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FLOOD RISK ASSESSMENT AND SEQUENTIAL TEST

PARK ROAD SOUTH, HAVANT, PO9 1HB



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1. Introduction

JDL have been appointed to undertake a Sequential Test, Exception Test and Flood Risk Assessment for the proposed additional residential stories above the existing retained building between Park Road South, West Street, and Brockhampton Lane. The aim of this report is to provide an appraisal of the details of the flood risk in accordance with the NPPF and with the LLFA and planning guidance, assess the suitability for the type of development in the proposed location and provide a Flood Warning and Evacuation Plan (FWEP) in accordance with the local and national policy.

2. Site Description

2.1. Site location & description

The site is located in the middle of Havant, between the junctions of West Street with the B2149 Park Road South to the east, and Brockhampton Lane to the west. Locally the site is in an area which is mixed residential and commercial, with the Havant Park to the north east as noted on the OS mapping below.



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Figure 2.1 – Site location plan

2.2. Geology & Hydrogeology

Geological mapping indicates that the site is located in an area of head deposits of clay and gravel, over various types of chalk formation. The BGS borehole logs to the immediate south of the site note 'soil' for a depth of two foot, underlain by clayey gravel to varying depths between 5 to 14 foot with chalk only present at depth.

The Soilscales mapping notes that the ground consists of loam and clayey loam with a naturally high groundwater table.

3. Flood Risk

3.1. Flood Zone

The site is partially in Flood Zones 2 and 3 along the eastern boundary as shown in Figure 3.1 below.

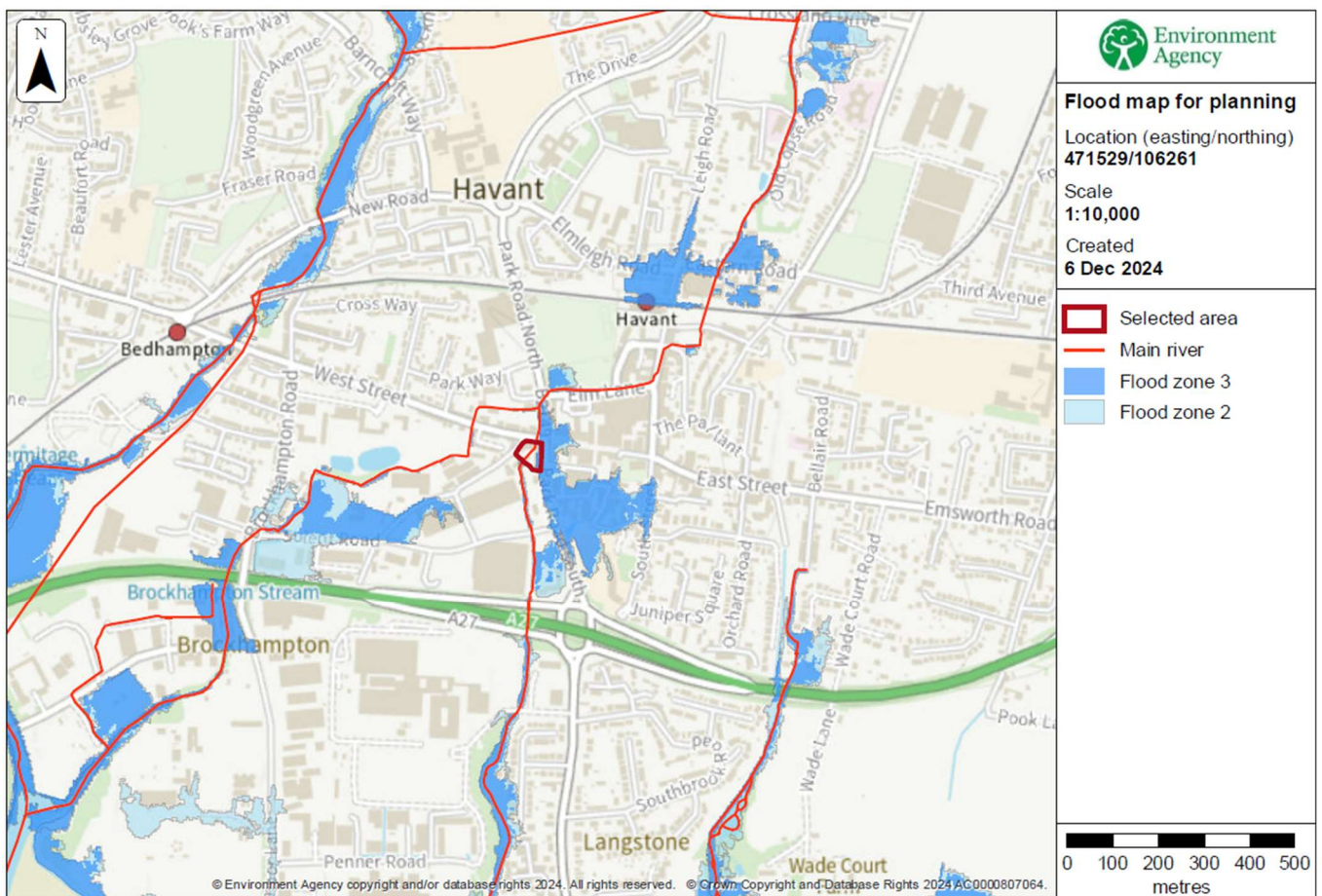


Figure 3.1 – Flood Zone Mapping

The Environment Agency OpenData has also been used to compare the Flood Zones to aerial mapping at a higher scale as shown in Figure 3.2 below.



