



Flood Risk Assessment for Planning

Prepared for:
Manjunath Naik

March 2016

Our reference:
87007-Naik-OakAve

Location:
34 Oak Avenue
Ickenham
Uxbridge
UB10 8LR



Document Issue Record

Project: Flood Risk Assessment for Planning
Client: Manjunath Naik
Location: 34 Oak Avenue, Ickenham, Uxbridge UB10 8LR
Application: Householder extension
Our ref: 87007-Naik-OakAve
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Lead Consultant: Ms Jackie Stone
Authorisation: Mr Edward Bouet

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Key Facts

Flood Risk Posed:

- EA Flood Zone 2 (Medium Risk).
- Fluvial flood risk originating from the Ickenham Stream 123m north east of the site.
- "Low" to "Medium" risk of flooding from surface water.
- Risk of flooding posed to the site by groundwater, sewer surcharge and reservoir flooding would appear to be low.

Flood Risk Management:

- The additional footprint created by the development will not exceed 250m².
- Floor levels within the extension will be set no lower than existing adjacent floor levels.
- No new bedrooms will be created on the ground floor.
- Flood proofing of the house will be incorporated as appropriate.
- The applicant will register with the free Environment Agency Floodline Warnings Direct service.

Assuming accordance with these flood risk management measures, Unda Consulting Limited consider the proposed application to be suitable in flood risk terms.

Introduction

Unda Consulting Limited have been appointed by Manjunath Naik (hereinafter referred to as “the applicant”) to undertake a Site Specific Flood Risk Assessment (FRA) for Planning at 34 Oak Avenue, Ickenham, Uxbridge UB10 8LR (hereinafter referred to as “the site”). The FRA has been undertaken in accordance with the National Planning Policy Framework (NPPF) March 2012 and the associated technical guidance.

The site appears to be partially located within Flood Zone 2 as defined by the Environment Agency (EA) on their Flood Map for Planning. Under the National Planning Policy Framework (NPPF), a FRA is required if a proposed development:

- includes building or engineering works in Flood Zone 2 or 3;
- includes building or engineering works on land classified by the Environment Agency as having critical drainage problem;
- changes the use of land or buildings in a location at risk of flooding from rivers or the sea, or with critical drainage problems;
- changes the use of land or buildings in a way that increases the flood vulnerability of the development where it may be subject to other sources of flooding;
- is larger than 1 hectare.

Given that the proposed application site is located in Flood Zone 2 (Medium Risk of flooding from rivers or the sea), and includes building works, the applicant is required to submit a FRA under the NPPF. The assessment should demonstrate to the Local Planning Authority (LPA) and EA how flood risk will be managed now and over the development’s lifetime, taking climate change into account, and with regard to the vulnerability of its potential users.

The objectives of a FRA to support a planning application are to establish:

- whether the proposed development is likely to be affected by current or future flooding from any source;
- whether it will increase flood risk elsewhere;
- whether the measures proposed to deal with these effects and risks are appropriate.

Existing Situation

Site Usage:

The site is occupied by a detected 2 storey residential property. The site is understood to have lawful planning permission for residential occupation.

Detailed existing site plans are provided in the report Appendix.



Figure 1: Site location plan and immediate surrounding area (Source: Google Earth)

Geography:

The site is located in an established residential area characterised by a mixture of detached / semi-detached houses.

Topography:

Environment Agency LiDAR has been used to assess the topography across the site and wider area. Light Detection and Ranging (LIDAR) is an airborne mapping technique, which uses a laser to measure the distance between the aircraft and the ground surface. Up to 100,000 measurements per second are made of the ground, allowing highly detailed terrain models to be generated at high spatial resolutions. The EA's LIDAR data archive contains digital elevation data derived from surveys carried out by the EA's specialist remote sensing team. Accurate elevation data is available for over 70% of England. The LiDAR technique records an elevation accurate to +0.3m every 2m. This dataset is derived from a combination of our full dataset which has been merged and re-sampled to give the best possible coverage. The dataset can be supplied as a Digital Surface Model (DSM) produced from the signal returned to the LIDAR (which includes heights of objects, such as vehicles, buildings and vegetation, as well as the terrain

surface) or as a Digital Terrain Model (DTM) produced by removing objects from the Digital Surface Model. 2.0m horizontal resolution DTM LiDAR data has been used for the purposes of this study.

EA 2m LiDAR remotely sensed digital elevation data suggests that the ground topography is approximately 43.02m AOD on the site.

Geology and Soil:

The British Geological Survey (BGS) Map indicates that the bedrock underlying the site is London Clay Formation, Clay, Silt and Sand.

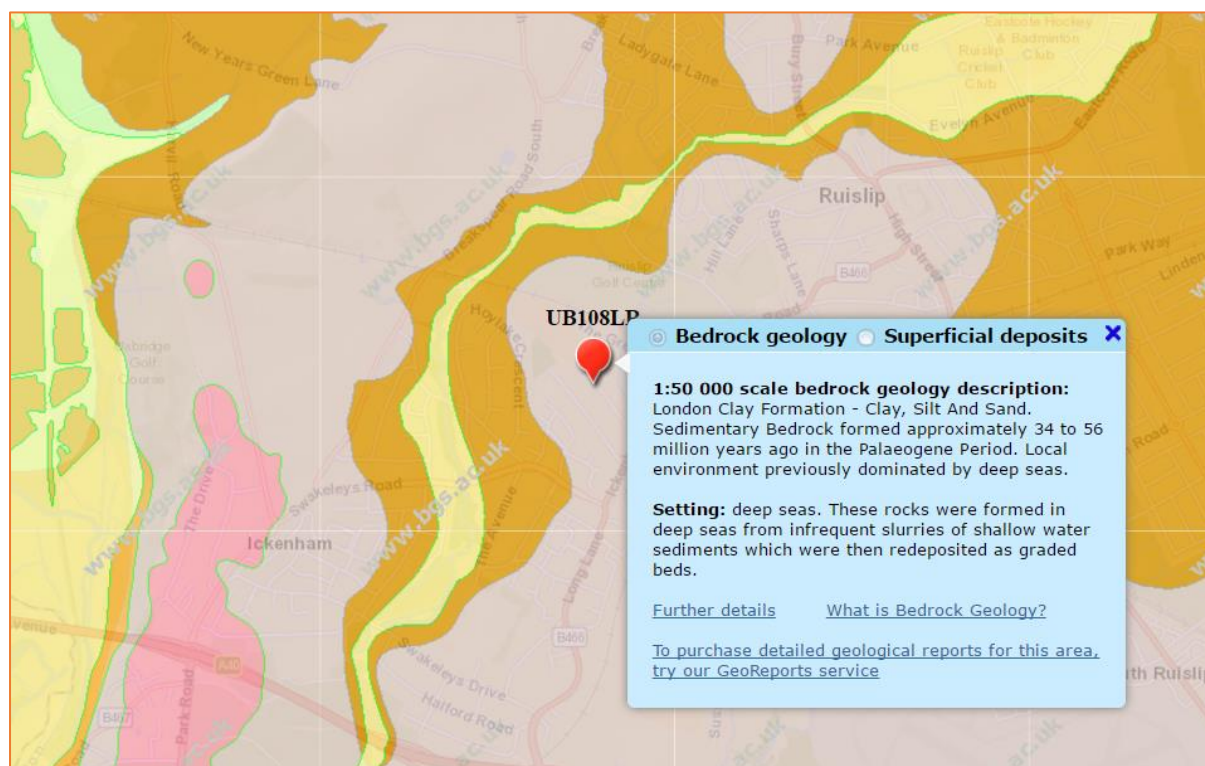


Figure 2: Local geology (Source: BGS)

The soil type in the area taken from the UKSO Website is Deep Prequaternary Marine/Estuarine - Sand and Silt. With soil conditions such as these, it would be advisable that this value is checked through trial pit infiltration tests on site prior to any final detailed drainage design requiring infiltration is carried out.

