2 Basements and lightwells

KEY MESSAGES

The Council will only permit basement and underground development that does not:

- cause harm to the built and natural environment and local amenity;
- result in flooding; or
- lead to ground instability.

You should submit information relating to the above within a Basement Impact Assessment (BIA) which is specific to your site and particular proposed development.

2.1 This guidance gives detailed advice on how we will apply planning policies when making decisions on new basement development or extensions to existing basement accommodation.

2.2 While basement developments can help to make efficient use of the borough's limited land, in some cases they may cause harm to the amenity of neighbours, affect the stability of buildings, cause drainage or flooding problems, or damage the character of areas and the natural environment.

2.3 This guidance relates to Planning Policy Guidance (PPG) 14 Development on unstable land, and Planning Policy Statement (PPS) 25 Development and flood risk. This guidance also relates to Camden Development Policy DP27 Basements and lightwells, but the following Local Development Framework policies are also relevant; Core Strategy policies CS5 Managing the impact of growth and development, CS13 Tackling climate change and promoting higher environmental standards, CS14 Promoting high quality places and conserving our heritage and CS15 Protecting and improving open spaces and encouraging biodiversity; and Development Policies DP22 Promoting sustainable design and construction, DP23 Water, DP24 Securing high quality design, DP25 Conserving Camden's heritage and DP26 Managing the impact of development on occupiers and neighbours.

When does this guidance apply?

2.4 This guidance applies to all developments in Camden that propose a new basement development, or an extension to existing basement accommodation where planning permission is required. Permitted development rights mean that some basements will not require planning permission.

PERMITTED DEVELOPMENT
Permitted development is governed by the Town and Country Planning (General Permitted Development) Order 1995 (as amended) which permits "the enlargement, improvement, or other alteration of a dwellinghouse" within the limits laid down for extensions.

In certain situations such 'Permitted Development' rights are removed, such as:

- For listed buildings;
- Within a conservation area if there are any trees which will be affected by the development;
- Outside a conservation area if any protected trees are to be affected (further guidance on the protection of trees is contained in Chapter 6 Landscape Design and Trees in this CPG); and
- For works classified as 'engineering operations'.
- You should also check any relevant Article 4 Directions which may remove Permitted Development rights. For guidance on permitted development rights, please visit the Camden Council website.

2.5 Policy DP27 Basements and lightwells of Camden's Local Development Framework requires you to consider a scheme's impact on local drainage and flooding and on the structural stability of neighbouring properties through its affect on groundwater conditions and ground movement. Further detail on how to address these issues is set out as follows:

- Structural stability of the building and neighbouring properties
  Paragraphs 2.29 to 2.30
- Drainage and run-off and damage to the water environment
  Paragraphs 2.33 to 2.35 and 2.40 to 2.43
- Cumulative impacts
  Paragraphs 2.7 to 2.31
- Neighbour amenity
  Paragraphs 2.47 to 2.50
- Open space and trees
  Paragraphs 2.62 to 2.64
- Landscaping
  Paragraphs 2.63 to 2.65
- Setting of the property and character of the area
  Paragraphs 2.49 to 2.62

Assessing the impact of basement development

2.6 We will only permit basements and other underground development where you can demonstrate it will not cause harm to the built and natural environment and local amenity, including to the local water environment, ground conditions and biodiversity. Addressing these issues may require the submission of a variety of information to provide us with a basis for determining applications. The level of information required is defined by

DP27 and will be commensurate with the scale, location and complexity of the scheme.

Basement Impact Assessments

2.7 This information should be contained within a Basement Impact Assessment (BIA) which is specific to your site and particular proposed development. The BIA will include the following stages:

- Stage 1 - Screening;
- Stage 2 - Scoping;
- Stage 3 - Site investigation and study;
- Stage 4 - Impact assessment; and
- Stage 5 - Review and decision making.

2.8 The purpose of a BIA is to enable the Council to 'assess whether any predicted damage to neighbouring properties and the water environment is acceptable or can be satisfactorily ameliorated by the developer' as stated in DP27.3.

2.9 Each of these stages is explained in full in this section. You should also refer to Chapter 6 of the Camden Geological, Hydrogeological and Hydrological Study, which is available on the Camden Council website. All the technical analysis and recommendations in this guidance are taken from the Study which should be treated as the evidence base and technical advice for this guidance and will be used when we are checking BIA reports.

2.10 At each stage in the process the person(s) undertaking the BIA process on your behalf should hold qualifications relevant to the matters being considered. We will only accept the following:

Qualifications required for assessments

Surface flow and flooding	A Hydrologist or a Civil Engineer specialising in flood risk management and surface water drainage, with either: • The "CEng" (Chartered Engineer) qualification from the Engineering Council; or a Member of the Institution of Civil Engineers ("MICE"); or • The "C.WEM" (Chartered Water and Environmental Manager) qualification from the Chartered Institution of Water and Environmental Management.
Subterranean (groundwater) flow	A Hydrogeologist with the "CGeol" (Chartered Geologist) qualification from the Geological Society of London.
Land stability	A Civil Engineer with the "CEng" (Chartered Engineer) qualification from the Engineering Council and specialising in ground engineering; or A Member of the Institution of Civil Engineers ("MICE") and a Geotechnical Specialist as defined by the Site Investigation Steering Group. With demonstrable evidence that the assessments have been made by them in conjunction with an Engineering Geologist with the "cGeol" (Chartered Geologist) qualification from the Geological Society of London.

A combination of these may be required to address a variety of site conditions.

Stage 1 - Screening

2.11 The first stage of the BIA is the identification of any matters of concern which should be investigated. Screening is a process of determining whether or not a full BIA is required. All basement proposals should be subjected to the screening stage of a BIA to identify the matters relevant to assessment of local flooding and/or neighbour amenity and structural risks.

2.12 In order to assist you in identifying what issues are relevant to your proposed scheme we have developed a series of screening flow charts over the following pages of this guidance, covering three main issues:

- Groundwater flow (see Paragraphs 2.33 to 2.35);
- Land stability (see Paragraphs 2.36 to 2.39); and
- Surface flow and flooding (see Paragraphs 2.40 to 2.43).

2.13 We will expect you to identify how these issues impact on neighbouring properties and the natural environment.

2.14 At the screening stage you will clearly need to set out why or why not a full BIA is required. This will need to include an assessment against the flowcharts below and be presented along with the information set out at

the end of Paragraph 233 of the Camden Geological, Hydrogeological and Hydrological Study.

2.15 Where a respondent answers “yes” or “unknown” to any of the questions in the flowcharts these matters will need further investigation. “No” answers will require written justification.

