



Section 19 Flood Investigation Report

Hornsey and Crouch End, London Borough of Haringey

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Abbreviations used within the report

CDA	Critical Drainage Area
DWMP	Drainage and Wastewater Management Plan
FEH	Flood Estimation Handbook
FWMA	Flood and Water Management Act 2010
LLFA	Lead Local Flood Authority
mAOD	Metres Above Ordnance Datum
RMA	Risk Management Authority
SFRA	Strategic Flood Risk Assessment
SWMP	Surface Water Management Plan
TW	Thames Water
GMTRA	Glasslyn, Montenotte and Tivoli Residents Association

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1 INTRODUCTION

1.1 Terms of Reference

McCloy Consulting have been instructed on behalf of Haringey Council to undertake an investigation into flooding, in accordance with Section 19 of the Flood and Water Management Act, 2010.

1.2 Legislative background

Where a significant flood event has occurred and the responsibility for managing the future risk is unclear, Haringey Council may conduct a formal flood investigation, under Section 19 of the Flood and Water Management Act, 2010. The aim of this investigation is to identify which authority has responsibilities and whether they are proposing to respond. The results of the investigation will be published.

As the Lead Local Flood Authority (LLFA) for the study area, Haringey Council has a duty to investigate flood incidents as set out in Section 19 of the Flood and Water Management Act, 2010 (the Act). The Act states:

- (1) *On becoming aware of a flood in its area, a lead local flood authority must, to the extent that it considers it necessary or appropriate, investigate:*
 - a. *Which risk management authorities have relevant flood risk management functions, and*
 - b. *Whether each of those risk management authorities has exercised, or is proposing to exercise, those functions in response to the flood.*
- (2) *Where an authority carries out an investigation under subsection (1) it must:*
 - a. *Publish the results of its investigation, and*
 - b. *Notify any relevant risk management authorities.*

Section 1 of the Flood and Water Management Act (FWMA) (2010) defines a flood as ‘any case where land not normally covered by water becomes covered by water’....

It does not matter for the purposes of subsection (1) whether a flood is caused by:

- a. *Heavy rainfall*
- b. *A river overflowing or its banks being breached*
- c. *A dam overflowing or being breached*
- d. *Tidal waters*
- e. *Groundwater, or*
- f. *Anything else (including any combination of factors).*

But “flood” does not include

- g. *flood from any part of a sewerage system, unless caused by an increase in the volume of rainwater, entering or affecting the system, or*
- h. *a flood caused by a burst water main*

1.3 Defining the study extents

Two flood events were experienced in July 2021.

- 31 reports of flooding to Haringey Council recorded following rainfall events on 12th July 2021.
- 47 reports of flooding to Haringey Council recorded following rainfall events on 25th July 2021.

Widespread flooding was experienced across Haringey for both events. Haringey Council has proposed that reported flood incidents be split into three geographic areas of Wood Green, Hornsey Crouch End and South Tottenham. These areas describe the main concentrations of flood reports across the catchment taking into account both dates. This report covers the **Hornsey and Crouch End** geographic areas.

2 STUDY AREA

2.1 Study Location and Context

Hornsey and Crouch End are suburban districts in the borough of Haringey in London, England. The districts cover parts the N6, N8 and N10 postal areas.

Figure 2-1 below shows the extent of the study area. Bounding areas of Muswell Hill and Hornsey Vale/Stroud Green are included in this report for the purposes of the investigation.

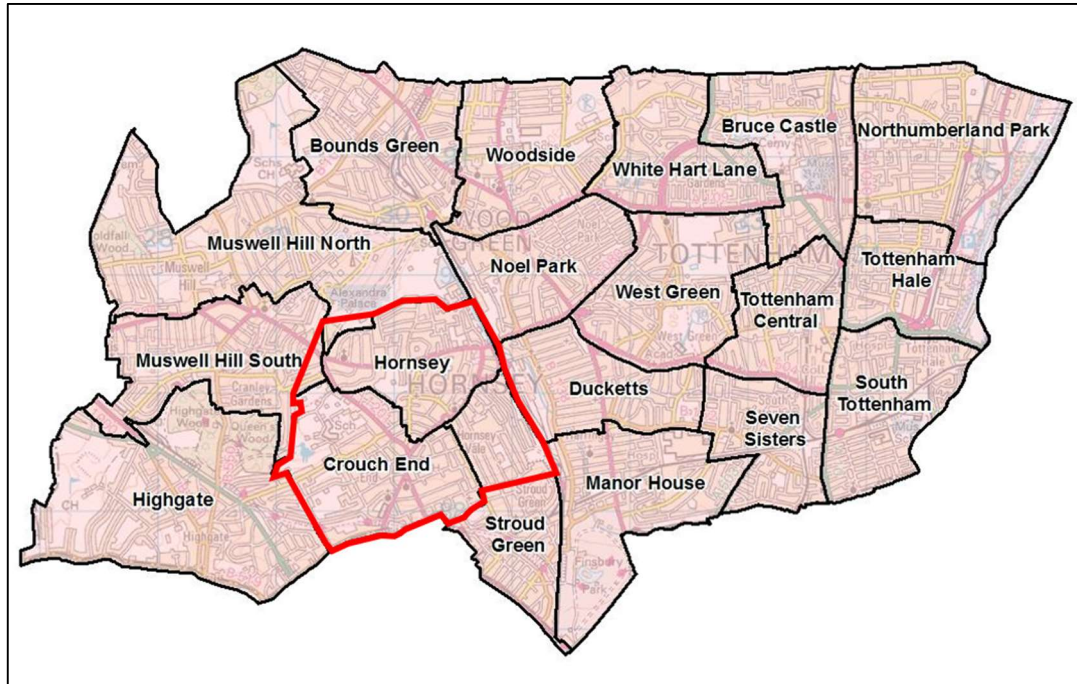


Figure 2-1 Map of Haringey showing study area extents

Hornsey and Crouch End lie approximately six miles north of central London. The districts are largely residential, with commercial and retail centred along High Street, Park Road and The Broadway.

The districts are served by a road network which includes the A103, A504, A1201 and A1080. Hornsey railway station lies on the eastern boundary of the Hornsey district. The station is on the Great Northern Route that forms part of the East Coast Main Line.

2.2 Topography

The topography of the study area is characterised by four primary high points: along Muswell Hill at the bound of Alexandra Palace Gardens to the north west (90m above ordnance datum (AOD)); at Hillfield Avenue in the east (50mAOD); along Shepherds Hill in the south west (80-100mAOD); and along Ridge Road in the south east (65mAOD). Lower land between these high points generally falls to the east.



Figure 2-2 Topography of Hornsey and Crouch End within London Borough of Haringey

2.3 Geology and Soils

Historic borehole logs within the study area were reviewed using British Geological Survey (BGS) database. Borehole Grid References TQ38NW4, TQ38NW293 and TQ38NW167/B identified similar ground conditions generally described as follows;

Made Ground (silty clay with fragments of brick, concrete, rootlets and ash) was encountered to up to 1.0m below ground level (bgl), with London Clay (stiff brown silty clay) encountered beyond that to over 40m bgl.

2.4 Watercourses

Hornsey and Crouch End lie within the Thames Catchment, and in particular drain to the Lower Lee.

Haringey's Strategic Flood Risk Assessment (SFRA)¹ details how a number of watercourses within the borough are culverted and commonly described as 'lost'.

The currently known alignment of watercourses local to Hornsey and Crouch End is shown in Figure 2-3. Note that the New River is a controlled waterway with Thames Water having responsibility under the FWMA.

¹ Strategic Flood Risk Assessment, 2015, Haringey Council: UK. Available at: http://www.haringey.gov.uk/sites/haringeygovuk/files/2012s6315_haringeycouncil_sfra_v4.0_0.pdf Accessed on 24/08/2017.

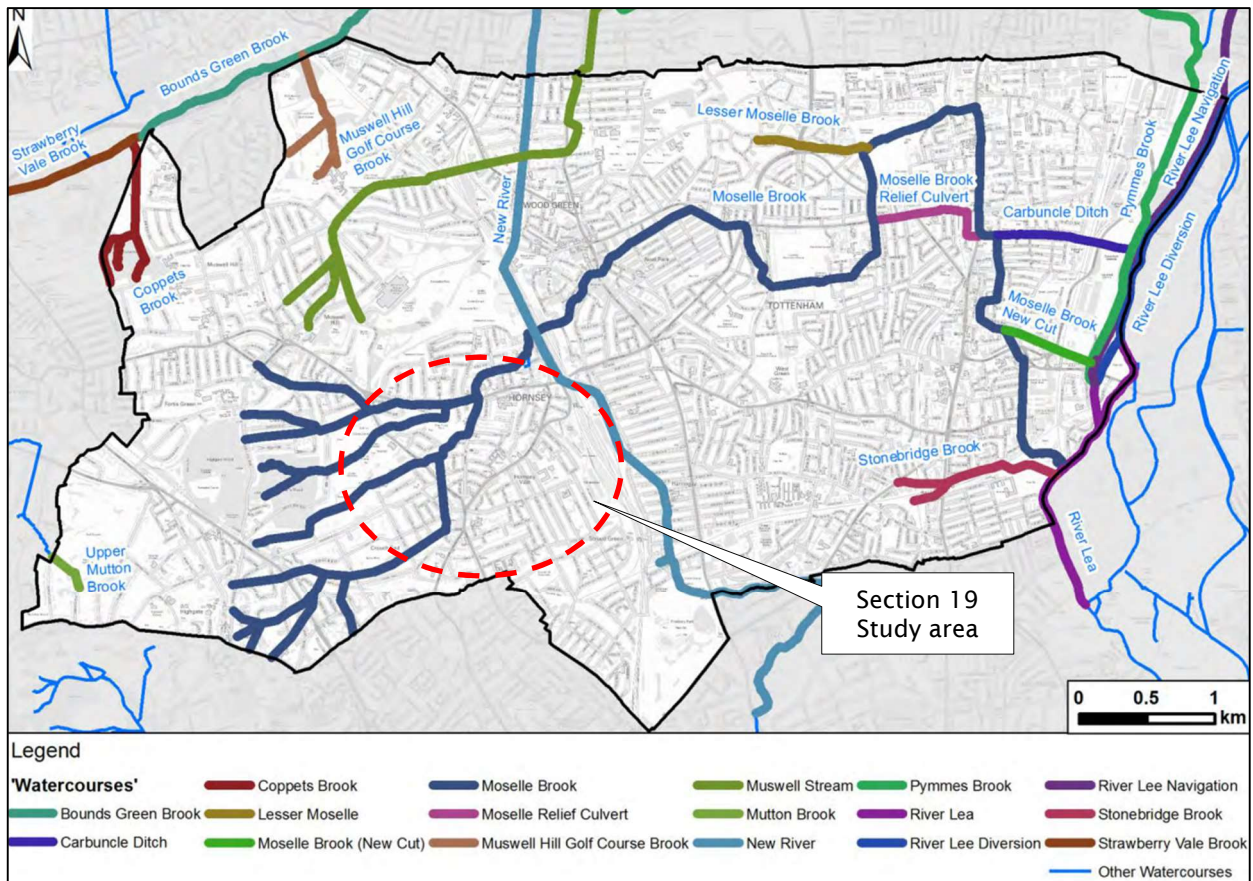


Figure 2-3 Overview of watercourses in Haringey and surrounding areas (from Haringey SFRA)

The following table indicates who is responsible for watercourses in Haringey;

Table 2-1 Watercourse responsibility in the London Borough of Haringey²

Watercourse	Classification	Responsibility under the FWMA
Moselle Brook	Main River	Environment Agency
Stonebridge Brook	Main River	
Pymmes Brook	Main River	
River Lee/River Lee Navigation	Main River	
Unnamed ditches	Ordinary Watercourse	Haringey Council
New River	Artificial Watercourse	Thames Water

² Surface Water Management Plan (SWMP), 2011, Haringey Council: UK. Available at: https://www.haringey.gov.uk/sites/haringeygovuk/files/dlt2_gp4_haringey_swmp_draft_v2.0_0.pdf Accessed on 02/11/21

2.5 Sewerage

The majority of Hornsey and Crouch End is urban development of residential and commercial properties. The area therefore has a high percentage of impermeable area due to buildings, car parks, hard standings and highways.

The sewer network is separate, with a percentage of storm runoff known to contribute to the foul system. The public sewers are owned and maintained by Thames Water.

For the purposes of the Section 19 investigation, Thames Water has provided access to the Practitioner Portal of the Drainage and Wastewater Plan (DWMP). The DWMP portal provides modelling outputs from Thames Water's Capacity Assessment Framework, which includes identifying areas where sewers would be at capacity during a 2 year storm, where potential escapes from manholes would occur during a 30 year storm and the risk of flooding during a 50 year storm. This information has been used to further analyse the possible flood mechanisms across the study area.

2.6 Highway Drainage

The public highway generally drains to the public sewer network in this area via road gullies and pipework owned and maintained by Haringey Council as the local highway authority.

2.7 Flood Risk Mapping

The Environment Agency (EA) online maps provide readily available flood risk data within the study area. No new flood risk mapping has been produced to support this assessment.

2.7.1 Risk of Flooding from Rivers and Sea

The entire study area is within Flood Zone 1 whereby the annual risk of flooding, from either rivers or the sea, is less than 0.1%.

2.7.2 Risk of Flooding from Surface Water

The surface water Long-Term Flood Risk Map is shown in Figure 2-4. There are areas of high-risk flooding on main vehicular routes throughout the borough, notably along the A504 Priory Road and Park Road. Further areas of flood risk are shown in the Priory Park area and along Weston Avenue, as well as the sports fields adjacent Highgate Wood Secondary School.

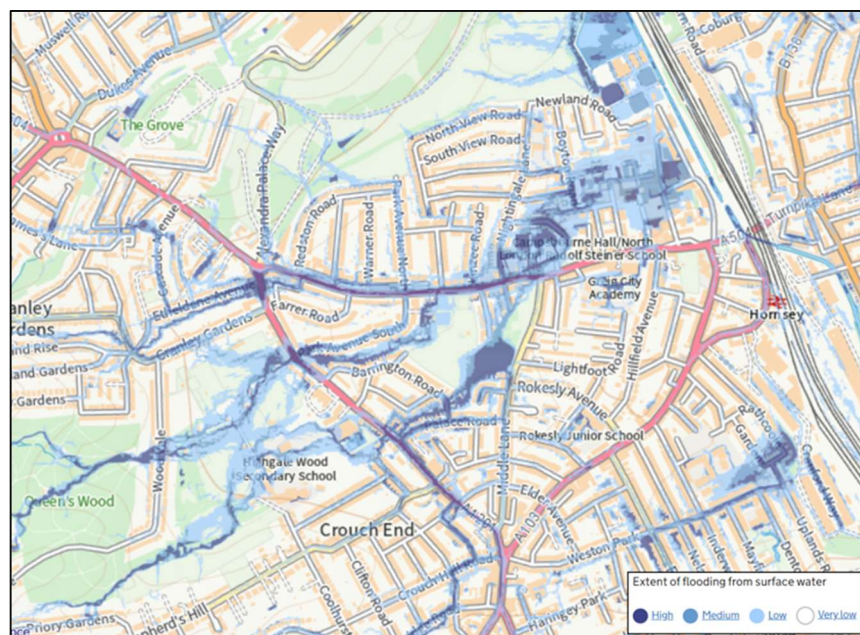


Figure 2-4 Surface Water Long Term Flood Risk Map

3 RISK MANAGEMENT AUTHORITIES

3.1 Haringey Council

Haringey Council is the LLFA for the area and the highway authority. The Flood and Water Management Act 2010 gives LLFAs powers and duties for the strategic overview of local flooding and for some flood risk management functions including:

- A duty to investigate flooding;
- A duty to maintain a register of significant structures and features;
- Powers to regulate ordinary watercourses;
- A duty as a statutory consultee to review drainage strategies and surface water management provisions associated with applications for major development.