Hydrology:

The site is situated 123m south west of the Ickenham Stream and 647m east of the River Pinn. The Grand Union Canal is 2.6km west of the site.

Greenfield runoff rates have been calculated using Microdrainage software, using ICP SUDS runoff estimation methods. See Appendix B.

As per the newly published climate change allowances (February 2016) for anticipated changes in extreme rainfall intensity in small and urban catchments, the upper end (40% increase) peak rainfall intensity allowances should be assessed to understand the impact of climate change. The increase in peak rainfall intensity has been assessed by increasing the SAAR (Standard average annual rainfall in mm) value in the calculations.

Proposed Development

The proposed planning application is for the construction of a part two storey, part single storey rear extension to a residential dwelling. Detailed proposed site plans are provided in the report Appendix.

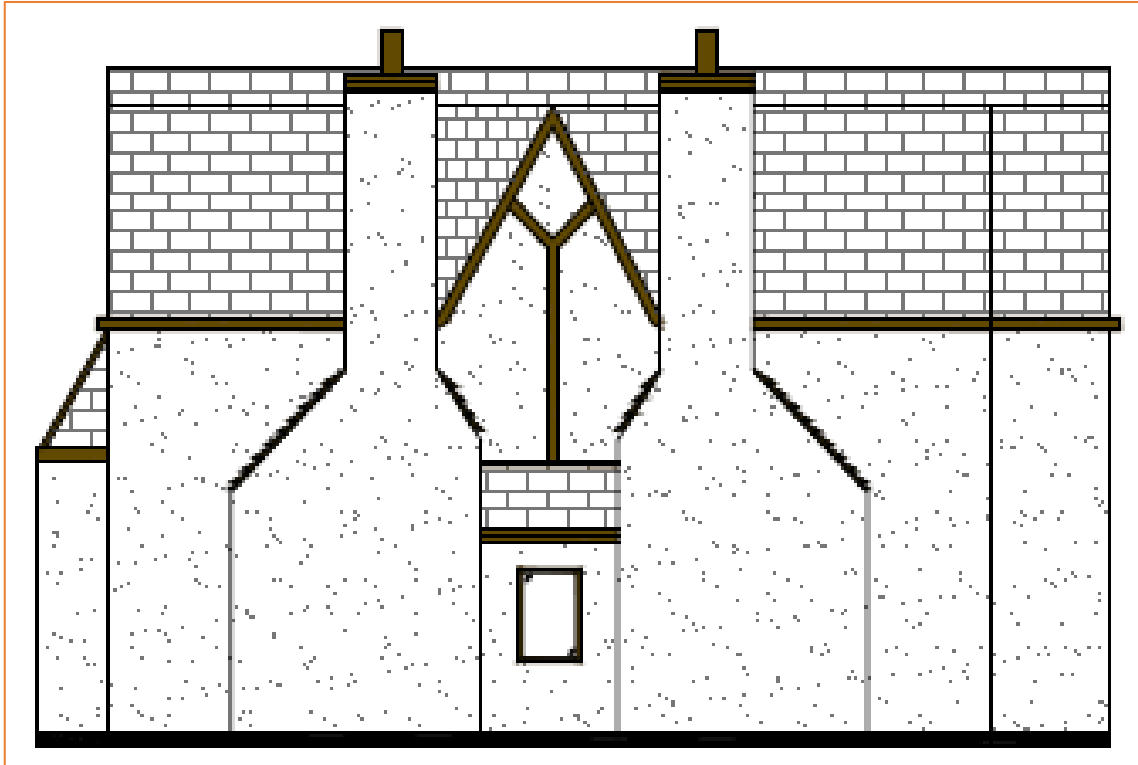


Figure 3: Existing side elevation (Source: Gotoplaning)

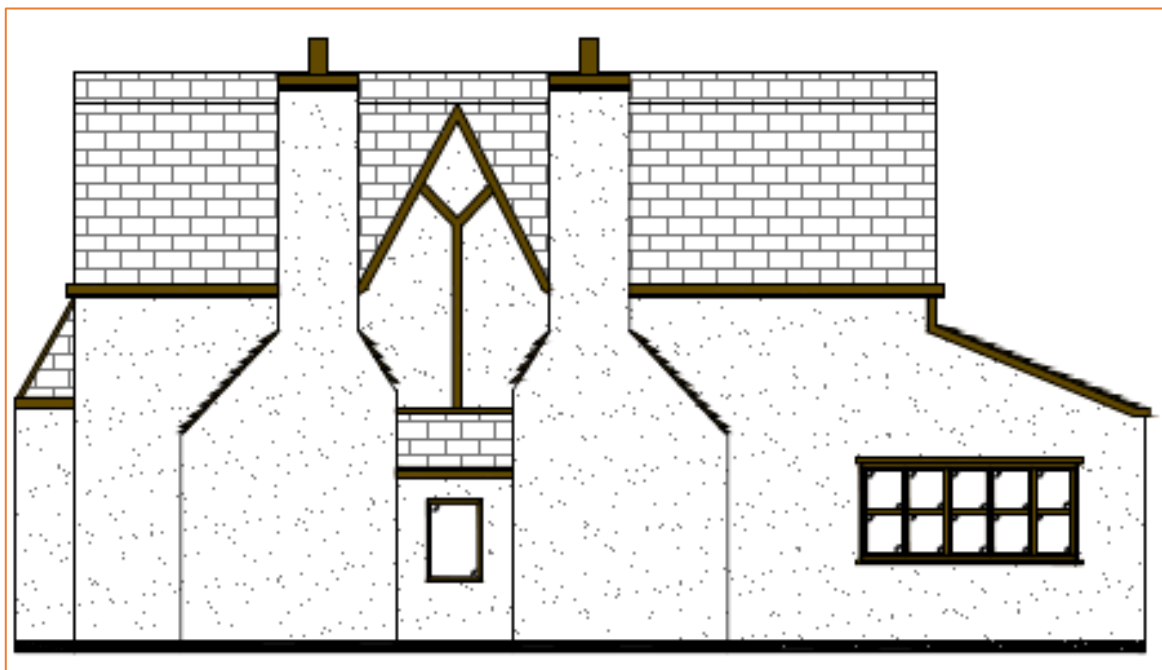


Figure 4: Proposed side elevation (Source: Gotoplaning)

Assessment of Flood Risk

Flood Zones:

Within planning, Flood Zones refer to the probability of river and sea flooding, ignoring the presence of defences. They are shown on the Environment Agency's Flood Map for Planning (Rivers and Sea), available on the Environment Agency's web site.

Flood Zone	Definition
Zone 1 Low Probability	Land having a less than 1 in 1,000 annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map – all land outside Zones 2 and 3)
Zone 2 Medium Probability	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or Land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding. (Land shown in light blue on the Flood Map)
Zone 3a High Probability	Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding. (Land shown in dark blue on the Flood Map)
Zone 3b The Functional Floodplain	This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)

Table 1: Flood Zones

The Flood Zones shown on the Environment Agency's Flood Map for Planning (Rivers and Sea) do not take account of the possible impacts of climate change and consequent changes in the future probability of flooding.

