# Appendix **E**

Resilience and Flood Risk

# 62 Mansfield Road, Camden

## FLOOD RISK ASSESSMENT

20th March 2014
Final Version 1.0
RAB: 749SE

Frances A Bennett
Ashton Bennett
Bridge Mills
Huddersfield Road
Holmfirth
WEST YORKSHIRE
HD9 3TW

Resilience and Flood Risk

## Revision history

| Version | Date | Amendments | Issued to |
|---|---|---|---|
| Draft 1.0 | February 2014 | | Frances A Bennett<br>Ashton Bennett |
| Final 1.0 | March 2014 | | Frances A Bennett<br>Ashton Bennett |
| | | | |

## Quality control

| Action | Signature | Date |
|---|---|---|
| Prepared | Michael Broadbent BSc CEng FICE | 26/02/2014 |
| Checked | Peter O'Flaherty BSc MSc | 20/03/2014 |
| Approved | Ray Pickering DipCE CEng MCIWEM C.WEM MCGI MEPS | 20/03/2014 |

## Disclaimer



## RAB Bedford Office

RAB Consultants
Kingsbrook House,
7 Kingsway,
Bedford,
MK42 9BA

This page intentionally left blank.

# Executive Summary

RAB Consultants has been commissioned by Frances A Bennett of Ashton Bennett to prepare this Flood Risk Assessment (FRA) in support of a proposed development at 62, Mansfield Road, Camden, NW3 2HU. Although the proposed development is specified to be located at the postal address of 62, Mansfield Road, the precise location and extent of the site to be developed is strictly located on Courthope Road. Access to the proposed development site is not available from Mansfield Road, and will only be accessible from Courthope Road in the future.

The development proposals include the construction of a two-bedroom residential dwelling on the existing paved unused land to the rear of 62 Mansfield Road. The proposed residential building will have a 28.5m$^2$ ground floor for kitchen, living and hall areas and a 28.5m$^2$ lower ground floor (basement) for bedrooms, bathrooms and patio.

The site is located within the Environment Agency's Flood Zone 1. In accordance with the Technical Guidance to the National Planning Policy Framework Flood Zone 1 comprises land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding (<0.1%). The proposed development is identified to be just outside the limits of a Critical Drainage Area (CDA). CDAs are areas of significant flood risk, characterised by the amount of surface runoff that drains into an area, its topography and hydraulic conditions of the pathway and receptors (people, properties and infrastructure) that may be affected by surface water flooding.

The official reports identify that surface water flooding historically occurred in the areas of, inter alia, Hampstead Heath and Gospel Oak, Camden, during 1975 and 2002, when specific drainage and sewers were overwhelmed and certain roads were flooded, including Mansfield Road in 1975. In light of the surface flooding that occurred in 1975, subsequent investigations by the council on flood mitigation schemes for Gospel Oak identified that flood risk was significantly reduced for this area as a consequence of the construction of a flood relief sewer in 1987. While the council acknowledge there is still some residual flood risk in the area, it is not now as significant as was originally believed, and this was confirmed by the lack of flooding along Mansfield Road in 2002.

The proposed development building is considered to be at low risk of flooding from other sources (i.e. groundwater, sewer flooding) apart from the possibility of some ponding. In this respect, it has been identified that there is a risk of ponding adjacent the proposed development site over the lower sections of Courthope Road, and that there is some uncertainty of the possible maximum depth of this ponding. It is therefore recommended that the level of the entry points to the proposed building and the relating ground floor level should be set at 300mm above the adjacent ground level.

Safe access and exit to and from the site will be provided by Courthope Road which leads directly north from the proposed development site to Savernake Road and away from the CDA to the South of Mansfield Road.

The proposed development will not increase the impermeable area. Consequently there is thought to be no effect on surface water run-off.

It can be concluded therefore that the proposed development is appropriate for the flood risk and is not expected to increase the risk of flooding elsewhere.

This page is intentionally left blank.

Resilience and Flood Risk

# Contents



# List of Figures

## List of Tables



## Abbreviations

| Abbreviation | Definition |
|---|---|
| ABI | Association of British Insurers |
| EA | Environment Agency |
| FRA | Flood Risk Assessment |
| LLFA | Lead Local Flood Authority |
| MFRC | London Borough of Camden flood risk management strategy, Managing Flood Risk in Camden |
| NPPF | National Planning Policy Framework |
| SFRA | Strategic Flood Risk Assessment |
| SuDS | Sustainable Drainage Systems |

# 1.0 Introduction

## 1.1. Terms of Reference

RAB Consultants has been commissioned by Frances A Bennett of Ashton Bennett to prepare this Flood Risk Assessment (FRA) in support of a proposed development at 62, Mansfield Road, Camden, NW3 2HU.

The National Planning Policy Framework requires a Flood Risk Assessment to be carried out to ensure flood risk to the proposed development is considered as well as the impact the development will have elsewhere on people and property.

