



ATRI7 2 LIMITED

FORMER MECCA BINGO
707-725 LORDSHIP LANE
WOOD GREEN
N22 5JY

FLOOD RISK ASSESSMENT

FEBRUARY 2024

FW2310_FRA_001 V1

REVISION HISTORY

Revision	Reason for Issue	Author	Checker	Approved	Date
DRAFT	Final Draft Issue.	JD	DM	JR	02.02.2024
V1	First Issue	JD	DM	EC	15.02.2024

EXECUTIVE SUMMARY

1. The site is at **NO** quantifiable risk of flooding from tidal events.
2. The property is identified within the EA Flood Risk mapping as being at **Low** risk of flooding from Rivers and Seas.
3. The site is identified by the EA as having a Very **Low** chance of flooding from overland Surface Water.
4. The site is considered to be at a **Low** quantifiable risk of flooding from groundwater sources.
5. The site is identified by the EA as being at **NO** quantifiable risk of flooding from manmade lakes within the topographical catchment of the site.
6. The site is at a negligible risk of flooding from the existing sewerage network in the vicinity of the site.
7. The site is at a negligible risk of flooding from its own private drainage connections however this can be mitigated by regular maintenance to ensure the ongoing performance of the system.
8. We therefore conclude that the proposed residential units are above the modelled flood level of the local watercourses and sits within Flood Zone 1 as defined in the National Planning Policy Framework December 2023 Table 1.

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1.0 INTRODUCTION

- 1.1.1 Farrow Walsh Ltd. has been appointed by ATri7 2 Limited to produce a Flood Risk Assessment to support the planning application at 707-725 Lordship Lane, Wood Green.
- 1.1.2 The development proposals include the demolition of the existing Mecca Bingo unit and associated parking, construction of residential-led mixed use development comprising of 623 purpose-built student accommodation units, 25 Shared ownership units and 52 social rent units.
- 1.1.3 A site location plan is included within Appendix A and the development proposals can be found on 762-PHL-SW-XX-DR-2001 which is included with the planning submission.
- 1.1.4 This report considers the flood risk associated with a development proposal of this type and considers mitigation measures to ensure user safety.
- 1.1.5 The Flood Risk Assessment (FRA) report has been informed by the guidance contained within The National Planning Framework (December 2023, Department for Communities and Local Government)(NPPF).
- 1.1.6 Reference has been made to basic flood maps contained within the EA websites and the EA Standing Advice for Local Planning Authorities.
- 1.1.7 In consulting the Environment Agency (EA) this report examines the following:
- Assessment of Flood risk and the likely sources of flooding
 - Managing Residual Flood Risk
 - Managing surface water
 - Remedial Measures
- 1.1.8 This FRA examines the flood implications of the proposed development based on the following objectives, set out within the NPPF.
- Appraising risk
 - Managing risk
 - Reducing risk
 - A partnership approach.
- 1.1.9 This report has been prepared using the following policy and guidance documentation:
- National Planning Policy Guidance (NPPG)
 - Ciria C753 – The SUDs Manual

- Adapting to Climate Change: Advice for Flood and Coastal Erosion Risk Management Authorities (EA - April 2016)
- Non-Statutory Technical Standards 2015
- Written Ministerial Statement regarding Sustainable Drainage (HCWS161) 2014
- The Water Framework Directive (2017)
- Building Regulations Part H 2015
- Haringey Council Strategic Flood Risk Assessment (February 2015 – JBA)
- North London Waste Plan Strategic Flood Risk Assessment (2022)
- Watercourse and Flood Risk Plan (August 2022 – Haringey Borough Council)
- Thames River Basin Management Plan (December 2022 – Gov.uk)
- The London Plan (March 2021 -Mayor of London)

1.1.10 In consulting with key stakeholders and policies this report aims to assess the risk of flooding both to the site and the impact of any development on the downstream network.

1.1.11 The flood management strategy, including consideration of safe access / egress to and from the site and flood resilience measures, is based on relevant British Standards (BS8533), the standing advice provided by the EA and on best engineering judgement. The approach for the FRA is based on the requirements of the EA and Haringey Borough Council.

1.1.12 The EA have been consulted in the preparation of this FRA and the correspondence can be found within Appendix G.

1.1.13 Any comments and opinions expressed in this report, including any conclusions are based on the information available to Farrow Walsh Ltd at the time of writing. The conclusions therefore could differ if the information is found to be inaccurate, incomplete or misleading. Farrow Walsh Ltd. accepts no liability should this be proven to be the case, or, if additional information is made available with respect to this site.

2.0 SITE DETAILS

2.1 SITE LOCATION

- 2.1.1 The proposed development site is located within the centre of Wood Green, within the London Borough of Haringey.
- 2.1.2 The Site is located on the southern side of Lordship Lane, within the eastern part of the Wood Green Town Centre and a short walk of Wood Green Underground Station.
- 2.1.3 The surrounding area comprises; to the east, a residential estate; to the west, a 7 storey residential building, with ground floor gym use; to the south, is Wellesley Road, featuring 3 storey terraced housing and the rear gardens of 2 storey properties on Moselle Avenue; to the north, is Lordship Lane and a series of traditional residential terraced housing.
- 2.1.4 A site location plan can be found within Appendix A.

2.2 SITE DESCRIPTION

- 2.2.1 The application sites are irregular in shape and cover a total area of 8,619m² or 0.862 hectares.
- 2.2.2 The site currently contains an existing bingo hall and associated car parking across the entire site.
- 2.2.3 The site is currently classified as entirely brownfield land.
- 2.2.4 Access to the site is directly from the adopted highway Lordship Lane to the northern boundary, with existing access points already in place. Gated access is also provided from Wellesley Road for emergency use.

2.3 TOPOGRAPHY

- 2.3.1 The ground levels on the site are recorded to OS datum as between 22.45 to 19.65mAOD and the site generally slopes in north-west to south-east direction towards the Moselle Brook culverted watercourse.

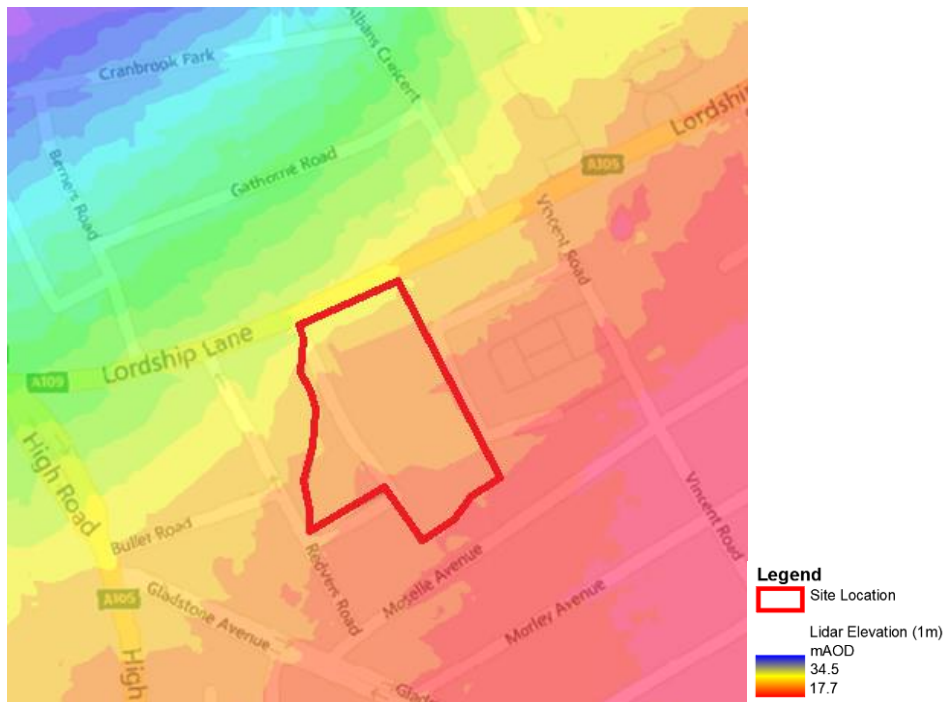


Figure 1 - LiDAR Elevation Data

2.3.2 A copy of the topographical survey can be located within Appendix C.

2.4 HYDROLOGICAL CONTEXT

2.4.1 The principal watercourse within the vicinity of the site is the Moselle Brook located along the southern boundary of the site. The brook was historically culverted in the 1950s and runs along the boundary line with the culvert bridging the development site and the residential properties of Moselle Avenue.