Stage 2 - Scoping

2.16 The scoping stage of the BIA requires you to identify the potential impacts of the proposed scheme as set out in chapter 5 of the Camden Geological, Hydrogeological and Hydrological Study which are shown by the screening process to need further investigation. You should use this stage to identify the potential impacts for each of the matters of concern identified in the previous screening stage, this may require some preliminary data collection and field work. Appendix F of the Camden Geological, Hydrogeological and Hydrological Study provides guidance on linking the potential impacts to the screening flowcharts. A conceptual ground model is often a useful of carrying out the scoping stage as it can include the known and suspected features on, below and adjacent to a proposed site. (refer to Section 6.3.3 and Figure 28 in the Camden Geological, Hydrogeological and Hydrological Study for further details and an example).

2.17 During the scoping stage we will encourage you to enter pre-consultation and/or set up a working group with local residents and amenity groups who may be impacted by a proposed basement in order to fully understand and address the concerns of local residents.

2.18 The scoping stage should build on the information obtained for the screening stage. When doing work for scoping stage, it is mostly likely you will have to carry out some works under Stage 3 of the BIA – Site investigation and study

Stage 3 – Site investigation and study

2.19 The third stage of the BIA – site investigation – is undertaken to develop an understanding of the site and its immediate surroundings. The degree of investigation will vary depending upon the matters of concern identified in the screening and scoping stages, and therefore will be dependent on the location of the proposed basement within the borough, its size and setting in relation to existing development on the site and its relationship to adjacent properties and nearby features of importance.

2.20 The BIA site investigation comprises several stages, including:

- Desk study, including site walkover;
- Field investigation, including intrusive investigation;
- Monitoring;
- Reporting; and
- Interpretation.

2.21 Each of these stages should reflect both the site of the proposed basement scheme and beyond the site boundary.

2.22 Section 7 of the Camden Geological, Hydrogeological and Hydrological Study sets out in further detail how this investigation should be carried out.

2.23 Appendix G of the Camden Geological, Hydrogeological and Hydrological Study provides typical contents lists for reporting these stages of the site investigation and we will be looking for submissions that contain comparable content.

Stage 4 – Impact assessment

2.24 This stage is concerned with evaluating the direct and indirect implications of the proposed project. Essentially this involves a comparison between the present situation (the baseline) with the situation as it would be with the basement in place (i.e. constructed). Therefore the BIA should describe, quantify and then aggregate the effects of the development on those attributes or features of the geological, hydrogeological and hydrological environment which have been identified (in the scoping stage) as being potentially affected. Section 7 of the Camden Geological, Hydrogeological and Hydrological Study provides more detail on what is required at this stage.

2.25 The recommendations in Section 7 on boreholes and trial pits set out the sort of thorough, up to date and professional methodologies of subsurface investigation and analysis, which Camden will look for. It is important to recognise as stated in Paragraph 287 and 288 of the Camden Geological, Hydrogeological and Hydrological Study that DP27 is particularly concerned with the potentially significant impact a development can have beyond the site boundary. Where permission is not given by adjacent landowners for structural surveys or subsurface investigations to be carried out, the undetermined structural conditions and ground conditions beyond the site boundary should be identified as a risk in the impact and should be assessed and mitigated against accordingly.

2.26 Hydrogeological processes are subject to seasonal and longer term cyclical influences. Measurements taken at one particular time may not indicate how conditions might be in one or six months from that time. Monitoring of groundwater levels in areas where it is more likely to be present over a period of time is therefore necessary.

2.27 The BIA will comprise a factual report and an interpretative report. This is explained in more detail in Section 7 of the Camden Geological, Hydrogeological and Hydrological Study. The interpretative report will have three sections:

- detailed site geology;
- the geotechnical properties of the ground; and
- an engineering interpretation of the implications of the ground conditions for the development of the site.

2.28 Appendix G3 of the study sets this out in more detail from which it should be noted that it must contain details of the retaining wall design for the basement excavation. It is essential for Camden to make the assessment called for by DP27 and to be able to consider, if planning approval is to be given, how the terms of any planning conditions or planning agreements should be drafted.

2.29 The engineering interpretation will require calculations of predicted ground movements and structural impact to be provided. Examples of these calculations are given in appendix D of the Camden Geological, Hydrogeological and Hydrological Study. The sides of excavation always move to some extent no matter how they are supported. The movement will typically be both horizontal and vertical and will be influenced by the engineering properties of the ground, groundwater level and flow, the efficiency of the various support system employed during the underpinning and the efficiency or stiffness of any support frames used.

WATER INGRESS
Change to water flows and levels both above and below ground.

2.30 If the identified consequences are not acceptable, mitigation should be incorporated into the proposed scheme and the new net consequences determined. For example, where the predicted structural damage to neighbouring property is identified as being greater than the Burland category of 'slight', or where water ingress to neighbouring gardens or properties is predicted to be damaging to residential amenity. Any proposed mitigation measures should be described in the BIA report with details of how they reduce and/or alter the impact of the proposed basement on the surrounding environment. Mitigation measures which may be included in your basement development proposals include (but are not limited to):

- Controlled or adequate drainage;
- High permeability corridors;
- Underpinning of neighbouring structures; and
- Setting the basement in from property boundaries.

BURLAND CATEGORY
A way to measure the extent of structural damage (see the table on the following page).

Category of damage	**Description of typical damage**	**Approximate crack width (mm)**	**Limiting tensile strain ε_{lim} (per cent)**
0 Negligible	Hairline cracks of less than about 0.1 mm are classed as negligible	<0.1	0.0-0.05
1 Very slight	Fine cracks that can easily be treated during normal decoration. Perhaps isolated slight fracture in building. Cracks in external brickwork visible on inspection	<1	0.05-0.075
2 Slight	Cracks easily filled. Redecoration probably required. Several slight fractures showing inside of building. Cracks are visible externally and some repointing may be required externally to ensure weathertightness. Doors and windows may stick slightly.	<5	0.075-0.15
3 Moderate	The cracks require some opening up and can be patched by a mason. Recurrent cracks can be masked by suitable lining. Repointing of external brickwork and possibly a small amount of brickwork to be replaced. Doors and windows sticking. Service pipes may fracture. Weathertightness often impaired.	5-15 or a number of cracks > 3	0.15-0.3
4 Severe	Extensive repair work involving breaking-out and replacing sections of walls, especially over doors and windows. Windows and frames distorted, floor sloping noticeably. Walls leaning or bulging noticeably, some loss of bearing in beams. Service pipes disrupted.	15-25 but also depends on number of cracks	>0.3
5 Very severe	This requires a major repair involving partial or complete rebuilding. Beams lose bearings, walls lean badly and require shoring. Windows broken with distortion, Danger of instability.	Usually > 25 but depends on number of cracks	

Damage Category Chart (CIRIA C580)

Stage 5 – Review and decision making

2.31 The final stage of the BIA is undertaken by LB Camden and consists of an audit of the information supplied by you and a decision on the acceptability of the impacts of the basement proposal. Section 8 of the Camden Geological, Hydrogeological and Hydrological Study outlines in more detail what LB Camden officers will be looking for, as a minimum.