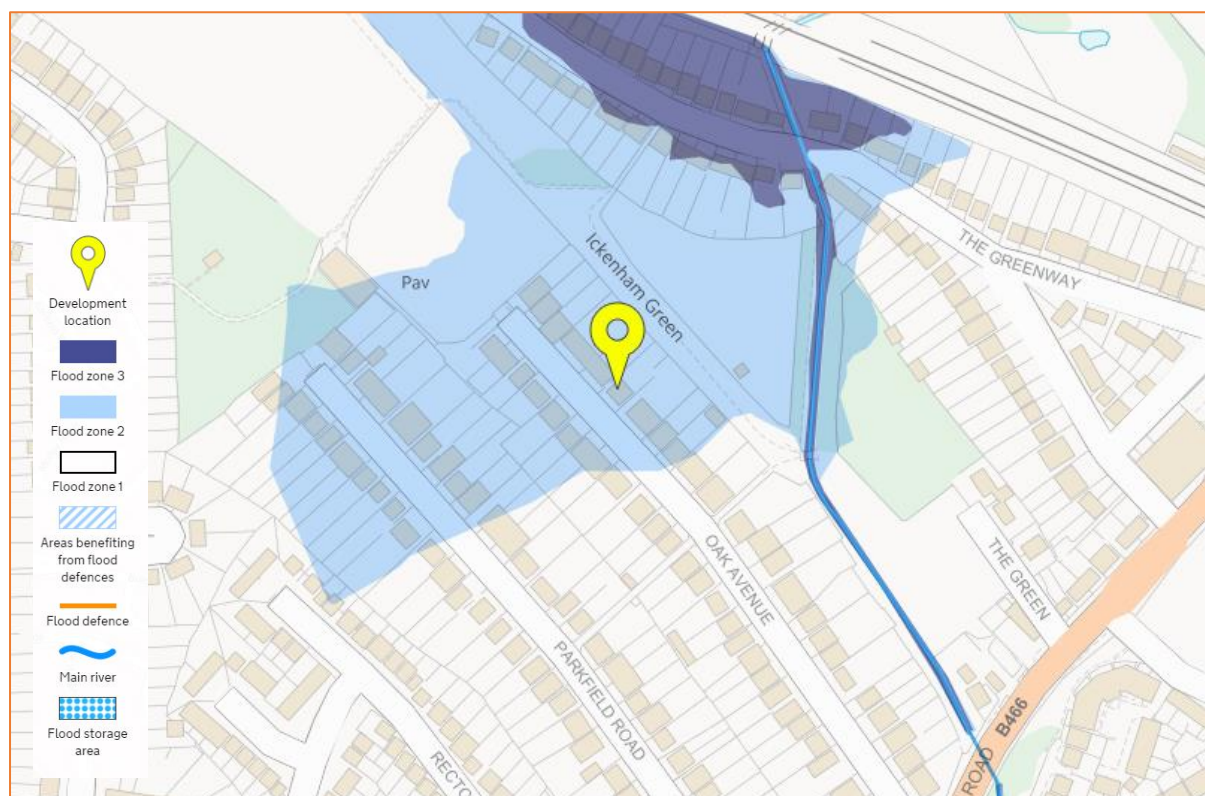


Figure 5: Environment Agency Flood Map for Planning (Rivers and Sea) (Source: EA)

The site is located within Flood Zone 2 (Medium Probability), which means it is defined as land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding.

The risk would appear to be predominantly fluvial, and originate from the Ickenham Stream 123m north east of the site.

Fluvial (Ickenham Stream):

The Ickenham Stream is a 'Main River' as classified by the Environment Agency which feeds into the River Pinn and forms part of the Thames catchment area.

Flood defences:

According to EA data, natural high ground banks flank either side of the Ickenham Stream which protect to a crest height of 40.52mAOD.

Residual risk (breach or overtopping of flood defences):

Breaching of flood defences can cause rapid inundation of areas behind flood defences as flow in the river channel discharges through the breach. A breach can occur with little or no warning, although they are much more likely to concur with extreme river levels or tides when the stresses on flood defences are highest. Flood water flowing through a breach will normally discharge at a high velocity, rapidly filling up the areas behind the defences, resulting in significant damage to buildings and a high risk of loss of life. Breaches are most likely to occur in soft defences such as earth embankments although poorly maintained hard defences can also be a potential source of breach.

Overtopping of flood defences occurs when water levels exceed the protection level of raised flood defences. The worst case occurs when the fluvial or tidal levels exceed the defence level as this can lead to prolonged flooding. Less severe overtopping can occur when flood levels are below defence levels, but wave action causes cyclic overtopping, with intermittent discharge over the crest level of the defence. Flood defences are commonly designed with a freeboard to provide protection against overtopping from waves. The risk from overtopping due to exceedance of the flood defence level is much more significant than the risk posed by wave overtopping. Exceedance of the flood defence level can lead to prolonged and rapid flooding with properties immediately behind the defences at highest risk.

No flood defences act to defend the site from direct inundation, meaning there is negligible residual risk from beach and overtopping of flood defences.

Historical flood events:

The EA have no records of historical flooding having affected the site. In addition, according to the Surface Water Management Plan for the London Borough of Hillingdon (2011) there are no records of historical fluvial incidents on site on the immediate area.

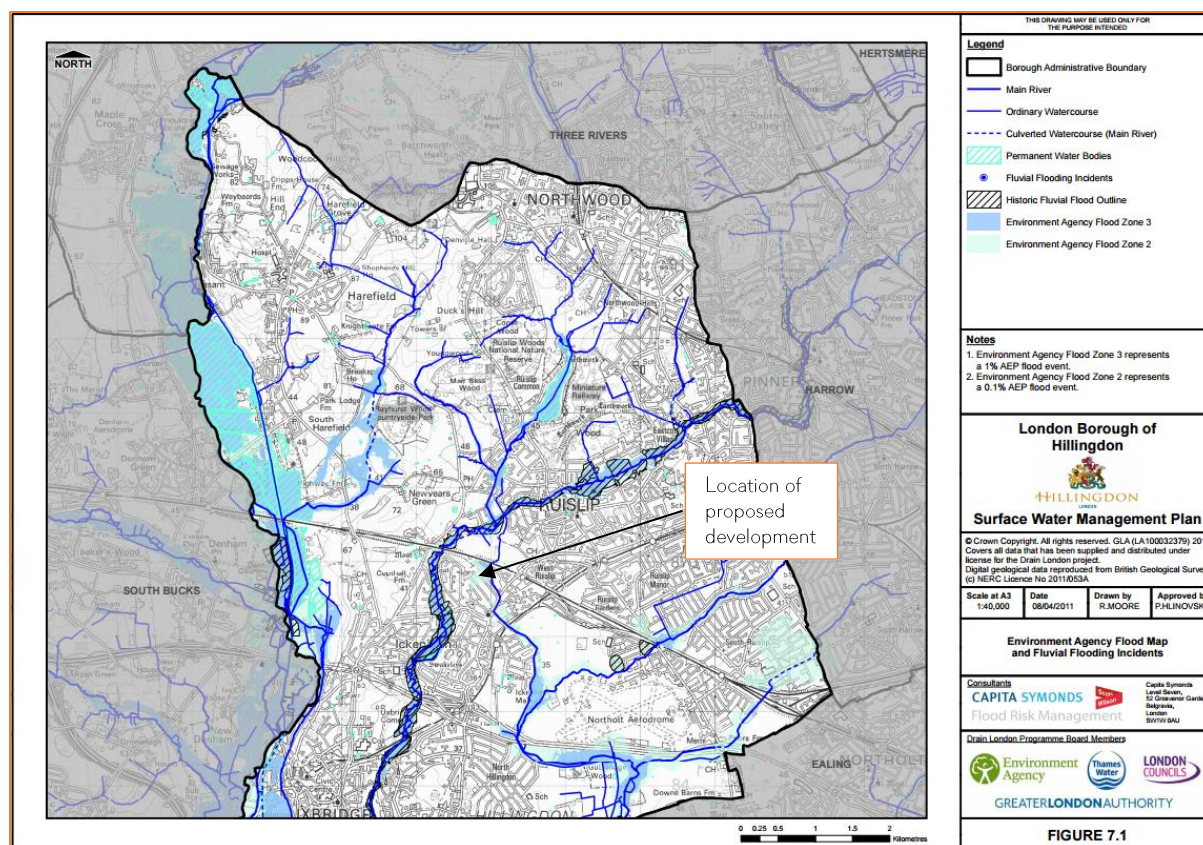


Figure 6: Extract from Environment Agency Flood Map and Fluvial Flooding Incidents North (Source: London Borough of Hillingdon, 2011)

Pluvial (Surface Water):

Pluvial (surface water) flooding happens when rainwater does not drain away through the normal drainage systems or soak into the ground, but lies on or flows over the ground instead.