2.4.2 The Moselle Brook is classified as a statutory main river by the EA.

2.4.3 The brook flows in an easterly direction within the Noel Park area of Wood Green for 0.9km before turning south for 0.5km and then turning east into Lordship Recreation Ground. The brook is culverted until it reaches Lordship Recreation Ground which is 1.2km directly east of the development site. The brook joins the River Lee at a point 3.8m directly east of the development site.

2.4.4 The routing of Moselle Brook can be seen in Figure 2.



Figure 2 - Moselle Brook Routing (EA January 2023)

- 2.4.5 The site lies within the operation catchment of the Lee Lower Rivers and Lakes and the London Management catchment.
- 2.4.6 A CCTV survey of the existing culvert was undertaken as part of a wider drainage survey in October 2023, and subsequently an additional survey was undertaken through means of a confined space survey to confirm the condition of the existing culvert through the site. The survey indicates that across the entire length of the development boundary the culvert was formed using 2604mm wide x 1370mm high (internal measurements) concrete box sections, presumably cast in situ based on observations. The condition of the culvert was considered to be sound with minimal water ingress through joints.
- 2.4.7 The survey indicated that an existing manhole cover providing maintenance access to the culvert was present within the site which had historically been covered. As part of any works this cover would be raised and made accessible once again.
- 2.4.8 The results of the survey have been provided to the EA as part of the application process.

2.5 GEOLOGICAL CONTEXT

- 2.5.1 The British Geological Society (BGS) online mapping indicates that the site geology comprises no superficial deposits with bedrock identified as the London Clay formation comprising clays, silts and sands.
- 2.5.2 A Phase I and II ground investigation has been undertaken by TEC with site works completed in May 2023. The site investigation comprised of 3 boreholes to a depth of 30m, 4 boreholes to a depth of 5m and 2 No trial pits for percolation testing. The report (2303004.001.02, dated June 2023) recorded the following:

- Made ground between 0.40m and 1.30m below ground level (BGL);
- No superficial deposits were recorded;
- The London Clay Formation was encountered to depths of 23.8m BGL, comprising slightly sandy silty clay with frequent selenite crystals;
- The Lambeth Group was encountered below the London Clay Formation to a maximum depth of 29.0m BGL;
- Groundwater seepage was encountered in two boreholes. In BH01 at a depth of 5.5 BGL and within BH01 and BH02 at a depth of 23.0 BGL.

2.5.3 The groundwater is understood to flow towards the Moselle Brook located and ultimately east towards the River Lee.

2.5.4 An extract of the site ground investigation is included within Appendix D.

2.6 GROUNDWATER VULNERABILITY

2.6.1 Online mapping indicates that neither the bedrock stratum or the superficial deposits are classified as an aquifer.

2.6.2 In terms of vulnerability, the ground is classified as Unproductive.

2.6.3 The site lies within a Zone II outer protection, Source Protection Zone.

2.7 EXISTING DRAINAGE

2.7.1 Thames Water are responsible for maintaining the public sewers within the area of Wood Green and the sewer records have been obtained and can be found within Appendix E.

2.7.2 The sewer records confirm an existing surface water 150mm diameter, becoming a 225mm diameter, sewer is located within the southern area of the site, which appears to collect flows from Wellesley Road prior to discharge into the culverted Moselle Brook.

2.7.3 Within the same vicinity as the surface water sewer is a 225mm diameter foul sewer which drains east to west from the site into Wellesley Road. All sewers within the site will carry easements as required by Thames Water.

2.7.4 Existing sewers are observed to the north within Lordship Lane, with a 1066x712mm brick egg foul sewer and a Ø450 surface water sewer observed.

2.7.5 Additional survey and trace of all drainage within the site extents has been undertaken which confirms the locations of the adoptable assets within the site along with existing private connections both into the foul sewers and the culverted watercourse.

2.7.6 The survey indicates that the surface water from the site drains unrestricted into the culverted Moselle Brook to the southern boundary with the roof area untreated but all parking areas treated via a form of bypass separator.

2.7.7 A copy of the drainage survey can be found in Appendix F.

2.8 ARTIFICIAL WATER BODIES

2.8.1 The nearest reservoir to the site is the East reservoir, located 3.2km south of the site. There are number of reservoirs noted within 3.8km to the east of the site in the vicinity of the Moselle Brook outfall. The reservoir to the southeast is not anticipated to impact the development due to existing elevation rise between the site and the reservoir, however the reservoirs to the west may impact on the Moselle Brook outfall.

2.8.2 The Regent's Canal lies approximately 4.0km south of the site.

3.0 ASSESSMENT OF FLOOD RISK

3.1 SCOPE AND APPROACH

3.1.1 All new developments must comply with the flood risk guidance set out in the NPPF and consider all sources of flooding including fluvial, pluvial and groundwater. The NPPF advocates a risk-based approach to flood risk management in terms of appraising, managing and reducing the consequence of flooding both to and from a development site.

3.1.2 The primary objectives of this FRA are to assess the following:

- the risk from all sources of flooding, both to and from the proposed development;
- how flood risk will be managed so that the proposed development remains safe throughout its lifetime, taking climate change into account;
- if the site is at risk of flooding, whether safe access to and from the site can be achieved and maintained during flood conditions;
- mitigation measures to alleviate (i) flood risk to the proposed development and (ii) impacts on flood risk elsewhere as a result of the proposed development (i.e. arising as a result of surface water run-off from additional impermeable surfacing).

3.2 HISTORICAL FLOODING

3.2.1 The Haringey Surface Water Management Plan indicates that no historic fluvial flood events have been recorded within the vicinity of the site.

3.3 FLUVIAL FLOOD RISK

3.3.1 The site lies within the Moselle Brook catchment, which is classified as a main river and falls under the administrative jurisdiction of the EA.

3.3.2 The EA have derived flood maps of England from which it is possible to initially identify whether a site is located within an area that is at risk of fluvial flooding. The maps, which are available on the EA's website, categorise land as being within Flood Zone 1, Flood Zone 2 or Flood Zone 3, with Flood Zone 1 being all land falling outside of the flood plain and Flood Zones 2 and 3 being all land within the floodplain. Flood Zone 3 is split into two further categories, namely Flood Zone 3a and Flood Zone 3b with Flood Zone 3b considered to be the functional floodplain.

3.3.3 The definitions of the Flood Zones extracted from the National Planning Policy Framework (NPPF) are described below:

- Flood Zone 1 – low probability. This zone comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding (<0.1%).
- Flood Zone 2 – medium probability. This zone comprises land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding (15 – 0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% - 0.1%) in any year.
- Flood Zone 3a – high probability. This zone comprises 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 year.
- Flood Zone 3b – the functional floodplain. This zone comprises land where water has to flow or be stored in times of flood. Typically, 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.

3.3.4 The extent of flooding on main rivers is indicated on the EA web site and an extract from the indicative flood maps can be seen in Figure 3. Areas of dark blue shading identify flooding probability of 1 percent (1 in 100 year) and the light blue shading shows areas of extreme flood between the 1 percent and 0.1 percent (1 in 1000 year) probability. Where no shading is observed the site is considered by the EA to have a less than 0.1 percent (1 in 1000 year) probability of flooding.

