

Basements and Flooding – Guide for Developers

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1. Introduction

As a Lead Local Flood Authority (LLFA), Southwark Council is responsible for managing flood risk from surface water, groundwater and ordinary watercourses throughout the borough. As part of this role, planning applications are reviewed from both a flood risk and drainage perspective. This includes developments that propose a new basement or an extension to an existing basement.

This guidance has been developed to inform developers of the requirements for planning submissions with regard to new or extended basements from a flood risk perspective only. It is not intended to provide a comprehensive guide for all planning aspects of basement development.

Should there be any queries on the information provided in this document, or any other queries regarding flood risk and drainage with respect to developments, Southwark's Flood Risk Management Team may be contacted via floodriskmanagement@southwark.gov.uk. More information on Flood Risk Management in Southwark is available on our website at; http://www.southwark.gov.uk/info/200448/flood_risk_management.

2. Basement Impact Assessments

Basements and other underground development will only be permitted where it can be demonstrated that the development will not cause harm to the built and natural environment and local amenity, including the local water environment, hydrogeology, ground conditions and biodiversity.

The requirement for a site specific Basement Impact Assessment (BIA) will be dependent on the size of the basement and whether the application falls within a high flood risk area. The council's strategic flood risk assessment (SFRA) identifies flood risk areas across the borough. The BIA will be used as a basis for reviewing and making recommendations for determining planning applications. The council should be consulted prior to planning submission to determine whether a BIA will be required. In general a BIA will be required when a proposed development includes a new or extended basement.

The BIA will not be considered as a replacement for a site specific Flood Risk Assessment (FRA) or drainage strategy. FRAs should be submitted as required by the National Planning Policy Framework (NPPF) and Environment Agency guidelines. If an FRA is not submitted for a development for which it is required, refusal of the application may be recommended.

2.1 BIA Requirements

If a BIA is required, this should be specific to the site and the particular proposed development. The level of information required will be commensurate with the scale, location and complexity of the scheme. A screening exercise should be undertaken to determine to what level of detail the BIA should be developed.

The BIA should assess the following:

- Impact of the proposals on surface water flow and flooding.
- Impact of the proposals on groundwater flow, levels and quality.
- Impact of the proposals on structural stability including potential impacts on adjacent / nearby properties.
- Impact on archaeology.
- The identification of suitable construction methods and mitigation measures for developments.
- A method for monitoring local ground conditions, water movement, subsidence and drainage.
- The cumulative impact of basement development (built or proposed) in the surrounding area.

All technical reports should be prepared by a professionally qualified engineer or geologist, who is a member of the relevant professional body.

The stages of the BIA should include screening, scoping, site investigation and study (as required) and final impact assessments. Details of each stage are provided in the following subsections.

2.1.1 Screening

The first stage is to determine whether a full BIA is required. All basement proposals should be subjected to the screening stage to identify the matters relevant to assessment of local flooding, neighbour amenity and structural risks. In order to identify relevant issues, the

following questions should be used as a template for assessment of groundwater and surface water conditions:

Groundwater

- a. Is the site located directly above an aquifer?
- b. Will the proposed basement extend underneath the water table level?
- c. Is the site within 100m of a watercourse, well or potential spring line?
- d. Will the proposed development result in a change in the effective proportion of hard surfaced / paved areas (including impermeable basement rooftops beneath garden areas)?
- e. As part of the site drainage, will more surface water (e.g. rainfall and runoff) than at present be discharged to the ground?
- f. Is the lowest point of the proposed excavation (allowing for any drainage and foundation space under the basement floor) close to, or lower than, the mean level of any local pond?

Surface Water

- a. As part of the proposed site drainage, will surface water flow paths be materially changed?
- b. Will the proposed basement development result in a change in the proportion of hard surfaced / paved external areas (including impermeable basement rooftops beneath garden areas)?
- c. Will the proposed basement development result in changes to the profile of the inflows of surface water being received by adjacent properties or downstream watercourses?
- d. Will the proposed basement development result in changes to the quality of surface water being received by adjacent properties or downstream watercourses?
- e. Is the site in an area identified as having surface water flood risk according to either the Local Flood Risk Management Strategy or SFRA?
- f. Is there a history of flooding/ponding across the site?

Where a respondent answers “yes” or “unknown” to any of the questions above, further investigation will be required. “No” answers should be justified. Please note that only factors affecting flooding and drainage are considered above; a similar scoping exercise should be undertaken for all risk parameters, including land and structural stability.

2.1.2 Scoping

The scoping stage should aim to build on the information provided in the screening stage. During this phase, a desk study should be undertaken to determine the preliminary impacts of the proposed basement development. This initial assessment should be used to identify any site investigation works required.

2.1.3 Site Investigations

This stage of the BIA is undertaken to develop a better understanding of the site, neighbouring properties and immediate surroundings. The degree of investigation required will vary depending on the issues identified in the screening and scoping stages.

2.1.4 Final Impact Assessment

The results of the scoping study and site investigations should be used to prepare the final BIA for submission as part of a planning application. This will be reviewed by Southwark to determine the acceptability of the proposal.