Principal impacts of basements in Camden

2.32 This section sets out the principal impacts that basement development can have upon the built and natural environment, and neighbour amenity, in Camden. Each of these impacts should be considered when undertaking the Basement Impact Assessment, particularly stages 1 and 2; Screening and Scoping (see Paragraphs 2.11 to 2.16 of this report).

GROUNDWATER FLOW:
The movement of water that travels and seeps through soil and rock underground.

HYDROGEOLOGY:
The study of groundwater moving through soils and rock formations

Groundwater flow

2.33 Basement development may affect groundwater flows, and even though the displaced water will find a new course around the area of obstruction this may have other consequences for nearby properties, trees, etc. Given the nature of the ground in many higher parts of the borough, or those where streams once flowed, basement development may have the potential to divert or displace groundwater which can cause a rise in groundwater, and cause flooding, upstream of the development, whilst immediately downstream the groundwater level may decline, which may affect wells, springs and ponds. Figure 23 of the Camden Geological, Hydrogeological and Hydrological Study sets out diagrammatically the potential impacts.

2.34 You should consider the flowchart below to determine whether or not to carry forward to the scoping stage of the Basement Impact Assessment. Where certain factors are present or proposed, for example geological setting, proximity to Hampstead Heath Ponds catchment, or an intention to undertake dewatering as part of the site works this flowchart will identify that a hydrogeological assessment will be required. If this is the case, it should be prepared by:

- A Hydrologist with the “CGeol” (Chartered Geologist) qualification from the Geological Society of London; and
- A Fellow of the Geological Society of London.

2.35 The Camden Geological, Hydrogeological and Hydrological Study contains a number of maps and plans relevant to groundwater flow, including:

- Figures 2 and 3 showing geology for the whole borough;

- Figure 4 which shows the geology for Hampstead Heath;
- Figure 5 showing the geology for the south of the borough;
- Figure 11 which maps the water courses within and around the borough; and
- Figure 14 which identifies Hampstead Heath surface water catchments and drainage.

Figure 1. Subterranean (ground water) flow screening chart

The Developer should consider each of the following questions in turn, answering either "yes", "unknown" or "no" in each instance.

Consideration should be given to both the temporary and permanent works, along with the proposed surrounding landscaping and drainage associated with a proposed basement development.

Question 1a: Is the site located directly above an aquifer?

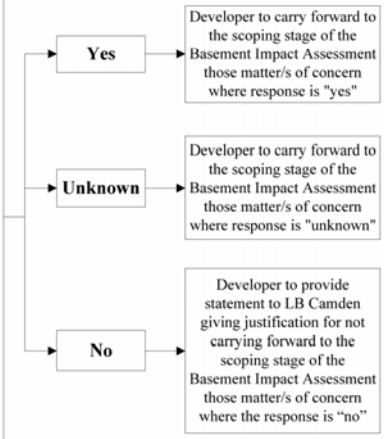
Question 1b: Will the proposed basement extend beneath the water table surface?

Question 2: Is the site within 100m of a watercourse, well (used/disused) or potential spring line?
Question 3: Is the site within the catchment of the pond chains on Hampstead Heath?

Question 4: Will the proposed basement development result in a change in the proportion of hard surfaced / paved areas?

Question 5: As part of the site drainage, will more surface water (e.g. rainfall and run-off) than at present be discharged to the ground (e.g. via soakaways and/or SUDS)?

Question 6: 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 water level in any local pond (not just the pond chains on Hampstead Heath) or spring line.



Notes / sources of information

Question 1: In LB Camden, all areas where the London Clay does not outcrop at the surface are considered to be an aquifer. This includes the River Terrace Deposits, the Claygate Member and the Bagshot Formation. The location of the geological strata can be established from British Geological Survey maps (e.g. 1:50,000 and 1:10,000 scale). Note that the boundaries are indicative and should be considered to be accurate to ±50m at best.
Additionally, the Environment Agency (EA) "Aquifer Designation Maps" can be used to identify aquifers. These can be found on the "Groundwater maps" available on the EA website (www.environment-agency.gov.uk) follow "At home & leisure" > "What's in Your Backyard" > "Interactive Maps" > "Groundwater". Knowledge of the thickness of the geological strata present and the level of the groundwater table is required. This may be known from existing information (for example nearby site investigations), however, it may not be known in the early stages of a project. Determination of the water table level may form part of the site investigation phase of a BIA.
Question 2: Watercourses, wells or spring lines may be identified from the following sources:

- Local knowledge and/or site walkovers
- Ordnance Survey maps (e.g. 1:25,000 or 1:10,000 scale). If features are marked (they are not always) the following symbols may be present: W; Spr; water is indicated by blue colouration. (check the key on the map being used)
- British Geological Survey maps (e.g. 1:10,000 scale, current and earlier editions). Current maps will show indicative geological strata boundaries which are where springs may form at the ground surface; of relevance are the boundary between the Bagshot Formation with the Claygate Member and the Claygate Member with the London Clay. Note that the boundaries are indicative should be considered to be accurate to ±50m. Earlier geological maps (e.g. the 1920's 1:10560 scale) maps show the location of some wells.
- Aerial photographs
- "Lost Rivers of London" by Nicolas Barton, 1962. Shows the alignment of rivers in London and their tributaries.
- The British Geological Survey (BGS) GeoIndex includes "Water Well" records. See www.bgs.ac.uk and follow "Online data" > "GeoIndex" > "Onshore GeoIndex".
- The location of older wells can be found in well inventory/catalogue publications such as "Records of London Wells" by G. Barrow and L. J. Wills (1913) and "The Water Supply of the County of London from Underground Sources" by S Buchan (1938).
- The Environment Agency (EA) "Source Protection Zone Maps" can be used to identify aquifers. These can be found on the "Groundwater maps" available on the EA website (www.environment-agency.gov.uk) follow "At home & leisure" > "What's in Your Backyard" > "Interactive Maps" > "Groundwater".
- The EA hold records of licensed groundwater abstraction boreholes. LB Camden is within the North East Area of the Thames Region. Details can be found on the EA website.
- LB Camden Environmental Health department may hold records of groundwater wells in the Borough.

Where a groundwater well or borehole is identified, it will be necessary to determine if it is extending into the Lower Aquifer (Chalk) or the Upper Aquifer (River Terrace Deposits, Bagshot Formation, Claygate Member etc). It is water wells extending into the Upper Aquifer which are of concern with regard to basement development.
Question 3: Figure 14 in the attached study, (prepared using data supplied by the City of London Corporation's hydrology consultant, Haycocks Associates) shows the catchment areas of the pond chains on Hampstead Heath.
Question 4: This will be specific to the proposed development and will be a result of the proposed landscaping of areas above and surrounding a proposed basement.
Question 5: This will be specific to the proposed development and will be a result of the chosen drainage scheme adopted for the property.
Question 6: The lowest point will be specific to the proposed development. Knowledge of local ponds may be taken from

- Local knowledge and/or site walkovers
- Ordnance Survey maps (e.g. 1:25,000 or 1:10,000 scale). If features are marked (they are not always) the following symbols may be present: W; Spr; water is indicated by blue colouration. (check the key on the map being used)
- Aerial photographs

Land stability

LAND STABILITY
Steep areas and a change in geological layers can have vulnerable land stability.