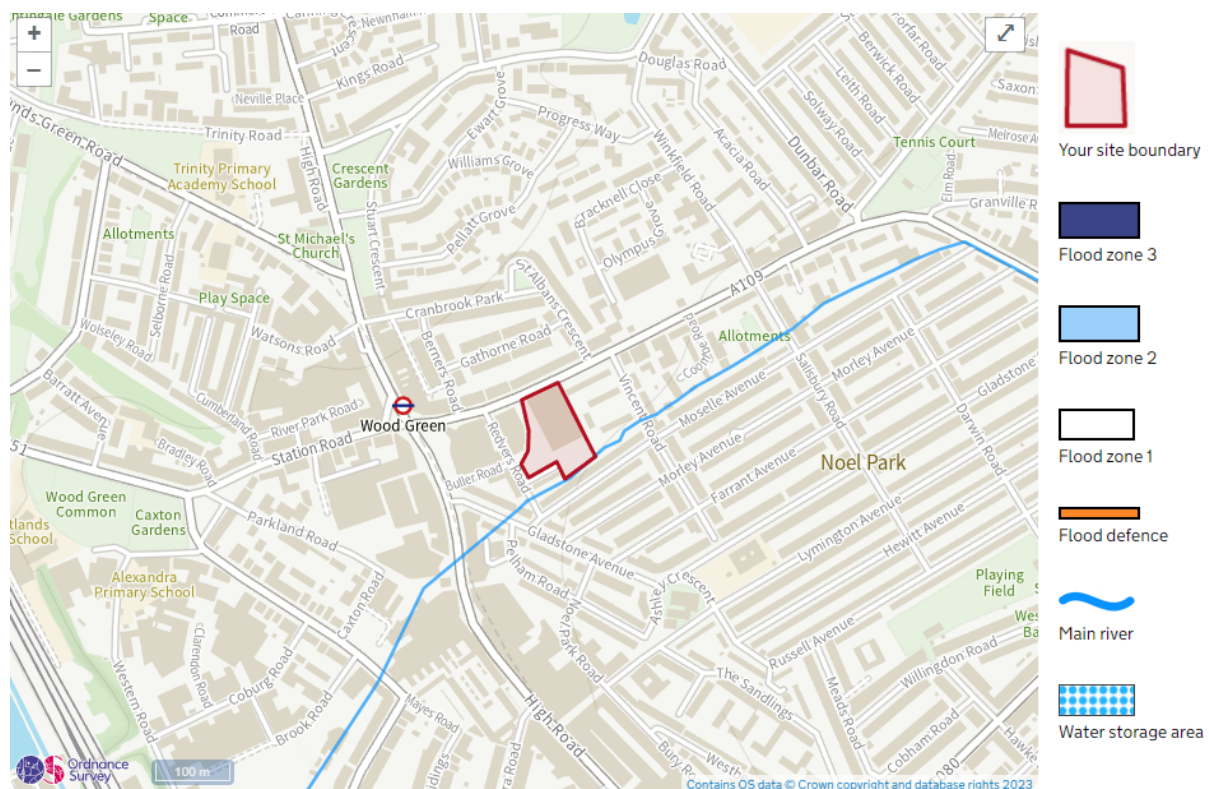


Figure 3 - Extract from EA Flood Map for Planning (January 2023)

- 3.3.5 Given the proximity of the site to the predicted flood outline, it is identified on the EA indicative planning flood mapping that the site lies within Flood Zone 1.
- 3.3.6 The EA have been contacted to obtain the Product 4 in proximity to the proposed development, The data provided is extracted from the River Lee Modelling & Mapping Study (Halcrow, 2010), and provided flood node level points along the Moselle Brook.
- 3.3.7 The information received from the EA includes a set of predicted fluvial and tidal flood levels for various Annual Event Probabilities (AEP) for the surrounding area. The nearest node point to the site is reference MOC132 and is located centrally along the southern boundary. Nodes MOC131 and MOC133 are located immediately downstream and upstream of the site respectively. The results are presented by the EA with a confidence rating of 3, which is defined as '*Poor quality channel or floodplain survey*'. The EA flood maps and level data can be found within Appendix G. The flood levels are summarised in Table 1.

Flood Event (years)	Modelled Flood Level (mAOD)		
	MOC132	MOC131	MOC133
1 in 2 (50%)	19.29	19.37	19.22
1 in 5 (20%)	19.45	19.53	19.39
1 in 10 (10%)	19.56	19.65	19.47
1 in 20 (5%)	19.63	19.72	19.54
1 in 25 (4%)	19.77	19.83	19.72
1 in 50 (2%)	20.78	20.83	20.75
1 in 100 (1%)	23.62	23.68	23.57
1 in 100 (1%) + 20% CC	27.14	27.23	27.07
1 in 200 (0.5%)	25.38	25.46	25.32
1 in 1000 (0.1%)	45.99	46.23	45.79

Table 1 - EA Modelled Flood Nodes

- 3.3.8 The EA modelling indicates a significant hydraulic jump above the 1 in 50 year storm events. Correspondence has been undertaken with the EA who have confirmed the data is not considered an anomaly albeit the jump is greater than would have normally been anticipated, The EA advise this is the best available data for the area and was designed for catchment wide flood risk rather than produce flood levels. Correspondence with the EA can be found within Appendix G.

3.3.9 Based on Table 1 of the NPPF the site has a Low probability of flooding due to main rivers within the extents outlined within Figure 3.

3.4 TIDAL OR COASTAL

3.4.1 The site has an elevational range of 22.45 to 19.65mAOD above sea level as shown within the topographical survey within Appendix C.

3.4.2 The site is geographically remote from any coastline. The site lies within the Thames River Basin and the catchment of the Moselle Brook, classified by the EA as a main river.

3.4.3 The site is indicated by mapping as being remote from the areas at risk of tidal flooding with the existing coastal defences intact or removed.

3.4.4 The site is therefore considered comprehensively free from risk from tidal or coastal flooding effects, being horizontally and vertically remote from such influences at present, and after consideration of climate change effects.

3.5 GROUNDWATER FLOODING

3.5.1 Groundwater flooding occurs as a result of rising water from underlying aquifers or from water flowing from abnormal springs. This tends to occur after long periods of sustained high rainfall, and the areas at most risk are often low-lying where the water table is more likely to be at a shallow depth. Groundwater flooding is known to occur in areas underlain by major aquifers, although it is increasingly being associated with localised floodplain sand and gravels.

3.5.2 The ground investigation data indicates that seepage occurred within one borehole at 5.5m below ground level and that two other seepages were observed at a depth of 23.0m below existing ground level. On the basis of the available information, it is therefore considered that the site is at Low risk of flooding from groundwater sources.

3.6 ARTIFICIAL WATER BODIES FLOODING

3.6.1 Reservoir flooding occurs due to the capacity of the reservoir being exceeded and/or as a result of dam or embankment failure. The latter can happen suddenly resulting in rapidly flowing, deep water that can cause a significant threat to life and major property damage.

3.6.2 The EA online mapping indicates that there are no areas within the vicinity of the site at risk of flooding from reservoirs.

3.6.3 The regulated nature of reservoir management means that the likelihood of such an event is very low. All large, raised reservoirs are inspected and supervised periodically by qualified Civil Engineers (referred to as Panel Engineers). The actual risk of reservoir flooding at the site is therefore considered to be very low.

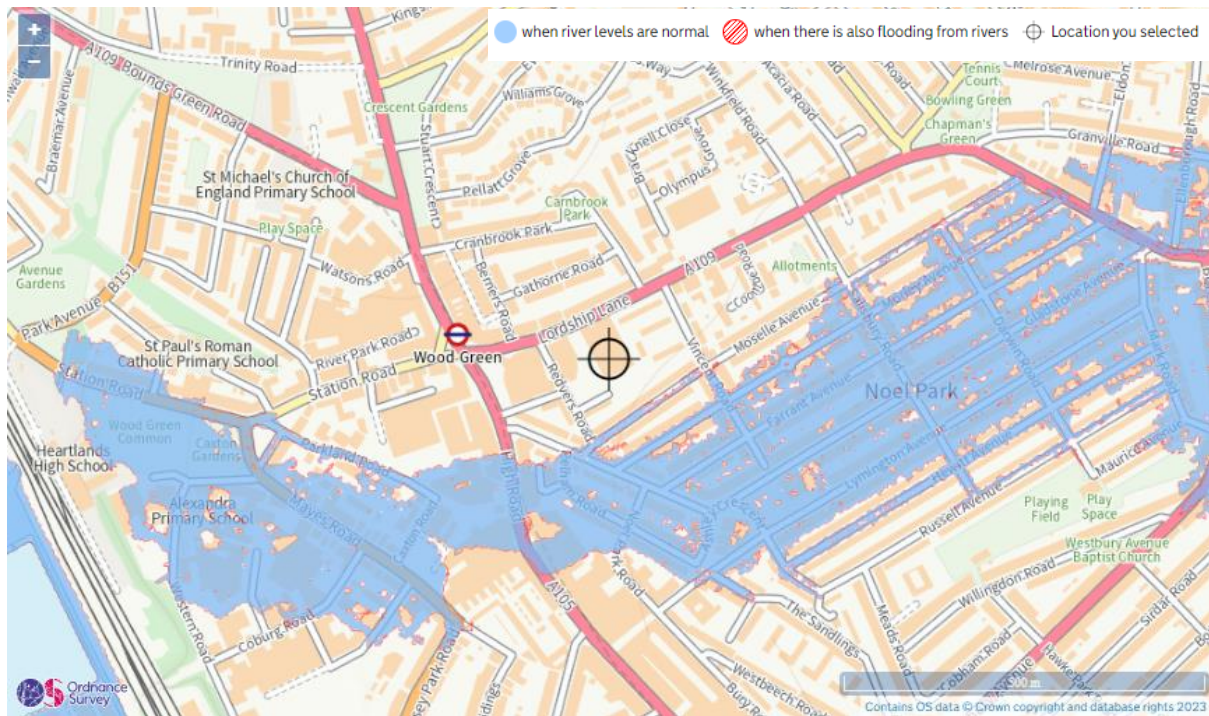


Figure 4 - Extract from EA Mapping Risk of Flooding from reservoirs (January 2023)

3.6.4 Canals are regulated waterbodies and are unlikely to flood, unless there is a sudden failure of an embankment or a sudden ingress of water from a river in areas where they interact closely. The Regent's Canal is located 4.0m south of the site. The canal is not at a higher elevation than the site and therefore a canal failure is unlikely to result in flooding of the site. The flood risk as a result of a canal failure is therefore considered to be very low.