In 2013 the EA, working with Lead Local Flood Authorities (LLFAs), produced an updated Flood Map for Surface Water. It is considered to represent a significant improvement on the previous surface water flood maps available, both in terms of method and representation of the risk of flooding. The modelling techniques and data used are considerably improved, and also incorporated locally produced mapping where this is available to represent features best modelled at a local scale.

The Flood Map for Surface Water assesses flooding scenarios as a result of rainfall with the following chance of occurring in any given year (annual probability of flooding is shown in brackets):

- 1:30 (3.3%)
- 1:100 (1%)
- 1:1000 (0.1%)

The mapping below shows the Risk of Flooding from Surface Water centred on the site. Please note that the EA to not consider this information suitable to be used to identify the risk to individual properties or sites. It is useful to raise awareness in areas which may be at risk and may require additional investigation.

The EA Surface Water Flood Map suggests that the site lies partially within an area of "Low" to "Medium" risk of surface water flooding.

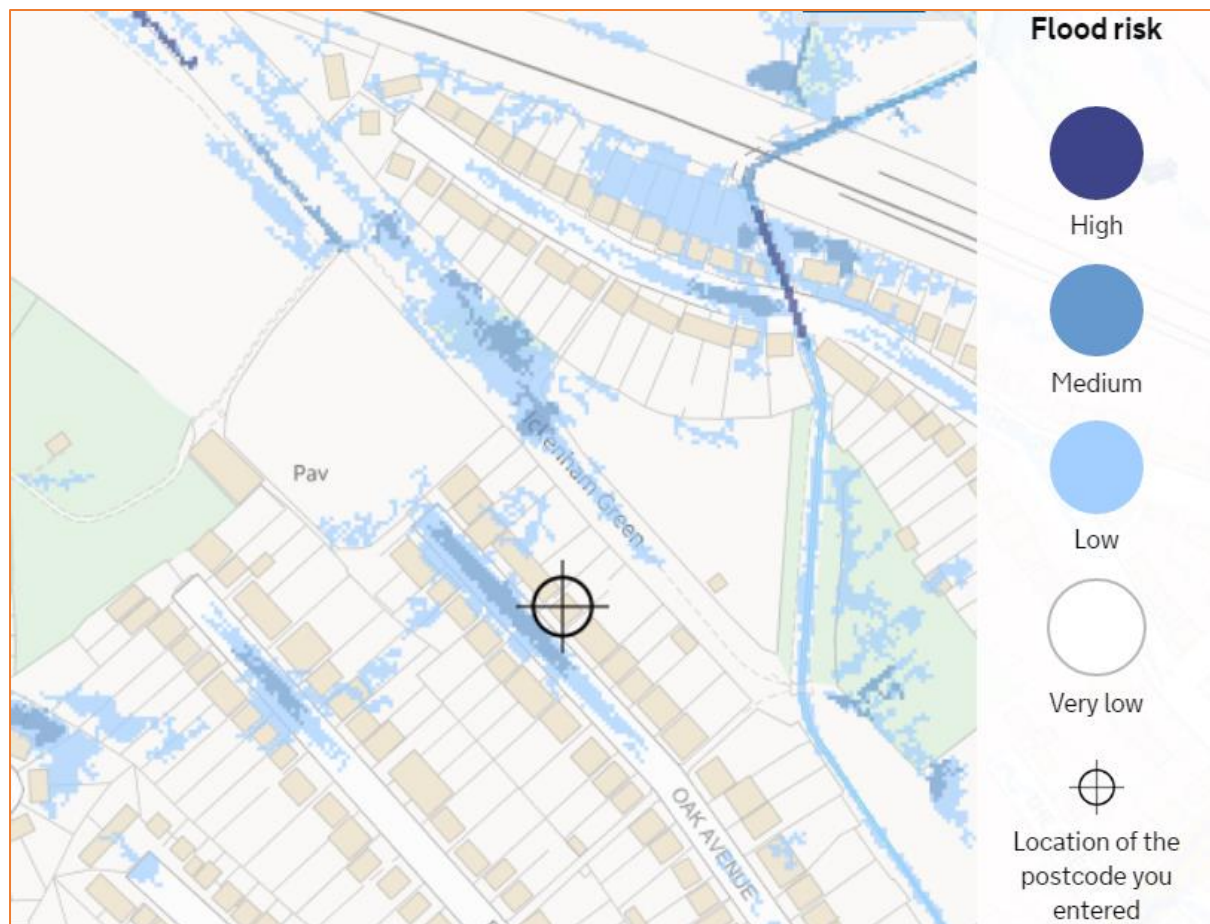


Figure 7: Extract from Environment Agency Surface Water Flood Map (Source: EA)

According to the Surface Water Management Plans for Hillingdon the site is not located with a critical drainage areas (CDAs).