2.2 Basements Vulnerability and Flood Zone Suitability

NPPF guidelines state that basement dwellings are considered highly vulnerable infrastructure, and therefore should not be permitted in flood zone 3. For basement dwellings in flood zone 2, an Exception Test must be undertaken and submitted to the local planning authority as part of the planning application (generally covered as part of the site specific FRA). Further detail regarding the criteria for basements in each flood zone is provided below.

Reference should be made to the SFRA for definition of the flood zones across the borough, and further detail on the flood risk mitigation measures described.

2.2.1 Flood Zone 3b

No basements are permitted within Flood Zone 3b. .

2.2.2 Flood Zone 3a

Basements must be restricted solely to non-residential uses within Flood Zone 3a. No highly vulnerable basement uses are permitted in this Flood Zone.

Basement thresholds must be raised above the 2100 year maximum water level, estimated through breach of the River Thames defences. Detailed consideration should be given to safe access and egress pathways and emergency planning to mitigate against any risk to life during a breach event. Internal access to upper floors must be provided and flood resilient design and construction techniques employed.

Flood depth, velocity and hazard rating should be considered in assessing the safety of the development and appropriate mitigation techniques.

The BIA must demonstrate that the development will be safe from a flood risk perspective, and will not have any adverse impacts on local hydrogeology.

A Sequential and/or Exception Test may additionally be required, depending on the proposed use of the basement.

All sources of flood risk should be considered.

2.2.3 Flood Zone 2

An Exception Test will be required for any residential or other highly vulnerable uses proposed in Flood Zone 2.

All basements must be flood resistant and have an internal access to above the 2100 year maximum water level, anticipated through breach of the River Thames defences. Consideration should be given to safe access and egress and emergency planning. Flood resilient design and construction techniques must be employed.

The BIA should demonstrate that the development will be safe from a flood risk perspective, and will not have any adverse impacts on local hydrogeology.

All sources of flood risk should be considered.

2.2.4 Flood Zone 1

Basements in Flood Zone 1 have a low risk of flooding from fluvial and tidal flooding; however, they may be susceptible to flooding from other sources. Appropriate mitigation measures should be implemented where required.

The BIA should consider and mitigate against flood risk from all sources and demonstrate that the development will not have any adverse impacts on local hydrogeology.

3. Flooding and Drainage

All developments involving basements should take flooding and drainage into account. Adequate site investigation information (suitable to the nature and size of the development) must be provided to confirm the local hydrogeological conditions and demonstrate that all potential impacts have been suitably considered.

If a basement is proposed in an area at risk of flooding, a site-specific Flood Risk Assessment should be submitted with a planning application. It is important that the assessment takes account of all sources of flooding; this is to ensure that the basement itself is safe from flooding.

3.1 Groundwater

Where possible, it should be demonstrated that basements will be constructed above the water table (through provision of site investigation information). Basements constructed at or below the groundwater table may impact on the natural groundwater flow and impact groundwater levels. For small, isolated basements, the impact is likely to be minimal due to the small associated building volume as compared to the aquifer. However, the cumulative impact of this type of development could lead to an impact on local hydrogeology. It is the duty of the developer to demonstrate that the basement will have no effects on groundwater.

The effects of basements on local groundwater conditions should be considered in the site-specific flood risk assessment if groundwater flooding may occur (a flood risk assessment may be required based on groundwater flooding alone, even if the development is not in flood zone 2 or 3, or over 1 hectare in area). The FRA should provide detail of how this flood risk will be mitigated.

3.2 Surface Water and Sewer

Basements can also have an impact on surface water conditions in their vicinity. New or extended basement areas can act to reduce the permeable surface through which rainfall can percolate into the ground. This can be the case even when a basement area is situated beneath a permeable surface such as a garden. This increase in effective impermeable surface can affect surface water paths, both on-site and off-site, and can also result in increases in run-off volumes. It is important that the impact on surface water is considered at an early stage and throughout design development. This is especially important when a basement is proposed within an identified Critical Drainage Area (CDA); refer to Southwark's Surface Water Management Plan and SFRA for the locations of CDA's. (http://www.southwark.gov.uk/downloads/download/2956/surface_water_management_plan)

Any basement impacts on local groundwater levels may also interact with levels of surface water flood risk, by restricting infiltration potential and further increasing runoff. Changes to surface water conditions resulting from basements can adversely impact nearby properties and cause localised flooding, as well as contributing to wider surface water flooding risks.

When a planning application includes the extension of a basement beyond the footprint of an existing or a new building, it should be demonstrated that there is no net increase in surface water drainage from the site. Sustainable drainage should be implemented as required to protect / improve the infiltration capacity of the site, thus preventing any contribution to wider

surface water flood risk. In general, Southwark expect every effort to be made to reduce the surface water runoff from the developed site to equivalent greenfield runoff rates. For further details on surface water management, refer to Southwark's Developers' Guide for Surface Water Management.

By virtue of their low lying nature, basements are particularly vulnerable to many types of flooding, and in particular sewer flooding. This can be a result of surcharging of larger trunk sewers, or as a result of operational issues, such as blockages. Drainage connections from basements to sewers should be fitted with a one way valve to prevent drains flooding the basements if they surcharge. Thames Water also requires a pumped sewage system in basements where there is a record of sewer flooding in the local area.

Historically certain developments have sought to pump groundwater ingress from basements into the sewer network. However, this may have an adverse effect on sewer capacity and associated levels of sewer flood risk so should be avoided wherever possible.