Figure 3.2 – Flood Zone Mapping compared to aerial photography

Therefore, whilst the site is within Flood Zone 2 and 3 this is only along the eastern extent, and the existing building would act as a barrier to this progressing further into the site. The culvert in this modelling is restricting any flooding within the centre of the site, but it is unclear from the modelling if this includes the short open section within the immediate southern 'courtyard' of the building. However, the short extents of flood defence structures is included in the Environment Agency database and therefore presumably included in the modelling.

3.2. Fluvial\Tidal

The gov.uk website includes flood risk mapping as well as the zoning mapping and this is shown in Figure 3.3 below.

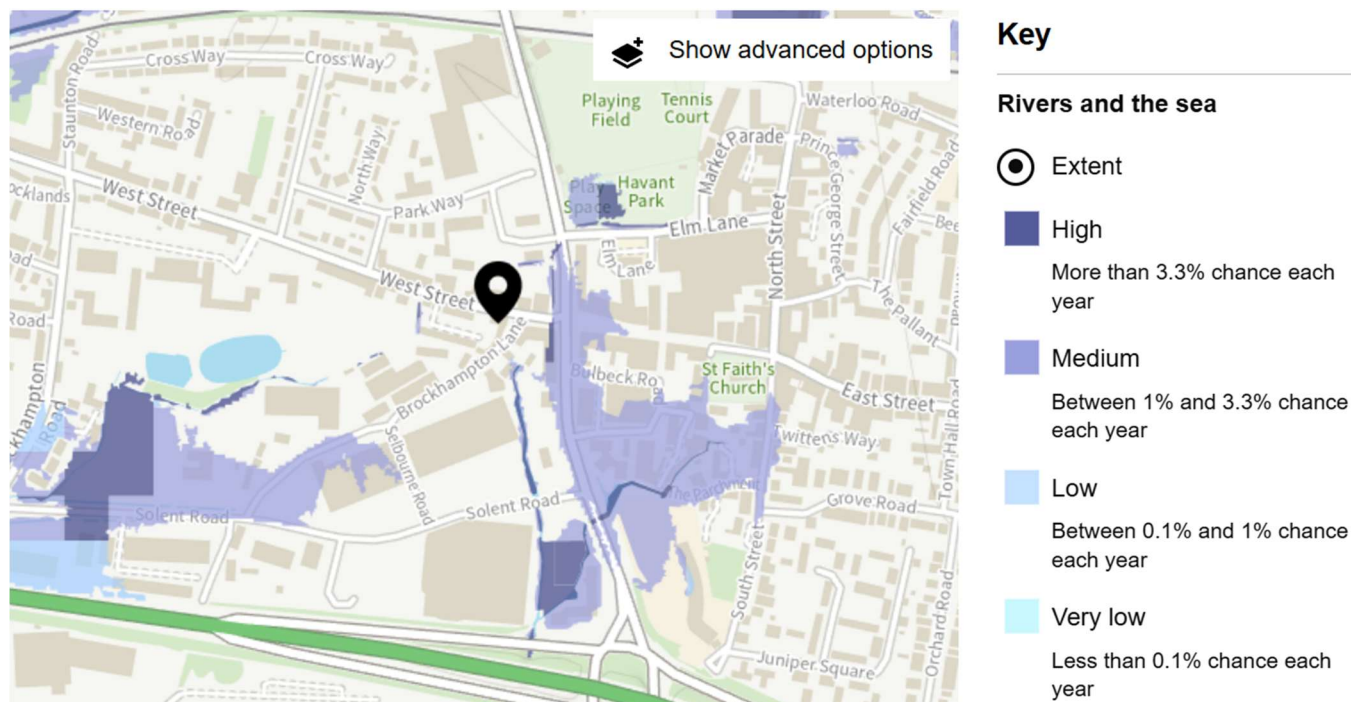


Figure 3.3 – Flood Risk Mapping

This is broadly similar to the Flood Zoning mapping but notes the site as being at medium risk, with the slight extent of high appearing to be a error in the modelling as it is not connected to the line of the watercourse and so could not be 'activated' at a higher risk than the adjacent area.

A data request was submitted to the Environment Agency with the response in Appendix C. This modelling is based on the Havant Flood Mapping Study 2008 which is modelling of the Lavant and Brockhampton Streams but undefended only. This modelling includes the 1.0% and 0.1% AEP events and the 1.0% AEP +20% climate change event as shown in Figures 3.4 and 3.5 below.