This FRA has been prepared in accordance with the Environment Agency's Flood Risk Assessment (FRA) Guidance Note 1 (Development Greater Than 1 Hectare (ha) in Flood Zone 1 (and Critical Drainage areas less than 1ha)).

## 1.2. FRA Requirements

It is a requirement for development applications to consider the potential risk of flooding to a proposed development over its expected lifetime and any possible impacts on flood risk elsewhere, in terms of its effects on flood flows and runoff.

Where appropriate, the following aspects of flood risk should be addressed in all planning applications in flood risk areas:

- The area liable to flooding.
- The probability of flooding occurring now and over time.
- The extent and standard of existing flood defences and their effectiveness over time.
- The likely depth of flooding.
- The rates of flow likely to be involved.
- The likelihood of impacts to other areas, properties and habitats.
- The effects of climate change.
- The nature and currently expected lifetime of the development proposed and the extent to which it is designed to deal with flood risk.

This FRA follows government guidance on development and flood risk (National Planning Policy Framework).

## 1.3. Site Details

Figure 1 - Summary of site details

| | |
|---|---|
| Site name | Land adjacent Courthope Rd, Mansfield Rd |
| Site area | Approximately 30m$^2$ |
| Existing land-use | Paved disused area of existing land |
| Purpose of development | Residential |
| Estimated lifespan | 100 years |
| OS NGR | 527978 185526 |
| Country | England (NPPF applies) |
| Local planning authority | London Borough of Camden |
| Other authorities | Environment Agency South East Region |


## 1.4. Site Description

The proposed development site covers an approximate area of 30m$^2$ of existing paved yard which is currently disused land. Historically the existing paved site was probably used as a

vehicle parking area. Access to the site is available through gates located on Courthope Road, and the remaining perimeter of yard is marked predominantly by a brick wall approximately 3m in height. The site is located between existing residential buildings, and these have frontages in the north onto Courthope Road and in the South onto Mansfield Road. The location and layout of the site is identified in Figure 2.

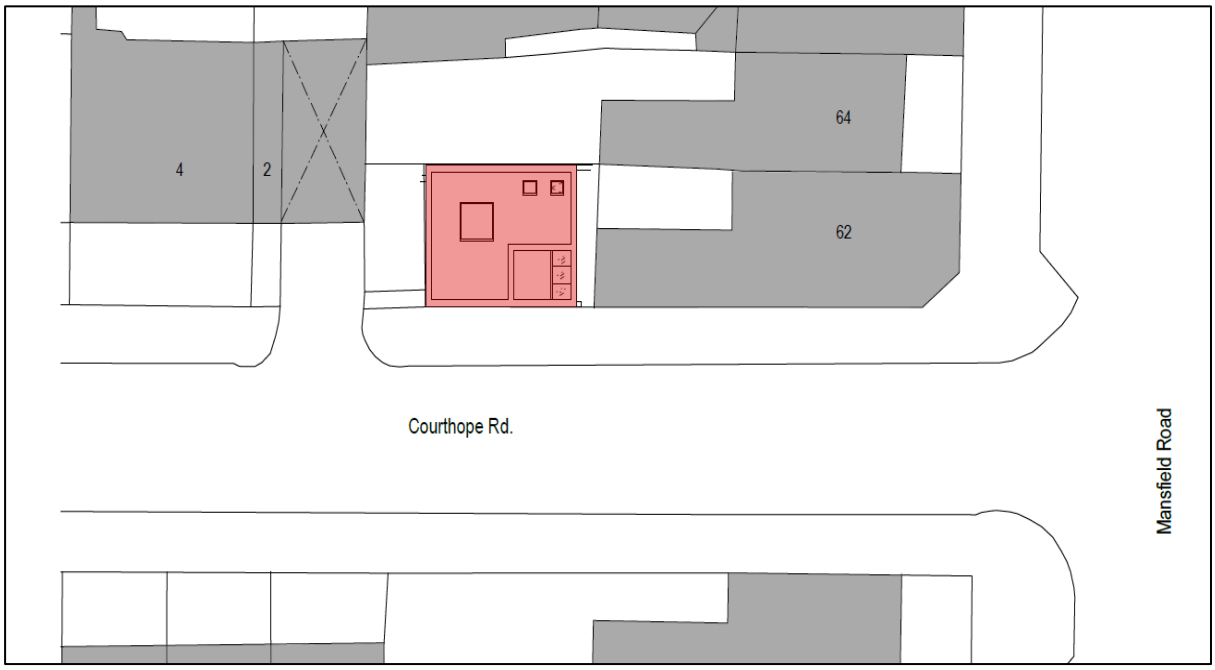
## 1.5. Development Proposals

The proposals comprise the development of the existing paved area of unused land to a two-bedroom residential building. The proposed residential building will have a 28.5m$^2$ ground floor for kitchen, living and hall areas and a 28.5m$^2$ lower ground floor for bedrooms, bathrooms and patio.