As the highway authority, Haringey Council is responsible for the maintenance and operation of drainage gullies and the pipework connecting these to the public sewers for the proper function of highways and safety of highway users.

Haringey Council has contracted Marlborough Highways to support it on all aspects of highway infrastructure including carriageway, footway and cycleway maintenance, junction improvements, traffic calming measures, gully, drainage works and sustainable drainage systems (SuDS). The five year contract began in 2020.

3.2 Environment Agency

The EA is responsible for taking a strategic overview of the management of all sources of flooding and coastal erosion. The EA also has responsibility for managing the risk of flooding from main rivers, reservoirs and estuaries.

3.3 Statutory Undertaker for Public Sewers

Thames Water has a duty as a sewerage undertaker under Section 94 of the Water Industry Act 1991, to provide and maintain sewers for the drainage of buildings and associated paved areas within property boundaries. It has responsibility for any flooding which is directly caused by its assets i.e. its water or sewerage pipes. It also has a duty to cooperate with other relevant authorities in the exercise of flood risk management functions, which may include the sharing of information with other relevant authorities.

3.4 Transport for London

Transport for London (TfL) is responsible for the primary roads, underground, rail networks (London Overground and TfL Rail), buses, taxis, trams and river services in London. In Haringey, the primary roads, or 'Red Routes' which TfL is responsible for include the A406, the A10 and parts of Archway Road and Seven Sisters Road.

3.5 Riparian Landowners

Private landowners have responsibilities for the maintenance and upkeep of ordinary watercourses, including any associated culverts, and the bed / banks of any watercourse adjacent to or within their land. They should clear away any debris from the watercourse or culvert even if it did not originate from their land.

3.6 Residents and Property Owners

Private landowners are responsible for the maintenance and operation of drainage assets and connecting pipework located on privately owned roads and footways, car parks and other hard standings and for building surface water drainage.

Residents and property owners who know they are at risk of flooding have responsibilities to mitigate the risk of flood damage to their property as far as is reasonably practicable³. They should take measures to protect themselves and their property when flooding is imminent. Residents and property owners have the right to defend their property as long as they do not subsequently increase the risk of flooding to other properties.

Business owners should make a flood plan for their business. There are measures that can be taken to reduce the amount of damage to business premises caused by flooding and properties at risk should be insured.

³ Living on the Edge. Environment Agency, 2015, available at https://www.wlma.org.uk/uploads/EA_Guide_to_rights_and_responsibilities_of_riverside_ownership.pdfhttps://www.wlma.org.uk/uploads/EA_Guide_to_rights_and_responsibilities_of_riverside_ownership.pdf, accessed 15th November 2021

4 SUMMARY OF RAINFALL EVENTS

4.1 12th July 2021

At 10:04 on 11th July 2021 (and updated 08:54 on 12th July 2021), the Met Office issued a Yellow warning of Rain expected between 10:00 and 23:59 on 12th July 2021. The warning covered the East of England, London, South East England and South West England.

Rainfall data was obtained from the EA for review from gauges located in Hornsey (grid reference TQ30557 89795), Brent, (grid reference TQ20836 87013) and Wanstead (grid reference TQ 41544 88234).

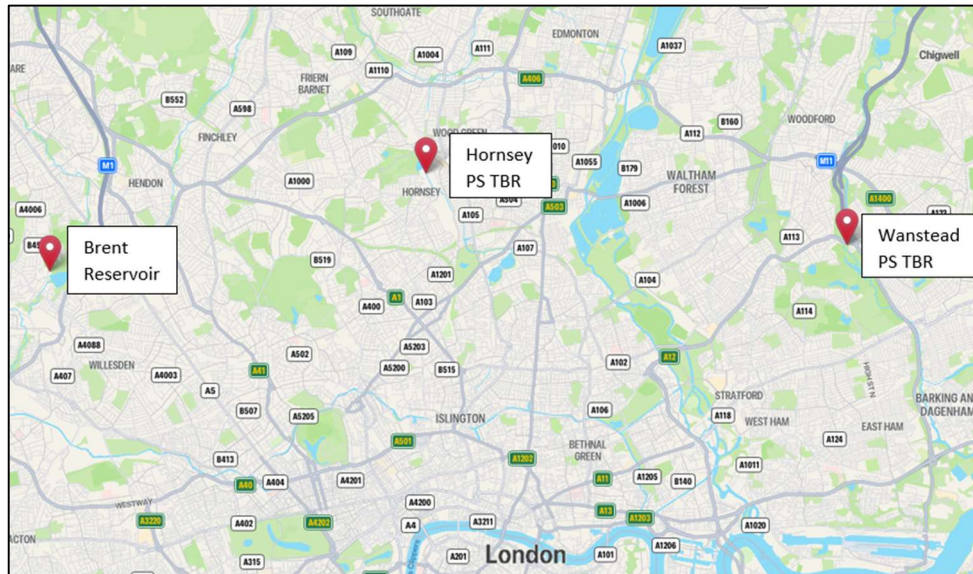


Figure 4-1 Locations of rainfall gauges

The most significant rain was recorded at Brent Reservoir between 17:00pm and 19:00pm, which recorded 7.6 mm of rainfall within this period. This rainfall is estimated as 1 in <2 year return event based on comparison of data obtained from the Flood Estimation Handbook. A total of 11.6mm was recorded for the whole day, with 10.2 mm of this falling over 3.5 hours. The rain gauge at Wanstead recorded 8mm over 24 hours, and the gauge and check gauge at Hornsey gave unreliable readings on the day due to apparatus blockages.

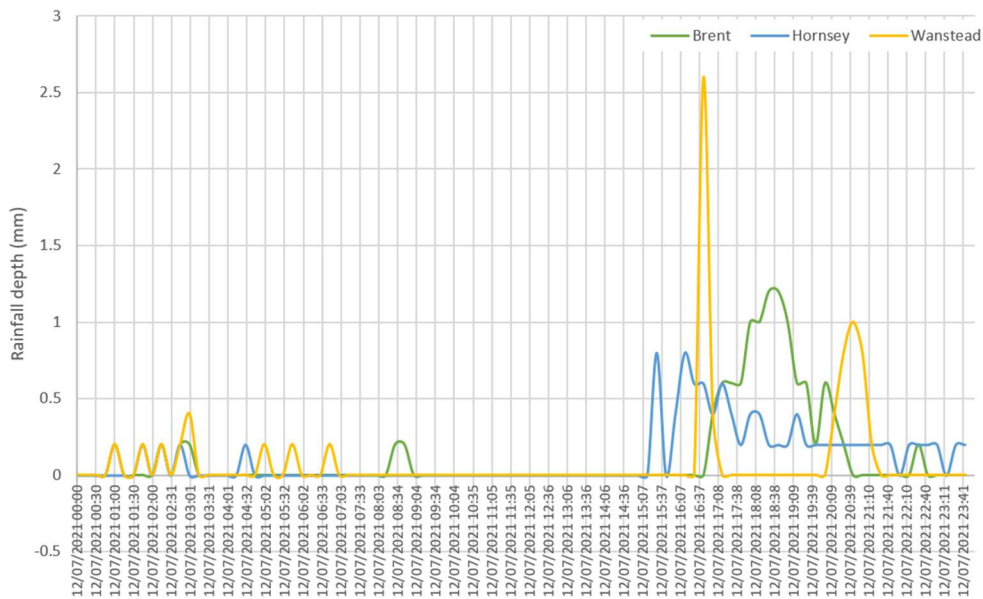


Figure 4-2 Rain gauge data, 12th July 2021

The relatively low rainfall recorded above is not consistent with the flood reports and anecdotal evidence provided from the area. The Hornsey gauges were blocked on retrieval of data and the recordings conflict with the Thames Water analysis of the event, which was presented at a recent workshop related to the floods⁴, and indicated that the district received rainfall return periods ranging from a <30 year to a <50 year event. The areas in which the gauges are located in Brent (Borough) and Wanstead (London Borough of Redbridge) did not experience the same intensity of rainfall experienced elsewhere, which concurs with the relatively low estimated rainfall return period derived from the rain gauge data for these locations.

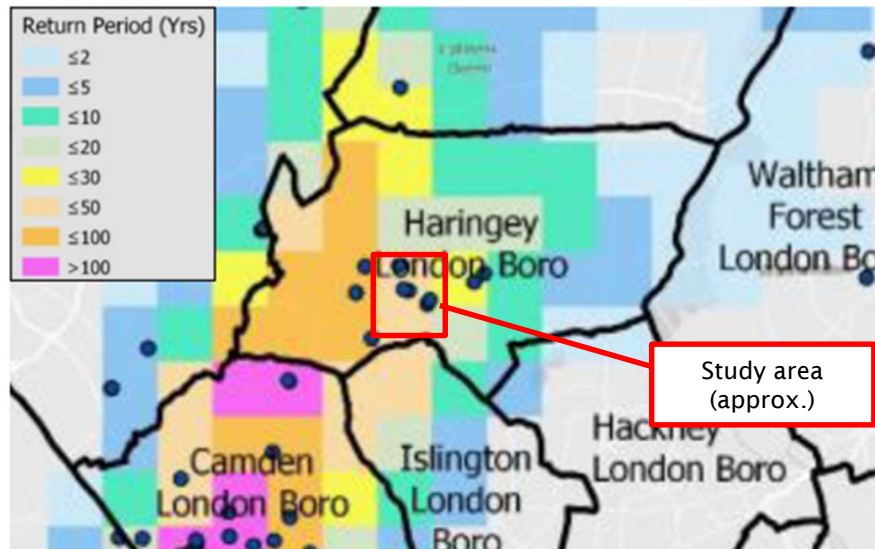


Figure 4-3 Rainfall Return Period and Report Flooding Incidents, 12th July 2021 (RaRa data using FEH99).

4.2 25th July 2021

The Met Office issued an Amber warning of Thunderstorm at 14:33 on 25 July 2021, expected between 14:33 and 19:00 on 25th July 2021, covering East of England, London and South East England.

The most significant rain being recorded at the selected gauges was between 14:15 and 15:45 at Wanstead. The rain gauge recorded 49 mm of rain within this time period, which was estimated to be a 1 in 70 year rainfall return event. A total of 54 mm was recorded for the whole day. The rain gauges at Brent Reservoir and Wanstead recorded 7.6mm and 22.8mm, respectively on this date.

⁴ Supporting Section 19 Investigations, Workshop, 28th September 2021. Thames Water: UK

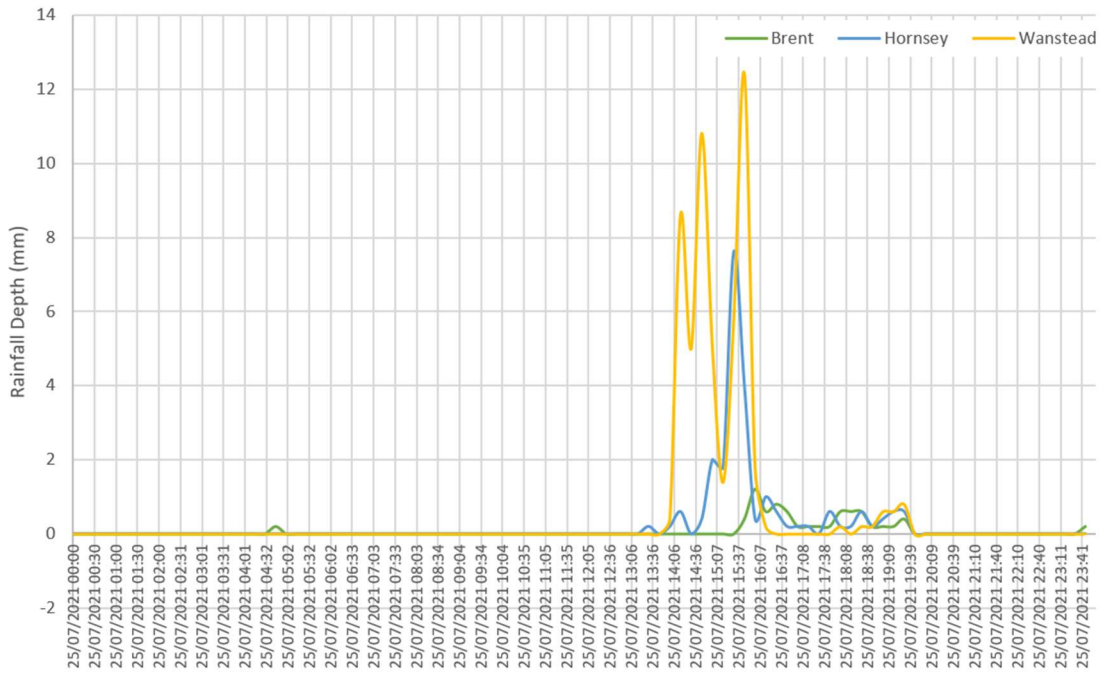


Figure 4-4 Rain gauge data, 25th July 2021

The Thames Water workshop presented and indicated that the district received rainfall return periods ranging from a <20 year to a <30 year event.