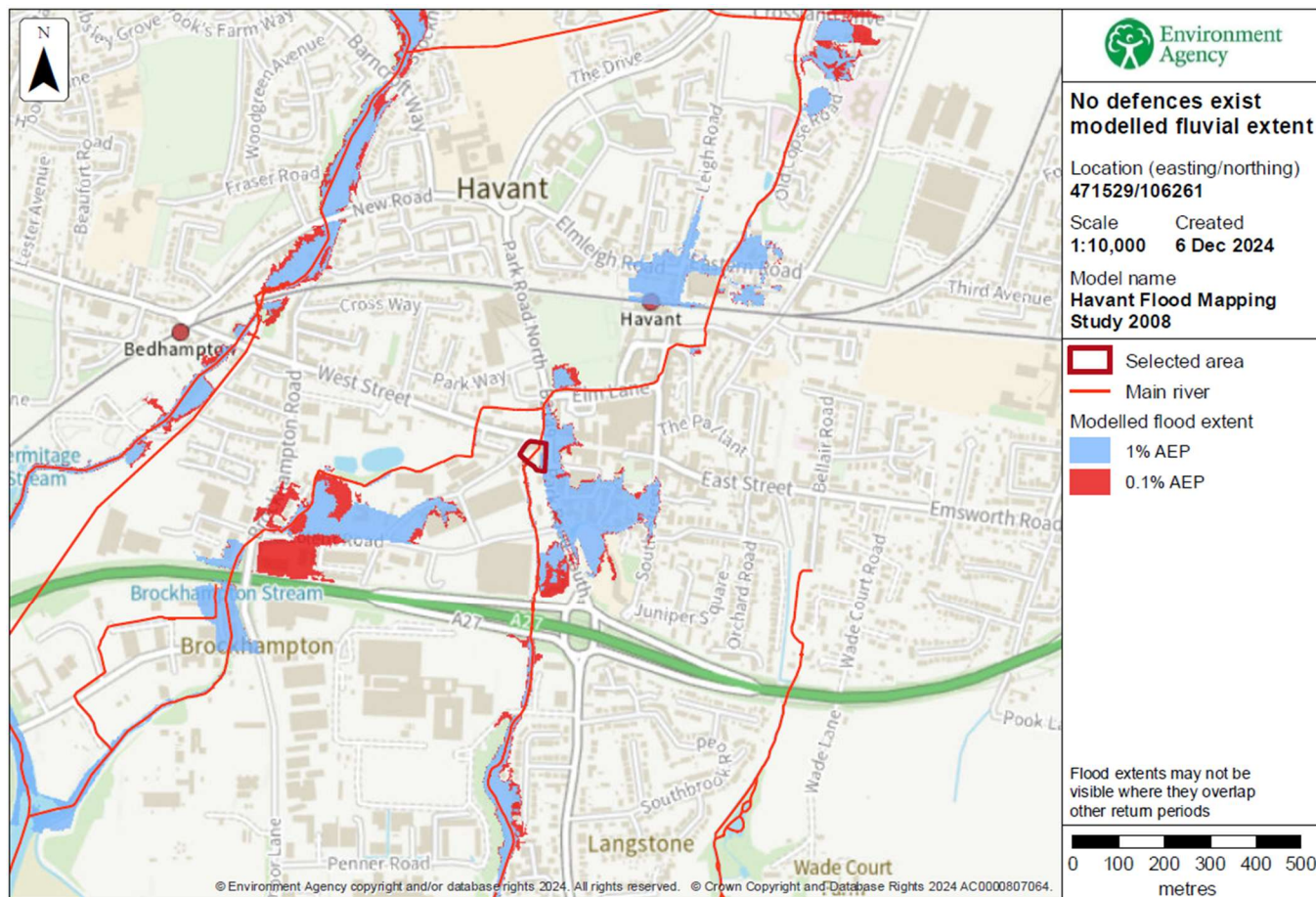


Figure 3.4 – 1.0% AEP and 0.1% AEP modelling

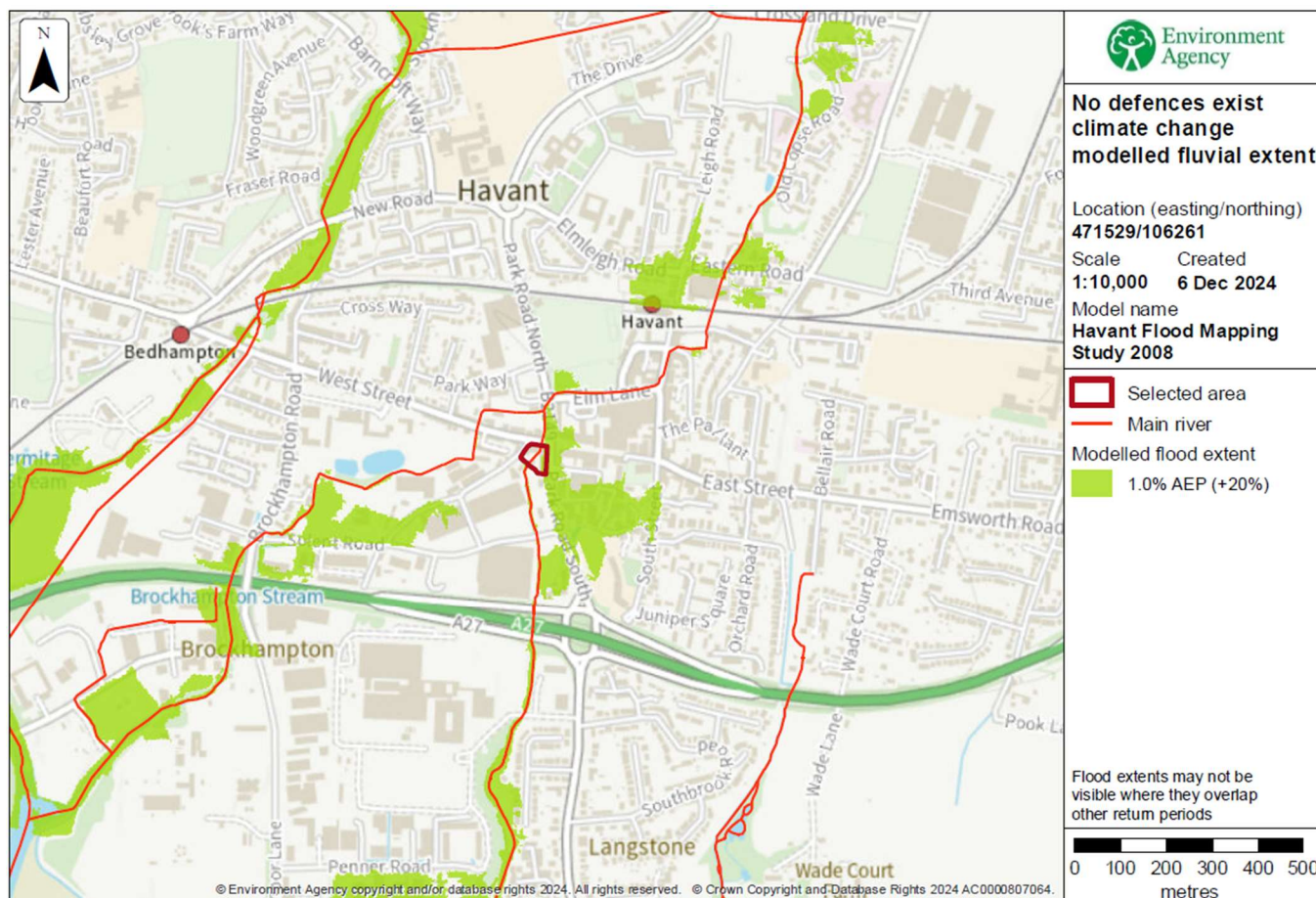


Figure 3.5 – 1.0% AEP +20% climate change modelling

Both of these sets of modelling are similar to the Flood Zoning and flood risk mapping which notes that the Lavant Stream comes out of bank to the north of the site and flows southwards along Park Road South and then re-enters the Lavant Stream and Homewell Stream (a tributary to the Lavant Stream) to the south. Again, neither set of mapping shows flooding within the site, only along the eastern boundary.

The Environment Agency response also includes nodal flood level data for the area as shown in figure 3.6 below.

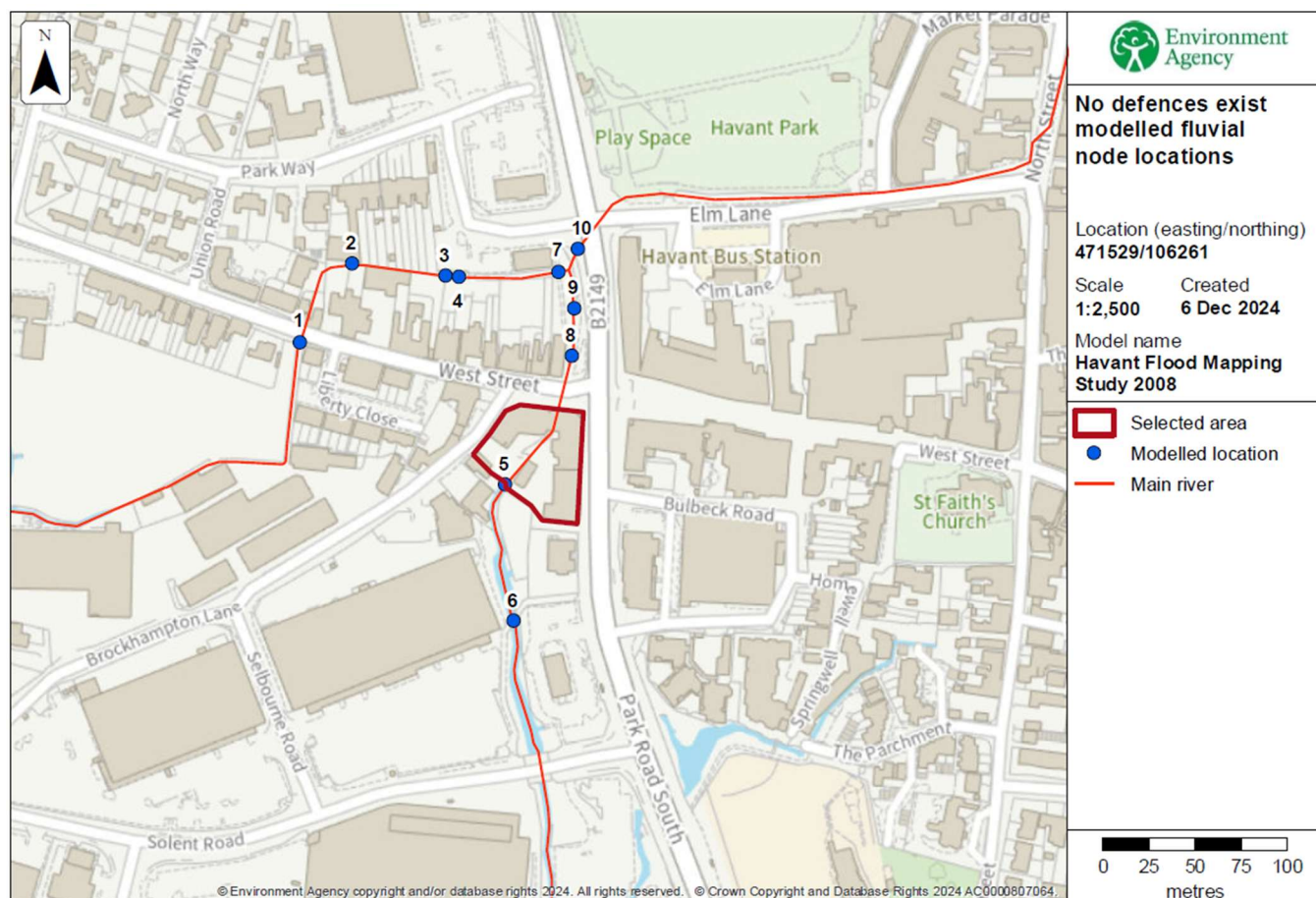


Figure 3.6 – Havant Flood Mapping Study 2008 nodal locations

The local modelled flood levels are as follows:

Node	Level (mAOD)	
	1.0% AEP	0.1% AEP
8	7.78	7.84
5	7.69	7.81
6	6.97	7.13

The flood levels at node 5 are higher than the existing car park levels within the courtyard at around 7.20mAOD, however the ground levels in the local area are falling to the south, with an open section of watercourse which extends to the south of node 6. Therefore, with the flood level at node 6 being significantly lower a backwater flow condition from subcritical flows appears unlikely and therefore there would be no flooding within the car park courtyard. For conservatism the Flood Warning and Evacuation Plan (FWEP) will be written on the basis that flooding could be present in this area, but this is not reflected in the modelling.

