We will co-operate fully with the Ombudsman during an investigation and comply with his final decision. Complaints should be sent to:

Martin Lucass

Commercial Director

GeoSmart Information Limited

Suite 9-11, 1st Floor,

Old Bank Buildings,

Bellstone, Shrewsbury, SY1 1HU

[redacted]

# 12. Terms and conditions, CDM regulations and data limitations

Terms and conditions can be found on our website:

http://geosmartinfo.co.uk/terms-conditions/

CDM regulations can be found on our website:

http://geosmartinfo.co.uk/knowledge-hub/cdm-2015/

Data use and limitations can be found on our website:

http://geosmartinfo.co.uk/data-limitations/