2.36 The Council will expect all basement development applications to provide evidence that the structural stability of adjoining or neighbouring buildings is not put at risk. In the first instance you should consider the flow chart below to determine whether to carry forward to the scoping stage of the Basement Impact Assessment. If so, it should be prepared by:

- A Civil Engineer with the "CEng" (Chartered Engineer) qualification from the Engineering Council and specialising in ground engineering; or
- A Member of the Institution of Civil Engineers ("MICE") and a Geotechnical Specialist as defined by the Site Investigation Steering Group.

2.37 With demonstrable evidence that the assessments have been made by them in conjunction with an Engineering Geologist with the "cGeol" (Chartered Geologist) qualification from the Geological Society of London.

2.38 For listed buildings, or properties adjoining or adjacent to listed buildings, we will require a structural stability report before we validate applications.

2.39 The Camden Geological, Hydrogeological and Hydrological Study contains a number of maps and plans relevant to land stability, including:

- Figures 2 and 3 showing geology for the whole borough;
- Figure 4 which shows the geology for Hampstead Heath;
- Figure 5 showing the geology for the south of the borough;
- Figure 11 which maps the water courses within and around the borough;
- Figure 16 which is a land stability slope angle map;
- Figure 17 which outlines areas of significant landslide potential

Figure 2. Slope stability screening flowchart

The Developer should consider each of the following questions in turn, answering either "yes", "unknown" or "no" in each instance.

Consideration should be given to both the temporary and permanent works, along with the proposed surrounding landscaping and drainage associated with a proposed basement development.

Question 1: Does the existing site include slopes, natural or manmade, greater than 7°? (approximately 1 in 8)

Question 2: Will the proposed re-profiling of landscaping at site change slopes at the property boundary to more than 7°? (approximately 1 in 8)

Question 3: Does the development neighbour land, including railway cuttings and the like, with a slope greater than 7°? (approximately 1 in 8)

Question 4: Is the site within a wider hillside setting in which the general slope is greater than 7°? (approximately 1 in 8)

Question 5: Is the London Clay the shallowest strata at the site?

Question 6: Will any tree/s be felled as part of the proposed development and/or are any works proposed within any tree protection zones where trees are to be retained? (Note that consent is required from LB Camden to undertake work to any tree/s protected by a Tree Protection Order or to tree/s in a Conservation Area if the tree is over certain dimensions).

Question 7: Is there a history of seasonal shrink-swell subsidence in the local area, and/or evidence of such effects at the site?

Question 8: Is the site within 100m of a watercourse or a potential spring line?

Question 9: Is the site within an area of previously worked ground?

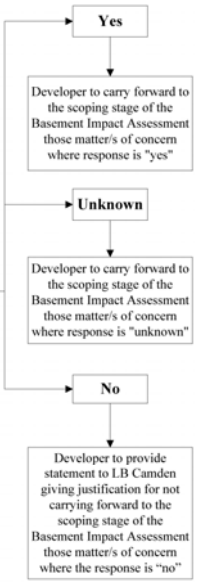
Question 10: Is the site within an aquifer? If so, will the proposed basement extend beneath the water table such that dewatering may be required during construction?

Question 11: Is the site within 50m of the Hampstead Heath ponds?

Question 12: Is the site within 5m of a highway or pedestrian right of way?

Question 13: Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?

Question 14: Is the site over (or within the exclusion zone of) any tunnels, e.g. railway lines?



Notes / sources of information

Question 1, 3 & 4: The current surface slope can be determined by a site topographical survey. Slopes may be estimated from 1:25,000 OS maps, however in many urban areas such maps will not show sufficient detail to determine surface slopes on a property-by-property scale, just overall trends. With regard to slopes associated with infrastructure, e.g. cuttings, it should be ensured that any works do not impact on critical infrastructure.

Question 2: This will be specific to the proposed development and will be a result of the proposed landscaping of areas above and surrounding a proposed basement.

Question 5: The plan footprint of the outcropping geological strata can be established from British Geological Survey maps (e.g. 1:50,000 and 1:10,000 scale). Note that the boundaries are indicative and should be considered to be accurate to ±50m at best.

Question 6: this is a project specific determination, subject to relevant Tree Preservation Orders etc.

Question 7: this can be assessed from local knowledge and on-site observations of indicative features, such as cracking. Insurance firms may also give guidance, based on post code. Soil maps can be used to identify high-risk soil types. Relevant guidance is presented in BRE Digest 298 "Low-rise building foundations: the influence of trees in clay soils" (1999); BRE Digest 240 "Low-rise buildings on shrinkable clay soils: part 1" (1993); and BRE Digest 251 "Assessment of damage in low-rise buildings" (1995).

Question 8: Watercourses or spring lines may be identified from the following sources:

- Local knowledge and/or site walkovers
- Ordnance Survey maps (e.g. 1:25,000 or 1:10,000 scale). If features are marked (they are not always) the following symbol may be present "Spr"; water is indicated by blue colouration. (check the key on the map being used)
- Geological maps will show indicative geological strata boundaries which are where springs may form at the ground surface; of relevance are the boundary between the Bagshot Formation with the Claygate Member and the Claygate Member with the London Clay. Note that the boundaries are indicative should be considered to be accurate to ±50m at best. British Geological Survey maps (e.g. 1:10,000 scale, current and earlier editions).
- Aerial photographs
- "Lost Rivers of London" by Nicolas Barton, 1962. Shows the alignment of rivers in London and their tributaries.

Question 9: Worked ground includes, for example, old pits, brickyards, cuttings etc. Information can be gained from local knowledge and/or site walkovers, and from historical Ordnance Survey maps (at 1:25,000 or 1:10,000 scale, or better) and British Geological Survey maps (at 1:10,000 scale, current and earlier editions). Earlier geological maps (e.g. the 1:10560 scale series from the 1920s) include annotated descriptions such as "old pits", "formerly dug", "brickyard" etc.

Question 10: In LB Camden, all areas where the London Clay does not outcrop at the surface are considered to be an aquifer. This includes the River Terrace Deposits, the Claygate Member and the Bagshot Formation. The general footprint of the geological strata can be assessed from British Geological Survey maps (e.g. 1:50,000 and 1:10,000 scale). Note that the boundaries are indicative and should be considered to be accurate to ±50m at best.

The Environment Agency (EA) Aquifer Designation Maps can be used to identify aquifers. These are available from the EA website (www.environment-agency.gov.uk), by clicking on 'At home & leisure' > 'What's in Your Backyard' > 'Interactive Maps' > 'Groundwater'.

Details are required of the thickness of the geological strata present and the level or depth of the groundwater table. This may be known from existing information (for example nearby site investigations); however, it may not be known in the early stages of a project. Determination of the water table level may form part of the site investigation phase of a BIA and may require specialist advice to answer. Depth of proposed development is project specific.