## 1.6. Existing Drainage Network

Surface water collecting on the existing paved area is currently managed through allowing natural drainage to occur from across the site and the existing footpath into the surface water and public sewers located along the length of Courthope Road.

Figure 2 - Layout and position of proposed development



# 2.0 Site Visit on Wednesday 19th February 2014

One site visit was undertaken by RAB Consultants. This visit took place on Wednesday 19th February 2014 which was on a dry, clear and sunny day.

RAB Consultants undertook photographic surveys and visual assessments of the proposed development site, including an extensive surface water drainage overview of the surrounding areas. This was considered necessary in light of preliminary findings from background reviews of available reports, namely the North London Strategic Flood Risk Assessment, the Camden Flood Risk Management Strategy, and the Surface Water Management Plan with respect to the London Borough of Camden.

## 2.1. Observations made on the 19th February 2014

A rapid overview of the catchment area was initially undertaken, extending across Parliament Hill to the Highgate Ponds and on the higher ground to the north of the rail cutting as well as embankment sections between Hampstead Heath and Gospel Oak Railways Stations. Following this, a careful visual review was undertaken of the existing dense urban development immediately to the south of the existing railway line, with a specific focus on the topography and features along Pond Street; Constantine Road; Savernake Road, and the more northerly sections of Fleet Road and Agincourt Road. The outcome of this overview provided a clearer understanding of likely surface water drainage patterns, particularly, the likely flow dispersion characteristics. This survey review provided a basis of explanations and clarity on historical flood events, which will be covered within Chapter 4.1.

It is clear from visual observations that surface water drainage from the existing dense urban development contained within the boundaries of Constantine Road; Savernake Road; and Agincourt Road will tend to naturally flow along the gradient falls towards Mansfield Road. Courthope Road is one of a number of access roads serving the dense urban area, all generally running in a north south direction between the higher levels of Constantine Road and Savernake Road to the lower level of Mansfield Road.

The features occurring at the junction between Savernake Road and Courthope Road are shown in Figure 3 and Figure 4. Although the number of gullies on Savernake Road were assessed to be limited, it is felt a good percentage of surface water drainage flowing on this road will continue in a west to east direction along Savernake Road, with only a possible small percentage diverted down into Courthope Road, given that there is one drainage gully immediately prior the junction.

The typical urban features along Courthope Road are shown in Figure 5 and Figure 6. The road has a reasonable longitudinal gradient, is in generally a good condition, and it is envisaged the likely characteristics of surface water flow patterns from the catchment towards the lower sections and the junction at Mansfield Road will not be unusual. The carriageway is formed in bituminous material, but channels adjacent the kerbs are formed in good quality block paving, which are perhaps not as smooth as might have been the case had the bituminous mix been laid up against the kerb face.

Critically, however, there are only two drainage gullies on each side of the road serving the associated paved areas, extending over a length of some 200m. One of these gullies is located

on each side of the road at the lowest points along Courthope Road, some 10m from the centre line of Mansfield Road. The access to the proposed development site from Courthope Road is shown in Figure 7, and the existing paved area within the boundaries of the site is shown in Figure 8. The paved area was capable of supporting a small drilling rig, from which core samples were taken, identifying on the first investigative survey a stiff clay at a depth of some 3m.

The features at the junction between Courthope Road and Mansfield Road are shown in Figure 9, and this identifies the level of the carriageway road surface is virtually identical to the footpath level at the mouth of the junction. The reason for this feature is not clear, as it may be a form of "speed bump"; it may be for pedestrian access convenience; or it may be a form of "drainage barrier" between Courthope Road and Mansfield Road. This issue will be discussed later in this FRA.

The features along Mansfield Road, both looking directly east and looking directly west, adjacent to the junction with Courthope Road, are shown in Figure 10 and Figure 11 respectively. The longitudinal gradient along Mansfield Road is assessed to be a very flat gradient, possibly no greater than 1 to 2% in most locations. The carriageway is formed from a bituminous material, and is generally in a good condition, but there are some failed sections, as shown in Figure 10.

The features at the junction where Savernake Road runs in Mansfield Road to the east of Courthope Road are shown in Figure 12. Again, the longitudinal gradient along Mansfield Road is assessed to be very flat at this location, whereas there is a reasonable fall along Savernake Road towards the main road. It is reasonable to assume a high percentage of surface water runoff from the side road would probably flow into the channels of the main road.

The flat longitudinal gradients along Mansfield Road continue through to where the main road runs under the railway line adjacent Gospel Oak Railway Station. The features at this location are shown in Figure 14, to the east of Courthope Road. An interesting feature shown in Figure 14 is the standing water that has not yet drained away from the southern kerb line adjacent the bridge at Gospel Oak, despite a number of dry days of weather following the considerable wet periods during February 2014.