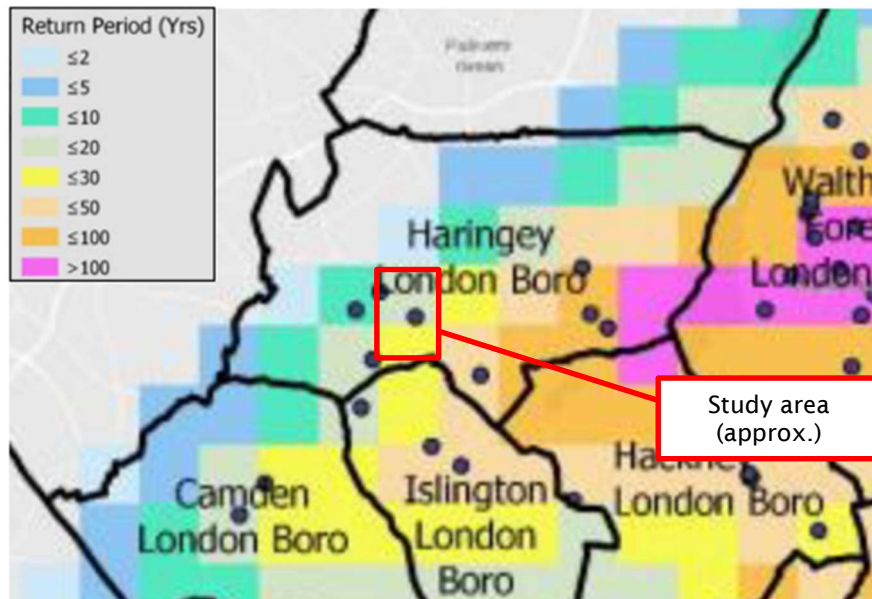


Figure 4-5 Rainfall Return Period and Report Flooding Incidents, 12th July 2021 (RARA data using FEH99).

5 ANALYSIS OF THE FLOOD EVENTS

5.1 Records of Incidents

Table 5-1 summarises the reports of flooding received by Haringey Council, and reactionary works that were undertaken by Haringey Council.

It is noted that the following have been screened out of further investigation;

- flood reports from single properties (not in proximity to other properties)
- locations where it is clear from the report that flooding was caused by internal drainage failure (for example a leaking roof).

Flood reports that have been screened out have been denoted by * beside the location name in the following table.

To support this investigation, Haringey Council has been provided with flood reports collated by London Fire Brigade (LFB) and Thames Water.

LFB received a total of 99 calls on 12th July 2021 and 58 calls on 25th July 2021 across the borough. Thames Water received 17 calls on 12th July 2021 and 13 calls on 25th July 2021 across the borough. LFB and Thames Water responses to individual flood locations are noted in the location specific sections of this report.

Table 5-1 Schedule of report flood incidents in Hornsey and Crouch End

Location	Date of Report	Details of Flooding	Response to Flooding	Critical Drainage Area
Priory Road/High Street area				
Outside 24 Boyton Road	12/07/2021	Flooding in highway	Visit made, no further actions required	Group4_055
Priory Park (rain gardens, entrance of bowling club and school)	12/07/2021	Flooding, manhole cover lifted, one resident fell in.	Actioned to replace cover to manhole.	
24/30 Rectory Gardens	12/07/2021	Major flooding in highway, water entered properties, damage to vehicles	No action taken as water had receded by time of visit.	
Mary's Church of England Primary School, Rectory Gardens	12/07/2021	No details recorded	School closure	
Priory Road jct Park Avenue South	25/07/2021	Minor flooding in junction	None recorded	

Location	Date of Report	Details of Flooding	Response to Flooding	Critical Drainage Area
Colorado Apartments	12/07/2021	Drains backing up into properties. Ankle deep flooding. Electrics tripped.	Residents placed in temporary accommodation	
Park Road (north)				
Park Road jct Park Avenue South	12/07/2021	Major flooding, blocked gullies	Marlborough attended to clear gullies. Road closure put in place.	Group4_055
Priory Road/Muswell Hill jct	12/07/2021	Flooding in highway	None recorded	
Park Road jct Cranley Gardens	12/07/2021	Lifted paving slabs, loud sewer noises	Marlborough attended and made safe.	
Park Road jct Etheldene Avenue	12/07/2021	Flooding in highway, lifted paving slabs.	Marlborough attended and made safe. Permanent fix required.	
	25/07/2021	Blocked drains	Cleared gullies	
308-310 Park Road	25/07/2021	Flooding to business	None recorded	
Park Road (south)				
Park Road jct Wolseley Road (Gransden House)	25/07/2021	Minor flooding	None recorded	Group4_055
Tivoli Road / View Crescent	25/07/2021	Minor flooding	None recorded	
Palace Road	25/07/2021	Flooded basement	None recorded	

Location	Date of Report	Details of Flooding	Response to Flooding	Critical Drainage Area
10 Middle Lane	25/07/2021	Flooded business	None recorded	
Maynard Arms, Park Road	25/07/2021	Cellar and beer garden flooded	None recorded	
Weston Park area				
Rathcoole Gardens	25/07/2021	Minor flooding	Clear gullies	Group4_056
Inderwick Road	25/07/2021	Flooded basement	None recorded	
98 Weston Park	25/07/2021	Flooded business	None recorded	
Other Locations				
Wood Vale	12/07/2021	Flooding of highway and numerous properties along road	None recorded	Group4_055
Fortismere School*	12/07/2021	Flooding of north wing hall and first floor	Year 10 students sent home. London Fire Brigade pumped water out of north wing.	Not applicable
Hillside Gardens	12/07/2021	Flooding in the highway, potential basements affected	Marlborough attended to make safe and supply sandbags.	Group4_055
Highgate Hill*	12/07/2021	Carriageway lifted, possible sink hole	Marlborough called and made safe	Not applicable
Rosebery Road by Parham Way*	12/07/2021	Flooding in highway	Inspection undertaken and no actions taken.	Not applicable

Location	Date of Report	Details of Flooding	Response to Flooding	Critical Drainage Area
Highgate Library*	13/07/2021	Roof leaking	None recorded	Not applicable
Edge of Muswell Hill Playing Fields*	12/07/2021	Flooding in highway and parks	None recorded	Not applicable
Campsbourne School*	13/07/2021	Leaking roof	Repairs to be undertaken by others	Not applicable
Stapleton Hall Road	25/07/2021	Flooding in a number of properties	Clear gullies	None

Figure 5-1 presents an overlay of flood reports from Haringey Council’s Reported Flooding Impacts Mapping and highlights the areas of interest where an increased number of flood incidents were reported. Note that screened out locations also appear in this figure.

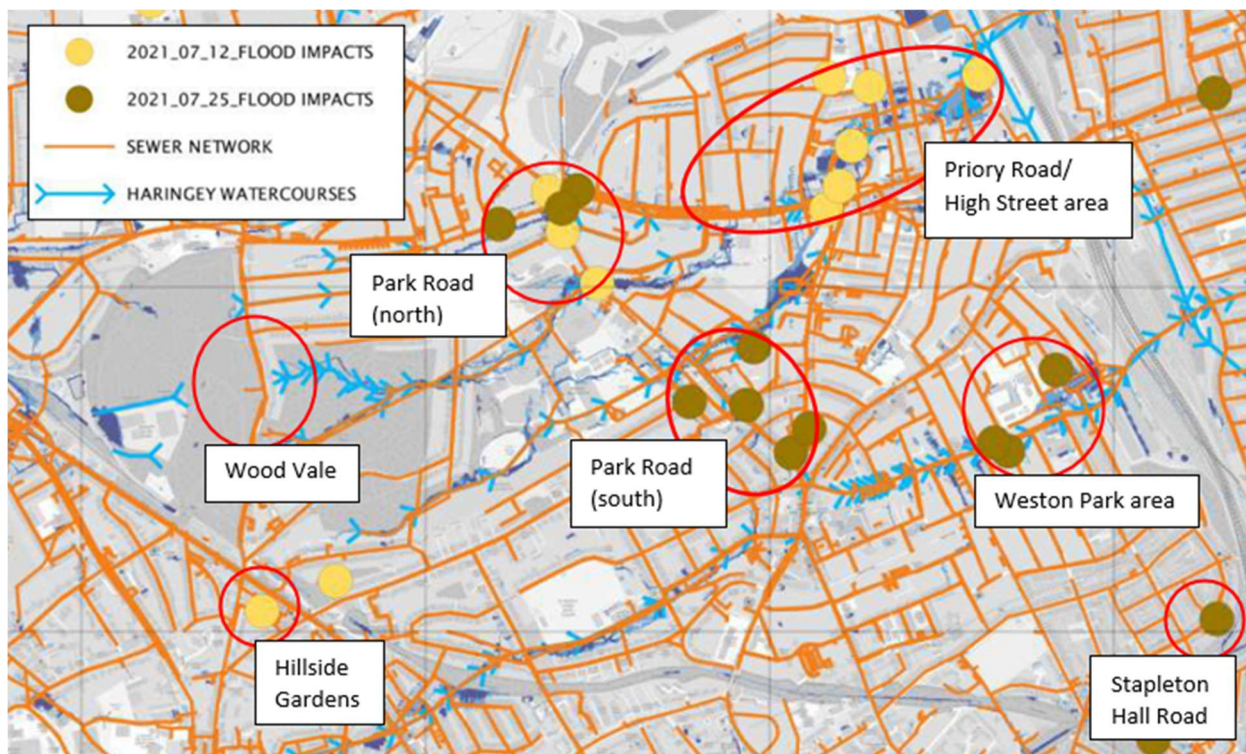
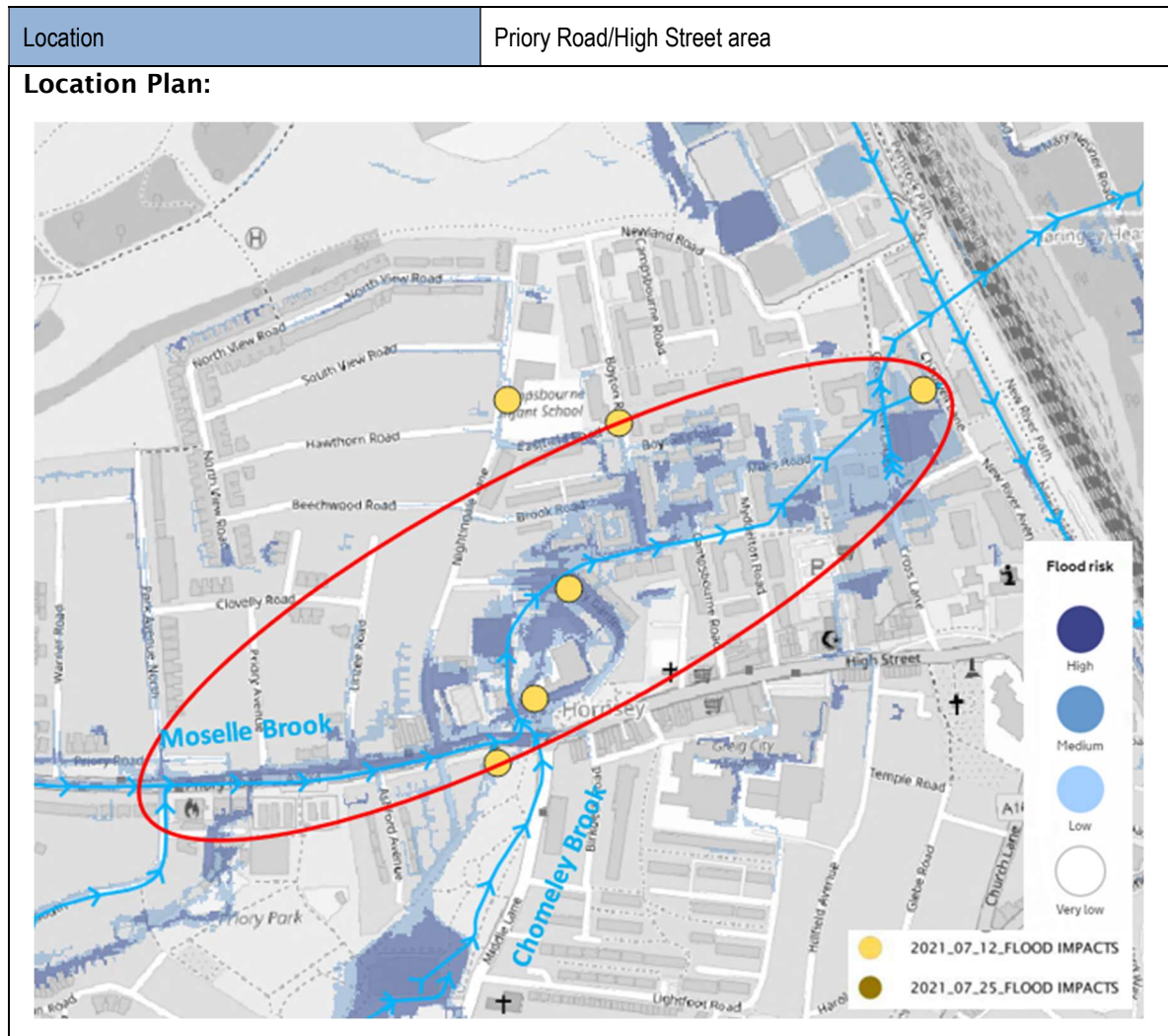


Figure 5-1 Recorded flood impacts and areas of interest in Hornsey and Crouch End

5.2 Priory Road/High Street area

Figure 5-2 Site Location



5.2.1 Summary of Impact

12th July 2021

LFB started to receive flood related emergency calls from 17:59pm. A total of 9 calls were received throughout the evening from properties between Park Avenue South and the High Street railway underpass, in addition to 4 received by Thames Water and 6 received by Haringey Council. Highways and properties were affected at Park Avenue South, Priory Road, Linzee Road, Nightingale Lane, Pembroke Road, Boyton Road, Rectory Gardens and Great Amwell Lane.

An emergency call was received from St Mary's Primary School north of Rectory Gardens; no detail is given of the flooding but the school was forced to close. Residents at Colorado Apartments experienced backing up of their building drainage, causing flooding of their property; residents were moved to temporary accommodation due to the severity of the flooding within their homes. Residents of Rectory Gardens reported to Haringey Council how the carriageway was totally submerged and caused damage to parking vehicles. In some instances, the floodwaters had encroached into properties.

The Councillor for Crouch End, Luke Cawley-Harrison, reported to Haringey Council via email correspondences that he suspected that the concrete tank beneath Priory Park had reached capacity due to the volume of water ponding within the park.

The following was noted from the site walkover carried out on 26th October 2021

- Businesses at the roundabout junction of High Street and Priory Road described how surface water was observed flowing quickly down Middle Lane toward the roundabout. The rain gardens in Rectory Gardens were observed to quickly fill with surface water, after which flows then bypassed them and continued across local paths and highways adjacent to the park.
- One business owner on Middle Lane noted that this is the first time flooding has been experienced.

25th July 2021

There were no reports of flooding received on 25th July 2021.

5.2.2 [Site Context](#)

The topography in this area forms a localised valley around the junction of Priory Road, High Road and Middle Lane, with land falling to this point (28mAOD) from the higher reaches of the three roads (36mAOD to 42mAOD). The valley runs north-east through the Rectory Gardens and Pembroke Road toward the New River (25mAOD). The surface water flood map in Figure 5-2 indicates that flow routes from Priory Park, Priory Road and Park Avenue South converge close to the roundabout junction, from where surface water flows broadly follow the route of the localised valley.

5.2.3 [Existing Drainage and Watercourses](#)

Asset records indicate that the area is served by separate networks of foul water and surface water sewers. A foul culvert up to 1219mm diameter runs under High Street. Surface water sewers range from 229mm to 625mm throughout the feeder streets.