Question 11: From local knowledge and/or site walkovers, and from Ordnance Survey maps (e.g. 1:25,000 or 1:10,000 scale). In relation to the stability and integrity of the pond structures and dams, the guidance of a Panel Engineer should be sought. (Details of Panel Engineers can be found on the Environment Agency website: http://www.environment-agency.gov.uk/business/sectors/64253.aspx). Duty of care needs to be undertaken during any site works in the vicinity of the ponds.

Question 12: From local knowledge and/or site walkovers, and from Ordnance Survey maps (e.g. 1:25,000 or 1:10,000 scale). Any works should not impact on critical infrastructure.

Question 13: From local knowledge and/or site walkovers. May find some details on neighbouring properties from searches of LB Council databases, e.g. planning applications and/or building control records.

Question 14: From local knowledge and/or site walkovers, from Ordnance Survey maps (e.g. 1:25,000 or 1:10,000 scale) and directly from those responsible for tunnels (e.g. TfL or Network Rail). Any works should not impact on critical infrastructure.

Surface flow and flooding

2.40 While nowhere in the borough is identified by the Environment Agency as being flood prone from rivers or the sea, there are still parts that are identified as being subject to localised flooding from surface water due to local soil conditions and topography. This is caused during times of heavy rainfall when the local combined sewer system is unable to deal with the volume and rate of flow. Flood Risk Assessment evidence suggests that areas of West Hampstead, Cricklewood and South Hampstead are at a higher risk of surface water floods. The relevant streets are broken down into 'primary areas' (those that have been affected by both major floods in 1975 and 2002) and 'secondary areas' (those that have been affected by one of the major floods) and these streets are listed on Page 29.

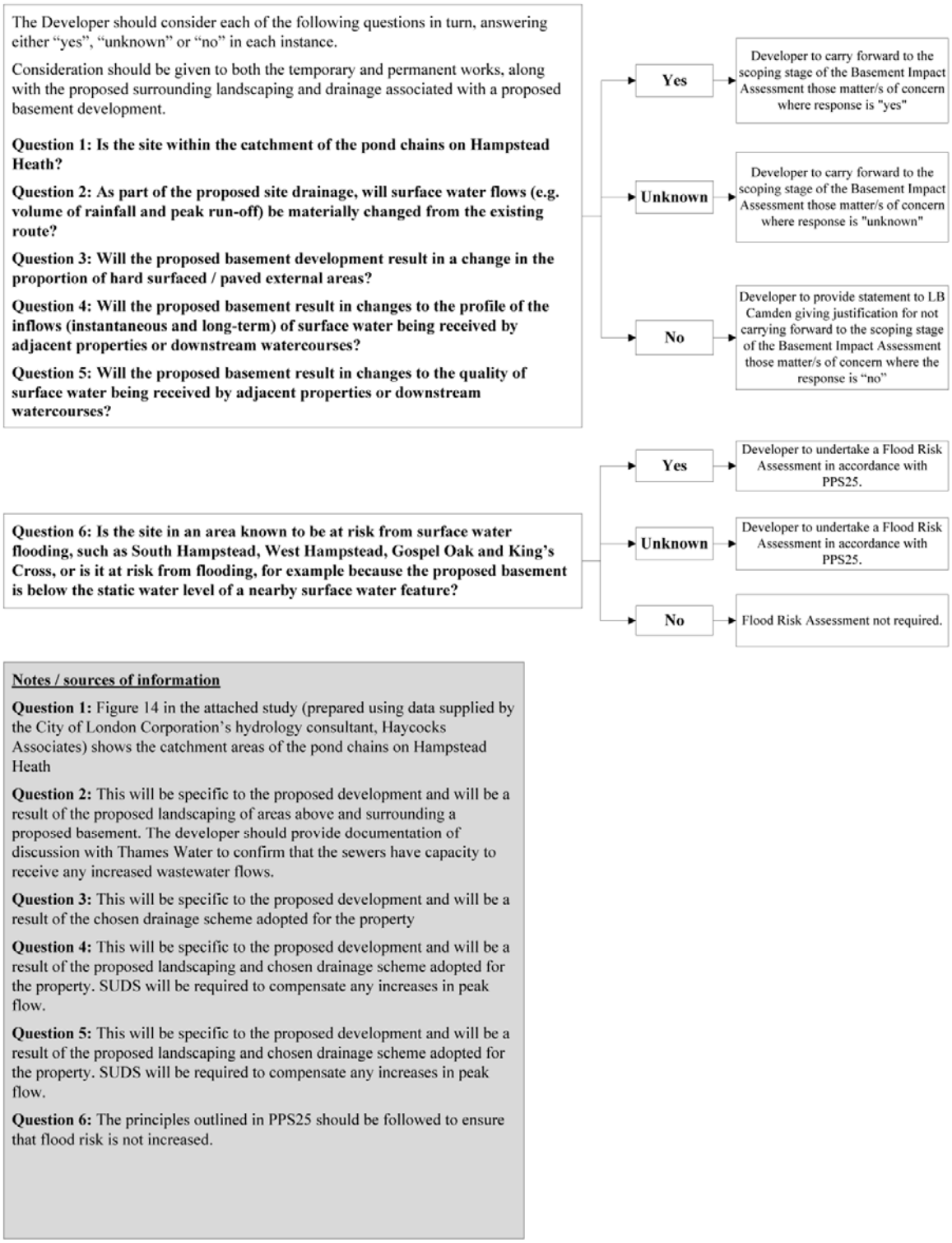
2.41 All applications for a basement extension within streets identified as either 'primary' or 'secondary' locations will be expected to include a Flood Risk Assessment with any application for a basement development, in line with the criteria set out in PPS25. In line with Development Policy DP27, the Council will not allow habitable rooms and other sensitive uses for self contained basement flats and other underground structures in areas at risk of flooding.

2.42 You should consider the flowchart below to determine whether you should proceed to the scoping stage of the Basement Impact Assessment and whether a Flood Risk Assessment should be undertaken as part of this. For surface flow and flooding issues the Basement Impact Assessment should be undertaken by a Hydrologist or a Civil Engineer specialising in flood risk management and surface water drainage, with either:

- The "CEng" (Chartered Engineer) qualification from the Engineering Council; or a Member of the Institution of Civil Engineers ("MICE); or
- The "C.WEM" (Chartered Water and Environmental Manager) qualification from the Chartered Institution of Water and Environmental Management.

2.43 Figure 14 within the Camden Geological, Hydrogeological and Hydrological Study identifies Hampstead Heath surface water catchments and drainage.

Figure 3. Surface flow and flooding screening flowchart



2.44 Where conflicting evidence is provided in response to a proposal we will expect you to fund an independent verification. This independent verification will either be:

- commissioned directly by the Council in negotiation with you; or
- commissioned by you from an independent body subject to the Council agreeing the body and the specifications in advance.

2.45 The Council is considering developing a list of selected consultants that we are satisfied can sufficiently address all of the elements of this guidance.