The flat longitudinal gradients along Mansfield Road are an important feature picked up from visual observations during the site visit. In parallel with this observation, it was noted that there was a limited number of surface water drainage gullies between Gospel Oak Railway Station and the junction between Mansfield Road and Courthope Road. Some locations were provided with single gullies, whereas others were double, as shown in Figure 13. The spacing of longitudinal gullies between Gospel Oak Railway Station was estimated to be 60m; 90m; 120m and 140m. This latter gulley was located near the junction with Shirlock Road, a junction on Mansfield Road to the west of Courthope Road. It was note also that one of these gullies was full of silt and not operationally effective.

The topography directly to the south of Mansfield Road is generally to lower levels than that found along the longitudinal alignment of the main road. Accordingly, surface water collecting on Mansfield Road will tend to drain freely to the south of this main road from where it would widely disperse.

Figure 3 – Looking down Courthope Rd from high point at Junction with Savernake Rd

Figure 4 - Looking east along Savernake Rd at Junction with Courthope Rd

Figure 5 - Centre of Courthope Rd looking North

Figure 6 – Centre of Courthope Rd looking South

Figure 7 - Open access Gate to Development Site looking East

Figure 8 - Development Site, Service Survey markings and preparations for Drilling Work

Figure 9 - Looking North across Mansfield Rd to Courthope Rd at Junction to Main Rd.

Figure 10 – Looking East along Mansfield Rd identifying Junction with Courthope Rd.

Figure 11 – Looking West along Mansfield Rd identifying Junction with Courthope Rd.

Figure 12 – Junction between Mansfield Rd and Savernake Rd to East of Courthope Rd.

Figure 13 – 1 of 3 No. Surface Water Gratings between Gospel Oak Stn and Courthope Rd.

Figure 14 – Mansfield Rd at Gospel Oak Stn and Rail Bridge (standing water at low spot).

# 3.0 Development and Flood Risk Policy

## 3.1. Planning Context

### 3.1.1. Applicable Planning Policy

National Planning Policy Framework (NPPF) was issued by the Department for Communities and Local Government in March 2012. NPPF deals specifically with development planning and flood risk using a sequential characterisation of risk based on planning zones and the Environment Agency Flood Map. The main study requirement is to identify the Flood Zones and vulnerability classification relevant to the proposed development, based on an assessment of current and future conditions.

### 3.1.2. Flood Zones

The Environment Agency has developed a Flood Map that shows the risk of flooding in England and Wales for different return period events. It should be noted that the Environment Agency's Flood Map is based on broad scale hydraulic modelling and is an indication of the potential flood risk to a site and the actual risk may differ. The Flood Zone Maps (without climate change) provide the information required by NPPF for planning purposes, as described in Section 3.2. The Flood Zones do not take account of the effect of flood defences.

The entire site lies within Flood Zone 1 as described in Table 1 of the Technical Guidance to the National Planning Policy Framework, with annual probability of fluvial and tidal flooding less than 0.1% (1 in 1,000 year). The proposed development is categorised as a 'more vulnerable' development in accordance with Table 2 of the Technical Guidance to the National Planning Policy Framework.

## 3.2. NPPF Flood Zones

Table 1 shows how the Flood Zones relate to a sequential planning process.

Table 1 - NPPF Flood Zones and Requirements

| Zone 1: Low Probability | |
|---|---|
| Land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1%). | **Appropriate uses**<br>All uses of land are appropriate in this zone.<br><br>**FRA requirements**<br>For development proposals on sites comprising one hectare or above the vulnerability to flooding from other sources as well as from river and sea flooding, and the potential to increase flood risk elsewhere through the addition of hard surfaces and the effect of the new development on surface water run-off, should be incorporated in a FRA.<br><br>**Policy aims**<br>Developers and local authorities should seek opportunities to reduce the overall level of flood risk through the layout and form of the development, and the appropriate application of sustainable drainage techniques. |
| **Zone 2: Medium Probability** | |
| Land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% - 0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% - 0.1%) in any year. | **Appropriate uses**<br>The water-compatible, less vulnerable and more vulnerable uses of land and essential infrastructure in Table2-2 are appropriate in this zone.<br>Highly vulnerable uses in Table 2-2 are only appropriate in this zone if the Exception Test is passed.<br><br>**FRA requirements**<br>All proposals in this zone should be accompanied by a FRA.<br><br>**Policy aims**<br>Developers and local authorities should seek opportunities to reduce the overall level of flood risk through the layout and form of the development, and the appropriate application of sustainable drainage techniques. |
| **Zone 3a: High Probability** | |
| Land assessed as having a 1 in 100 or greater annual probability of river flooding (<1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any | **Appropriate uses**<br>The water-compatible and less vulnerable uses of land in Table 2-2 are appropriate in this zone.<br>The highly vulnerable uses (Table 2-2) should not be permitted in this zone. |