3.3. Surface Water

Surface water flood risk is noted on the gov.uk website, but it should be noted that this mapping is indicative only and does not include formalised drainage networks including public and private drainage, and culverted sections of watercourses etc. As such this mapping should only be used to identify if there are unmapped watercourses or overland flow route which run through the proposed development. The mapping is shown on the figure below:

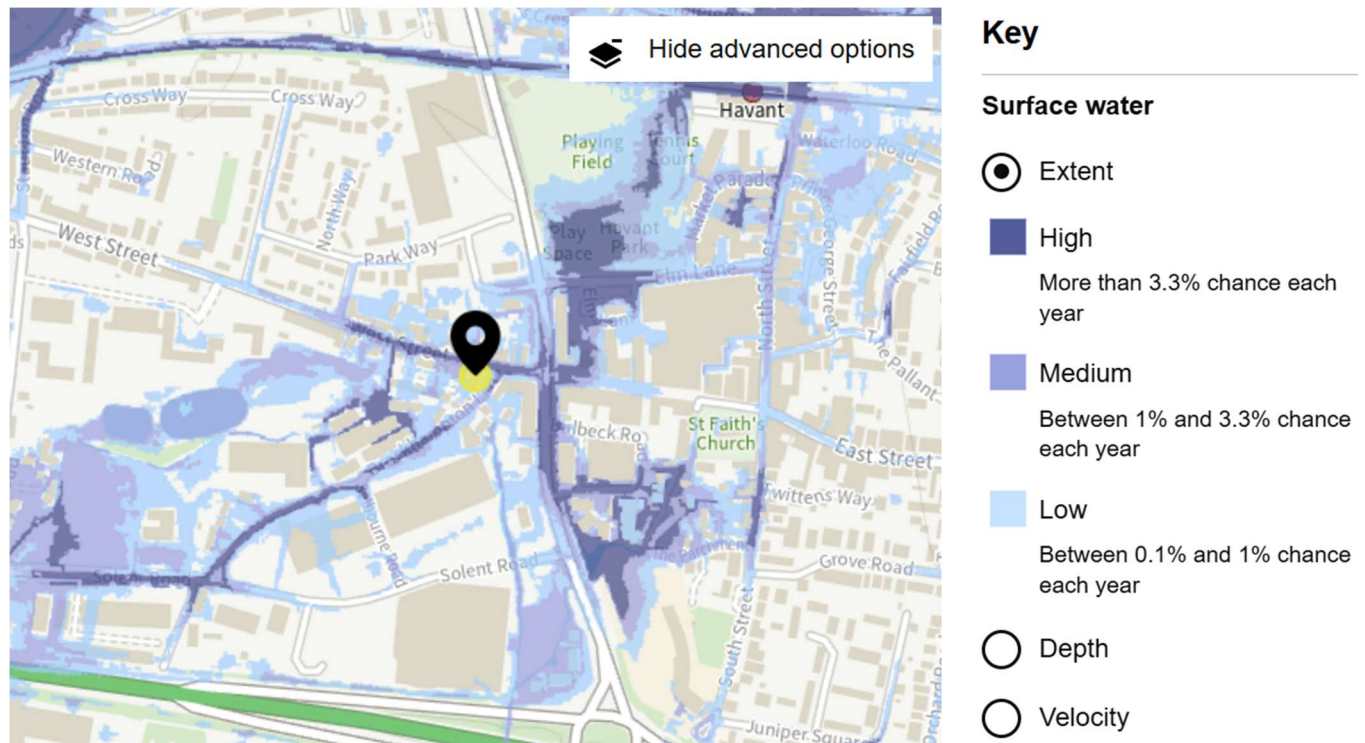


Figure 3.7 - Surface water flood risk mapping (Gov.uk)

The mapping does show extents of surface water flood risk in the local area, and the Environment Agency OpenData RoSWF mapping has been used to produce higher scale comparison show in figure 3.8 below.