2.46 Basement development should not displace ground water or surface water flow so it causes flooding on nearby sites or those further away. The Council will require an adequate drainage plan and has a preference for the use of Sustainable Urban Drainage Systems (SUDS). Only where this cannot be achieved should surface/ground water be discharged to combined sewers (refer to the chapter on water efficiency in CPG3 Sustainability and policy DP23 Water).

SUSTAINABLE URBAN DRAINAGE SYSTEMS (SUDS)
Low environmental impact approaches to drain away dirty and surface water run-off through collection, storage, and cleaning before allowing it to be released slowly back into the environment, thereby preventing flooding, pollution and contamination of groundwater.

Impacts to neighbours from demolition and construction

2.47 Some of the worst problems affecting amenity are experienced during the demolition and construction phases of a development, and this is particularly so for basement development. Although this is temporary, it tends to create noise, vibration, dust, air and light pollution, and can last for lengthy periods of time.

2.48 Full care and consideration should be given to neighbouring properties, as the works can be particularly intrusive to immediate neighbours. All construction and demolition processes are expected to be in accordance with the Considerate Constructors Scheme standards. Construction and demolition processes are also expected to conform to the ICE Demolition Protocol (www.ice.org.uk) and should have regard to the Guide for Contractors working in Camden, Feb 2008, which is available the Camden Council website and to the GLA's best practice guidance document The Control of Dust and Emissions from Construction and Demolition (www.london.gov.uk).

CONSIDERATE CONSTRUCTORS SCHEME
Aims to ensure that contractors carry out their operations in a safe and considerate manner, with due regard to local residents and businesses, passing pedestrians and road users.

2.49 Where basement works are proposed in conservation areas or adjacent to a listed building, the Council will seek the submission of a management plan for demolition and/or construction. The Council may

also require this in other areas depending on the scale of the development and site conditions of the particular area. These management plans include:

- provisions for phasing;
- management of waste, noise and access during construction;
- provisions to ensure stability of buildings and land; and
- provisions for monitoring movement.

DEMOLITION PROTOCOL
Provides a framework for sustainability in construction, demolition and refurbishment projects.

2.50 In considering these applications, the Council will refuse permission for such plans which do not minimise the harmful impacts of construction on the building(s) and on local amenities. Construction management plans should consider the recommendations from the Camden Geological, Hydrogeological and Hydrological Study. See Camden Planning Guidance 6 for more information on Construction Management Plans.

Sustainable construction

2.51 As part of an application for a basement development, applicants will be required to describe within their Design and Access Statement how the development has considered materials, resources and energy. This statement should explain how the use of sustainable materials has been considered and applied in the proposal, and the reasons for the choices that are made. The statement should also detail which existing materials on the site are to be re-used as part of the development or made available for re-use elsewhere, and the measures to improve the energy efficiency of the development. Further guidance is provided within CPG3 Sustainability (sustainability assessment tools chapter).

DESIGN AND ACCESS STATEMENT
A report supporting a planning application that justifies the design principles and concepts of the scheme, and explains how issues relating to access have been dealt with. The level of detail depends on the scale and complexity of the application.

Planning and design considerations

2.52 We recognise that there can be benefits from basement development in terms of providing additional accommodation, but we need to ensure that basement schemes:

- do not cause undue harm to the amenity of neighbouring properties;
- do not have a detrimental impact on the groundwater environment, including ponds and reservoirs;
- do not have any effects on surface water run-off or ground permeability;

- do not harm the recognised architectural character of buildings and surrounding areas, including gardens and nearby trees, and that conservation area character is preserved or enhanced;
- conserve the biodiversity value of the site;
- achieve sustainable development; and
- do not place occupiers at risk or have any effects on the stability or bearing capacity of adjacent land generally.

Size of development

2.53 Often with basement development, the only visual features are lightwells and skylights, with the bulk of the development concealed wholly underground and away from any public view. However, just as overly large extensions above the ground level can dominate a building, contributing to the over-development of a site, an extension below ground can be of an inappropriate scale. There may be more flexibility with the scale of a development when it is proposed underground, but there are a number of factors that would mean basement development would be overdevelopment.

SKYLIGHT
A window, dome, or opening in the roof or ceiling, to admit natural light.

LIGHTWELL
An opening within or next to a building that allows natural light to reach basement windows, that would otherwise be obscured.

2.54 These include, for example, harm caused to any trees on or adjoining the site, where the development would restrict future planting and mature development of trees typical to the area, and any impact to the water environment. The permissible size of a basement development will therefore be guided by the characteristics of the site.

2.55 A basement development that is modest in size such that it does not extend beyond the footprint of the original building and is no deeper than one full storey below ground level (approximately 3 metres in depth) is often the most appropriate way to extend a building below ground, provided that the internal environment is fit for the intended purpose, and there is no impact to any trees on or adjoining the site, or to the water environment or land stability. Larger schemes (i.e. those consisting of two or more underground storeys) will be expected to provide evidence that the development does not harm the built and natural environment or local amenity.

2.56 Development Policy DP27 (Paragraph 27.6) states that the Council will not allow habitable rooms and other sensitive uses for self contained basement flats and other underground structures in areas at risk of flooding. Outside of these areas, where basement accommodation is to provide living space (possibly for staff), it will be subject to the same standards as other housing in terms of space, amenity and sunlight. Suitable access should also be provided to basement accommodation to allow for evacuation.

Conservation areas and listed buildings

2.57 Where the building is listed, new basement development or extensions to existing basement accommodation will require listed building consent, even if planning permission is not required. The acceptability of a basement extension to a listed building will be assessed on a case-by-case basis, taking into account the individual features of the building and its special interest. Applicants should the Council at the earliest opportunity to discuss such proposals.

> **LISTED BUILDING CONSENT**
> Legally required in order to carry out any works to a Listed Building which will affect its special value. This is necessary for any major works, but may also be necessary for minor alterations and even repairs and maintenance. Listed Building Consent may also be necessary for a change of use of the property.

2.58 As with all basement schemes, we will need to be satisfied that effective measures will be taken during demolition and construction works to ensure that damage is not caused to the listed building and any buildings it directly adjoins. Poor demolition and construction methods can put its neighbours at risk and so can have considerable effects on the character and appearance of heritage buildings and conservation areas.

2.59 We will seek the submission of a management plan for demolition and/or construction where basement works are proposed in conservation areas or adjacent to a listed building. Further guidance on this is contained within CPG6 Protecting and improving the quality of life chapter on Construction Management Plans.

Basement walls, windows and doors

2.60 The development of a basement and the introduction of light wells will result in an area of exposed basement wall and will usually mean new window or door openings. Any exposed area of basement development to the side or rear of a building will be assessed against CPG1 on Extensions, alterations and conservatories, in this guidance. In general, this expects that any exposed area of basement to be:

- subordinate to the building being extended;
- respect the original design and proportions of the building, including its architectural period and style; and
- retain a reasonable sized garden.