| | |
|---|---|
| year. | The more vulnerable and essential infrastructure uses in Table 2-2 should only be permitted in this zone if the Exception Test is passed.<br><br>**FRA requirements**<br>All proposals in this zone should be accompanied by a FRA.<br><br>**Policy aims**<br>Developers and local authorities should seek opportunities to:<br>• reduce the overall level of flood risk through the layout and form of the development and the appropriate application of sustainable drainage techniques;<br>• relocate existing development to land with a lower probability of flooding;<br>• create space for flooding to occur by allocating and safeguarding open space for flood storage. |
| **Zone 3b: Functional Floodplain** | |
| Land where water has to flow or be stored in times of flood.<br>(Land which would flood with an annual probability of 1 in 20 (5%) or greater in any year or is designed to flood in an extreme (0.1%) flood, or at another probability to be agreed between the local planning authority and the Environment Agency, including water conveyance routes). | **Appropriate uses**<br>Only the water-compatible uses and the essential infrastructure listed in Table 2-2 that has to be there should be permitted. It should be designed and constructed to:<br>• remain operational and safe for users in times of flood;<br>• result in no net loss of floodplain storage;<br>• not impede water flows;<br>• not increase flood risk elsewhere.<br><br>**FRA requirements**<br>All proposals in this zone should be accompanied by a FRA.<br><br>**Policy aims**<br>In this zone, developers and local authorities should seek opportunities to:<br>• reduce the overall level of flood risk through the layout and form of the development and the appropriate application of sustainable drainage techniques;<br>• relocate existing development to land with a lower probability of flooding. |

Source: NPPF Technical Guidance Table 1

Table 2 - Flood Risk Vulnerability Classification

| | |
|---|---|
| **Essential Infrastructure** | Essential transport infrastructure and strategic utility infrastructure, including electricity generating power stations and grid and primary substations. |
| **Highly Vulnerable** | Police stations, Ambulance stations and Fire stations and Command Centres and telecommunications installations and emergency dispersal points.<br>Basement dwellings, caravans, mobile homes and park homes intended for permanent residential use.<br>Installations requiring hazardous substances consent. |
| **More Vulnerable** | Hospitals, residential institutions such as residential care homes, children's homes,<br>Social services homes, prisons and hostels.<br>Buildings used for: dwelling houses, student halls of residence, drinking establishments, nightclubs, hotels and sites used for holiday or short-let caravans and camping.<br>Non–residential uses for health services, nurseries and education.<br>Landfill and waste management facilities for hazardous waste. |
| **Less Vulnerable** | Buildings used for shops, financial, professional and other services, restaurants and cafes, offices, industry, storage and distribution, and assembly and leisure.<br>Land and buildings used for agriculture and forestry.<br>Waste treatment (except landfill and hazardous waste facilities), minerals working and processing (except for sand and gravel).<br>Water treatment plants and sewage treatment plants (if adequate pollution control measures are in place). |
| **Water-compatible Development** | Flood control infrastructure, water transmission infrastructure and pumping stations.<br>Sewage transmission infrastructure and pumping stations.<br>Sand and gravel workings.<br>Docks, marinas and wharves, navigation facilities.<br>MOD defence installations.<br>Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location<br>Water-based recreation (excluding sleeping accommodation).<br>Lifeguard and coastguard stations.<br>Amenity open space, nature conservation and biodiversity, outdoor sports and recreation.<br>Essential sleeping or residential accommodation for staff required by uses in this category, subject to a warning and evacuation plan. |

Source: NPPF Technical Guidance Table 2

Table 3 - Flood Risk Vulnerability and Flood Zone 'compatibility'

| Vulnerability Classification (Table 3) | | Essential Infrastructure | Water Compatible | Highly Vulnerable | More Vulnerable | Less Vulnerable |
|---|---|---|---|---|---|---|
| Flood Zone (Table 2) | Zone 1 | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Zone 2 | ✓ | ✓ | Exception Test | ✓ | ✓ |
| | Zone 3a | Exception Test | ✓ | × | Exception Test | ✓ |
| | Zone 3b | Exception Test | ✓ | × | × | × |

Source: NPPF Technical Guidance Table 3

Key:

✓ Development is appropriate

× Development should not be permitted

### 3.2.1. Critical Drainage Areas

Critical Drainage Areas are areas of significant flood risk, characterised by the amount of surface runoff that drains into the area, the topography and hydraulic conditions of the pathway and the receptors (people, properties and infrastructure) that may be affected by surface water flooding.

The National Planning Policy Framework defines “areas at risk of flooding” as land within Flood Zones 2 and 3; or land within Flood Zone 1 which has critical drainage problems and which has been notified to the local planning authority by the Environment Agency.

From a preliminary inspection, it is assessed that the proposed development site appears to be located just outside a Critical Drainage Area (CDA), as defined within the 2011 London Borough of Camden Surface Water Management Plan (SWMP). Consequently, there is a case to investigate whether the site is in an “area at risk of flooding”.