3.7 SURFACE WATER FLOODING

3.7.1 Surface water flooding occurs when natural and engineered systems drainage network capacity is exceeded and thus cannot accommodate the volume of rainfall / runoff. Surface water flooding occurs often in urban areas during extreme, high intensity, low duration rainfall events which overwhelm the local surface water drainage systems. In rural areas this type of flooding can occur during medium intensity, long duration events where saturated ground conditions prevent natural infiltration into the subsoils below the surface. Flood water arising from such events is then conveyed above ground following the topography of the surrounding land.

3.7.2 The site is located within the middle reaches of the overall catchment as on the EA catchment website. The local catchment tends north-west to south-east towards the Moselle Brook and ultimately east towards the River Lee.

3.7.3 The EA have modelled locations along critical flow paths and area situated in topographic depressions, which could flood following an extreme rainfall event when drainage capacity has been exceeded. Figure 5 indicates the predicted surface water flood risk map taken from the EA's website.

3.7.4 The site is considered to be generally at very low risk from overland flows by the EA, with a small area of medium to High risk to the south of the site at the end of the adopted Highway Wellesley Road.

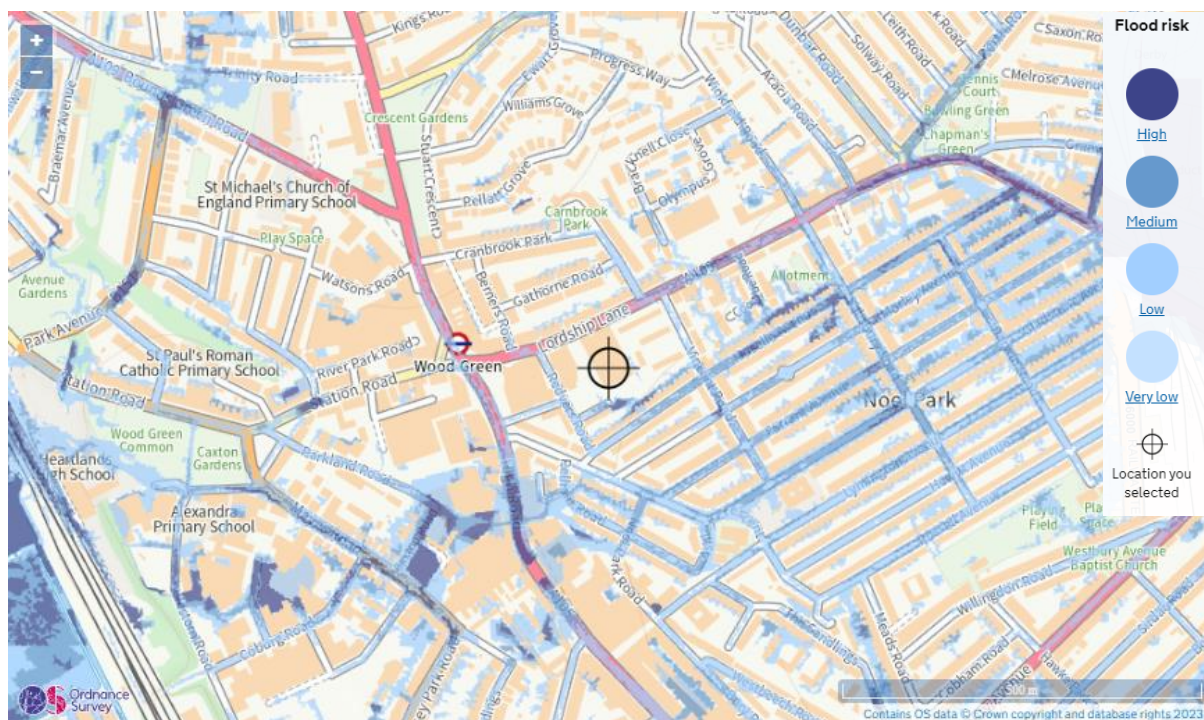


Figure 5 - Extract from EA Mapping Risk of Surface Water Flooding (January 2023)

3.7.5 The EA mapping indicates that flows emanate from the drainage system of Wellesley Road to the west and travel into the topographic low spot within the development site. The risk associated with this is considered medium - high risk. The proposed development will seek to remove the topographical low spot from the site whilst also improving the drainage along the private road which will lead off Wellesley Road to remove this area of Higher risk. Investigations have previously confirmed a blockage within the Thames Water sewer which has been removed as part of the survey works and thus should improve drainage from Wellesley Road.

3.7.6 The EA's risk of flooding from surface water map maximum depths during the 1% rainfall event (medium risk) are shown to only indicate a very small area below 300mm at the end of Wellesley Road.

3.8 EXISTING SEWER FLOODING

- 3.8.1 The sewer network surrounding the development is owned and maintained by Thames Water. A copy of the sewer records for the area can be found within Appendix E.
- 3.8.2 These records indicate a 225mm diameter foul drain within the site draining east to west into Wellesley Road. Surveys have been undertaken to confirm that this sewer is not functioning upstream of the manhole 2306.
- 3.8.3 A 150/225mm surface water sewer is located within the site toward the southern boundary and connects into the culverted watercourse, Moselle Brook.
- 3.8.4 Generally, due to the site levels and those of the surrounding areas it is considered that any breach of the sewers would follow the natural topography of the highway and drain north along Wellesley Road and within the new private road. In the event the sewers breached and exceeded the kerb line, flows would drain towards the topographical low spot of the site which is the southern boundary where they would be held by the existing masonry perimeter wall.
- 3.8.5 The site is also not recorded as a critical drainage area by the Haringey Surface Water Management Plan.
- 3.8.6 It should be noted that the sewerage systems are design to accommodate the 1 in 30 year storm events and thus for storm events above this probability flooding from sewers will occur.

4.0 PROPOSED DEVELOPMENT

4.1 DEVELOPMENT PROPOSALS

- 4.1.1 The development proposals include the demolition of the existing Mecca Bingo unit and associated parking, and construction of residential-led mixed use development comprising of 623 purpose-built student accommodation units, 25 Shared ownership units and 52 social rent units.
- 4.1.2 A site location plan is included within Appendix A and the development proposals can be found on 762-PHL-SW-XX-DR-2001 which is included with the planning submission.
- 4.1.3 All units shall be a minimum 150mm above the final ground levels to ensure that local overland flows do not enter the properties. A copy of the proposed finished levels for the development can be found within Appendix L.
- 4.1.4 The current use of the application site is classed as brownfield use, with a hardstand area of 8,619m² (100%) which currently drains unrestricted into the culverted Moselle Brook watercourse via a private connection into the culvert.

4.2 FLOOD ZONE CLASSIFICATION

- 4.2.1 The findings of the FRA indicate that the site is considered to be located within FZ1.
- 4.2.2 In accordance with Table 3 of NPPG (2023), a residential land use has a flood vulnerability classification of 'more vulnerable'.

Flood Risk Vulnerability Classification					
Flood Zones	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test Required	✓	✓	✓
Zone 3a	Exception Test Required	✗	Exception Test Required	✓	✓
Zone 3b	Exception Test Required	✗	✗	✗	✓

Table 2 - Extract from NPPG 2023 (Table 3)

- ✓ Denotes Development is appropriate
- ✗ Development should not be permitted

- 4.2.3 Development is to be located within FZ1 and thus deemed appropriate for development in accordance with NPPG.
- 4.2.4 The findings of the FRA indicate that the south of the site at the end of Wellesley Road may be susceptible to surface water flooding when considering the impacts of climate change. However, the design of the drainage and external levels is deemed to mitigate the risk and therefore require no further mitigation measures are deemed required.
- 4.2.5 The drainage design should account for any residual risk of flooding from surface water as a result of exceedance events.