The DWMP model output indicates that most sewers along Priory Road, High Street and Middle Lane, as well as the flood affected streets north of High Street, are at risk of surcharging during a 1 in 2 year rainfall event.

A culverted section of the Moselle Brook flows east along Priory Road, converging with the Chomeley Brook at the roundabout junction before following the localised valley to the north-east, passing under the railway line and into Wood Green. The culvert diameter ranges up to 1828mm. Asset records indicate that local surface water sewers connect into the culvert.

5.2.4 [Flood History](#)

Appendix D, Figure 5 of the Haringey SWMP does not record any previous flood events in this area. Appendix D, Figure 9 of the SWMP records up to 5 instances of flooding in the N8 0 postcode area, as of 2010.

5.2.5 [Previous flood studies](#)

Priory Road/High Street falls within CDA Group 4_055 ("North of Hornsey High Street and west of the mainline railway"). The CDA flood mapping shows overland flows following the path of the Moselle Brook catchment, with the embankment of the railway forming a restriction to overland flows. The crossing of the railway embankment is therefore considered to form a 'pinch-point' for surface water flows which reach this location. CDA mapping indicates estimated ponding of up to 0.5m depth west of the railway embankment.

5.2.6 [Potential Flood Mechanisms](#)

The site context and anecdotal evidence suggests that the primary cause of the flooding was the extent of rainfall which exceeded the capacity of the drainage network in this area.

The DWMP hydraulic model outputs suggests that the limited receiving capacity of the public sewer system and Moselle Brook culvert may have increased the risk of overland flows locally.

The intensity of the rainfall meant that it is likely that surface water was unable to enter the sewer network fast enough and accumulated in the topographical low points around the roundabout junction of Priory Road and High Street, from where water would eventually breach kerb levels and follow the local valley topography, affecting roads, the school and residential properties along this route.

Colorado Apartments on Great Amwell Lane is noted from review of topography of the catchment and from site observations to be located in a localised low spot.

The current condition of Moselle Brook culvert is unknown. Any build up of silt within the culvert would result in a reduced capacity within the culvert and potentially cause surcharging within the surface waters sewers discharging to the culvert.

5.2.7 [Responses to Flooding](#)

Haringey Council:

- Actioned remedial works to cover the manhole in Priory Park to make it safe. Visits were also made to Boyton Road and Rectory Gardens on 12th July to inspect the flooding. The floodwaters had receded by the time the visits were made.
- Emergency Planning team visited residents in Hornsey and Crouch End on 13th and 16th July to collate reports on the impact of the flooding. Visits focused on High Street, Rathcoole Gardens, Rectory Gardens, Great Amwell Lane, Abbeville Road, Park Road, Nightingale Lane, Campsbourne Road and Brooke Road. A leaflet drop was also undertaken to provide residents with information on flood risk and potential mitigation.
- Arranged bulk collections of water damaged household items from the area on 20th July and 11th August.
- Provided a schedule of all gully cleaning works that have taken place in Hornsey and Crouch End between 12th July and 30th September 2021. A total of 1353 'jobs' were raised for gully clearance between these dates. Haringey Council confirmed via email that gully cleaning occurs on a cyclical basis, with additional reactive maintenance where required. The proposed cycle was to clean all the gullies in the borough once every two years and clean all gullies in Critical Drainage Areas every year. The Council has introduced a new gully cleaning programme started in first week of October and the aim is to have cleaned all the gullies in the borough by Summer 2022.
- Is progressing a flood alleviation scheme in the upstream catchment at Priory Park, with options including provision of a stormwater storage basin and opening up of a culverted watercourse within the park. This scheme is currently at outline design stage and will have a beneficial impact on the downstream area during periods of significant rainfall.
- Is progressing a SuDS scheme in the upstream catchment, which will include the introduction of SuDS features at Muswell Hill junction, Priory Road, Park Road, Etheldene Avenue and Farrer Mews. This scheme is currently at design stage and is likely to have a beneficial impact on the Priory Road and High Street area during periods of significant rainfall.
- Thames Water contacted by Haringey Council regarding the construction details of the underground storage tank at Priory Park to establish further details on the tank.

Transport for London

- No TfL assets were affected in this location.

Thames Water

- Residents raised concern to Haringey Council that localised flooding in Hornsey is becoming more frequent, with questions raised as to whether the underground flood storage tank in Priory Park is still operating effectively. Haringey Council submitted an enquiry to Thames Water on 15th September about the current operational status of the tank, including the cleaning regime for the tank. Works were carried out on the surface water sewers around the storage tank between the 29th June to 1st July 2021. The storage tank was also surveyed. The survey works undertaken are indicate that the storage tank had no evident operational issues and would have been in operation on the dates considered as part of this study.
- No information on response or remedial works undertaken by Thames Water was provided by Thames Water for this location at the time of writing.

London Fire Brigade

- LFB attended the property where emergency calls were received. No further details are recorded regarding remedial works.

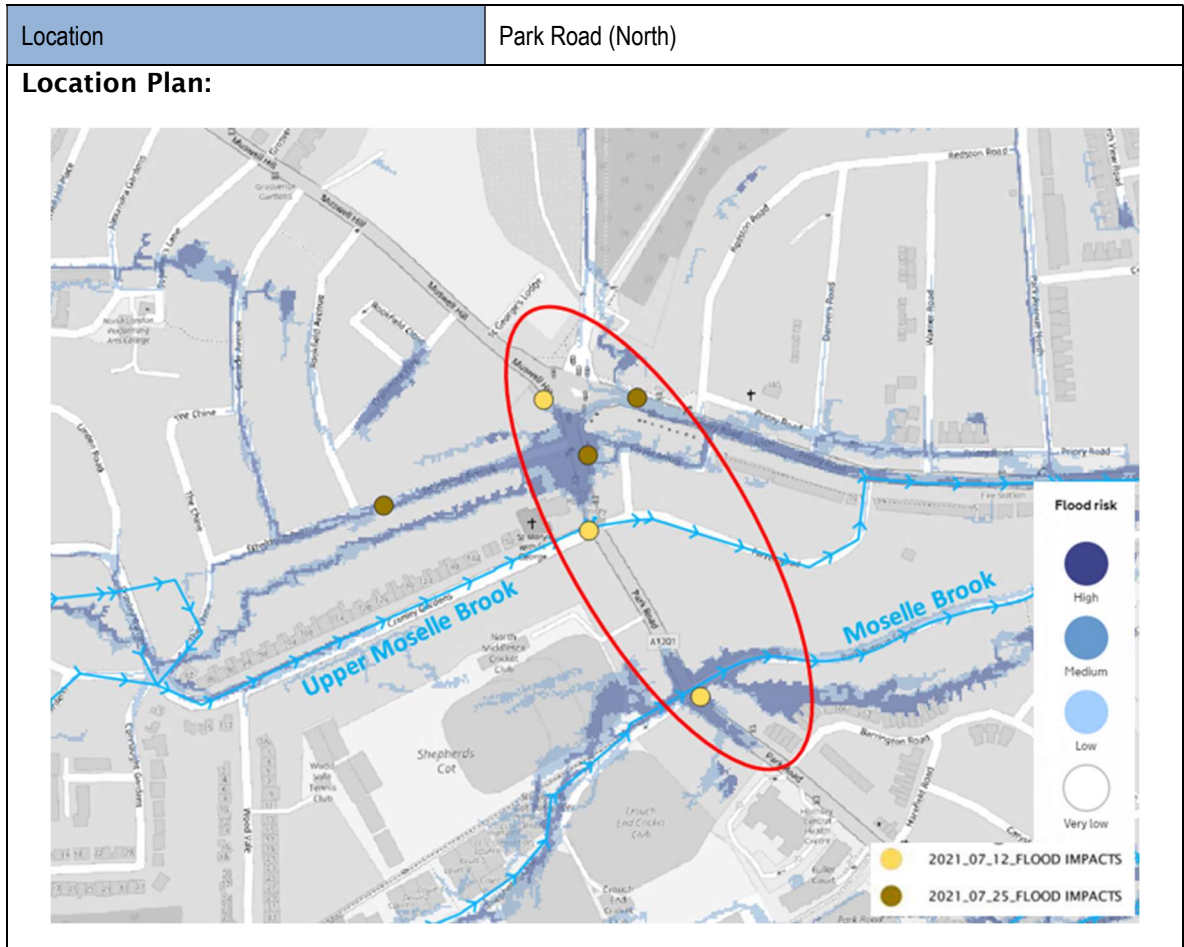
5.2.8 [Next steps](#)

The EA surface water flood maps indicate that the Priory Road/High Street area is located in an area prone to surface water flooding. The following measures may be considered to reduce the risk and impact of flooding.

- Affected property owners to consider installation of demountable flood gates, flood doors and air vent covers. Properties should be surveyed by qualified professionals to ensure that all openings have been identified and defences properly specified.
- A review of the operational status and maintenance regime of the existing concrete tank is understood to be ongoing by Thames Water. Steps should be taken to optimise the functioning of the tank based upon the findings of the review.
- The SuDS feature at Rectory Gardens was observed to come into effect and be fully utilised. Consideration should be given by Haringey Council to implementation of further SuDS measures in the contributing catchment to reduce the volume and rate of runoff reaching the area at risk and reduce the load on the drainage infrastructure at this location.
- Thames Water to consider a review of the local sewer network to identify locations where surface water sewers have insufficient capacity and work with other RMAs to identify potential mitigation as appropriate.
- Thames Water to provide Haringey with details of the tank under Priory Park.
- EA to confirm operational status of Moselle Brook culvert from the reported incidents of flooding to the railway embankment (through survey or other means as appropriate) to demonstrate that the culvert is operating at intended capacity.

5.3 Park Road (North)

Figure 5-3 Site Location



5.3.1 Summary of Impact

12th July 2021

Reports of flooding were received from businesses in the northern extent of Park Road, where major flooding of the highway was reported as well as damage to footway paving at Etheldene Avenue and Cranley Gardens. Photographs and videos circulated on social media indicate the spread and depth of flooding along Park Road outside units 308-310 Park Road and the junction with Etheldene Avenue, as well as locals trying to unblock drains in the carriageways. This is shown below.



Figure 5-4 Flooding on Park Road and Etheldene Avenue, 12th July 2021

As the flood waters receded it became apparent that paving slabs and manhole covers had been lifted as shown below. Haringey Council instructed Marlborough Highways to attend the area to make safe the damaged footways and manholes.



Figure 5-5 Pavement damage, Cranley Gardens and Etheldene Avenue

Councillor Cawley-Harrison confirmed to Haringey Council via email that he made visits to flood affected residents following the 12th July flooding, during which it was noted that gullies outside units 308-310 Park Road remained blocked. Figure 5-6 below shows one of the gullies. Mr Carley-Harrison reported a further 50 blocked gullies to Haringey Council from Park Road along adjacent roads and junctions.



Figure 5-6 Failed attempt to unblock gully outside 308-310 Park Road

25th July 2021

Flooding was experienced in the area on 25th July 2021, which was noted to be less severe than experienced on the 12th July. Business at 308-310 Park Road was affected by internal flooding with flood waters reported to have come from the highway.

Businesses reported on social media that the gullies here had not been cleared after the 12th July flooding⁵⁶. Minor flooding was reported the junction of Park Road and Muswell Hill. The report at Etheldene Avenue cited flooding within the street around blocked gullies.

5.3.2 Site Context

The northern extend of Park Road, prior to its junction with Muswell Hill and Priory Road, lies in a topographical low spot at circa 40mAOD. The adjacent streets, including Etheldene Avenue, Cranley Gardens, Farrer Road, Park Avenue South and Shepherd's Hill, all fall toward Park Road south of the junction. The carriageway rises toward Muswell Hill and Priory Road junction. Through the low spot, a total of 6 gullies are present over a 55m length of Park Road.

5.3.3 Existing Drainage and Watercourses

Asset records indicate a 381mm diameter surface water sewer in Park Road. A 1066mm diameter surface water sewer runs under Etheldene Avenue, crossing the Park Road/Muswell Hill junction and continuing downhill along Priory Road.

The DWMP model output indicates that most sewers along Etheldene Avenue, Park Avenue South and Cranley Gardens, are at risk of surcharging during a 1 in 2 year rainfall event. There is no indication of surcharging occurring during a 1 in 2 year event along the northern section of Park Road. The DWMP model does not indicate how large a rainfall event would cause surcharging or flooding along the northern section of Park Road.

A culverted section of the Moselle Brook passes through Cranley Gardens, crossing Park Road and continuing along Farrer Road, eventually reaching Priory Road from where it continues to the east.

5.3.4 Flood History

The Haringey SWMP does not record any instances of flooding at Park Road specifically. Appendix D, Figure 9 of the SWMP records up to 50 instances of flooding in the N8 8 postcode area, as of 2010.

5.3.5 Previous flood studies

The northern section of Park Road falls within CDA Group 4_055 ("North of Hornsey High Street and west of the mainline railway"). The CDA analysis shows potential flooding of up to 0.5m depth around the junction of Etheldene Avenue and Park Road.

5.3.6 Potential Flood Mechanisms

The photographic evidence, local topography and available flood reports suggests that the primary cause of the flooding was excessive rainfall which exceeded the capacity drainage network in this area in combination with the lack of operational gully pots. Further investigation would be required to identify whether the capacity issues were primarily due to the receiving capacity of the highway drains / gully pots, the public sewer, or a combination.

- **Blocked Gullies**

One of the business owners at 308-310 Park Lane has repeatedly asked for drains on Park Road to be cleared. During a visit by Councillor Cawley-Harrison following the 12th July floods, it was noted that the gullies outside the premises had still not been cleared despite the severity of the flooding observed. It was noted by the business owner and Councillor Cawley-Harrison that off the 6 gullies serving this low point, 5 were blocked during the 12th July event, and only 1 had been cleared prior to the 25th July event. Such blockages would have further reduced the capacity for surface water to enter reach the public sewer.

⁵ Instagram, 2021 https://www.instagram.com/p/CRrv91M6Fd/?utm_medium=twitter

⁶ Twitter, 2021 <https://twitter.com/WyckoffSmith/status/1419351919265472514>

- **Threshold Heights**

During the site walkover it was noted that a number of properties in the affected area had flush front door thresholds. Whilst important for accessibility, this arrangement would allow for surface water to quickly enter properties once the footway had been submerged. It was noted that since the 12th July flooding, the business at 308-310 Park Road have installed a flood gate to their shop entrance.

- **Sewer flooding**

Photographs provided at Cranley Gardens and Etheldene Avenue indicate chamber covers that have been lifted during a flood event. It has not been confirmed whether these covers relate to the storm sewer.