This flood risk assessment goes on to assess the sites specific flood risk from all sources in line with the requirements of the National Planning Policy Framework.

# 4.0 Assessment of Flood Risk

## 4.1. Previous Flood History

The 2008 North London Strategic Flood Risk Assessment (SFRA); the 2011 London Borough of Camden Surface Water Management Plan (SWMP); and the London Borough of Camden Flood Risk Management Strategy, Managing Flood Risk in Camden (MFRC), are the official reports and some of the records that have been consulted for the preparation of this FRA.

The 2011 SWMP identifies that surface water flooding historically occurred in Camden during 1975 and 2002, when specific drainage and sewers were overwhelmed, and certain roads were flooded. The information provided within the 2011 SWMP clearly identifies with respect to surface water drainage the significance of the existing railway cuttings and embankments between Hampstead Heath and Gospel Oak Railway Stations. Runoff from the high ground of Parliament Hill appears to be naturally shed towards either the west and in the direction of the Station at Hampstead Heath or to the east and in the direction of the Station at Gospel Oak. The 2011 SWMP also identifies that Mansfield Road was flooded from surface water runoff during 1975, on an occasion when heavy precipitation occurred. However, the records identify that neither Constantine Road or Savernake Road were flooded from surface water runoff during these events, whereas Fleet Road leading to Mansfield Road is identified to have been flooded during the same event. These records tend to suggest that surface water runoff from Fleet Road contributed to the flooding of Mansfield Road. It is noted within the MFRC report that there was a lack of significant flooding in the borough in 2002.

The outcome of these events, together with related supporting assessments and evaluations, have been subsequently used to identify the related Critical Drainage Areas (CDAs) and key Local Flood Risk Zones (LFRZs) for Camden. The proposed development site, named 62, Mansfield Road, which is actually located on Courthope Road, is strictly outside the limits of any of these CDAs or LFRZs, even though it is relatively close to the boundary which runs along Mansfield Road and CDA 3_003.

There is no indication, however, that any of the past historical flooding events have directly affected the proposed development site although they did impact the local area. There is also no other indication within the 2008 SFRA; the 2011 SWMP; and the MFRC Reports that previous flooding has affected the proposed development site.

## 4.2. Fluvial and Tidal Flood Risk

The proposed development site is located entirely within the Flood Zone 1 (low probability) of the Environment Agency's Flood Map as described in Table 1 of the Technical Guidance to the National Planning Policy Framework. There is no fluvial or tidal flood risk associated with this site.

## 4.3. Flood Defence Breach and Overtopping

There are no formal flood defences protecting the proposed development site. Consequently there is no risk of flooding from this source.

## 4.4. Canal Flood Risk

Although Regents Canal is a predominant feature of the Borough of Camden, this feature does not impact on either Hampstead Heath or Gospel Oak, including any of the immediate surrounding area. Consequently there is no risk of flooding from this source.

## 4.5. Reservoir Flood Risk

The proposed development site is shown to be on the boundary of an area at risk of reservoir flooding from one reservoir on the EA reservoir flood map; the reservoir is shown in Table 4.

Table 4 - Summary of reservoirs posing risk to site

| Name | Owner | Grid Reference | EA Area | Local Authority |
|---|---|---|---|---|
| Hampstead Pond No.1 | Corporation of London | 527210 185750 | North East Thames Area in South East Region | Camden |

The EA reservoir flood map shows the largest area that might be flooded if a reservoir were to fail and release the water it holds. Since this is a prediction of a worst case scenario, it's unlikely that any actual flood would be this large. Reservoir flooding is also extremely unlikely with no loss of life attributed since 1925; before reservoir safety legislation was introduced to make sure reservoirs are well maintained.

## 4.6. Surface Water Flood Risk

The MFRC report notes that in response to the historic surface water flooding in the area in 1975(which is not shown to have impacted the proposed development site), the council produced preliminary work for flood mitigation schemes for Gospel Oak. This preliminary work showed that the effects of a flood relief sewer constructed in 1987 had significantly reduced the risk of flooding in the area. While there is still some residual flood risk in the area, it is not as significant as originally believed. This is confirmed by the lack of significant flooding in 2002.

The 2008 SFRA; the 2011 SWMP; MFRC reports all identify a number of limitations in the precise nature of information that is available for a comprehensive assessment of surface flood risks. Some of this information relates specifically to sewer records required for detailed assessments. Some of these issues are likely to be clarified, as Thames Water have given undertakings to address some of the current shortcomings over the medium to longer term.

However, the details relating to both surface water runoff flow velocities and ponding depths, provide indicative information on the potential impacts of surface water on the proposed development site, provided this is conditioned by the visual observations and assessments made during the site inspection, together with the information provided in the official reports. The potential for flooding at the development site is therefore examined for a worse-case scenario where there is a very heavy precipitation event in the future comparable to the events in 1975 and 2002 in the area of Savernake Road, Courthope Road, and Mansfield Road. For this scenario examination, it is assumed a number of the limited existing surface water road gullies become blocked, even though pipe drainage capacities in the immediate area of the site are assumed to be adequate to accommodate the storm runoff from this future event.