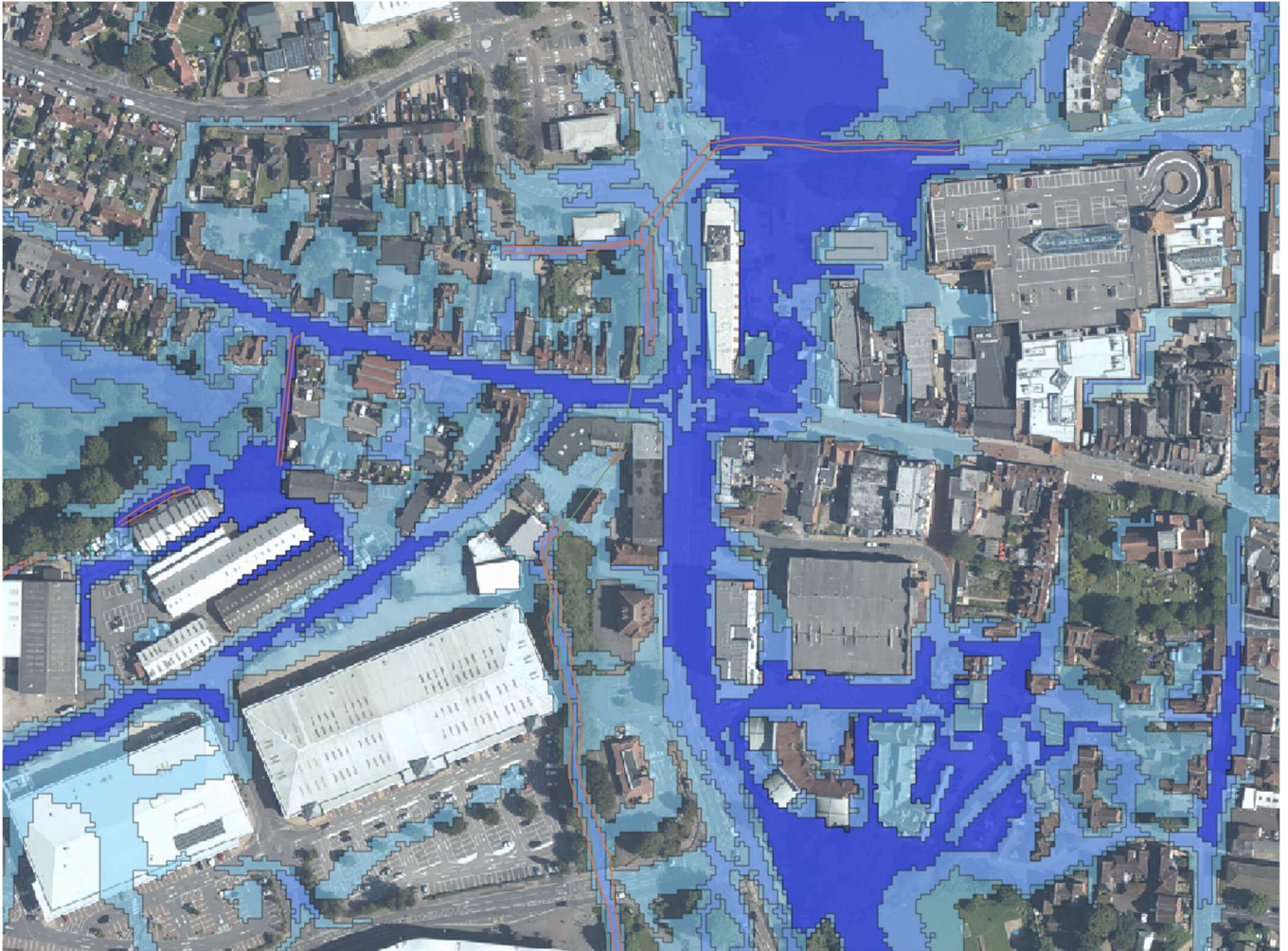


Figure 3.8 - RoSWF mapping to aerial photography

As noted above the issue with this modelling is that it would be unlikely to accurately represent the watercourse, especially the culverted sections, in the local area. Noting on the above that the line of the watercourse is not at high risk as part of the modelling this assessment is more appropriately superseded by the watercourse modelling provided by the Environment Agency.

What this modelling does show is an agreement with the flow routing for the flooding which is mainly to the south along Park Road South around the existing development.

The flooding noted in the car parking area to the south of the building is noted as being of low risk only, and this is likely overtopping from Park Road South and is not reflected in the Havant Flood Mapping.

Therefore, the surface water flood risk is not considered greater than that of the fluvial flood risk.

3.4. Reservoirs

The Gov.uk flood risk mapping shows the areas which are liable to reservoir flooding either when river levels are normal, and when combined with flooding along the rivers. This is shown in the figure below:

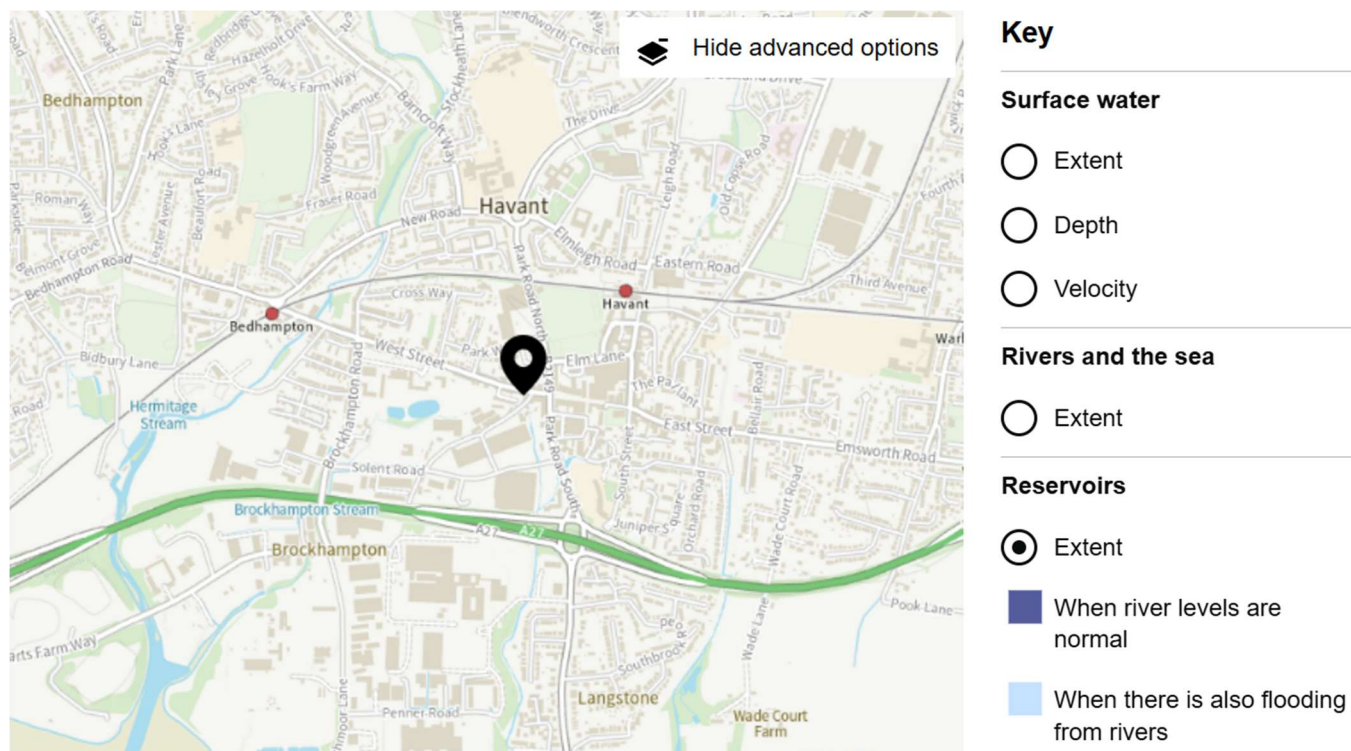


Figure 3.9 - Reservoir flood risk (Gov.uk)

This shows that there is no risk from reservoirs.