2.61 The width of any visible basement wall should not dominate the original building.

2.62 In number, form, scale and pane size, basement windows should relate to the façade above. They should normally be aligned to the openings above and be of a size that is clearly subordinate to the higher level openings so as not to compete with the character and balance of the original building. On the street elevation, and on certain rear elevations

where there is a distinguishable pattern to the fenestration, the width and height of windows should be no greater than those above.

FAÇADE
The face or front of a building

FENESTRATION
The arrangement of windows in a building.

Trees, landscape and biodiversity

2.63 Proposals for basement development that take up the whole front and / or rear garden of a property are very unlikely to be acceptable. Sufficient margins should be left between the site boundaries and any basement construction to enable natural processes to occur and for vegetation to grow naturally. These margins should be wide enough to sustain the growth and mature development of the characteristic tree species and vegetation of the area. The Council will seek to ensure that gardens maintain their biodiversity function for flora and fauna and that they are capable of continuing to contribute to the landscape character of an area so that this can be preserved and enhanced. Applicants should contact the Council for further advice.

GREEN ROOF
A roof that has vegetation growing on it, which can help improve visual appeal, reduce the environmental impact of the building and create habitat for native flora and fauna.

DETENTION POND
A stormwater management facility that is designed to protect against flooding by storing water for a limited period of a time.

2.64 The basement development should provide an appropriate proportion of planted material to allow for rain water to be absorbed and/or to compensate for the loss of biodiversity caused by the development. This will usually consist of a green roof or detention pond on the top of the underground structure. It will be expected that a minimum of 0.5 metres of soil be provided above basement development that extends beyond the footprint of the building, to enable garden planting. The use of SUDS is sought in all basement developments that extend beyond the profile of the original building. For further guidance on SUDS, see CPG3 Sustainability (water efficiency chapter).

2.65 Consideration should be given to the existence of trees on or adjacent to the site, including street trees and the required root protection zone of these trees (further information on the protection of existing trees in included in CPG in this document on Landscaping and trees).

ROOT PROTECTION ZONE
The area around the base or roots of the tree that needs to be protected from development and compaction during construction to ensure the survival of the tree.

Lightwells

2.66 The building stock in Camden is varied. Some areas contain basements developments that include front lightwells taking up part, or all, of the front garden. Other areas do not have basements or lightwells that are visible from the street. The presence or absence of lightwells helps define and reinforce the prevailing character of a neighbourhood.

2.67 Where basements and visible lightwells are not part of the prevailing character of a street, new lightwells should be discreet and not harm the architectural character of the building, or the character and appearance of the surrounding area, or the relationship between the building and the street. In situations where lightwells are not part of the established street character, the characteristics of the front garden or forecourt will help to determine the suitability of lightwells.

2.68 In plots where the depth of a front garden is quite long, basement lightwells are more easily concealed by landscaping and boundary treatments, and a substantial garden area can be retained providing a visual buffer from the street. In these situations new lightwells that are sensitively designed to maintain the integrity of the existing building may be acceptable, subject to other design requirements and environmental considerations.

2.69 In plots where the front garden is quite shallow, a lightwell is likely to consume much, or all, of the garden area. This will be unacceptable in streets where lightwells are not part of the established character and where the front gardens have an important role in the local townscape.

2.70 Excessively large lightwells will not be permitted in any garden space.

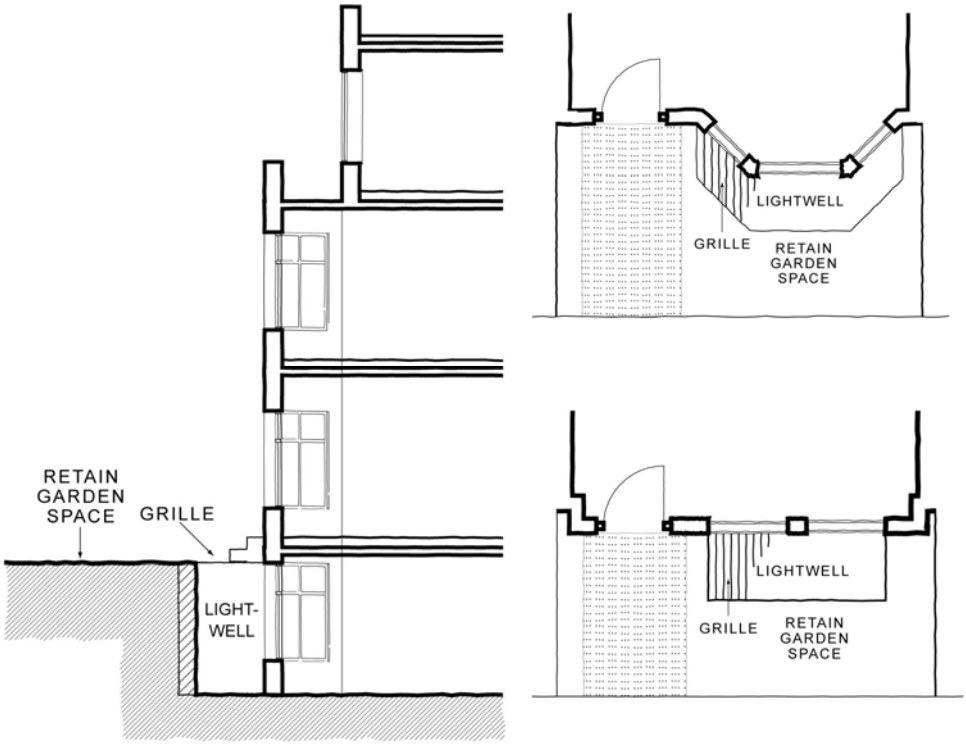
2.71 A lightwell to the side or rear of a property is often the most appropriate way to provide a means of providing light to a new or extended basement development, and can often provide a link to the rear garden. Lightwells to the side or rear of a property should be set away from the boundary to a neighbouring property.

Railings, grilles and other lightwell treatment

2.72 In order to comply with building regulation standards, light wells should be secured by either a railing (1100mm high) or a grille. In gardens that front a street, railings can cause a cluttered appearance to the front of the property and can compete with the appearance of the front boundary wall, or obscure front windows. This is particularly the case in shallow gardens. Where front light wells are proposed, they should be secured by a grille which sits flush with the natural ground level, rather than railings (refer to Figure 4 on the following page). In certain publicly accessible locations grilles should be locked to prevent lightwells being misused for casual sleeping and drug use.

2.73 Railings will be considered acceptable where they form part of the established street scene, or would not cause harm to the appearance of the building.

Figure 4. Lightwells and railings



2.74 The lowering of the natural ground level to the rear of the property should be minimised as much as is practicable. It is recommended that the rear garden should be graded rather than secured by railings.

2.75 Where a basement extension under part of the front or rear garden is considered acceptable, the inclusion of skylights designed within the landscaping of a garden will not usually be acceptable, as illumination and light spill from a skylight can harm the appearance of a garden setting and cause light pollution.

