Job Number: 191025

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Flood Risk Assessment

Property:

Vine House
Hampstead Square
Camden
NW3 1AB

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Executive Summary

This flood risk assessment for the basement development at Vine House has explored the potential sources of flooding and compared existing and proposed conditions. The assessment has included a detailed study of the site and the surrounding area. The assessment concludes that the proposals will not increase the risk of flooding to nearby properties. There is a low risk of flooding to Vine House. This can be suitably mitigated by adopting appropriate design and construction methods.

1. Introduction

A new basement is proposed below an existing property at Vine House. This report comprises a FRA (flood risk assessment) to support the planning application.

The objectives of the FRA is to establish:

- Whether the basement is likely to be affected by current or future flooding from any source
- Whether the basement will increase flood risk elsewhere
- Whether mitigation measures to deal with these effects and risks are feasible and appropriate

This flood risk assessment includes proposed design measures to reduce any risks associated with flooding and mitigate the impacts for the operation of the building and its occupants.

Planning Context

The Environment Agency has not identified any areas in Camden that are at high risk of flooding from rivers and seas. However, the property is situated in a CDA (Critical Drainage Area). This includes areas that are identified as being subject to localised flooding from surface water. This is caused during times of heavy rainfall, when the local combined sewer system may have insufficient capacity to meet the increase in volume and rate of flow.

All applications for a basement extension within flood risk areas identified in the Camden Flood Risk Management Strategy will be expected to include a Flood Risk Assessment.

This report is based on information from a desk study, a site visit and relevant parts of the following documents:

- Basements CPG - March 2018
- Water and flooding CPG - March 2019

The scope of the FRA should be proportionate to the scale, nature and location of the development. This proposal described in this assessment is for a single dwelling. The level of analytical detail is limited accordingly.

2. Existing Site Conditions & Proposed Development

The existing property is situated in Hampstead and comprises a three storey detached building surrounded by soft landscaped gardens. Brick walls separate the property from the public highway – Hampstead Square to the south and Holford Road the east - and from neighbouring properties to the north and the west.

Figure 1: Plan view of site (approx. area outlined in red) and the surrounding properties

The Strategic Flood Risk Assessment (SFRA 2014) for the London Borough of Camden has identified three CDAs (Critical Drainage Areas) within the borough. These are areas where multiple and interlinked sources of flood risk (surface water, groundwater, sewer, main river and/or tidal) may cause flooding. The property is situated in one of these, as shown below.

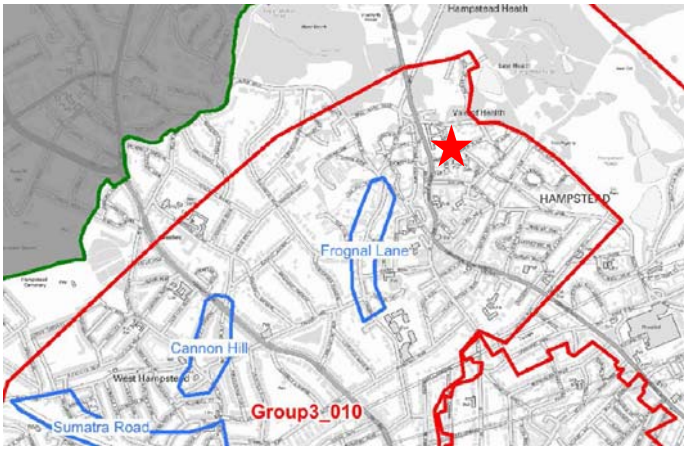

*Figure 2: Extract from Camden CDA map (site indicated with *)*

Given the higher level of flood risk in this area, a flood risk assessment is required in accordance with Camden Council's CPG – Water and Flooding.

The proposal is to form a new single-storey basement below the footprint of the existing property. There will be no increase in external hard surfaced areas.

3. Flood Hazards and Mitigation Measures

The potential hazards related to flooding are as follows:

Tidal and Fluvial Flooding

Given that the site is above 120m AOD, and lies in Flood Risk Zone 1 (defined by the Environment Agency as having low risk of flooding from rivers and seas), the risk of flooding from fluvial and tidal sources is not significant.

Surface Water and Pluvial Flooding

The nearest risk of surface water flooding is located 40m to the south west of the site, which is identified as a low risk from the UK Government Flood risk website (extract below).