3.5. Public and Private Sewers

With the watercourse running through the local area, which is assumed to be the outfall of the local public and private surface water drainage, then the risk of flooding is inherently linked to the fluvial flood risk as noted above. Exceedance would then follow a similar overland route to the fluvial and RoSFW mapping and re-entering the watercourse after going around the eastern extent of the building.

The proposed development does not change the drainage characteristics of the site and therefore there is no increase in risk from the proposals.

3.6. Historic Flooding

The Environment Agency database of historic flood events notes that there has previously been an extent of flooding to the west of the site associated with an event in March 1991. The closest extent is just over 100m from the site and appears to be associated with the Brockhampton Stream, rather than the Lavant Stream which runs through the site.

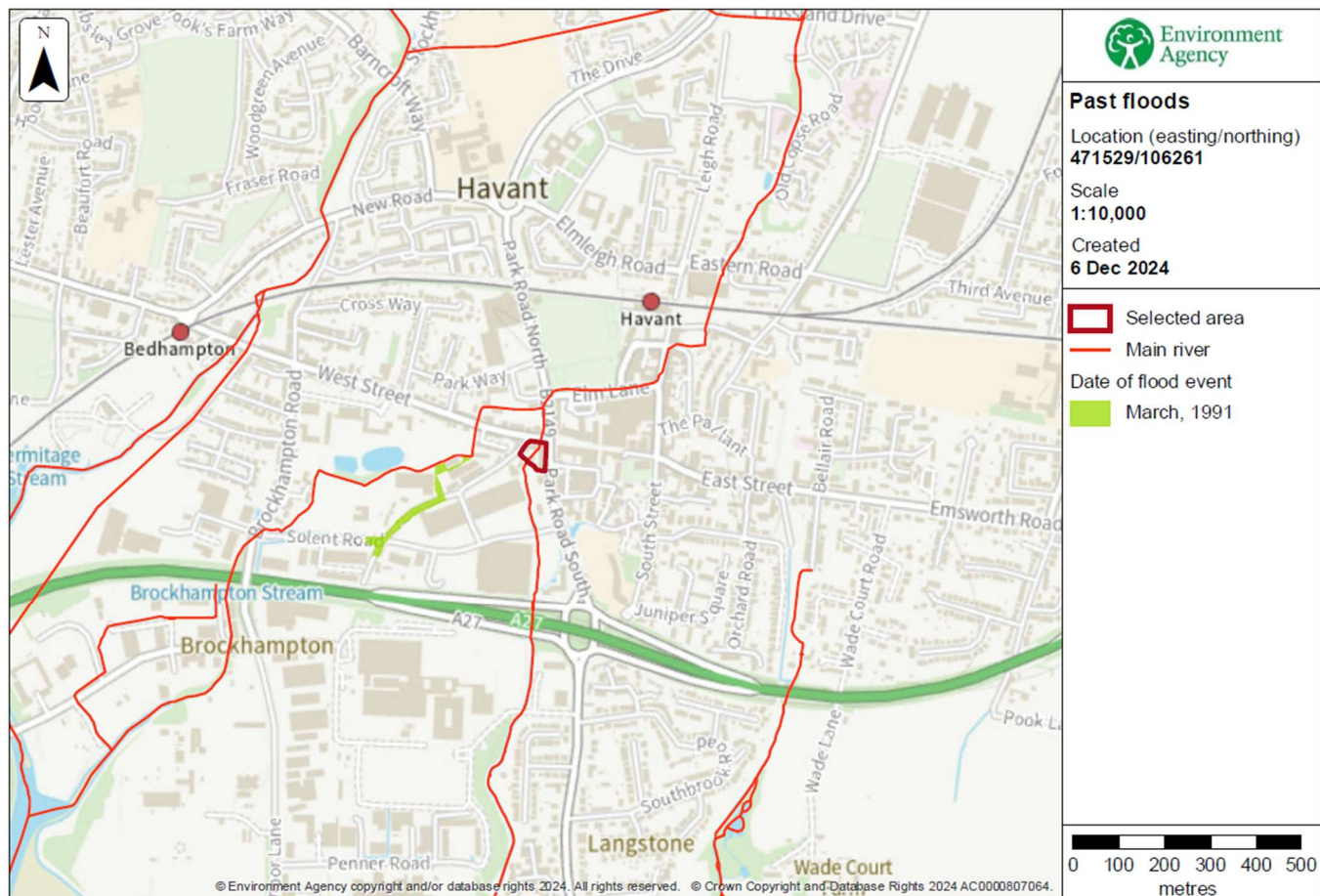


Figure 3.10 – Historic flood mapping

No other records of historic flooding have been identified for the development site.

3.7. Groundwater

Given soil mapping and local BGS borehole records the area appears to be capped with impermeable material over the chalk bedrock. Where there is emergence from the chalk aquifer this would likely travel to the local watercourses as the lowest points in the area and therefore any flood risk would be linked to the fluvial flood risk modelling.

3.8. Other Sources

No other sources of flood risk have been identified to the proposed development.