5.0 SURFACE WATER MANAGEMENT

5.1 FLOOD RISK FROM THE DEVELOPMENT

- 5.1.1 In accordance with NPPG site specific flood risk assessments should consider and assess how runoff from the development will be managed and whether it will increase flood risk elsewhere.
- 5.1.2 The primary flood risk generated by the new development is likely to be the risk posed by overland surface water flooding due to exceedance of the existing drainage network.

5.2 EXISTING SURFACE WATER DISCHARGE

- 5.2.1 The existing on site drainage network has been mapped and all outfalls into the unnamed culverted watercourse within southern boundary of the development and can be seen on the drainage survey contained within Appendix F. All existing Thames Water Sewers can be seen in Appendix E.
- 5.2.2 The existing site is classified as brownfield.
- 5.2.3 Existing brownfield runoff rates have been calculated for the overall existing impermeable area of 0.862ha and are also shown below.

- $Q_{L, BR} = 119.8 \text{ l/s } [2.78 \times 0.862\text{ha} \times 50\text{mm/hr}]$

5.3 CLIMATE CHANGE

- 5.3.1 National Planning Policy Guidance requires that climate change be incorporated within the surface water drainage design in accordance with The EA's 'Adapting to Climate Change: Advice for Flood and Coastal Erosion Risk Management Authorities' April 2016 when assessing flood risk for a development.
- 5.3.2 The design life of the development is beyond 2070, therefore in accordance with the EA guidance the development should make allowances for an increase in extreme rainfall intensity of an additional 40% when compared to the 1961-1990 baseline.

5.4 PROPOSED SURFACE WATER DRAINAGE STRATEGY

- 5.4.1 Surface Water runoff from the proposed development should mimic, as far as possible, the surface flows from an undeveloped greenfield site.
- 5.4.2 Building Regulations 2010 Part H guidance for disposal of surface water is as follows:
- A soakaway or infiltration system, or where not reasonably practical;
 - A surface water ditch or watercourse, or where not reasonably practical;
 - A below ground sewer

- 5.4.3 The ground investigation undertaken on the site has confirmed the site to be underlain by London Clay, and therefore concludes that infiltration would not be suitable for disposal of surface water on the site.
- 5.4.4 The nearest watercourse to the site is the Moselle Brook culverted watercourse located within the site at the southern boundary. A connection to the watercourse would be feasible given the topographical levels recorded on the site, however through discussions with the EA preference is that an existing connection should be reused, rather than a new connection made into the concrete culvert.
- 5.4.5 There are two existing connections into the Moselle Brook Culvert within the site extents, the first is located to the south west corner of the site and previously served the development. The second identified connection is the Thames Water surface water sewer.
- 5.4.6 The Thames Water mapping indicates that the surface water sewer is the Ø225 sewer located within the southern portion of the site and runs from west to east from Wellesley Road before connecting into the Moselle Brook culvert.
- 5.4.7 Therefore, surface water disposal by the means of treatment and detention prior to controlled release into the existing culverted watercourse is deemed the most appropriate solution and based upon the site layout present and building positions a connection into the Thames Water sewer is deemed most appropriate due to the greater access for maintenance.
- 5.4.8 Existing greenfield runoff rates have been calculated for the development area and can be found within Appendix H and are also shown below.

Storm Event	Site – 0.862 Ha (l/s)	Per Ha (l/s/ha)
Q _{BAR,GR}	3.74	4.34
Q _{1,GR}	3.18	3.69
Q _{30,GR}	8.60	9.98
Q _{100,GR}	11.93	13.84

Table 3 - Greenfield Runoff Rates

- 5.4.9 The existing Q_{BAR} greenfield runoff equates to rate of 4.34 l/s/ha.
- 5.4.10 The development area is 0.862 hectares, and it is proposed that 91% (0.788ha) of the development will be impermeable and require collecting and attenuating prior to discharge. The above areas are based on the current Landscape Proposals Ref: 7692-PHL-SW-00-DR-L-2001 submitted as part of the application.

5.4.11 Due to the topography of the site, it is proposed that a number of flow controls are utilised throughout the site to store runoff at the source. It is proposed that the surface water from the development will be discharged at two locations, the first connection will be to the Thames Water sewer in Wellesley Road and will be controlled using a vortex flow control prior to discharge. The second discharge point will be into the existing Thames Water sewer immediately upstream of the culverted Moselle Brook watercourse again controlled by a vortex flow control.

5.4.12 To accommodate the proposed development a diversion of the existing surface water sewer through the site will be required and this will be subject to approval by Thames Water under a S185 agreement.

5.4.13 Surface water drainage will be provided in new below ground gravity drains constructed around the properties and in the hardstand areas mirroring the existing runoff arrangement with surplus flows being attenuated using above ground shallow landscape depressions, tree pits and cellular attenuation crates. Runoff from the hardstand area shall be drained via permeable surfacing to offer treatment at the source in combination with slot drainage channels and sumps to remove sediments and a filter trench located within the cellular attenuation tanks. Runoff from Buildings A, B and C will be via green roofs which will provide treatment and delay in peak runoff while also encouraging evapotranspiration.

5.4.14 A copy of the Drainage Strategy can be found within Appendix L along with typical SuDS construction details.

5.5 PROPOSED SURFACE WATER DISCHARGE

5.5.1 In accordance with the London Plan Policy SI 13, development proposals should target greenfield run-off rates and ensure runoff is managed as close to the source as possible.

5.5.2 The proposed surface water runoff rates will match the existing Q_{BAR} greenfield runoff rates for the proposed impermeable area of 0.788ha and are shown below. The rate for the site will be set at 4.10l/s.

Storm Event	Site – 0.788ha (l/s)	Per Ha (l/s/ha)
$Q_{1,PR}$	2.90	3.68
$Q_{2,PR}$	3.20	4.06
$Q_{30,PR}$	3.80	4.82
$Q_{100+40\%CC,PR}$	4.10	5.20

Table 4 - Proposed Discharge Rates

5.5.3 The discharge rate has been set as close to the existing QBAR greenfield runoff rates as reasonably practical to mimic the natural undeveloped state and represents a significant reduction in runoff rate when compared the current on-site arrangement. This discharge rate is subject to approval from Thames Water.

5.5.4 At present it is proposed that the discharge rate will be split into two outfalls, one restricted to 3.1 l/s and one restricted to 1.0 l/s, a combined 4.1 l/s. This discharge rate has been agreed with Haringey LLFA and is confirmed within the correspondence dated 12.02.2024 contained within Appendix O.

5.5.5 By controlling the discharge rate from the site for a 1in100 year + 40% storm event greenfield runoff rates the site is offering a betterment to the downstream network by utilising on site flood storage at an earlier stage in the overall river catchment potentially reducing flooding downstream.

5.5.6 All sewers and drainage are to be constructed in accordance with all relevant industry standards, including but not limited to:

- Building Regulations Approved Document Part H 2010
- Sector Guidance in relation to the adoption of sewerage assets by sewerage companies in England

5.5.7 The drawings & schedules of the as-built site drainage system are to be made available to the building occupier to enable drainage maintenance and future works to be undertaken.

5.6 CONSIDERATION OF SUDS

5.6.1 With reference to CIRIA 753 and the surface water treatment process, with a green roof finish to Buildings A, B and C and rain garden plantings to provide surface water treatment, allowing for the removal of silts from the drainage system, delay of peak runoff and also providing ecological benefits for the site.

5.6.2 Both the Environment Agency and the Haringey Borough Council require Sustainable Drainage (SuDS) techniques to be incorporated within new developments where possible.

5.6.3 Consideration should therefore be given to the use of the Sustainable Urban Drainage Systems. Table 2 below gives commentary in relation to the suitability of SuDS techniques for the proposed development.