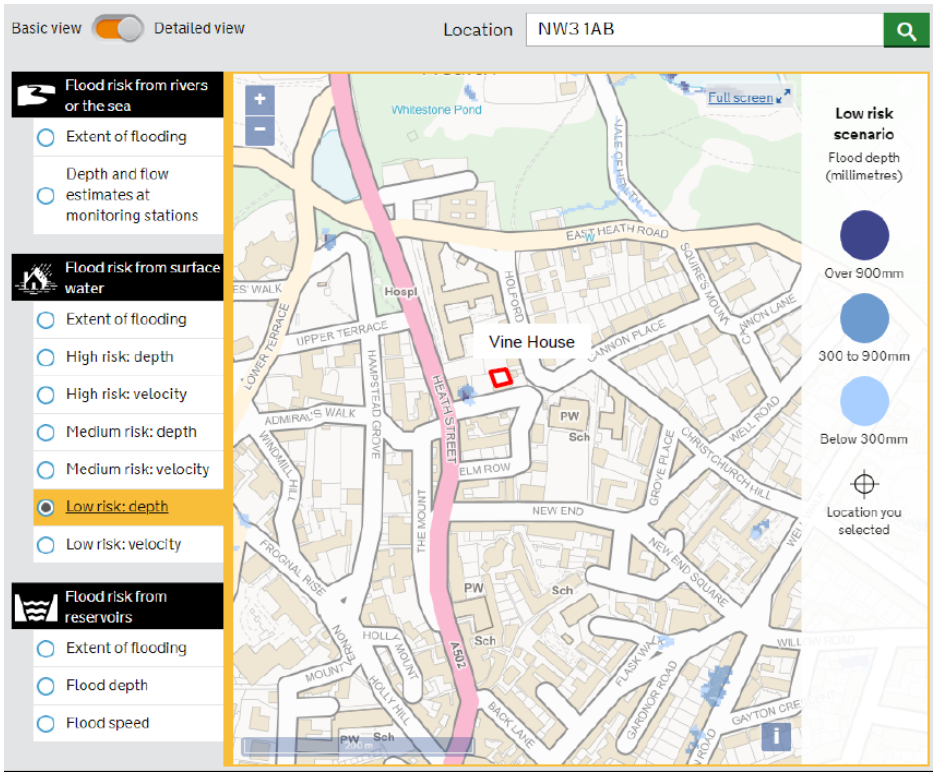

Figure 3: Extract from Environment Agency map showing surface water flood risk areas

The area surrounding the site has a gentle slope from north-west to south-east.

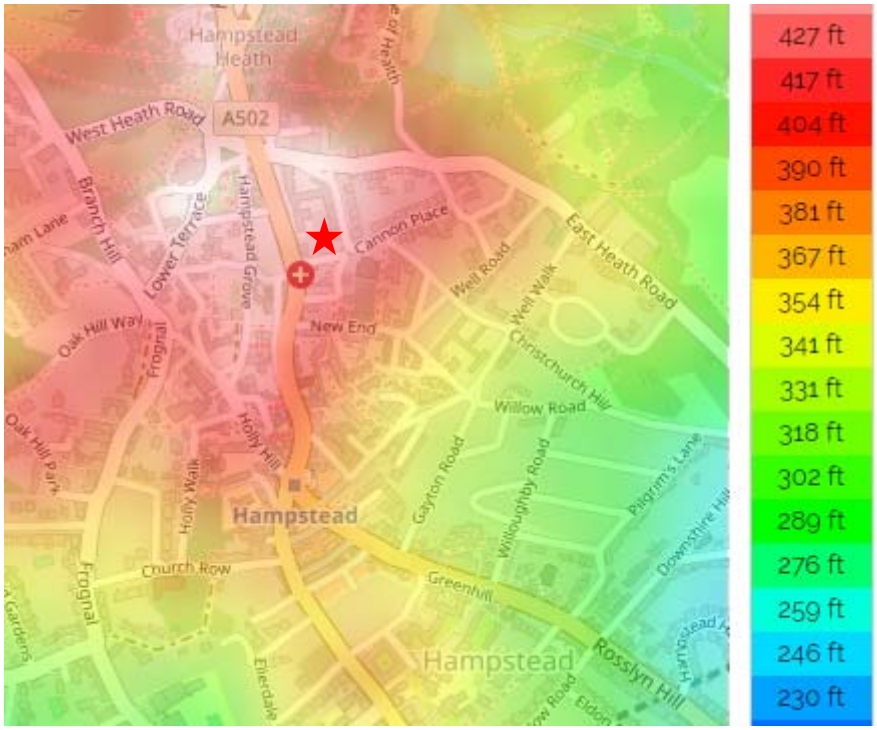

*Figure 4: Extract from Lidar map showing surface topography (site indicated with *)*