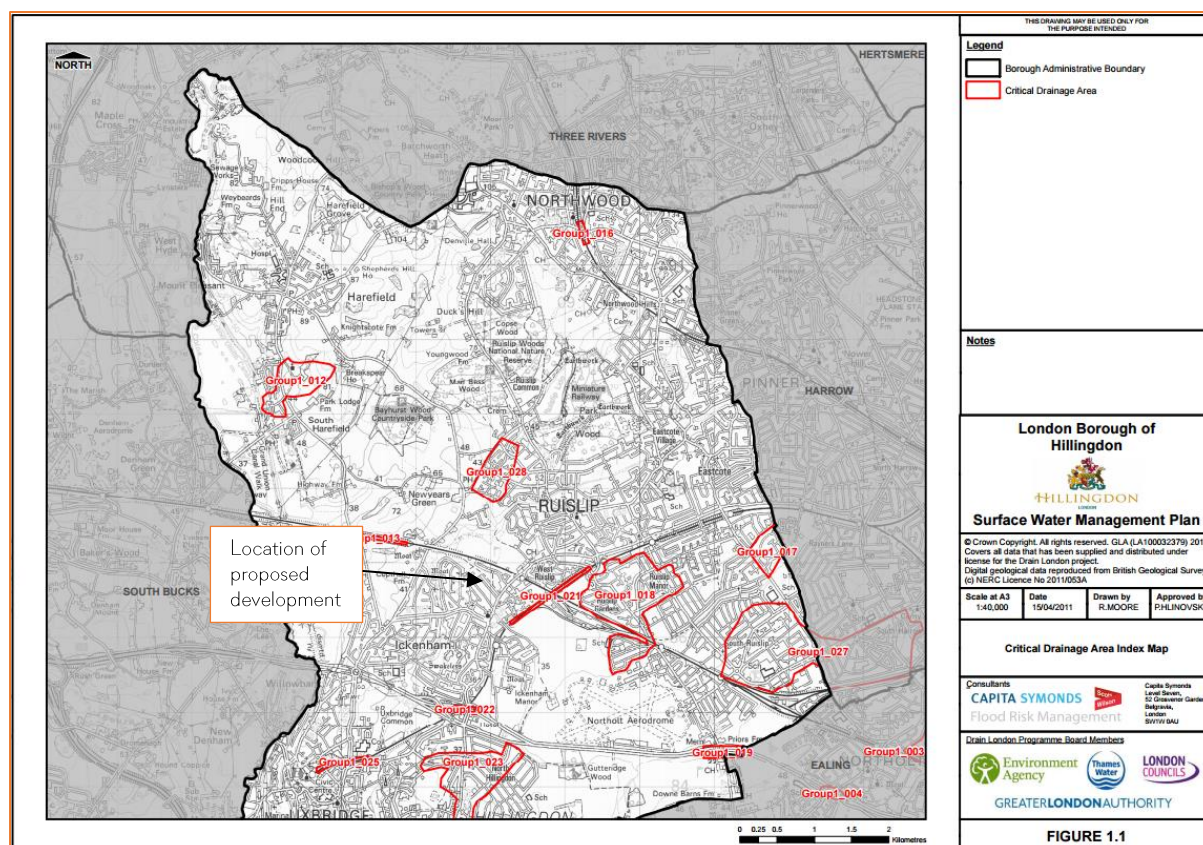


Figure 8: Extract from Critical Drainage Area Index Map North (Source: London Borough of Hillingdon)

Groundwater:

Groundwater flooding occurs as a result of water rising up from the underlying rocks or from water flowing from abnormal springs. This tends to occur after much longer periods of sustained high rainfall. Higher rainfall means more water will infiltrate into the ground and cause the water table to rise above normal levels. Groundwater tends to flow from areas where the ground level is high, to areas where the ground level is low. In low-lying areas the water table is usually at shallower depths anyway, but during very wet periods, with all the additional groundwater flowing towards these areas, the water table can rise up to the surface causing groundwater flooding.

Groundwater flooding is most likely to occur in low-lying areas underlain by permeable rocks (aquifers). These may be extensive, regional aquifers, such as chalk or sandstone, or may be localised sands or river gravels in valley bottoms underlain by less permeable rocks. Groundwater flooding takes longer to dissipate because groundwater moves much more slowly than surface water and will take time to flow away underground.

According to the Surface Water Management Plan for the London Borough of Hillingdon (2011) there are no records of groundwater flooding on site or in the immediate vicinity. In addition the site is not located in an area where there is an increased potential for elevated groundwater.

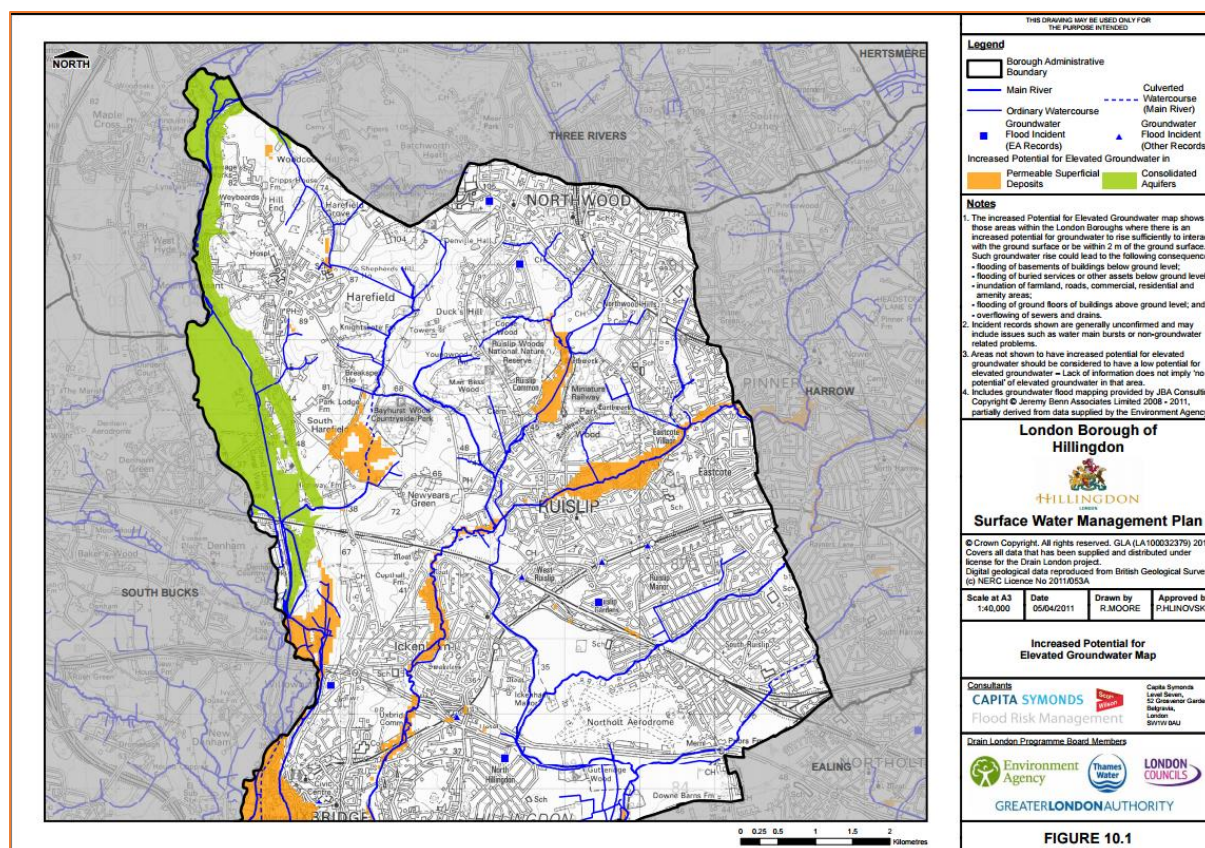


Figure 9: Increased Potential for Elevated Groundwater Map North (Source: London Borough of Hillingdon, 2011)

Sewer Surcharge:

Sewer flooding occurs when the sewer network cannot cope with the volume of water that is entering it. It is often experienced during times of heavy rainfall when large amounts of surface water overwhelm the sewer network causing flooding. Temporary problems such as blockages, siltation, collapses and equipment or operational failures can also result in sewer flooding.

All Water Companies have a statutory obligation to maintain a register of properties/areas which have reported records of flooding from the public sewerage system, and this is shown on the DG5 Flood Register. This includes records of flooding from foul sewers, combined sewers and surface water sewers which are deemed to be public and therefore maintained by the Water Company. The DG5 register records of flood incidents resulting in both internal property flooding and external flooding incidents. Once a property is identified on the DG5 register, water companies can typically put funding in place to address the issues and hence enable the property to be removed from the register. It should be noted that flooding from land drainage, highway drainage, rivers/watercourses and private sewers is not recorded within the register.

According to the Surface Water Management Plan for the London Borough of Hillingdon (2011) the site is serviced by Thames Water. The site is located in an area which is served by a surface water sewer.