SUDS Technique	Commentary	Suitability
Green Roof	Green roof is to be utilised to slow peak runoff, treat runoff and provide biodiversity benefits.	Yes
Blue Roof	Blue roof was considered however, due to the amount of plant located at roof level along with the number of PV panels provided the required maintenance to these would make the incorporation of a blue roof system difficult.	
Infiltration by Soakaway	Ground investigation has confirmed infiltration not to be viable on the site.	No
Water Butt	Storage of roof runoff via the use of water butts can be utilised to the Building D dwellings. An additional water but shall be located within the Building A first floor terrace and used for non-potable uses.	Yes
Filter Strip	There is no potential, due to the limited site area.	No
Infiltration Trench/Filter Trench	There is no suitable area within the site for infiltration trenches/filter trenches.	No
Swale	There is limited potential due to the urban nature of the site.	No
Bio-retention	There are limited areas for this to be sited.	No
Permeable Surfacing	Permeable surfacing has been used across the site to provide both treatment to surface water runoff and low level storage.	Yes
Geocellular/modular system	Geocellular system is required in conjunction with permeable surfacing with voided stone below. Tree pit storage will also be provided to provide both storage and treatment to runoff.	Yes
Infiltration Basin	It is not viable or practical to accommodate infiltration basins on site as there are no open soft landscaped areas to accommodate these nor does infiltration work on the site.	No
Detention Basin	It is not viable or practical to accommodate detention basins on site as there are no extensive large open soft landscaped areas to accommodate these along with limitations of the existing topography.	No
Pond	Similarly, to detention basins, there is no feasible position for such a feature.	No
Stormwater Wetland	It is not viable or practical to accommodate stormwater wetland on site as there are no extensive large open soft landscaped area to accommodate this.	No
Rainwater Gardens	Rain Gardens are to be utilised around the site with the green roof discharging into the rain gardens for further treatment.	Yes
Tree Pits	Tree pits within planters and offering low level treatment and storage below can be utilised on the site.	

Table 5 - SuDS Consideration Table

5.6.4 The table above identifies that due to site constraints, the most feasible method for providing SuDS is to utilise a green roof to reduce the peak discharge rate from the site, to be designed by specialists. Permeable paving is to be used in all hardstand areas of the site and rainwater gardens and tree pits are also to be utilised. Further SuDS can be offered if required by means of water butts for non-potable use in the landscape areas by maintenance teams.

5.6.5 The SuDS techniques proposed are deemed to provide the scheme with sufficient water quality, biodiversity and amenity benefits to comply with the London Plan Policy SI.5.

5.6.6 A perforated pipe will be utilised beneath the permeable paved surfaces, rainwater gardens and tree pits to convey any excess water to the sewer in a controlled manner.

5.6.7 By incorporating the green infrastructure such as the planters and rainwater gardens into the drainage design a connected SuDS system has been created in line with the OPDC Local Plan Policy EU3 (Water). This benefits both the water quality and quantity leaving the site.

5.7 ATTENUATION PROPOSALS

5.7.1 In accordance with current design guidelines the attenuation volume for a site should be calculated based on a 1 in 100 year + climate change allowance.

5.7.2 In accordance with Haringey's '*SuDS Design Requirements for LLFA Technical Assessment*' dated May 2016, the following criteria has been applied to the site:

- FEH 2022 Rainfall Data
- Coefficient of Volumetric Runoff (Cv) = 0.90 (this is based on the fact the majority of the roofs utilise green roof systems and therefore will encourage more uptake through evapotranspiration, alongside the use of raingardens)
- Climate Change allowance of 40%
- Surface outfall sensitivity testing undertaken assuming the culverted watercourse is surcharged
- Urban creep is set to 0% due to Buildings A, B and C being flats and Building D being constrained by the EA watercourse easement mean no extension will be permitted in the future.
- A copy of the Haringey Proforma has been included within the planning submission

5.7.3 It is proposed that runoff will be attenuated using cellular attenuation storage below ground with additional storage offered by permeable paving and tree pits.

5.7.4 Due to level differences across the site, a number of flow controls have been utilised within the main drainage through the site, this is to restrict runoff and control the surface water volume directly at the source thus utilising the cellular storage provided within the drainage system. Subsurface check dams within the permeable paving sub-base will be utilised.

5.7.5 A total of four cellular attenuation tanks below the hard surfaced areas is proposed, as indicated on the Drainage Strategy drawings within Appendix L.

5.7.6 Basins would have provided an alternative as an above ground attenuation system, however the existing topography make this challenging with little to no opportunity to provide the level of attenuation this development will require. Shallow rain garden will offer some surface level attenuation.

5.7.7 Hydraulic modelling of the drainage network has been undertaken using industry recognised software to confirm the drainage design suitability and these calculations can be found within Appendix J.

5.8 EXCEEDANCE FLOWS

5.8.1 Exceedance flows are to be contained within the site and directed away from buildings towards the areas of hard and soft landscaping. The intention is to direct flows away from properties with all properties being a minimum of 150mm above the external surrounding levels with the exception of level threshold entrances.

5.8.2 All level thresholds shall be provided with a threshold drain to prevent any runoff from entering the buildings.

5.8.3 Drainage modelling indicates that exceedance flows of between 1-2m³ could be expected during the 1 in 100 year + 40% climate change storm event. These flows will be directed away from the buildings in the landscaped and paved areas.

5.8.4 Drainage exceedance flow routes can be seen within Appendix L.

5.9 WATER QUALITY

5.9.1 The SuDS Manual (Ciria C753, November 2015) introduces an approach for surface water quality management. The Manual describes the risks posed by the surface water runoff to the receiving environment as a function of:

- The pollution hazard at a particular site (i.e. the pollution source).
- The effectiveness of the SuDS treatment components in reducing the levels of pollutants to environmentally acceptable levels.
- The sensitivity of the receiving environment.

5.9.2 The recommended approach for the water quality risk management are given in Tabel 26.1 of the SuDS Manual. The 'Simple index' approach will be used as a design method for the site.

5.9.3 To deliver adequate treatment, the selected SuDS components should have a total pollution mitigation index for each component type that equals or exceeds the pollution hazard index for each contaminant type. Therefore, the total SuDS mitigation index should be greater or qual to the pollution hazard index.

5.9.4 Table 26.2 of the SuDS Manual provides hazard classification of different land uses, which for this site are tabulated in Table 5.

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Residential Roofs	Very Low	0.2	0.2	0.05
Individual property driveways, residential car parks, low traffic roads (e.g. cul de sacs, home zones and general access road)	Low	0.5	0.4	0.4

Table 6 - Hazard Classification and Pollution Hazard Classification

5.9.5 The SuDS mitigation index for the SuDS components which will be constructed within the site are taken from Table 26.3 of the SuDS manual and are tabulated in Table 7. Runoff from the roof will be treated initially within the green roof and roof garden areas, and catch pits. Runoff from the hardstand areas shall be treated by differing methods, such as rain gardens, raised planters, tree pits and permeable paving. All offering a filtration and pollutant removal stage. Finally, all runoff will be filtered through perforated pipe treatment trenches within the cellular storage to further filtrate and remove any pollutants. Hydrocarbons arising from vehicle areas will be treated by the permeable paving which is recognised for holding and breaking down hydrocarbons through biodegradation.

Types of SuDs Component	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Bioretention Systems (Green roof, rain gardens, tree pits)	0.8	0.8	0.8
Permeable Paving	0.5	0.5	0.6
Treatment Trench (within cellular attenuation)	0.5	0.5	0.6

Table 7 - SuDS Mitigation Indices

5.9.6 Table 7 indicates that the proposed SuDS for the development offer suitable mitigation measures to improve water quality of the runoff leaving the site and entering the culverted watercourse.

5.10 CONSTRUCTION SEQUENCING

5.10.1 The primary surface water drainage, flow controls and attenuation tanks are to be constructed at the start of the programme to ensure that runoff is controlled from the site throughout the duration of the works. This will minimise the impact of the developed at the start of the project potentially lessening the effects of flooding on downstream properties.

5.10.2 Protection is to be provided to the watercourse through the lifetime of the works and the drainage outfalls are to have mesh grillage installed during the construction phase to prevent the entry of construction debris entering the watercourse network.

5.11 MAINTENANCE

5.11.1 The drainage network identified within this report will be managed by the on-site management team. Future maintenance schedules for the SuDS features have been provided within Appendix K.

5.11.2 The drawings and schedules of the as built drainage are to be made available to the building owner to enable drainage maintenance and future works to be undertaken.

5.11.3 At this stage, the maintenance company has not yet been appointed and as such the applicant will be responsible until such time as they are appointed. Once appointed the contact details will be provided to the LLFA for their records.