Streets at risk of surface water flooding

Abbey Road	1975
Aberdare Gardens	1975
Achilles Road	2002
Adamson Road	2002
Agamemnon Road	2002
Ajax Road	2002
Aldred Road	2002
Arkwight Road	1975 and 2002
Arkwright Road	1975 and 2002
Avenue Road	2002
Belsize Lane	1975 and 2002
Belsize Park Gardens	1975
Belsize Road	1975 and 2002
Boundary Road	1975
Broadhurst Gardens	1975
Broomsleigh Street	1975
Bullbarrow, Abbey Road Estate	1975
Canfield Gardens	1975 and 2002
Cannon Hill	1975 and 2002
Caversham Road	2002
Chalcot Gardens	1975
Chesterford Gardens	2002
Cotleigh Road	1975
Dennington Park Road	1975 and 2002
Edis Street	1975
Egbert Street	1975
Fairfax Road	2002
Fairhazel Gardens	1975 and 2002
Fellows Road	1975
Ferncroft Avenue	1975
Finchley Road	2002
Fleet Road	2002
Fordwych Road	1975
Frognal Gardens	1975
Gaisford Street	2002
Glenhurst Avenue	2002
Gloucester Avenue	1975
Goldhurst Terrace	1975 and 2002
Gospel Oak Estate	1975
Greencroft Gardens	1975 and 2002
Hampstead Lane N6	1975
Harben Road	2002
Harley Road	1975
Hawley Road	1975
Heath Street	1975
Hemstal Road	1975
Highgate Road	1975
Hillfield Road	1975 and 2002
Holmdale Road	1975 and 2002
Ingestre Road	2002
Inglewood Road	2002

Jeffreys Street	2002
Kelly Street	1975 and 2002
Kentish Town Road	1975
Kidderpore Gardens	1975
Kilburn High Road	1975
Kilburn Priory	1975
Kingdon Road	2002
Kingsgate Road	1975
Lady Margaret Road	2002
Lambolle Road	1975
Lancaster Drive	2002
Lancaster Grove	1975 and 2002
Langland Gardens	1975
Lowfield Road	1975
Lyncroft Gardens	2002
Lyndurst Gardens	1975
Mansfield Road	1975
Maygrove Road	1975
Menelik Road	2002
Messina Avenue	1975
Mill Lane	1975 and 2002
Nassington Road	2002
Oak Village	1975
Ornan Road	2002
Pandora Road	1975 and 2002
Park End	1975
Parkhill Road	1975 and 2002
Parliament Hill	2002
Platt's Lane	1975 and 2002
Primrose Hill Road	1975 and 2002
Prince of Wales Road	2002
Princess Road	1975
Priory Road	2002
Priory Terrace	1975
South End Road	2002
South Hill Park	2002
South Hill Park Gardens	2002
Sumatra Road	1975 and 2002
Swains Lan	1975
Tanza Road	2002
Templewood Avenue	2002
Templewood Gardens	2002
Wendling, Haverstock Road	2002
West End Lane	2002
Westbere Road	2002
Willow Road	1975 and 2002
Winchester Road	1975
Windmill Hill	1975
Woodchurch Road	2002
Woodsome Road	1975
York Rise	1975

Source: Floods in Camden, Report of the Floods Scrutiny Panel, London Borough of Camden 2003, Appendix 4, Flooded Roads in Camden 1975 and 2002.

Other permits and requirements

Building Regulations

2.76 A Building Regulations application is required when converting an existing basement to habitable use, excavating a new basement or extending an existing basement. Due to the nature of the work, in which different problems can arise, it is advised that the "deposit of plans route" is adopted to obtain building regulation approval. This is the most widely known procedure and involves you submitting plans which show full details of the work. These plans are then checked for compliance with the Building Regulations and, if satisfactory, an Approval Notice is issued.

> **BUILDING REGULATIONS APPLICATION:**
> The Building Regulations apply to most 'Building Work' and you need to make an application to our Building Control department before proceeding. Further details are available from the Building Control section of the Council's website.

2.77 We recommend that you follow the full plans procedure unless the work is of a very minor nature. The Full Plans procedure gives greater protection to the building owner.

2.78 As part of the application it will be necessary to submit a full site investigation and a consulting civil or structural engineers report on the investigation and development proposals.

2.79 Building Regulations are set out by various technical parts (A-P) and the principal requirements include the following:

- Part A Structure
- Part B Fire Safety
- Part C Site preparation and resistance to contaminants and moisture
- Part E Resistance to passage of sound
- Part F Ventilation
- Part H Drainage
- Part J Combustion appliances
- Part K Protection from falling collision and impact
- Part L Conservation of fuel and power
- Part M Access and use of building
- Part P Electrical safety

2.80 The above are available to be viewed on the Communities website www.communities.gov.uk. Additional guidance can be obtained from the Approved Document: Basements for Dwellings 2nd edition 2004 (superseded but provides the framework for satisfying the building regulations).

Highway licence

2.81 If you need to put a skip or building material on the public highway, or if you wish to erect a scaffold, hoarding or gantry you will need to apply for a license under the Highways Act. You will also need to obtain the consent of the appropriate highway authority if your proposal involves any work under any part of the highway or footway. The Council is the highway authority for most streets in the Borough, although for some major roads Transport for London act as the highway authority. For more information about the highway authority or licensing matters, please visit the Council's website at http://www.camden.gov.uk/ccm/navigation/transport-and-streets/ or contact the Council's Highways Management Team on telephone 020 7974 6956 (see Appendix 1).

Party wall agreement

For most basement developments you will need a party wall agreement with your neighbour(s). This includes when excavation is

- within 3 metres of a neighbouring structure;
- would extend deeper than that structure's foundations; or
- within 6 metres of the neighbouring structure and which also lies within a zone defined by a 45 degree line from that structure.

2.82 The Council is not itself involved in Party Wall agreements, but a guidance note explaining the procedures can be found on the Council's website or from the Planning Portal website www.planningportal.gov.uk.

Freeholder permission

2.83 Most residential leases will require some form of landlord permission for improvements and alterations. This is also the case for leasehold Housing Revenue Account (HRA) property, where permission from Camden's Housing Department is required for any improvements and alterations, including basement development.

Other mitigation measures

In addition to the measures identified in 2.31 above, the impact of a basement scheme, or other underground development, can be mitigated by implementing a number of measures, including:

- preparing a detailed drainage plan;
- preparing a construction management plan (see CPG6 Protecting and improving the quality of life chapter on Construction Management Plans);
- ensuring that contractors adopt the practices outlined within the Demolition Protocol and the Considerate Constructors Scheme;
- consulting your neighbours prior to submitting the planning application;

- informing neighbours when works are beginning and how long they will last, and any changes of plan;
- instructing developers to arrange noisy work at periods when it least inconveniences neighbours, and not blocking neighbouring entranceways; and
- having regard to the Guide for Contractors working in Camden, Feb 2008, which is available on the Council's website.