The roads to the south and the east of the property are at a lower level than the ground immediately surrounding the building. These roads slope downwards, away from the site. Rainwater accumulating on the road will flow in directions of the slope of the surrounding area, away from the property, from north to south and from west to east, for Holford Road and Hampstead Square respectively.

On the front (south) elevation, the property is further protected from surface water flooding from the road by the presence of a kerb, steps and a boundary wall.

Figure 5: Front elevation and street (Hampstead Square)

Water entering the boundary of the property, in the event of intense rainfall, is more likely to be from wind-blown ingress than from surface flow due to gravity. Given the distance from the building to the road, the risk of this occuring is considered low.

The site is adequately drained, as are the surrounding roads (which are drained by gullies maintained by Thames Water).

The new basement will not involve a significant removal of permeable surfaces. Rainwater will be able to infiltrate into the ground as before and will not migrate to alternative locations above ground level.

The presence of a new basement will therefore not increase the risk of flooding to the ground floor of the property or to any other properties in the surrounding area and beyond.

Groundwater Flooding

Initial and repeat groundwater readings show that groundwater is not present above the formation level of the basement. The basement is highly unlikely to increase the risk of groundwater flooding.

Site specific borehole records (GWPR3410, November 2019) show that the new basement will be founded on, and be surrounded by Bagshot Formation. This has a relatively high level of permeability and will assist with groundwater conveyance. An elevated level of ground water will be able to migrate around the basement: there are no additional obstructions in the ground that could cause local damming.

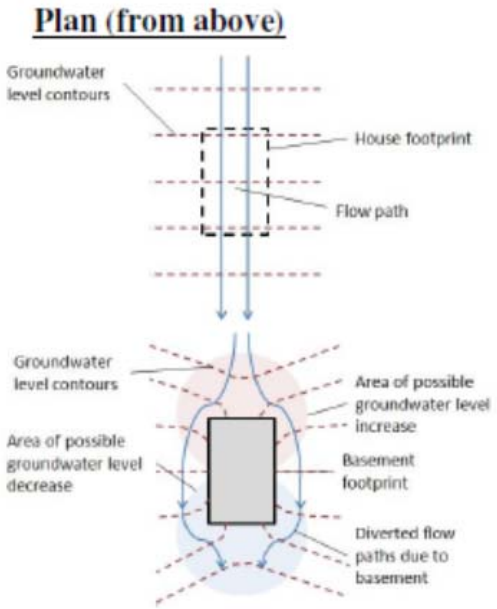

Figure 6: Diagram illustrating groundwater conveyance

The increase in risk of flooding from groundwater, to Vine House and the surrounding area, is therefore negligible.

Infrastructure Flooding

There is a Thames Water reservoir over 100m to the north-west of the site, which could cause flooding in the event of failure. This asset is assumed to have a high level of maintenance thus the risk of flooding from these is considered very low.

There is always a risk that the incoming water mains may break, causing significant flood risk to the occupants of the basement. This risk is inherent with all basement structures. Mitigation measures are proposed in the following section.

Mitigation Measures

The Environment Agency requires that for new extensions, the ground floor should be at least 300mm above the general ground level. This is out of context with the Ground Floor as is it is an existing structure and not a new extension. However, it is pertinent to note that the level of the Ground Floor is already 300mm higher than the street level, as shown below (the Ground Floor is level with the top of the step at 125.13m AOD).

Figure 7: Extract from survey (outline of front of building shown at the top)

During times of high rainfall there will be an increased risk of surface water flooding from the impermeable surfaces of the street and pavement in front of the property. As described previously, the likelihood of surface floodwater reaching the front of the property is low. The kerb and the step provide passive defences in front of the property.

Around the other sides of the property there is plentiful soft landscaping which will allow any excess water to discharge directly into the ground before reaching the perimeter of the building.