5.3.7 [Responses to Flooding](#)

Haringey Council:

- Instructed Marlborough Highways to unblock gullies along the road. It is not stated in the flood report schedules how many gullies were cleaned, but during a visit by Councillor Cawley-Harrison following the 12th July floods, gullies were still blocked.
- Emergency Planning team visited residents in Hornsey and Crouch End on 13th and 16th July to speak about the impact of the flooding. High Street, Rathcoole Gardens, Rectory Gardens, Great Amwell Lane, Abbeville Road, Park Road, Campbourne Road and Brooke Road were visited. A leaflet drop was also undertaken to provide residents with information on help during future floods.
- Arranged bulk collections of water damage household items to the area on 20th July and 11th August.
- Provided a schedule of all gully cleaning works that have taken place in Hornsey and Crouch End between 12th July and 30th September 2021. A total of 1353 jobs were raised for gully clearance between these dates. Haringey Council confirmed via email that gully cleaning occurs on a cyclical basis, with reactive maintenance where required. The proposed cycle was to clean all the gullies in the borough once every two years and clean all gullies in Critical Drainage Areas every year. The Council has now increased its gully cleaning capacity to 2 No. cleaning machines. Its new cleaning programme started in first week of October and the aim is to have cleaned all the gullies in the borough by Summer 2022.
- Is progressing a SuDS scheme in the upstream catchment, which will include the introduction of SuDS features at Muswell Hill junction, Priory Road, Park Road, Etheldene Avenue and Farrer Mews. This scheme is currently at design stage and is likely to have a beneficial impact on Park Road during periods of significant rainfall.

Transport for London

- No TfL assets were affected in this location.

Thames Water

- No information on response or remedial works undertaken by Thames Water was provided by Thames Water for this location at the time of writing.

London Fire Brigade

- There are no records of LFB being contacted in this location.

5.3.8 [Next steps](#)

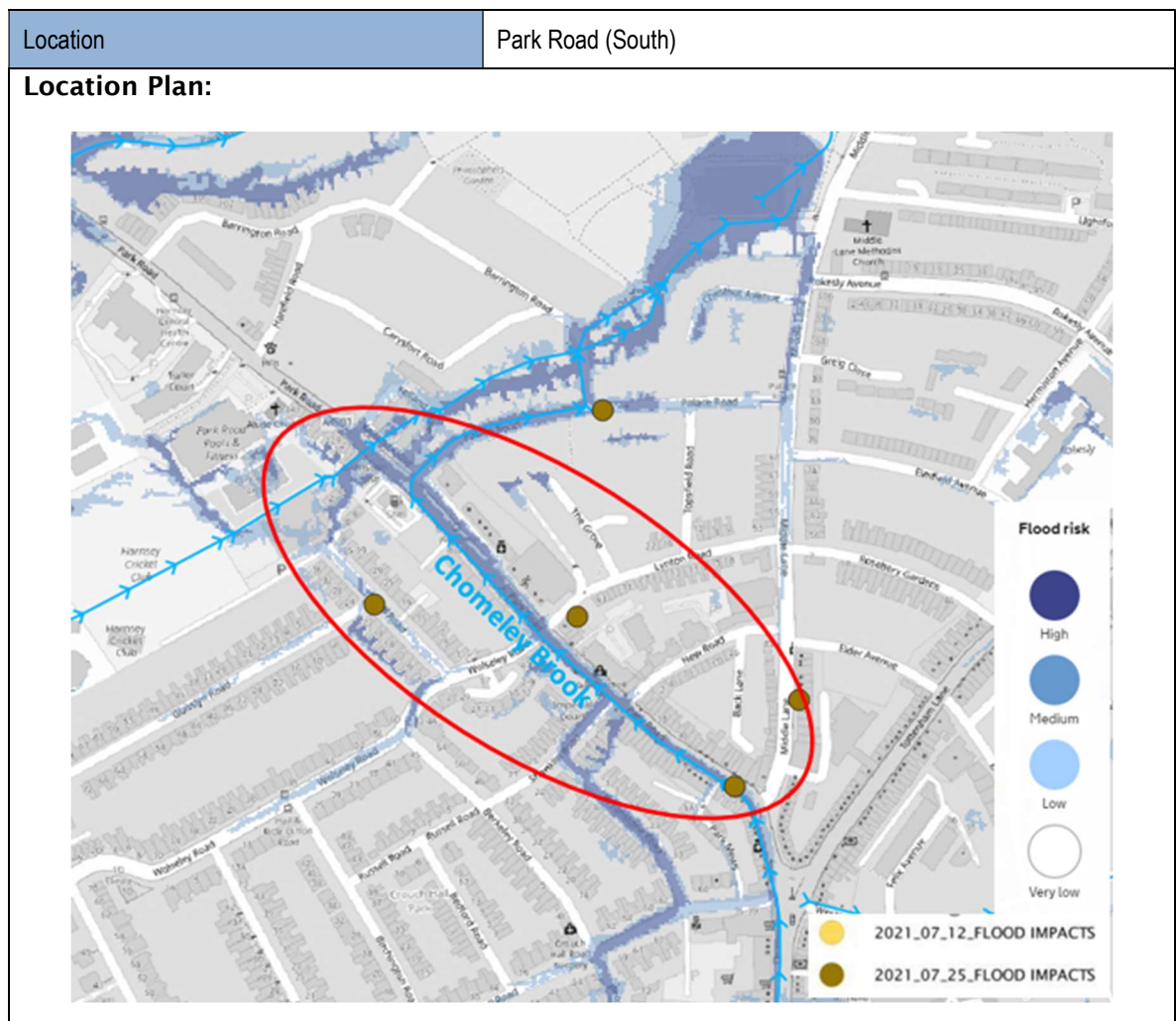
The EA surface water flood maps indicate that Park Road (north) is located in an area prone to surface water flooding. The following measures may be considered to reduce the risk and impact of flooding.

- Haringey Council to consider construction of additional road gullies to increase inlet capacity. Discussions with Thames Water would be required to confirm that there is sufficient capacity within the receiving storm sewer network to facilitate additional inlet connections. Additional connections to the sewer would require the consent of Thames Water.
- Haringey Council to consider implementation of SuDS measures in the contributing catchment to reduce the volume and rate of runoff reaching the area at risk and reduce the load on the drainage infrastructure at this location.

- Affected property owners to consider installation of demountable flood gates, flood doors and air vent covers. Properties should be surveyed by qualified professionals to ensure that all openings have been identified and defences properly specified.
- Thames Water to consider inspection of the large surface water sewer passing through the Park Road / Muswell Hill junction, as well as the Moselle Brook culverts, to ensure they are at full operating capacity.
- Thames Water to consider a review of the local sewer network to identify locations where surface water sewers have insufficient capacity and work with other RMA's to identify potential mitigation as appropriate.

5.4 Park Road (South)

Figure 5-7 Site Location



5.4.1 Summary of Impact

12th July 2021

A total of 3 flooding-related emergency calls were recorded by LFB between 7pm and 9pm on 21st July, from southern extent of Park Road (Palace Road and Tivoli Road). LFB attended the calls but no further details on damage or remedial measures are recorded. Further details have been made available courtesy of email correspondences between Haringey Council and Councillor Cawley-Harrison, which contains observations of Councillor Cawley-Harrison's visit to the area following the floods. Details are also taken from minutes of a meeting between Haringey Council and the Glasslyn, Montenotte and Tivoli Residents Association (GMTRA).

Based on conversations held during Councillor Cawley-Harrison's visits, property owners (residents located along Palace Road and businesses between the Princess Alexandra and Maynard Arms pubs), experienced basement flooding which appeared to originate from underground sources rather than flows entering the basement from the surrounding surface catchment. The basement flooding in the Maynard Arms rose to circa 300mm depth.

Residents of Gransden House (115-119 Park Road), View Crescent and Tivoli Road described how surface water appeared to flood their properties from the road. The minutes of the GMTRA meeting indicate that most flooding of properties on View Crescent was limited to flooding of under floor spaces as a result of surface water entering the property via air bricks. Three garages and two conservatories were flooded on View Crescent, with one resident reporting up to 300mm depth of water. At least 36 properties on Tivoli Road and Glasslyn Road reported experienced flooding, 25 of which experienced basement or cellar flooding. Properties between 1 and 10 Glasslyn Road described the floodwaters as coming through the walls of their basements and cellars. Three residents also described how flooding within their property had occurred as a result of their drains backing up into their property. Other properties indicated that flooding had occurred in their properties as a result of build-up or runoff of surface water from their gardens, the roads and uphill properties.

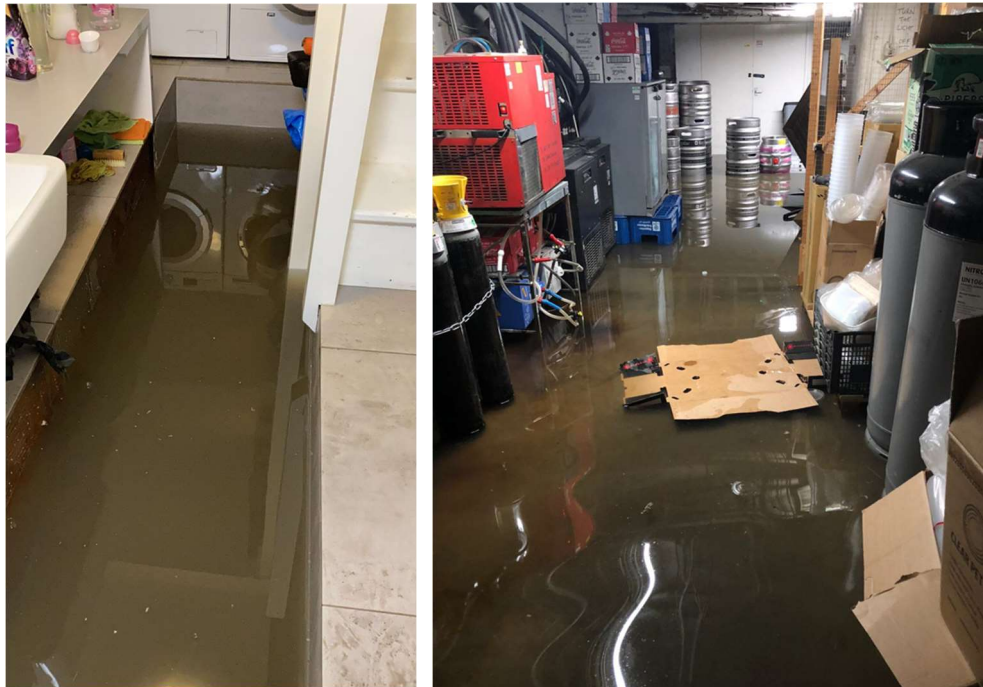


Figure 5-8 Flooding of property on Tivoli Road and Basement flooding in business, 70 Park Road, 12th July 2021



Figure 5-9 Flooding of property in Glasslyn, Montenotte and Tivoli Road area

25th July 2021

Further flooding was experienced in this area on 25th July but to a lesser extent in comparison to 12th July. The Maynard Arms observed up to 75mm of basement flooding, and minor flooding was experienced in Gransden House. Residents of View Crescent, Tivoli Road and Glasslyn Road experienced further flooding but it was noted that the highway flooding did not reach the same depths as on 12th of July, and properties on Glasslyn and Tivoli Road either experienced less flooding or were not affected.

Haringey have noted from a meeting with GMTRA, that “Many of the surface water problems were caused by rainwater flowing down Shepherds Hill into Montenotte Road and from Wolseley Rd into Tivoli Road”.

5.4.2 [Site Context](#)

The southern section of Park Road forms a valley around the culverted tributary of the Moselle Brook. Park Road falls from the Hornsey Central Neighbourhood Health Centre in the north (40mAOD) to Gransden House and Princess Alexandra pub (37mAOD) before rising again toward the Crouch End clock tower (44mAOD). View Crescent and Tivoli Road are located within this low topographical area, immediately south of Gransden House. Roads from the south leading onto Park Road, including Glasslyn Road and Wolseley Road, are steep, falling from 69mAOD to 40mAOD over 345m (an average gradient of 1 in 12). This is reflected in the surface water flood maps, which shows areas of generally lower flood risk on the surrounding steep residential roads, and higher flood risk along Park Road and the topographical valley where overland flows would collect. The junction of Tivoli Road and Glasslyn Road also forms a localised low spot where floodwaters were observed by residents to collect.

5.4.3 [Existing Drainage and Watercourses](#)

Asset records indicate that the area is served by separate networks of foul water and surface water sewers. Surface water sewers range from 229mm to 750mm throughout the area.

The DWMP model indicates that most sewers along Park Road, are at risk of surcharging during a 1 in 2 year rainfall event. Sewers serving Tivoli Road, View Crescent, Palace Road and the northernmost extents of Glasslyn Road and Wolesley Roads are also indicated to be at risk of surcharging in a 1 in 2 year event.

A culverted tributary of the Moselle Brook flows from the west through Hornsey Cricket Club, crossing Park Road. The culvert passes through the rear gardens of Palace Road and Carysfort Road before entering Priory Park. The tributary and a culverted section of the Cholmeley Brook (which is a tributary of the Moselle Brook)

converge at Priory Park, the culverted Cholmeley Brook having flowed from the south along Park Road and Palace Road. Asset records indicate that culverted tributary of the Moselle Brook is 450mm diameter increasing to 838x559mm before joining with the Cholmeley Brook culvert (1066mm diameter) and flowing onwards.

5.4.4 [Flood History](#)

The Haringey SWMP does not record any instances of flooding at Park Road (south) specifically. Appendix D, Figure 9 of the SWMP records up to 50 instances of flooding in the N8 8 postcode area, as of 2010.

5.4.5 [Previous flood studies](#)

The southern section of Park Road falls within CDA Group 4_055 (“North of Hornsey High Street and west of the mainline railway”). The CDA analysis shows overland flows following the path of the Moselle Brook catchment, passing through Palace and Carysfort Roads and into Priory Park, with potential flood depths estimated to be up to 0.5m. Flood depths on Park Road are estimated to be up to 0.25m.

5.4.6 [Potential Flood Mechanisms](#)

The photographic evidence, local topography and available flood reports suggests that the primary cause of the flooding was excessive rainfall which exceeded the capacity drainage network in this area. The intensity of the rainfall meant that surface water was unable to enter the sewer network fast enough and accumulated in the topographical low points, causing flooding of the highway. Given the intensity of rainfall for the two rainfall events, it is likely that the rate of runoff may have exceeded the receiving capacity of gully pots on steeper streets such as Glasslyn and Wollesley Roads, resulting in more runoff reaching lower areas at Tivoli Road, View Crescent and Park Road.

Any surcharging or flooding of the culverted sections of the Cholmeley Brook and tributary of the Moselle Brook would have acted to increased flooding on the carriageways and footways.

The DWMP indicates that surcharging in most of the area occurs during a 1 in 2 year rainfall event, and residents of Tivoli Road experienced drains backing up and causing flooding in their homes, which suggests that it is the sewer capacity which was exceeded.

Further investigation would be required to identify whether the capacity issues were primarily due to the receiving capacity of the highway drains, the public sewer, the culverts, or a combination.