5.12 DRAINAGE SUMMARY

5.12.1 The proposed surface water drainage system can be summarised as follows:

- Surface water runoff from the site will be treated at source through green roofs and permeable pavements prior to control within below ground cellular storage, then discharged into the existing Thames Water sewer at a controlled rate, prior to release into the culverted watercourse to the south of the site.
- The intention is to utilise green roofs, permeable surfacing in conjunction with catch pits, voided stone sub-base, rain gardens and tree pits with the intention of trapping, filtering and removing hydrocarbons by biodegradation in line with CIRIA reports C753, C609 & C582 and 'Pollution Prevention Guideline' PPG3 (EA, 2006) guidance.
- Use of voided stone and cellular attenuation to store runoff volumes in extreme storm events up to the 1 in 100 year +40% climate change storm event, with an assessment of exceedance flows confirming no impact to buildings on or off site due to exceedance flows emanating from the 1 in 100 year + 40% climate change storm event.

6.0 FOUL WATER DRAINAGE STRATEGY

6.1 FOUL WATER DRAINAGE DESIGN

- 6.1.1 It is proposed that foul water drainage will be conveyed from the rear to the front of the properties via gravity drains prior to connection into the existing Thames Water sewers located with the southern portion of the site.
- 6.1.2 Correspondence has been undertaken with Thames Water in order to confirm capacity of the receiving sewers. At the time of writing, a response is awaited from Thames Water.
- 6.1.3 The foul drainage arrangement can be seen within Appendix L.
- 6.1.4 Where available, any existing connections into the sewer shall be utilised.

7.0 MOSELLE BROOK CULVERTED WATERCOURSE

7.1 EXISTING SITUATION & CONDITION

- 7.1.1 The culverting of the Moselle Brook appears to have been undertaken in the 1950s and culverted using 2604mm wide x 1370mm (internal measurement) high concrete box sections.
- 7.1.2 Historically, a perimeter wall has been constructed above the culvert which forms the boundary between the development site and the neighbouring properties. Over time the residential properties have been extended with properties now extending over the culvert structure or abutting the culvert. Trees have also been planted within the site which currently stand approximately 8m in height.
- 7.1.3 To the eastern boundary an electric substation has been constructed above the culvert.
- 7.1.4 At present there are no access manholes located at surface level within the development area therefore no access can currently be gained to the culvert from within the site. The site is currently used as car parking in the vicinity of the culvert which affords ample room should any maintenance works be required to the culvert.
- 7.1.5 A survey has been undertaken of the culvert and the culvert has found to be constructed of concrete with the condition observed to be very good. This has been discussed with the EA and they have confirmed that they concur the culvert is in good condition as per the correspondence in Appendix G.
- 7.1.6 The design life of the culvert is anticipated to be 75-100 years which would mean potential replacement of the culvert would be required in the 2050s.
- 7.1.7 The survey undertaken indicates that the flows entering the Moselle Brook are considered to be low with no more than a small trickle of flow recorded in the culvert during the investigation works undertaken in October, November and December 2023. This is despite the catchment area indicating the majority of Wood Green to drain through the brook.

7.2 LOCAL POLICIES

- 7.2.1 The Haringey local plan Policy SP5: Water Management and Flooding seeks to restore and enhance the Blue Ribbon Network including the Moselle Brook and de-culverting watercourses and tributaries wherever possible.
- 7.2.2 The Environment Agency are opposed to culverting of watercourses and encourage existing culverts to be daylighted where possible.
- 7.2.3 The Water Framework Directive (2017) (WFD) sets targets for the de-culverting of watercourses to improve ecology, biodiversity and to improve the natural environment.

7.2.4 The WFD sets environmental objectives for surface water bodies which include to protect and enhance each artificial or heavily modified water body with the aim of achieving good ecological potential.

7.2.5 The London Plan Policy SI 17 Protecting and enhancing London's waterways, states that development plans should support river restoration and biodiversity improvements.

7.3 DAYLIGHTING

7.3.1 Consideration has been given to the daylighting of the existing culvert which is located on the southern boundary, however the culvert does not lie wholly within the applicant's ownership boundary as the watercourse historically ran along the boundary between the site and the residential plots to the south.

7.3.2 Figure 6 identifies the surveyed location of the culverted watercourse overlaid onto the aerial mapping of the area. It should be noted the satellite imagery gives an approximate location.

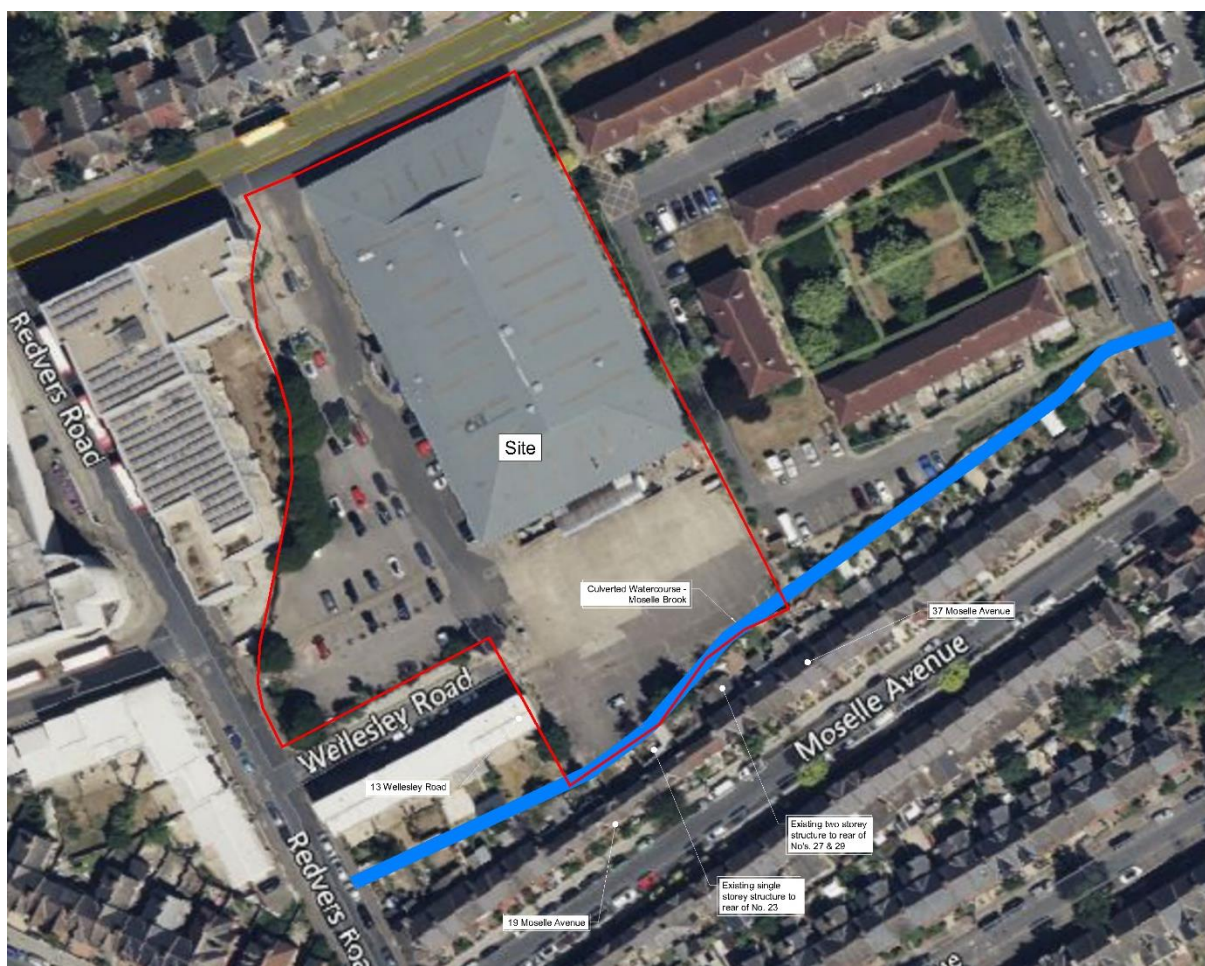


Figure 6 - Existing Culvert Overlaid onto Satellite Imagery

7.3.3 The image in Figure 6 indicates that the culvert is located on the historic boundary between the proposed site and the dwellings on Moselle Avenue. The culvert straddles the existing boundary line with both the

existing boundary brick wall and mature trees located above the culvert as shown in Appendix N. The existing mature trees will be removed as these are located on the clients land. However, the brick wall forms the boundary between the site and the residential dwellings on Moselle Avenue, and in some instances the wall is utilised as part of the residential dwellings structure. Figure 6 demonstrates that No. 23 has a single storey structure constructed up the boundary wall and this over the culverted watercourse. Number 27 & 29 Moselle Avenue have a two-storey rear extension which is located within 0.5m of the boundary wall, again partially over the existing culvert. This can be seen in both Figure 6 and the photos contained within Appendix N.