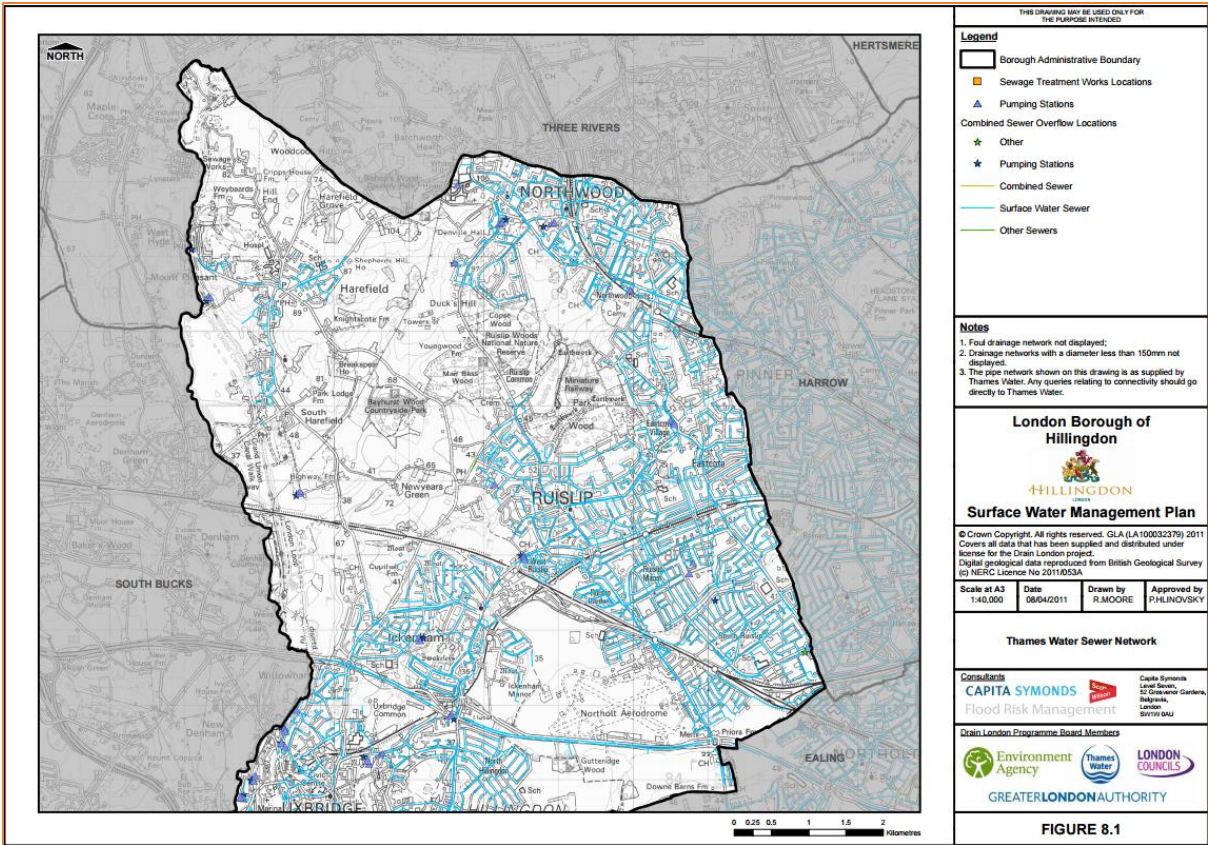


Figure 10: Extract from the Thames Water Sewer Network Map North (Source: London Borough of Hillingdon, 2011)

No information has been provided to suggest that the site is susceptible to sewer surcharge flooding.

Other Sources:

Reservoirs with an impounded volume in excess of 25,000 cubic metres (measured above natural ground level) are governed by the Reservoirs Act and are listed on a register held by the Environment Agency. The site is outside the maximum inundation extent on the EA Reservoir Inundation Map. The EA also advise on their website that reservoir flooding is extremely unlikely. There has been no loss of life in the UK from reservoir flooding since 1925. All major reservoirs have to be inspected by specialist dam and reservoir Engineers. In accordance with the Reservoirs Act 1975 in England, these inspections are monitored and enforced by the EA themselves. The risk to the site from reservoir flooding is therefore minimal and is far lower than that relating to the potential for fluvial / tidal flooding to occur. The Environment Agency Reservoir Flood Map illustrated below, illustrates the largest area that might be flooded if the storage area were to fail and release the water it is designed to hold during a flood event.

Records of flooding from reservoirs and canals are erratic as there is no requirement for the Environment Agency to provide information on historic flooding from canals and raised reservoirs on plans. In particular, the NPPF does not require flood risk from canals and raised reservoirs to be shown on the Environment Agency flood zones.

Overflows from canals can be common as they are often fed by land drainage, and often do not have controlled overflow spillways. Occasionally, major bank breaches also occur, leading to rapid and deep flooding of adjacent land.

There do not appear to be any further artificial (man-made) sources of flood risk (such as raised canals) in the immediate vicinity of the site.

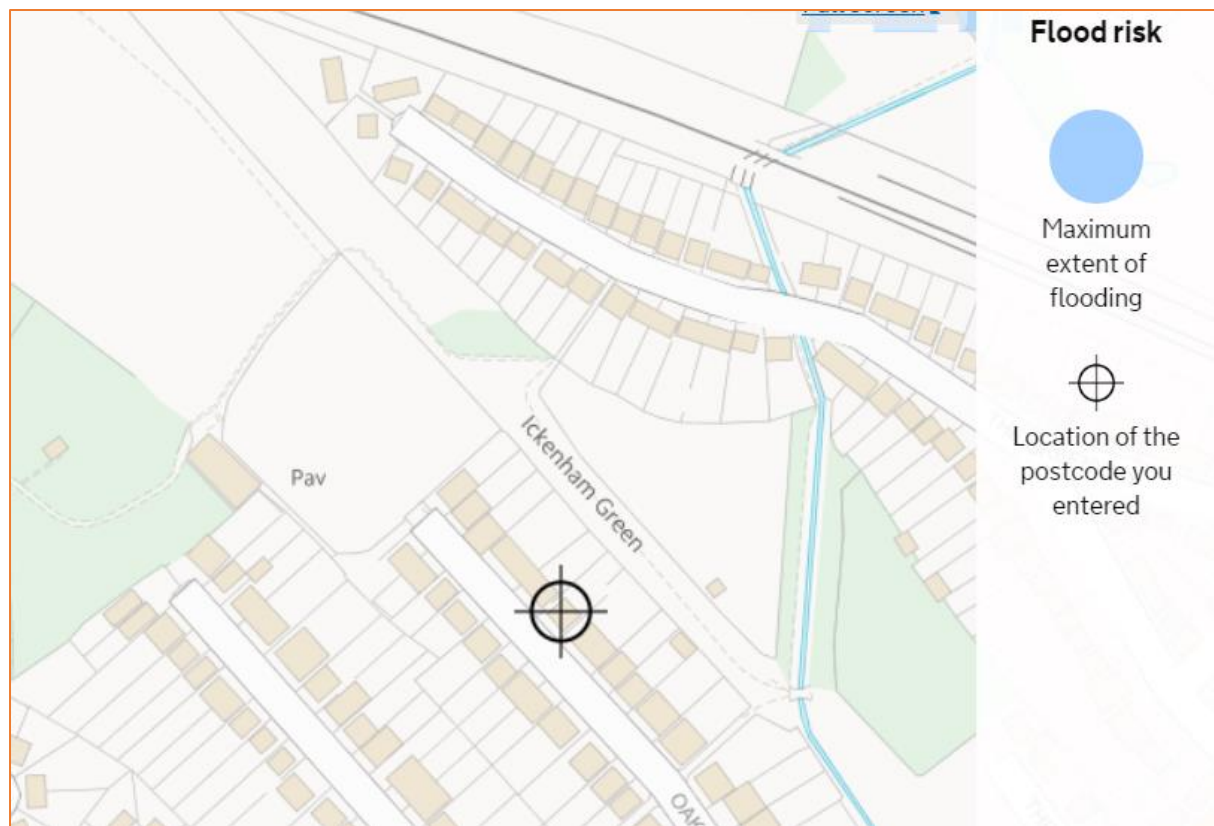


Figure 11: Extract from Environment Agency Reservoir Flood Map (Source: EA)

Flood Risk Management

Vulnerability to flooding:

The NPPF classifies property usage by vulnerability to flooding.