Other items were identified that may have affected the depth and magnitude of the flooding, including:

- **Blocked Gullies**

During the GMTRA meeting, concerns were raised about the operating status of the gully pots at the junction of Tivoli and Glasslyn Roads as well as the steeper connecting roads. The concern is reiterated by Councillor Cawley-Harrison who reported 50 blocked gullies to Haringey Council following his community visit. During a site walkover on 26th October 2021, gully pots were inspected and found to be clear.

- **Groundwater Flooding**

Basement / cellar flooding was reported in the area, with most occurrences located along Glasslyn and Tivoli Roads. Residents queried whether this was from groundwater or flooding from the culverted watercourses. There are no culverted watercourses within Glasslyn Road and Tivoli Road. The BGS online mapping tool shows that the underlying geology of the area is dominated by London Clay; this geological layer is largely impermeable and devoid of groundwater.

A possible mechanism of flooding of basements and cellars may be the result of shallow / perched ground water with saturated upper layers of soil arising from the heavy rainfall. Further investigation of the local soil makeup in this area would be required to confirm whether this is a viable flood mechanism.

5.4.7 [Responses to Flooding](#)

Haringey Council:

- Emergency Planning team visited residents in Hornsey and Crouch End on 13th and 16th July to speak about the impact of the flooding. High Street, Rathcoole Gardens, Rectory Gardens, Great

Amwell Lane, Abbeville Road, Park Road, Campbourne Road and Brooke Road were visited. A leaflet drop was also undertaken to provide residents with information on help during future floods.

- Arranged bulk collections of water damage household items to the area on 20th July and 11th August
- For CDA Group 4_055 the SWMP identified options for providing surface water management within the upstream catchment (Queen's Wood and Hornsey Cricket Club). The Queen's Wood natural flood management project has been developed to design stage⁷ and is likely to have a beneficial impact on Wood Vale during periods of significant rainfall.
- Provided a schedule of all gully cleaning works that have taken place in Hornsey and Crouch End between 12th July and 30th September 2021. A total of 1353 jobs were raised for gully clearance between these dates. Haringey Council confirmed via email that gully cleaning occurs on a cyclical basis, with reactive maintenance where required. The proposed cycle was to clean all the gullies in the borough once every two years and clean all gullies in Critical Drainage Areas every year. The Council has now increased its gully cleaning capacity to 2 No. cleaning machines. Its new cleaning programme started in first week of October and the aim is to have cleaned all the gullies in the borough by Summer 2022.
- Is progressing a SuDS scheme in the upstream catchment, which will include the introduction of SuDS features at Muswell Hill junction, Priory Road, Park Road, Etheldene Avenue and Farrer Mews. This scheme is currently at design stage and is likely to have a beneficial impact on Park Road during periods of significant rainfall.

Transport for London

- No TfL assets were affected in this location.

Thames Water

- The GMTRA minutes note that Thames Water attended Glasslyn Road to inspect the sewers following the flooding. It is noted in the GMTRA minutes that no blockages were found.
- No other information on response or remedial works undertaken by Thames Water was provided by Thames Water for this location at the time of writing.

London Fire Brigade

- LFB attended the property where emergency calls were received. No further details are recorded regarding remedial works.

5.4.8 [Next steps](#)

The EA surface water flood maps indicate that Park Road (south) is located in an area prone to surface water flooding. The following measures may be considered to further reduce the risk and impact of flooding.

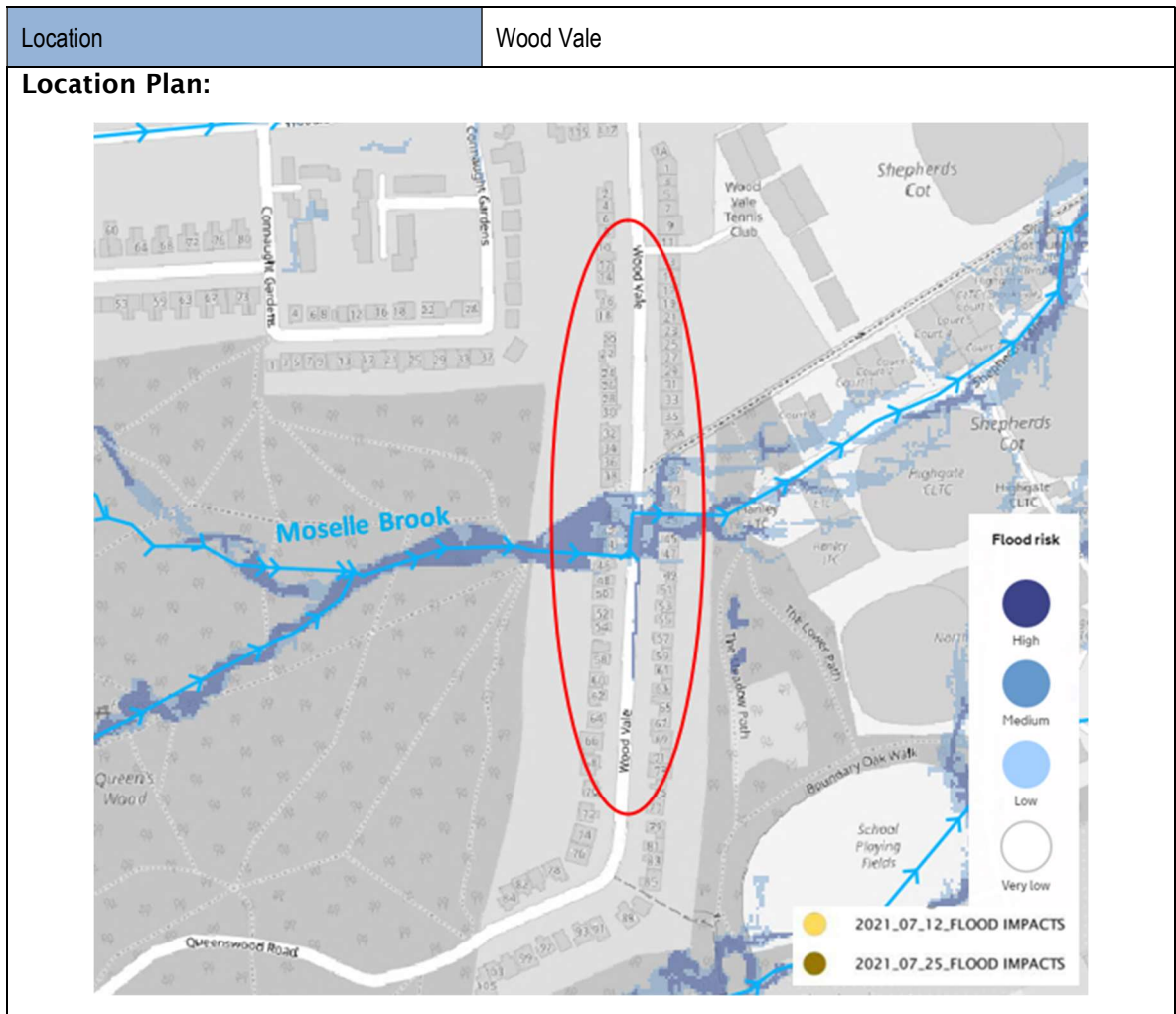
- Haringey Council to consider gully and grating selection along the steeper sections of roads to increase the inlet capacity of the drainage system to ensure that flows are not bypassing gully grating openings on steeper sections of highway during intense rainfall.
- Haringey Council to consider implementation of SuDS measures in the upslope catchment to reduce the amount of runoff reaching the location of flood risk.
- Affected property owners to consider installation of air vent covers and basement waterproofing. Properties should be surveyed by qualified professionals to ensure that all openings have been identified and defences properly specified.
- Haringey Council to consider inspection of culverted Cholmeley Brook and tributary to ensure they are at maximum operating capacity. Where culvert is riparian responsibility and outcomes of survey indicate that the mechanism of flood is deficiency in the operational capacity of the culvert, Haringey to notify the respective riparian owners of their responsibilities and any subsequent actions to be undertaken.

Thames Water to consider a review of the local sewer network to identify locations where surface water sewers have insufficient capacity and work with other RMAs to identify potential mitigation as appropriate.

⁷ https://www.haringey.gov.uk/sites/haringeygovuk/files/queens_wood_letter_to_residents_220221f.pdf

5.5 Wood Vale

Figure 5-10 Site Location



5.5.1 Summary of Impact

12th July 2021

Flooding at Wood Vale was reported to Haringey Council via email correspondence from a resident on 13th July and was not recorded in the flood report schedule or mapping in Figure 5-10. The resident described how the main drain at the foot of the Queen's Wood could not take the water, resulting in at least 10 houses experiencing flooding (it was not confirmed whether this was internal or external flooding). The resident reported that the flood wall in the Queen's Wood was breached causing surface water to flow into residents' gardens. The resident reported that the gully pots further uphill on Wood Vale were blocked. Associated photographs of Wood Vale on 12th July are presented in Figure 5-11 below.



Figure 5-11 Flooding of highway and property along Wood Vale, 12th July 2021

25th July 2021

No information was received of flooding in Wood Vale for 25th July.

5.5.2 [Site Context](#)

Wood Vale runs north to south, with high points on the northern and southern extents of the road (60-65mAOD). The road falls steeply to its central section which lies at an approximate elevation of 52mAOD. Immediately to the west of Wood Vale lies Queen's Wood, a 21 hectare area of ancient woodland. The woodland generally falls toward Wood Vale, and a number of tributaries of the Moselle Brook are located within small valleys within the wood. These valleys converge within the wood, with the eventually culverted Moselle Brook emerging from Queen's Wood into Wood Vale. The highest surface water risk on the EA mapping is shown to generally follow the path of these watercourses. High surface water flood risk is also shown in the topographically lowest section of Wood Vale, as shown in Figure 5-10. Most properties are served by driveways and footways on both sides of the road are wide and planted with trees.

5.5.3 [Existing Drainage and Watercourses](#)

Asset records indicate one 229mm diameter foul water sewer and one 229mm diameter surface water sewer within Wood Vale.

The DWMP model output indicates that sewers in the southern section of Wood Vale, are at risk of surcharging during a 1 in 2 year rainfall event currently, whereas it is expected that the northern section would become at risk of such surcharging by 2035.

A culverted section of the Moselle Brook crosses Wood Vale at its topographically lowest point, emerging from Queen's Wood and continuing into Shepherd's Lane. The culvert reaches 610mm diameter through this section.

5.5.4 [Flood History](#)

The Haringey SWMP does not record any instances of flooding at Wood Vale specifically. Appendix D, Figure 9 of the SWMP records up to 10 instances of flooding in the N10 3 postcode area, as of 2010.

5.5.5 Previous flood studies

Wood Vale falls within CDA Group 4_055 (“North of Hornsey High Street and west of the mainline railway”). The CDA analysis shows overland flows following the path of the Moselle Brook through Queen’s Wood and across Wood Vale, with potential flood depths estimated to be up to 0.25m.

5.5.6 Potential Flood Mechanisms

The photographic evidence, local topography and available flood reports suggests that the primary cause of the flooding was excessive rainfall which exceeded the capacity of the drainage network in this area. The intensity of the rainfall meant that surface water overwhelmed the existing drainage routes in Queen’s Wood and was unable to enter the sewer network fast enough, resulting in overland flows accumulating in the topographical low point in Wood Vale and causing flooding of the highway. Given the intensity of rainfall, it is likely that the rate of runoff may have exceeded the receiving capacity of gully pots on the steeper sections of the road, resulting in more runoff reaching the low central section of Wood Vale. Surcharging or flooding of the Moselle Brook may have increased flooding on the carriageways and footways. Further investigation would be required to identify whether the capacity issues were primarily due to the receiving capacity of the highway drains, the public sewer, the culverts, or a combination. The DWMP indicates that surcharging part of Wood Vale occurs during a 1 in 2 year rainfall event. In any case the following item was identified that may have affected the depth and magnitude of the flooding, including:

- **Blocked Gullies**

Email correspondence between a resident of Wood Vale and Haringey Council indicates that gullies along Wood Vale were blocked.

- **Excessive flows from the upslope wooded catchment**

Queen’s Wood is a well used local resource for the community. The compaction of topsoil through footfall may have generated additional runoff than would be expected from a rural catchment woodland understorey.

5.5.7 Responses to Flooding

Haringey Council:

- For CDA Group 4_055, the SWMP identified options for providing surface water management within the upstream catchment (Queen’s Wood and Hornsey Cricket Club). The Queen’s Wood natural flood management project has been developed to design stage⁸ and is likely to have a beneficial impact on Wood Vale during periods of significant rainfall.
- Provided a schedule of all gully cleaning works that have taken place in Hornsey and Crouch End between 12th July and 30th September 2021. A total of 1353 jobs were raised for gully clearance between these dates.
- Confirmed via email that gully cleaning occurs on a cyclical basis, with reactive maintenance where required. The proposed cycle was to clean all the gullies in the borough once every two years and clean all gullies in Critical Drainage Areas every year. The Council has now increased its gully cleaning capacity to 2 No. cleaning machines. Its new cleaning programme started in first week of October and the aim is to have cleaned all the gullies in the borough by Summer 2022.

Transport for London

- No TfL assets were affected in this location.

Thames Water

- Attended Wood Vale on 30th July 2021 and 2nd August 2021 to undertake clean-ups in response to the flooding. No further details of the clean-ups have been provided at time of writing.

London Fire Brigade

- LFB did not record any call outs to Wood Vale during the rainfall events.