In the unlikely event that the gulley on Savernake Road immediately prior to the upper junction with Courthope Road were to be blocked, then surface water runoff in the channel at this location would be diverted down the western channel of Courthope Road. If likewise, the very limited number of gullies in Courthope Road were also to be all blocked, then the entire runoff from the catchment identified, including the entire length of Courthope Road itself, would flow to the southern end of Courthope Road where it would start to pond. The level of ponding would increase until it was able to spill over the existing "speed bump/drainage barrier" onto Mansfield Road. In the event that Mansfield Road was also flooded, then the pond level would increase to the flood level on Mansfield Road, from where it would disperse to the lower ground to the south of Mansfield Road, namely into the area of CDA, 3_003. Accordingly, the worst outcome of this future heavy precipitation event would be a short duration pond outside existing buildings, including the proposed development site, where the high level of the pond would be equivalent to the depth of flooding on Mansfield Road plus the difference in level between the ground outside the proposed site on Courthope Road and the comparable level on Mansfield Road adjacent the junction with Courthope Road.

It is assessed this proposed development will have no negative impact on the levels of existing surface water run-off, as the existing area is already paved, and the proposed development provides for an identical area of flat roof. There will therefore be no increase of surface water runoff as a consequence of the proposed development.

In contrast, if ponding were to occur across the lower section of Courthope Road as a consequence of an event, and the very worst scenario was to occur, then there is a risk that the ground floor, and in turn therefore the lower ground floor, could be flooded and submerged unless adequate precautions were taken. Such precautions are readily accommodated by fixing the ground floor level at a high enough level to prevent the highest possible pond level waters from entering the proposed development building. Furthermore, it would equally be necessary to ensure no surface water flooding could enter the proposed building at the entry points, and in turn, to ensure the building envelope was adequately sealed to prevent any water entering the lower ground floor.

It is therefore recommended that the level of the entry points to the proposed building and the relating ground floor level should be set at 300mm above adjacent ground. A higher ground floor level than might have been originally envisaged would also probably entail a higher lower ground floor level, which may be beneficial, given that the proposed bathroom is located on the lower ground floor.

The Environment Agency most recent surface water flood maps are freely available online at their website and can be used to see the approximate areas that would experience surface water flooding from a variety of rainfall return periods. The surface water maps concur with the above analysis and identify that the site is in an area that has a very low chance of flooding from surface water; with a chance of flooding of less than 1 in 1,000 years (0.1%). It is important to note however, that the adjacent road surface near the junction between Courthope Road and Mansfield Road is within an area that has a high chance of flooding from surface water; with a chance of flooding of greater than 1 in 30 (3.3%). This location was noted to be at a low spot adjacent to the site and is a possible ponding site.

## 4.7. Drainage and Sewage Infrastructure

Sewer flooding is often caused by excess surface water entering the drainage network causing sewers to surcharge. Thames Water, who are responsible for the management of urban drainage and sewerage within Camden, maintain a DG5 register of sites affected by sewer flood incidents on a post code by post code basis.

For the ten years preceding production of the 2011 SWMP Thames Water have provided this data showing that no incidents have occurred at the NW3 post code area have been affected by sewer flooding events. Accordingly, there is no indication that the proposed development site itself has been affected by this flooding.

It is important to note that previous sewer flood incidents do not indicate the current or future risk to the site as upgrade work could have been carried out to alleviate any issues or conversely in areas that have not experienced sewer flooding incidents the local drainage infrastructure could deteriorate leading to future flooding.

## 4.8. Groundwater/Geology

British Geological Survey records from a number of sources indicate that the proposed development site sits primarily over the London Clay Formation with Hampstead Heath atop the Bagshot Formation/Claygate Member.

While the London Clay will provide an impermeable cap to groundwater rising from below the bedrock, it is also likely to prevent water infiltrating through from any permeable formation. During periods of heavy rainfall, any superficial deposits could become saturated. Where water cannot infiltrate into the London Clay it could form a perched water table at the boundary which could rise and cause flooding problems in subsurface structures (i.e. basements) or at the ground surface.

However, groundwater mapping from a number of sources indicates that elevated groundwater from superficial soils are located at the southern end of the Borough of Camden. Furthermore, a visual inspection of the first drilling core samples taken at the development site identified a very dry sample of very firm clay, even after a period of very wet UK weather. This would tend to indicate that groundwater issues are an unlikely problem at the proposed development site.

Apart from some records held by the Environment Agency, there are no other records of groundwater flood incidents held by the Borough of Camden, and overall, and officially it is considered groundwater flooding to be a relatively low risk in the London Borough of Camden.