The existing site usage is classified as “more vulnerable” throughout, as it is a residential property. Post development, the site will remain “more vulnerable”, as the application is for the extension of the existing residential property. Accordingly, it is considered that the vulnerability of the site as a whole is not increased post development.

EA Standing Advice:

The EA Standing Advice guidance is for domestic extensions and non-domestic extensions where the additional footprint created by the development does not exceed 250m². It should not be applied if an additional dwelling is being created, e.g. a self-contained annex or additional commercial unit. The proposed extension is considered to fit within the EA’s standing advice for domestic extensions.

Physical Design Measures:

The applicant has confirmed that the floor level of the proposed ground floor extension will be set no lower than that of the existing adjoining ground floor. No additional sleeping accommodation is proposed on the ground floor. To help protect against flooding during extreme events, the applicant has agreed to implement flood resistant design measures into the extension. These measures can include the following:

- Closed-cell foam used in wall cavities;
- Waterproof ground floor internal render;
- External walls rendered resistant to flooding to first floor level;
- Exterior ventilation outlets, utility points and air bricks fitted with removable waterproof covers;
- Ground floor electrical main ring run from first floor level; and on separately switched circuit from first floor;
- Electrical incomer and meter situated at first floor level or above;
- Boilers, control and water storage / immersion installed at first floor level or above;
- Gas meter installed at first floor level or above;
- Plumbing insulation of closed-cell design;
- Non-return valves fitted to all drain and sewer outlets;
- Manhole covers secured;
- Anti-syphon fitted to all toilets;
- Use of MDF carpentry (i.e. skirting, architrave, built-in storage) avoided at ground floor level;
- Stairs of solid hardwood construction with wood faces treated to resist water penetration.

The applicant should also consider the use of demountable flood defence barriers to defend new doorways and low windows.

Safe Escape:

The NPPF requires a route of safe escape for all residents and uses to be provided from new residential properties in Flood Zone 3. Safe escape is usually defined as being through slow moving flood water no deeper than 25cm.

However, it should be noted that the proposed application is for the extension of the existing residential property. No new units will be created as part of the development. Safe escape is not a requirement under the EA Standing Advice guidance is for domestic extensions.

Residents should follow the warning and evacuation procedure detailed in the following section.

Flood Warning:

The EA is responsible for issuing flood alerts/warnings. Flood alerts/warnings are issued to the emergency services and local authorities. Both private individuals and organisations can sign-up to receive warnings via phone, text or email. This system of receiving warnings is currently voluntary.

Advice regarding severe flood warnings will generally be given during weather forecasts on local radio and TV. In the case of extreme events, warnings can also be disseminated via door to door visits by the police or locally appointed flood wardens.

The site lies in an Environment Agency Flood Alert Area. The EA issue flood warnings to specific areas when flooding is expected. It is recommended that the applicant registers online with the free Environment Agency Floodline Warnings Direct service at <https://fwd.environment-agency.gov.uk/app/olr/register> to receive flood alerts/warnings by phone, text or email.

To further conform to the EA Standing Advice, the applicant has agreed to subscribe to the EA's flood warning service.

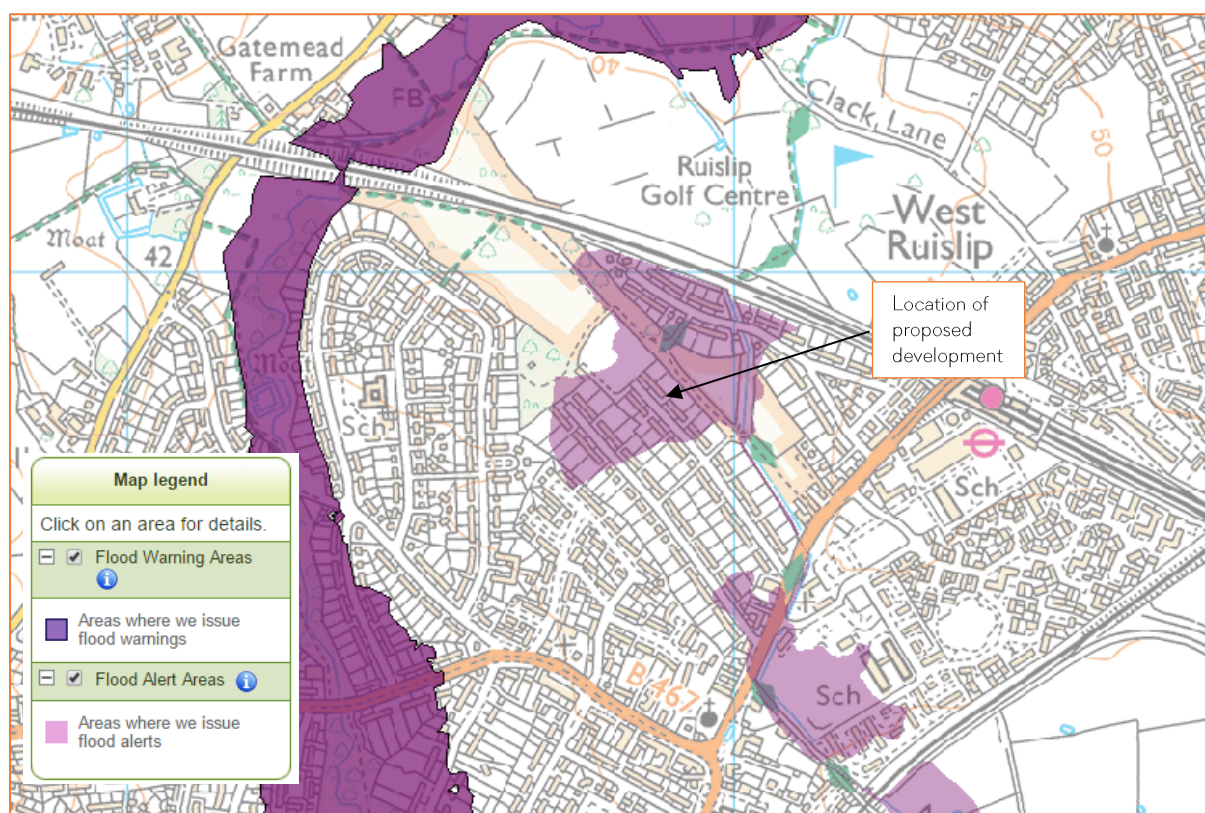


Figure 12: Environment Agency Flood Warning Areas (Source: EA)

The flood warning service has three types of warnings that will help you prepare for flooding and take action:

Flood Warning	Flood Alert	Flood Warning	Severe Flood Warning
			
What it means?	Flooding is possible. Be prepared.	Flooding is expected. Immediate action required.	Severe flooding. Danger to life.
When it's used?	Two hours to two days in advance of flooding.	Half an hour to one day in advance of flooding.	When flooding poses a significant threat to life.
What to do?	Be prepared to act on your flood plan. Prepare a flood kit of essential items. Monitor local water levels and the flood forecast on our website.	Move family, pets and valuables to a safe place. Turn off gas, electricity and water supplies if safe to do so. Put flood protection equipment in place.	Stay in a safe place with a means of escape. Be ready should you need to evacuate from your home. Co-operate with the emergency services. Call 999 if you are in immediate danger.