⁸ https://www.haringey.gov.uk/sites/haringeygovuk/files/queens_wood_letter_to_residents_220221f.pdf

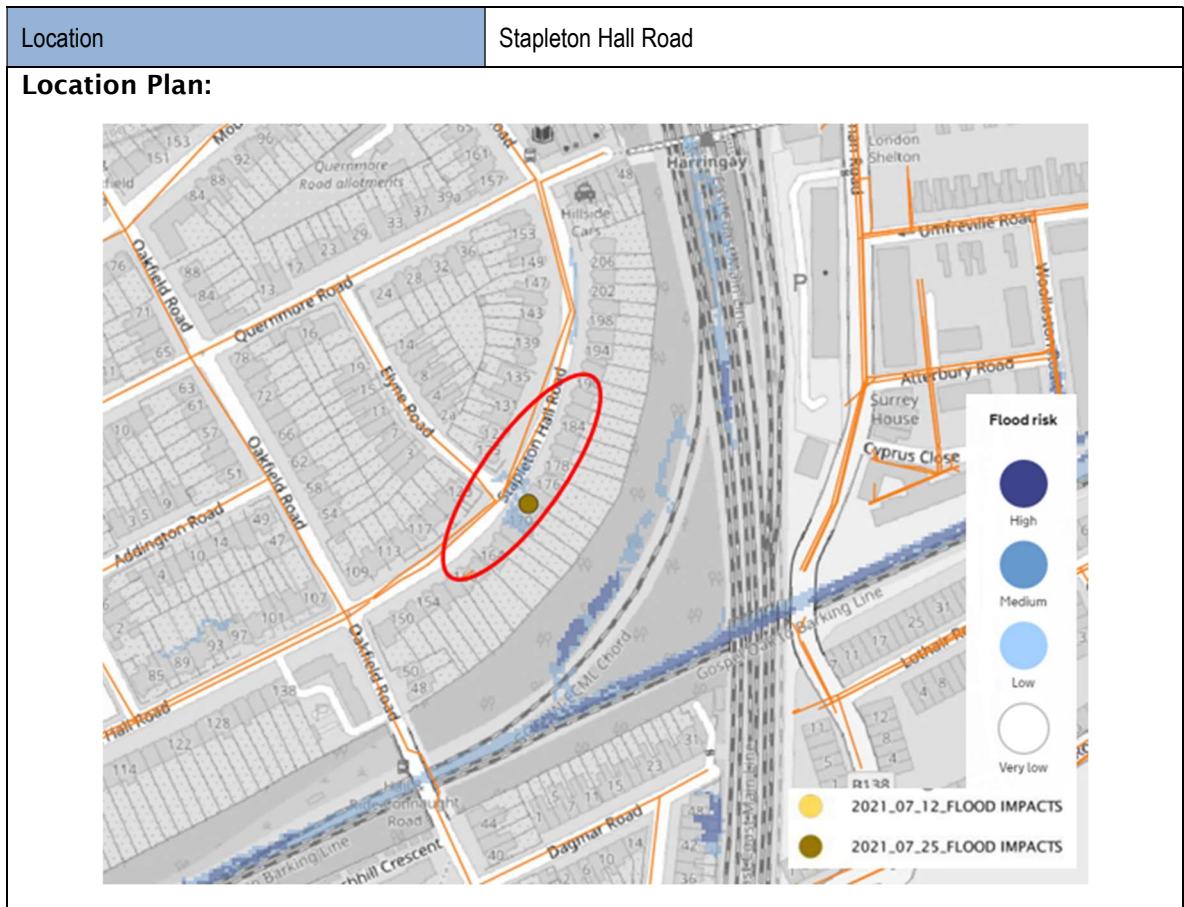
5.5.8 [Next Steps](#)

The EA surface water flood maps indicate that Wood Vale is located in an area prone to surface water flooding. The following measures should be considered to reduce the risk and impact of flooding.

- Haringey Council to programme and undertake increased frequency gully cleaning along Wood Vale.
- Haringey Council to consider gully and grating selection along the steeper sections of roads to increase the inlet capacity of the drainage system to ensure that flows are not bypassing gully grating openings on steeper sections of highway during intense rainfall.
- Haringey Council to consider SuDS measures in the contributing catchment. The Queen's Wood NFM scheme is still in development at time of writing. On street SuDS would help to slow down flows from the steep highways along Wood Vale.
- Affected property owners to consider installation of demountable flood gates, flood doors and air vent covers. Properties should be surveyed by qualified professionals to ensure that all openings have been identified and defences properly specified.
- Haringey Council to consider inspection of the Moselle Brook culvert to ensure it is working at maximum operating capacity.

5.6 Stapleton Hall Road

Figure 5-12 Site Location



5.6.1 Summary of Impact

12th July 2021

There are no reports of flooding recorded on 12th July in this area.

25th July 2021

LFB received flooding related calls from Stapleton Hall Road at 16:24pm. Haringey Council also recorded a call from Stapleton Hall Road, where an unspecified number of properties had experienced flooding during the rainfall event. Subsequent video footage shows the carriageway and footways submerged in circa 300mm of water, as shown in Figure 5-13. No further information has been obtained for this location.



Figure 5-13 Flooding on Stapleton Hall Road, 25th July 2021

5.6.2 [Site Context](#)

Stapleton Hall Road lies on the south-eastern extent of the study area, adjacent to the mainline railways east and south. The road is located in the topographically lowest part of a wider residential area which includes Mount View Road, Albany Road, Granville Road and Oakfield Road. Most of these roads fall toward Stapleton Hall Road at steep gradients. The section of Stapleton Hall Road between Oakfield Road and Mount View Road is indicated to be at medium risk of surface water flooding.

5.6.3 [Existing Drainage and Watercourses](#)

Asset records indicate that the road, and wider residential area is served by combined sewers. A 305mm diameter pipe runs along Stapleton Hall Road.

The DWMP model output indicates that sewers in Stapleton Hall Road are at risk of surcharging during a 1 in 2 year rainfall event currently.

No watercourses were identified in this area.

5.6.4 [Flood History](#)

The Haringey SWMP does not record any instances of flooding on the road specifically and the road is not in a CDA. Appendix D, Figure 9 of the SWMP records up to 10 instances of flooding in the N4 4 postcode area, as of 2010.

5.6.5 [Potential Flood Mechanisms](#)

There is limited reported information on flooding at this location, but the photographic evidence, local topography and information from the DWMP suggests that the primary cause of the flooding was excessive rainfall which exceeded the capacity drainage network in this area. The intensity of the rainfall meant that surface water was unable to enter the sewer network fast enough and accumulated in the topographically lowest part of the residential area along Stapleton Hall Road, causing flooding of the highway and flooding of properties. Further investigation would be required to identify whether the capacity issues were primarily due to the receiving capacity of the highway drains, the public sewer, or a combination.

- **Bow wave effect**

Video footage from the 25th July flooding along indicates that larger vehicles moving through the flood water caused a bow wave effect. Anecdotal reports from other parts of Haringey indicated bus movement had caused further movement of water onto the footway and into their properties.

5.6.6 [Responses to Flooding](#)

Haringey Council:

- Instructed Marlborough Highways to unblock gullies along the road. It is not stated in the flood report schedules how many gullies were cleaned.
- Plan to carry out rectification works on existing SuDS features along the road in early 2022.
- Provided a schedule of all gully cleaning works that have taken place in Hornsey and Crouch End between 12th July and 30th September 2021. A total of 1353 jobs were raised for gully clearance between these dates. Haringey Council confirmed via email that gully cleaning occurs on a cyclical basis, with reactive maintenance where required. The proposed cycle was to clean all the gullies in the borough once every two years and clean all gullies in Critical Drainage Areas every year. The Council has now increased its gully cleaning capacity to 2 No. cleaning machines. Its new cleaning programme started in first week of October and the aim is to have cleaned all the gullies in the borough by Summer 2022.

Transport for London

- No TfL assets were affected in this location.

Thames Water

- No information on response or remedial works undertaken by Thames Water was provided by Thames Water for this location at the time of writing.

London Fire Brigade

- LFB did not record any call outs to Wood Vale during the rainfall events.

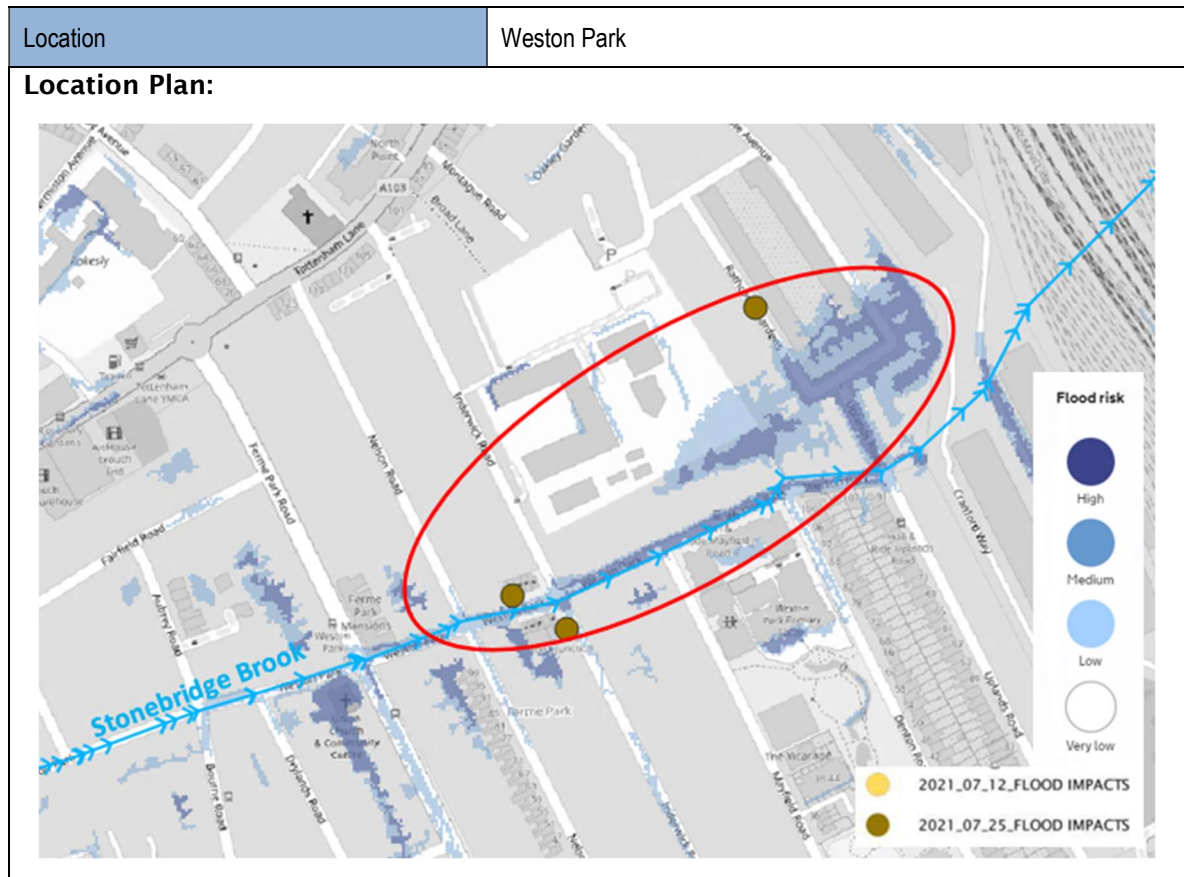
5.6.7 [Next Steps](#)

The EA surface water flood maps indicate that Stapleton Hall Road is located in a topographically low area prone to surface water flooding. The following measures should be considered to reduce the risk and impact of flooding.

- Haringey Council to programme and undertake increased frequency of gully cleaning along Stapleton Hall Road.
- Haringey Council to consider construction of additional road gullies to increase inlet capacity. Discussions with Thames Water would be required to confirm that there is sufficient capacity within the receiving storm sewer network to facilitate additional inlet connections. Additional connections to the sewer would require the consent of Thames Water.
- Haringey Council to consider implementation of further SuDS measures in the contributing catchment. It is understood from correspondence with Haringey Council that existing SuDS features are being improved.
- Affected property owners to consider installation of demountable flood gates, flood doors and air vent covers. Properties should be surveyed by qualified professionals to ensure that all openings have been identified and defences properly specified.
- Thames Water to consider a review of the local sewer network to identify locations where surface water sewers have insufficient capacity and work with other RMAs to identify potential mitigation as appropriate.

5.7 Weston Park

Figure 5-14 Site Location



5.7.1 Summary of Impact

12th July 2021

No flooding was reported to Haringey Council on 12th July from the Weston Park area.

25th July 2021

Three reports of flooding were received from the Weston Park area on 25th July. Businesses near the junctions of Nelson Road and Inderwick Road were reported to have been affected by flooding. One business noted that flooding of their premises was caused by drains backing up causing internal flooding. Email correspondence between Haringey Council and Councillor Cawley-Harrison indicates that residents along Weston Park had also experienced flooding. During a site walkover visit on 26th October 2021, a business owner at this location described how the manhole cover outside the shop had been lifted as a result of the volume of water emerging from it.

At Rathcoole Gardens minor flooding of the highway was reported.

5.7.2 Site Context

Weston Park falls in an easterly direction from its junction with Tottenham Lane (circa 45mAOD) to its junction with Uplands Road (circa 35mAOD). The roads then continue to fall north to Rathcoole Gardens, the lowest street in the area at 33mAOD.

5.7.3 Existing Drainage and Watercourses

Asset records indicate that surface water and foul water sewers are separate in this area. A 610mm diameter brick surface water sewer passes under Weston Park. Rathcoole Gardens and Rathcoole Avenue are served by 305mm to 525mm diameter sewers.

The DWMP model output indicates that sewers along Weston Park, adjoining streets, Rathcoole Gardens and Rathcoole Avenue are at risk of surcharging during a 1 in 2 year rainfall event.

A culverted section of the Stonebridge Brook passes through Weston Park, crossing Uplands Road and continuing under Cranford Way, the New River and the mainline railway. Asset records indicate that local surface water sewers connect into the culvert; the extent and nature of these would need further investigation.

5.7.4 [Flood History](#)

The Haringey SWMP does not record any instances of flooding at Weston Park specifically. Appendix D, Figure 9 of the SWMP records up to 5 instances of flooding in the N8 9 postcode area, as of 2010.

5.7.5 [Previous Flood Studies](#)

The Weston Park area is within CDA Group 4_056 ("Rathcoole Gardens, Hornsey Vale"). The CDA analysis indicates that the natural outfall from this area has been integrated into the drainage network beneath the railway and the New River, which both form man made obstacles to overland flow.

5.7.6 [Potential Flood Mechanisms](#)

The asset plans and anecdotal evidence suggests that the primary cause of the flooding was excessive rainfall which exceeded the capacity drainage network in this area. The intensity of the rainfall meant that sewers quickly reached capacity, leading to lifting of manhole lids and backing up of drains into properties, causing flooding of the highway property. The surcharging or flooding of the Stonebridge Culvert may have increased flooding on the carriageways and footways. Further investigation would be required to identify whether the capacity issues were primarily due to the receiving capacity of the highway drains, the public sewer, the culvert, or a combination.

- **Blocked Gullies**

Haringey Council's flood report schedule indicates that reactive crews were instructed to check for blocked gullies at Rathcoole Gardens. Such blockages would have further reduced the capacity for surface water to enter reach the public sewer at this low topographical point.

5.7.7 [Responses to Flooding](#)

Haringey Council:

- Instructed Marlborough Highways to check and unblock gullies along Rathcoole Gardens. It is not stated in the flood report schedules how many gullies were cleaned, but a site walkover on 26th October 2021 showed that leaf litter had quickly built up along the roadsides, highlighting the need for regular maintenance in risk areas such as this.
- Emergency Planning team visit residents in Hornsey and Crouch End on 13th and 16th July to speak about the impact of the flooding. High Street, Rathcoole Gardens, Rectory Gardens, Great Amwell Lane, Abbeville Road, Park Road, Campbourne Road and Brooke Road were visited. A leaflet drop was also undertaken to provide residents with information on help during future floods.
- Arranged bulk collections of water damage household items to the area on 20th July and 11th August.
- Provided a schedule of all gully cleaning works that have taken place in Hornsey and Crouch End between 12th July and 30th September 2021. A total of 1353 jobs were raised for gully clearance between these dates. Haringey Council confirmed via email that gully cleaning occurs on a cyclical basis, with reactive maintenance where required. The proposed cycle was to clean all the gullies in the borough once every two years and clean all gullies in Critical Drainage Areas every year. The Council has now increased its gully cleaning capacity to 2 No. cleaning machines. Its new cleaning programme started in first week of October and the aim is to have cleaned all the gullies in the borough by Summer 2022.