There is a low risk of incoming water mains bursting resulting in localised flooding. This would occur at the front of the property and the passive defences stated above would mitigate the risk of flooding into the basement.

To mitigate the risks associated with flooding from groundwater, Croft would recommend that suitable waterproofing measures be proposed in conjunction with the structural design. A common and anticipated detailed design stage approach is to use internal dimpled membranes (Delta or similar). These will be integral to the waterproofing of the basement.

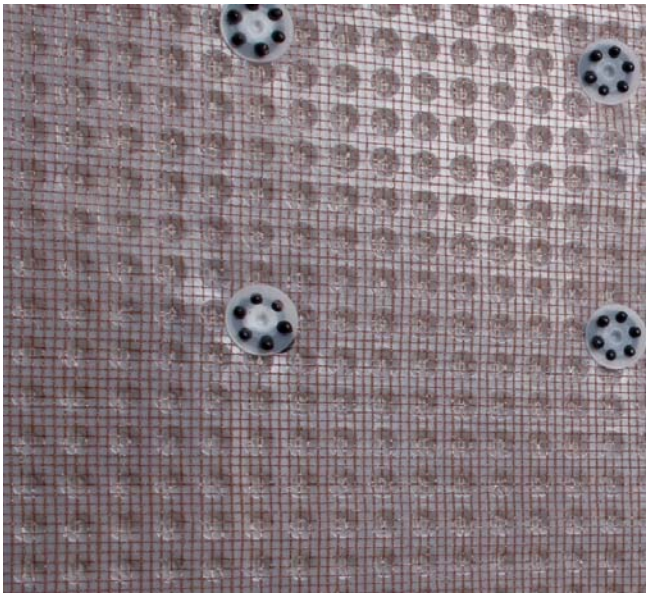

Figure 8: Example of dimpled membrane used for waterproofing basements

Any water from this will enter a drainage channel below the slab. This will be pumped and discharged into the exiting sewer system.

It is recommended that a waterproofing specialist is employed to ensure all the water proofing requirements are met. The waterproofing specialist must name their structural water-proofer. The structural water-proofer must inspect the structural details and confirm that he is happy with the robustness.

Due to the segmental construction nature of the basement, it is not possible to waterproof the joints. All waterproofing must be made by the waterproofing specialist. He should review the structural engineer's design stage details and advise if water bars and stops are necessary.

The waterproofing designer must not assume that the structure is watertight. To help reduce water flow through the joints in the segmental pins, the following measures should be applied:

- All faces should be cleaned of all debris and detritus
- Faces between pins should be needle hammered to improve key for bonding
- All pipe work and other penetrations should have puddle flanges or hydrophilic strips

The design of the services could include the following:

- A pumping system should be installed for the proposed basement. There is a likelihood that this may fail and allow excess water to accumulate. If this were to occur, the build-up of water would be gradual and noticeable before it becomes a significant life-threatening hazard.

- The pumping system should be a dual mechanism to maintain operation in the event of a failure. This should include a battery backup and a suitable alarm system for warning purposes.

Figure 9: Example of sump pump used commonly used for basement drainage

- Non-return valve to avoid the risk of backflow
- Install all electrical wiring at high level

SUDS Considerations

To minimise the discharge to the existing sewer, SuDS (Sustainable Drainage Systems) is often requested by local authorities. This aims to achieve greenfield run-off rates and ensure that surface water run-off is managed as close to its source as possible. To achieve this, the generally accepted hierarchy of these methods are presented below:

1. store rainwater for later use
2. use infiltration techniques, such as porous surfaces in non-clay areas
3. attenuate rainwater in ponds or open water features for gradual release
4. attenuate rainwater by storing in tanks or sealed water features for gradual release
5. discharge rainwater direct to a watercourse
6. discharge rainwater to a surface water sewer/drain
7. discharge rainwater to the combined sewer.

There is plentiful soft landscaping in the rear garden which allow and will continue to allow rainwater to discharge into the ground. This mechanism will be maintained: there are no proposals to significantly change the landscaping in the rear garden. The use of artificial mechanisms such as attenuation tanks is therefore not considered necessary in this development. Given the size of the plot, the large extent of soft landscaping and the permeability of the ground, infiltration is considered the most appropriate for this development. For the new driveway to the eastern boundary of the site, the design team may wish to consider the use of permeable paving to assist with direct infiltration to the ground.