3.9. Sequential and Exception Test

As the development proposals are under permitted development rights, and retaining the existing building the development cannot be located in a location of lower risk. Therefore, the Sequential Test is not applicable to the development, and whilst the Exception Test is also not required consideration should be given to the management of flood risk.

The existing site includes commercial units at the ground floor and this is to be retained within the proposals without expansion and therefore there is no increase in risk with the proposals.

The commercial units, where refitted, should be in accordance with flood resistance and resilience recommendations from C790 as noted in the section below.

A Flood Warning and Evacuation Plan (FWEP) has also been prepared for the proposed development (Appendix D) to increase the awareness of the occupants and residents and given them a structure for a flood preparedness plan to reduce the possible consequences of any flooding.

3.10. Flood Risk Conclusions

Therefore, whilst the site is noted as being in Flood Zone 3 the current risk to the site is medium/low, along the eastern boundary and exposed to the commercial properties only. In accordance with Table 3 of the NPPF for Less Vulnerable development (commercial) the site is suitable. The category of the upper floors is Highly Vulnerable development (residential dwellings) but these are outside of the flood risk area vertically and therefore equivalent to Flood Zone 1.

Table 3: Flood risk vulnerability and flood zone 'compatibility'

Flood risk vulnerability classification (see table 2)		Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
Flood zone (see table 1)	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	✗	Exception Test required	✓
	Zone 3b functional floodplain	Exception Test required	✓	✗	✗	✗

Key: ✓ Development is appropriate.
 ✗ Development should not be permitted.

Notes to table 3:

This table does not show:

- the application of the Sequential Test which guides development to Flood Zone 1 first, then Zone 2, and then Zone 3;
- flood risk assessment requirements; or
- the policy aims for each flood zone.

3.11. Flood Resistance and Resilience

The flood modelling discussed above note that at node 8 to the north of the site the flood levels are 7.78 and 7.84mAOD for the 1.0% AEP and 0.1%AEP events respectively, with the climate change modelling appearing similar in extent and therefore level. The existing FFLs of the units vary across the site between 7.70mAOD and 7.30mAOD and therefore a design flood depth of 1.0m should be taken into account in the design for flood resistance and resilience.

Bedrooms will also not be located on the ground floor, and basements will not be included within the development.

For the design of any new elements they will be in accordance with C790 'Guidance on the code of practice for property flood resilience'. These features include:

- Engineering bricks at the lower levels.
- The below floor cavity is vented to the which allows for drain-down after a flood event.
- Concrete floors with hard surface covering minimising the impact of flooding.
- Damp Proof Membranes to minimise the passage of water through ground floors. Impermeable polythene membranes are at least 1200 gauge to minimise ripping. Joining of membranes includes a minimum 300mm overlap.
- Floor insulation is of the closed-cell type to minimise the impact of flood water. Wall insulation specified for the fire resistance requirements of the development but to be laid horizontally so that it can be easily replaced in the event of water ingress in to the product.
- Underfloor services have been avoided where possible and instead routed to come down from ceiling level and where necessary will be non-ferrous.
- Sockets, switches and meters on the ground floor have been cited as high as possible whilst complying with accessibility requirements to minimise the risk of flood damage.
- Pipework and service entries are to be sealed with expanding foam or similar closed cell material, and closed cell material to be used for pipe and service insulation below the flood level.
- Plasterboard, where used, is to have a joint 1.0m above the FFL to allow for easier replacement and drying of the structure in the event of a flood.
- Recoverable wall finishes such as magnesium oxide board should be use.
- Flood recoverable kitchens\bakeries\food preparation areas design advice should also be followed for the layout and specification of the kitchens\bakeries\food preparation areas, although commercial specifications of stainless steel are less affected by flooding.

The proposed occupants and residents will also be issued with a Flood Warning and Evacuation Plan (FWEP) document so that they can be warned of the potential risks, and can plan for potential flooding events to reduce the risk to people and property.

3.12. Conclusion

On the basis of the above it is therefore demonstrated that the site does not require the Sequential and Exception Tests. Whilst there is a medium to low risk of fluvial flooding along the eastern boundary, there is no increase in risk from the development and therefore the proposals are in compliance with local and national policy.

4. SuDs Strategy

The existing surface water from the site is believed to drain directly to the watercourse which runs through the site.

The development proposals do not increase the roof area or the hardstandings to the rear with only a new stepped access to the rear of the building for the residential units, modifications to

create a refuse and recycling point, along with the additional stories. Therefore there will be no changes to the existing hydrology of the site and the runoff rate and volume.

5. Foul

Foul flows from the site will include an additional 24 residential units and therefore on the basis of the DCG rate of 4000l/dwelling/day the discharge rate will be 1.11 l/s. This will outfall via the existing site's foul network into the surrounding adopted drainage.

6. Conclusions

The site is noted as being partially within Flood Zone 2 and 3 along the eastern boundary. The Lavant Stream runs through the site and this is the cause of the fluvial flood risk as it comes out of bank to the north of the site due to the culvert which runs under the site.

The commercial units on the ground floor are to be retained in the proposals and not expanded and therefore the flood risk is not changed in the proposals.

The new residential units are all located above the modelled flood levels for the 1.0% AEP plus climate change and 0.1% AEP event with an access to the rear through the car park which is not shown to be at risk and as such there is safe access and egress from the site.

There is no change to the hydrology of the site as the proposals are only to include additional stories and not modify the external hardstandings and as such there is no increase in the runoff rate and volume.

The additional residential units increase the foul flows by 1.11l/s and this will drain to the existing foul network on the site.

Appendix A:
Topographical Survey

Appendix B:
Proposed Layout

Appendix C:
Environment Agency Flood Response

Appendix D:

Flood Warning and Evacuation Plan