Transport for London

- No TfL assets were affected in this location.

Thames Water

- No other information on response or remedial works undertaken by Thames Water was provided by Thames Water for this location at the time of writing.

London Fire Brigade

- LFB received a flood related emergency call from the Weston Park but no further details are provided on the response.

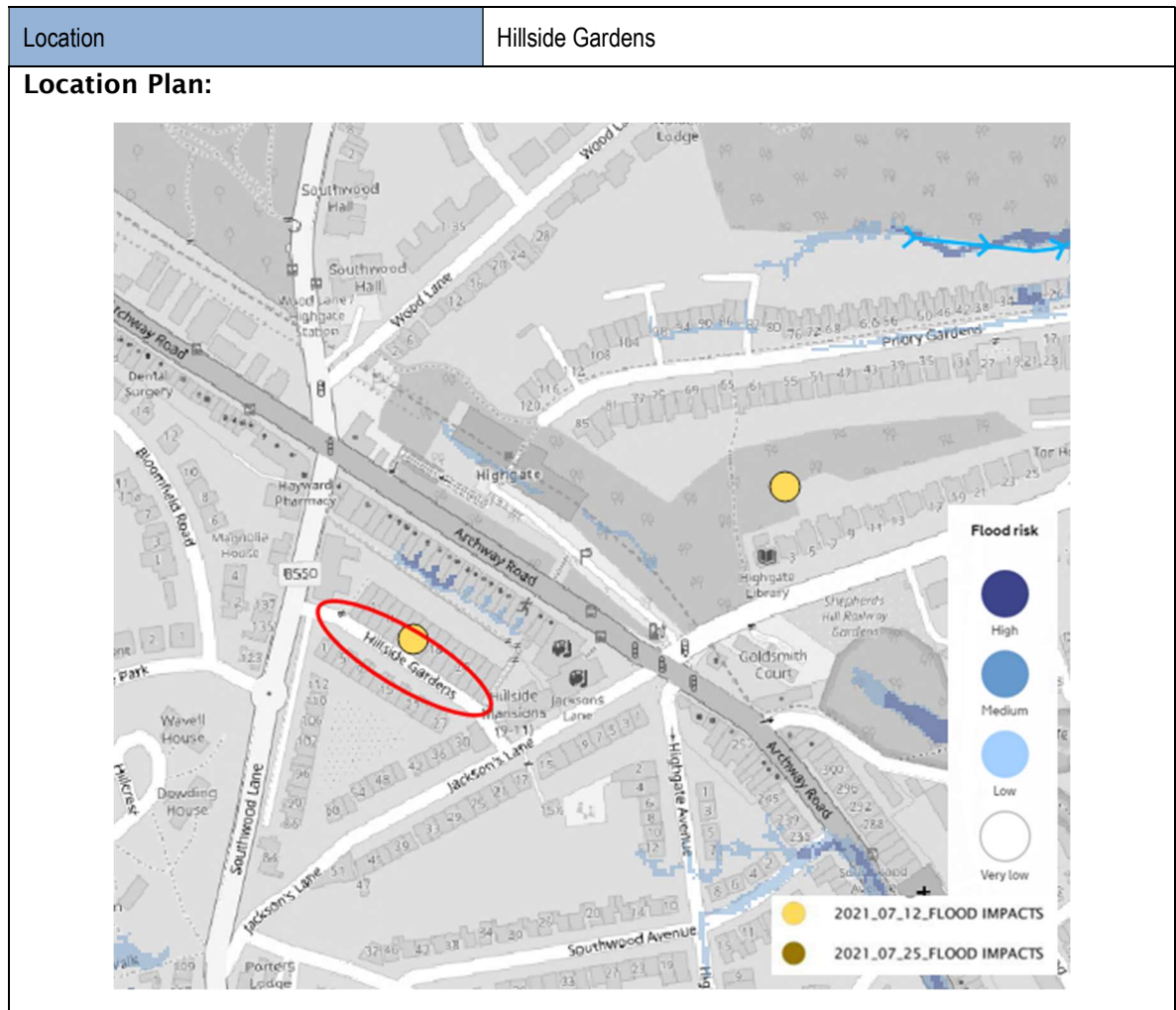
5.7.8 [Next steps](#)

The EA surface water flood maps indicate that Weston Park is located in a CDA area prone to surface water flooding. The following measures may be considered to reduce the risk and impact of flooding.

- Haringey Council should programme and undertake increased frequency of gully cleaning along High Road and particularly through Rathcoole Gardens.
 - Haringey Council to consider construction of additional road gullies to increase inlet capacity. Discussions with Thames Water would be required to confirm that there is sufficient capacity within the receiving storm sewer network to facilitate additional inlet connections. Additional connections to the sewer would require the consent of Thames Water.
 - Haringey Council to consider implementation of SuDS measures in the contributing catchment.
 - Affected property owners to consider installation of demountable flood gates, flood doors and air vent covers. Properties should be surveyed by qualified professionals to ensure that all openings have been identified and defences properly specified. Properties at the lower parts of Rathcoole Gardens and Rathcoole Avenue are already identified in CDA Group 4_056 in the SWMP as suitable areas for introduction of flood resistant and flood resilience measures.
 - Haringey Council to consider inspection of the Stonebridge Brook culvert to ensure it is working at operating capacity.
 - Thames Water to consider a review of the local sewer network to identify locations where surface water sewers have insufficient capacity and work with other RMAs to identify potential mitigation as appropriate. In particular
 - Thames Water to consider inspection of the brick surface water sewer in Weston Park to ensure it is working at operating capacity.
- Thames Water to consider increased below ground stormwater storage infrastructure to reduce pressure on the existing drainage system. Sections of Weston Park are already identified for such works CDA Group 4_056 within the SWMP.

5.8 Hillside Gardens

Figure 5-15 Site Location



5.8.1 Summary of Impact

12th July 2021

A report of flooding was received from Hillside Gardens, where flooding of the highway was reported. Reactionary crews have noted that some flood water may have encroached into properties. At the time of a visit that evening by Haringey Council, some flood water remained on the carriageway and partially covered one of the footways, as shown in Figure 5-16. Marlborough Highways were called to supply sandbags to residents.

25th July 2021

LFB received a flood related emergency phone call at 13:29pm from Hillside Gardens. LFB attended the call but no further details are provided on the call out.

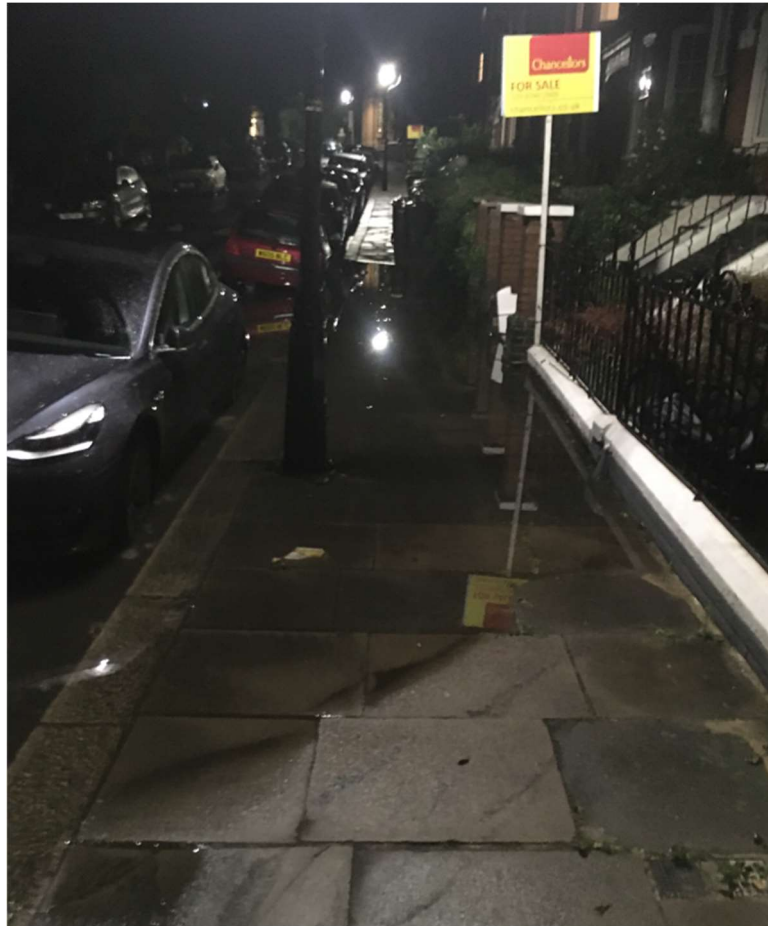


Figure 5-16 Flooding at Hillside Gardens, 12th July 2021

5.8.2 Site Context

Hillside Gardens is located between Southwood Lane and Jackson's Lane, two roads which fall quickly toward Archway Road. Hillside Gardens forms junctions with both lanes and generally follows the topographical contours, hence gradients within the street are reasonably gradual.

5.8.3 Existing Drainage and Watercourses

Asset records indicate that a 229mm diameter surface water sewer is located in Hillside Gardens, separate from the foul sewer. The records indicate that this drains to Jackson's Lane.

The DWMP does provide any information related to the risk of surcharging or sewer flooding for the street.

There are no watercourses identified in this area.

5.8.4 Flood History

The Haringey SWMP does not record any instances of flooding at Hillside Gardens specifically. Appendix D, Figure 9 of the SWMP records up to 10 instances of flooding in the N6 5 postcode area, as of 2010.

Hillside Gardens falls within CDA Group 4_055 ("North of Hornsey High Street and west of the mainline railway"). The CDA analysis shows scattered areas of medium surface water flood risk through the street and adjacent lanes.

5.8.5 Potential Flood Mechanisms

The photographic evidence suggests that the primary cause of the flooding was excessive rainfall which exceeded the capacity drainage network in this area. Exceedance flows from properties higher up the hill may have reached Hillside Gardens where it ponded in localised low spots. Further investigation would be

required to identify whether the capacity issues were primarily due to the receiving capacity of the highway drains, the public sewer, or a combination.

5.8.6 [Responses to Flooding](#)

Haringey Council:

- Instructed Marlborough Highways to attend the site, make safe and supply sandbags.
- Confirmed via email that gully cleaning occurs on a cyclical basis, with reactive maintenance where required. The proposed cycle was to clean all the gullies in the borough once every two years and clean all gullies in Critical Drainage Areas every year. The council now increased its gully cleaning capacity to 2 No. cleaning machines. Its new cleaning programme started in first week of October and the aim is to have cleaned all the gullies in the borough by Summer 2022.

Transport for London

- No TfL assets were affected in this location.

Thames Water

- No other information on response or remedial works undertaken by Thames Water was provided by Thames Water for this location at the time of writing.

London Fire Brigade

- LFA were called on 12th July to attend a flood related emergency at Hillside Gardens, but no further information is provided on their response.

5.8.7 [Next steps](#)

The following measures may be considered to reduce the risk and impact of flooding.

- Haringey Council to consider further investigation into the specific nature and extent of flooding experienced by properties.
- Haringey Council to consider construction of additional road gullies to increase inlet capacity. Discussions with Thames Water would be required to confirm that there is sufficient capacity within in the receiving storm sewer network to facilitate additional inlet connections. Additional connections to the sewer would require the consent of Thames Water.
- Haringey Council to consider inspection of the local highway sewers to ensure they are working to operating capacity.
- Thames Water to consider a review of the local sewer network to identify locations where surface water sewers have insufficient capacity and work with other RMAs to identify potential mitigation as appropriate.

6 SUMMARY

The flooding that occurred on 12th July and 25th July 2021 in Hornsey and Crouch End was caused by storms ranging from a 1 in 20 to a 1 in 50 year event, and in some locations potentially up to a 1 in 70 year rainfall event. Traditional pipe and gully pot drainage systems were historically not designed to deal with the rainfall intensity / severity experienced on these dates.

It is understood that there are no programmes for Thames Water to invest in upscaling its local drainage networks to provide additional sewer capacity.

Other factors have been identified which may have caused flooding at the respective locations identified within this report, which include;

- Blocked gully pots observed during the site visits to the respective locations.
- Lack of capacity within surface water sewers (as noted by recorded reports of flooding and outputs from DWMP models)
- Potential lack of operational capacity within culverted main and ordinary watercourses.
- Potential perched groundwater caused by saturated ground conditions affecting basements.
- Propagation of flood waters by passage of vehicles through flood waters causing bow waves.

Thames Water were unable to provide location specific data or actions carried out in relation to a number of the flood locations considered by this Section 19 assessment.

Thames Water has indicated that they have undertaken an internal review, (which considers the wider London catchment) to examine the actions taken ahead of, during and after the July 2021 storm events. This review concluded that the two key areas in which customers were let down was the initial response on the ground and lack of Thames Water customer contact provision during the events.

A further Independent Review has been commissioned by Thames Water into the causes and impacts of flooding, with a detailed assessment of sewer performance, which is due to be completed by Spring 2022.

It is understood that there are no current programmes for Thames Water to invest in upgrading local drainage networks to provide additional sewer capacity in the Hornsey and Crouch End areas.

6.1 Next steps

Haringey Council has committed to programme and undertake future gully cleaning throughout Haringey which is proposed to be completed by Summer 2022.

Other actions are recommended and are summarised below:

- The outcomes of the Thames Water independent review (due 2022) to be shared with other RMAs to ensure that mechanisms of flood can be better understood and any actions identified from the review can be developed jointly with other RMAs (as appropriate).
- Priority should be given to cleaning of gully pots in areas of known surface water flood risk.
- Localised temporary road closures or diversions are recommended in high-risk areas with low profile kerbs to reduce ingress of floodwaters onto footways and into properties where risk of internal flooding is caused by bow wave affect from the movement of vehicles through flood waters.
- Homeowners and businesses should be aware of their risk of flooding and investigate flood resilience and resistant measures to protect affected properties. Haringey Council offers advice through its [website](#)⁹. This link also provides information on how to sign up for flood warnings.
- Haringey Council to consider further retrofitting of SuDS to manage excess storm runoff.
- Haringey Council to consider inspection of culverted Cholmeley Brook and tributary to ensure they are at maximum operating capacity. Where culvert is riparian responsibility and outcomes of survey indicate that the mechanism of flood is deficiency in the operational capacity of the culvert, Haringey to notify the respective riparian owners of their responsibilities and any subsequent actions to be undertaken.

⁹ Be prepared for flooding. Haringey Council, 2021, available at <https://www.haringey.gov.uk/environment-and-waste/major-emergencies/drainage-and-flooding/be-prepared-flooding>, accessed 12th November 2021.