## 4.9. Climate Change

In assessing the impacts of climate change on flood risk emanating from the land and rivers, sensitivity ranges in Table 5 of the Technical Guidance to the National Planning Policy Framework may provide an appropriate precautionary response to the uncertainty about climate change impacts on rainfall intensity.

Table 5 - NPPF Technical Guidance recommended national precautionary sensitivity ranges for peak rainfall intensities

| Parameter | 1990 to 2025 | 2025 to 2055 | 2055 to 2085 | 2085 to 2115 |
|---|---|---|---|---|
| Peak Rainfall Intensity | +5% | +10% | +20% | +30% |

On a more localised scale, If emissions follow a medium future scenario, UKCP09 projected changes by the 2050s relative to the recent past are:

- Winter precipitation increases of around 15% (very likely to be between 2 and 32%);
- Precipitation on the wettest day in winter up by around 15% (very unlikely to be more than 31%);
- Relative sea level at Sheerness very likely to be up between 10 and 40cm from 1990 levels (not including extra potential rises from polar ice sheet loss);
- Peak river flows in a typical catchment likely to increase between 8 and 18%.

Climate changes can affect local flood risk in several ways. Impacts will depend on local conditions and vulnerability. More intense rainfall causes more surface runoff, increasing localised flooding and erosion. In turn, this may increase pressure on drains, sewers and water quality. Storm intensity in summer could increase even in drier summers, so there is a need to be prepared for the unexpected. Drainage systems in the borough have been modified to manage water levels and could help in adapting locally to some impacts of future climate on flooding, but may also need to be managed differently. Rising sea or river levels may also increase local flood risk inland or away from major rivers because of interactions with drains, sewers and smaller watercourses. Even small rises in sea level could add to very high tides so as to affect places a long way inland.

# 5.0 Mitigation Measures

## 5.1. Recommended Finished Floor Levels

It has been identified that there is a risk of ponding adjacent the proposed development site over the lower sections of Courthope Road, and there is no indication of possible maximum depth of this ponding. It is therefore recommended that the level of the entry points to the proposed building and the relating ground floor level should be set at 300mm above adjacent ground. A higher ground floor level than might have been originally envisaged would also probably entail a higher lower ground floor level, which may be beneficial, given that the proposed bathroom is located on the lower ground floor.

## 5.2. Safe Access and Exit

Safe access and exit to and from the site will be provided by Courthope Road which leads directly north from the proposed development site to Savernake Road and away from the CDA to the South of Mansfield Road.

## 5.3. Surface Water Runoff

There is no proposed increase in impermeable area as a result of the development meaning there will be no effect on surface water runoff.

There is thought to be no scope for the implementation of SuDS techniques as part of the proposed development.

# 6.0 Conclusion

The proposed development site is an area of existing paved yard which is currently disused land. Historically the existing paved site was probably used as a vehicle parking area. Access to the site is available through gates located only on Courthope Road. The site is located between existing residential buildings, and these have frontages in the north onto Courthope Road and in the South onto Mansfield Road.

The proposals comprise the development of the existing paved area of unused land to a two-bedroom residential building. The proposed residential building will have a 28.5m$^2$ ground floor for kitchen, living and hall areas and a 28.5m$^2$ lower ground floor for bedrooms, bathrooms and patio.

The proposed development site, named 62, Mansfield Road, is located on Courthope Road, and is strictly outside the limits of the Critical Drainage Area (CDA) 3_003, even though it is relatively close to the boundary of this CDA which runs along Mansfield Road in the Borough of Camden.

The site is located within the Environment Agency's Flood Zone 1, at low risk of flooding from fluvial and tidal sources.

The sites underlying geology and indicative groundwater susceptibility details suggest that the site is not at risk of groundwater flooding.

The site is not within a post-code area that has been affected in the past by sewer flooding incidents.

The proposed development building is considered to be at low risk of flooding from other sources apart from the possibility of some ponding. In this respect, it has been identified that there is a risk of ponding adjacent the proposed development site over the lower sections of Courthope Road, and that there is some uncertainty of the possible maximum depth of this ponding. It is therefore recommended that the level of the entry points to the proposed building and the relating ground floor level should be set at 300mm above the highest cross section level on Mansfield Road at its junction with Courthope Road.

Safe access and exit to and from the site will be provided by Courthope Road which leads directly north from the proposed development site to Savernake Road and away from the CDA to the South of Mansfield.

The proposed development will result in no net increase in impermeable area. Consequently there is thought to be no effect on surface water run-off.

It can be concluded therefore that the proposed development is appropriate for the flood risk and is not expected to increase the risk of flooding elsewhere.

# 7.0 Recommendations

- Finished ground floor levels should be set at a minimum of 300mm above adjacent ground level to mitigate against the low risk of surface water flooding.

Resilience and Flood Risk

# Appendix A Development Proposals

This page intentionally left blank.