- 7.3.4 Sections have been drawn using the survey data to identify the location of the existing culvert in relation to the boundary wall and proposed properties, these are located within Appendix N. Here it can be seen that the full removal of the culvert or even removal of the top of the box culvert cannot be achieved without the removal of land from third parties, and in some instances requiring alterations to the residential properties of Moselle Avenue.
- 7.3.5 The WFD seeks to achieve environmental and ecological enhancements to existing watercourse, through the daylighting of culverts. However, due to the location of the culvert and the fact that any works to de-culvert this would necessitate the removal of multiple residential gardens of Moselle Avenue, which are outside of the applicant's ownership, means that this is not an option for this section of the culverted watercourse.
- 7.3.6 While the development is not able to offer environmental benefits through the de-culverting of the Moselle Brook, it is able to offer benefits further downstream by the improvement of the water quality when leaving the site. The development will seek to treat runoff at the source removing contaminants and sediments before the discharge into the culverted watercourse. Current discharge of the roof area is untreated and the car parking is discharging via a historic oil separator which does not appear to have been maintained for a number of years.

7.4 EASEMENTS

- 7.4.1 Current EA guidance stipulates that a maintenance easement of 8m from the top of watercourse embankment should be provided. The existing situation provides an 8m easement from the extent of the culvert through the existing car parking on site, although trees are observed within the easement adjacent to the brick boundary wall.
- 7.4.2 To the west there is no easement provided as this is formed of residential gardens and buildings. To the south there is no easement provided as the Moselle Avenue residential properties and gardens are located immediately south of the culvert. To the east the culvert can be accessed through the parking areas of the adjacent Haringey owned residential development, however immediately west of the site boundary the culvert is located directly below an electricity substation.

7.4.3 As part of the proposals, it is proposed that the clear easement be reduced to 3m, from the edge of the culvert, within the site extents. Due to the residential nature of the Building D development, the residential gardens are proposed to be segregated from the public by the use of fencing. The easements would be accessed through the use of slotted post and panel fencing. This would enable fence panels to be removed for maintenance access and only require the replacement of posts should the access for vehicles within the easement be required.

7.5 FUTURE MAINTENANCE

7.5.1 Maintenance will be provided to the existing culvert for vehicles off Wellesley Road into the private turning court. Fence panels will be removable to allow visual access in the first instance to the existing manhole chamber, which is to be raised and uncovered to allow the inspection of the culvert within the site. By uncovering the buried manhole this allows an additional point of access for maintenance to the culvert.

7.5.2 Upon removal of the fence panels access for maintenance vehicles can be removed should the culvert require any intrusive works. Any intrusive works undertaken will likely need authority from multiple residential owners along the southern boundary before any works are undertaken.

7.5.3 Consideration has been given to how remedial works would be undertaken and a method statement for these works can be found within Appendix M.

7.5.4 All buildings are proposed to be augured piles to ensure no load is transmitted during the construction works. Augured piles will also offer greater flexibility for any unlikely replacement works to the culvert as the new properties would not be undermined by any excavations.

7.5.5 It should be considered that whilst the design life of the culvert will be exceeded by the design life of the development, the culvert is considered to be in good condition for its age and with regular monitoring and maintenance there appears to be no obvious reason why this culverts design life cannot be extended.

7.5.6 Visual inspections should be undertaken on a two yearly basis or after a significant storm event to ensure continual operation and access can still be gained from Redvers Road to the west and Vincent Road to the east. The inspection will need to be via a confirmed space survey.

7.6 CONSTRUCTION WORKS WITHIN VICINITY

7.6.1 Any works within 8m of the culvert will require a Flood Risk Activity Permit to be submitted to the EA in advance of any works being undertaken.

8.0 FLOOD MITIGATION STRATEGY

- 8.1.1 In accordance with the NPPF and the associated PPG, it must be demonstrated that the proposed development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere and, where possible, will reduce flood risk overall.

8.2 SEQUENTIAL APPROACH

- 8.2.1 The site is located within Flood Zone 1 and the buildings have been positioned where possible away from the existing watercourse to ensure a sequential approach is taken by trying to position buildings as far away from the source of flooding as practical.

8.3 SURFACE WATER MANAGEMENT

- 8.3.1 Development can often give rise to an increase in impermeable surfacing which can result in increased surface water flows and volumes leaving site without suitable mitigation. The drainage strategy outlined in Section 5.0 outlines a sustainable surface water management scheme to both treat and delay peak runoff.
- 8.3.2 In accordance with current Planning Policy the surface water runoff from the site will be therefore managed in a sustainable manner mitigating the risk for flooding to both the development and downstream network.

8.4 FINISHED FLOOR LEVELS

- 8.4.1 Floor levels should be set such that they are above the surrounding ground levels and should be no less than 150mm above the final surrounding ground levels where possible. Where this is not possible due to topographical constraints, buildings should be provided with tanking measures to be agreed with Building Control. All thresholds are to have threshold drains to prevent water ingress.
- 8.4.2 The site lies within Flood Zone 1 and therefore there are no requirements concerning the FFLs being set above a certain flood level.

8.5 SAFE ACCESS AND EGRESS

- 8.5.1 In accordance with current guidance and DEFRA FD2320 safe access is to be provided for residents in the event of flooding. Where safe access cannot be provided measures are to be implemented to ensure the residents' safety until the emergency services have been able to reach them.
- 8.5.2 The EA online mapping indicates that the site access lies within FZ1 and therefore has a low probability of flooding.

Table 13.1 Danger to people for different combinations of depth and velocity

Velocity (m/s)	Depth of flooding (m)											
	0.05	0.10	0.20	0.30	0.40	0.50	0.60	0.80	1.00	1.50	2.00	2.50
0.00												
0.10												
0.25												
0.50												
1.00												
1.50												
2.00												
2.50												
3.00												
3.50												
4.00												
4.50												
5.00												

Key:

Danger for some

Danger for most

Danger for all

Figure 7 - Extract from DEFRA FD2320 showing Table 13.1

8.5.3 The site, Lordship Lane and Wellesley Road are free from fluvial flooding during the 0.1% flood event. Wellesley Road contains low risk of surface water flooding which is primarily contained within the kerb height which indicates that all users would be able to utilise the footpaths for access and egress if required. Flood free access and egress will therefore be available to all users for the site.

8.6 FLOOD WARNING & EVACUATION

8.6.1 The site is considered to have a low probability of flooding from all sources, and a stay put approach can be adopted if necessary. Due to the low probability of flooding it is not anticipated a flood evacuation plan will be required for the site.

9.0 CONCLUSIONS

- 9.1.1 The site proposed for development is free of potential risk of flooding from tidal events.
- 9.1.2 The site is outside the extents of the mapped flood plain of main river systems while being classified as an area of low risk.
- 9.1.3 The site is at generally at very low risk of flooding from overland flow routing from surface water with a small area of medium to High risk to the south of the site at the end of Wellesley Road.
- 9.1.4 The site is at a low susceptibility of flooding from groundwater sources.
- 9.1.5 The site is at no risk of flooding from manmade lakes.
- 9.1.6 The escape flow route from the strategic water mains has also been considered. In the unlikely event of failure of the mains the flows would not reach the properties.
- 9.1.7 The site is at no risk of flooding from existing sewerage systems.
- 9.1.8 The proposed surface water discharge rate matches the undeveloped greenfield Q_{BAR} runoff rates for the 1in100 year + 40% climate change combined with the use of SUDS will treat and delay runoff entering the watercourse network.
- 9.1.9 The site is at a negligible risk of flooding from its own private drainage systems; however, this can be mitigated against by regular maintenance in accordance with the maintenance strategy provided within this report and channelling of flows within the development away from the properties.
- 9.1.10 We therefore conclude the application site lies within Flood Zone 1 as defined in the NPPF Table 1 and since the exception test for this has been passed more vulnerable development uses should be permitted.

APPENDICES