Table 2: Flood Warnings

Flood Plan:

It is recommended that the applicant and future owners, occupiers and Landlords of the property prepare a flood plan to protect life and property during a flood event:

Before a flood:

- Find out if you are at risk of flooding.
- Find out if you can receive flood warnings.
- Prepare and keep a list of all your important contacts to hand or save them on your mobile phone.
- Think about what items you can move now and what you would want to move to safety during a flood such as pets, cars, furniture, and electrical equipment.
- Know how to turn off gas, electricity and water supplies.
- Prepare a flood kit of essential items and keep it handy. It can include copies of important documents, a torch, a battery-powered or wind-up radio, blankets and warm clothing, waterproofs, rubber gloves and a first aid kit including all essential medication.
- Consider buying flood protection products such as flood boards and airbrick covers to help reduce flood water getting into your property.

During a flood:

- Tune into your local radio station on a battery or wind-up radio.
- Fill jugs and saucepans with water.
- Grab your flood kit - if you have prepared one.
- Collect blankets, torch, first aid kit, medication and food.

- Move important documents, personal items, valuables, and lightweight belongings upstairs or to high shelves.
- Raise large items of furniture, or put them in large bags if you have them.
- Move people, outdoor belongings, cars and pets to higher ground.
- Switch off water, gas and electricity at mains when water is about to enter your home. Do not touch sources of electricity when standing in water.
- Fit flood protection products, if you have them, for example flood boards, airbrick covers, sandbags.
- Put plugs in sinks and baths. Weigh them down with a pillowcase or plastic bag filled with soil.
- If you do not have non-return valves fitted, plug water inlet pipes with towels or cloths.
- Move your family and pets upstairs or to a high place with a means of escape.
- Listen to the advice of the emergency service and evacuate if told to do so.
- Avoid walking or driving through flood water. Six inches of fast-flowing water can knock over an adult and two feet of water can move a car.

After a flood:

- If you have flooded, contact your insurance company as soon as possible.
- Take photographs and videos of your damaged property as a record for your insurance company.
- If you don't have insurance, contact your local authority for information on grants and charities that may help you.
- Flood water can contain sewage, chemicals and animal waste. Always wear waterproof outerwear, including gloves, wellington boots and a face mask.
- Have your electrics, central heating and water checked by qualified engineers before switching them back on.

Off-Site Impacts:

The NPPF requires that where development is proposed in undefended areas of floodplain, which lie outside of the functional floodplain, the implications of ground raising operations for flood risk elsewhere needs to be considered. Raising existing ground levels may reduce the capacity of the floodplain to accommodate floodwater and increase the risk of flooding by either increasing the depth of flooding to existing properties at risk or by extending the floodplain to cover properties normally outside of the floodplain. Flood storage capacity can be maintained by lowering ground levels either within the curtilage of the development or elsewhere in the floodplain, in order to maintain at least the same volume of flood storage capacity within the floodplain.

In undefended tidal areas, raising ground levels is unlikely to impact on maximum tidal levels so the provision of compensatory storage should not be necessary.

For development in a defended flood risk area, the impact on residual flood risk to other properties needs to be considered. New development behind flood defences can increase the residual risk of flooding if the flood defences are breached or overtopped by changing the conveyance of the flow paths or by displacing flood water elsewhere. If the potential impact on residual risk is unacceptable then mitigation should be provided.

The site is situated in Flood Zone 2 when using the Environment Agency Flood Map for Planning (Rivers and Sea), but the application is for a minor extension which does not exceed 250m².

Post development, there will be no unacceptable loss of floodplain storage.

Surface Water Drainage:

The development will utilise Sustainable drainage systems (SuDS) design in accordance with the NPPF for Planning Applications and the drainage hierarchy as follows:

The development will utilise a rainwater harvesting system to reduce the use of water and minimise current and future flood risk. Rainwater harvesting not only provides a source of non potable water for domestic use, the storage tanks used also provides a means of retaining storm water run-off to be used over time. Microdrainage software has been used to estimate the tank size requirement to provide adequate surface water run-off management (see Appendix B). Total storage of $2.0.83\text{m}^3$ would be required to provide adequate stormwater control storage volume for the additional proposed building footprint. A 2.0m^3 tank will be installed beneath the side garden to provide this attenuation. Any residual overflow from the rainwater harvesting system will be discharged into the existing public surface water sewer at a controlled rate of less than 5.0l/s . The rainwater harvesting tank will be designed as an integrated system to provide the necessary discharge control, and to optimise any spare storage within the overall system. This system will manage the entire proposed additional roof area (32.50m^2), proving significant betterment over the existing run off situation.

The calculation sheets are provided in Appendix B.

Sequential and Exception Test

The Sequential Test aims to ensure that development does not take place in areas at high risk of flooding when appropriate areas of lower risk are reasonably available. The site is situated in Flood Zone 2 when using the Environment Agency Flood Map for Planning (Rivers and Sea). Post development, the site will remain “more vulnerable”, as the application is for the extension of the existing property. The proposed application is considered to be suitable within Flood Zone 2.

Flood Zones	Flood Risk Vulnerability Classification				
	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 3: Flood risk vulnerability and flood zone ‘compatibility’

The Sequential and Exception Tests do not need to be applied to minor developments and changes of use. The proposed application is for the minor extension of an existing property.

Conclusion

Unda Consulting Limited have been appointed by Manjunath Naik (hereinafter referred to as "the applicant") to undertake a Site Specific Flood Risk Assessment (FRA) for Planning at 34 Oak Avenue, Ickenham, Uxbridge UB10 8LR (hereinafter referred to as "the site"). The FRA has been undertaken in accordance with the National Planning Policy Framework (NPPF) March 2012 and the associated technical guidance.

The proposed planning application is for the construction of a part two storey, part single storey rear extension to a residential dwelling. The existing site usage is classified as "more vulnerable" throughout, as it is a residential property. Post development, the site will remain "more vulnerable", as the application is for the extension of the existing residential property. Accordingly, it is considered that the vulnerability of the site as a whole is not increased post development.

The site is situated in Flood Zone 2 when using the Environment Agency Flood Map for Planning (Rivers and Sea). The risk would appear to be predominantly fluvial, and originate from the Ickenham Stream 123m north east of the site.

The EA and the London Borough of Hillingdon Council have no records of historical flooding having affected the site.

The EA Surface Water Flood Map suggests that the site lies partially within an area of "Low" to "Medium" risk of surface water flooding. According to the London Borough of Hillingdon Surface Water Management Plan the site is not located within a critical drainage area.

Additionally, the risk of flooding posed to the site by groundwater, sewer surcharge and reservoir flooding would appear to be low.

Due to the nature of the proposed development, which uses the confines of the existing structure and to help protect against flooding during extreme events, the applicant has agreed to implement flood resistant design measures into the development.

The development will utilise a rainwater harvesting system to reduce the use of water and minimise current and future flood risk. Total storage of 2.083m³ would be required to provide adequate stormwater control storage volume for the additional proposed building footprint. A 2.0m³ tank will be installed beneath the side garden to provide this attenuation. Any residual overflow from the rainwater harvesting system will be discharged into the existing public surface water sewer at a controlled rate of less than 5.0l/s. The rainwater harvesting tank will be designed as an integrated system to provide the necessary discharge control, and to optimise any spare storage within the overall system. This system will manage the entire proposed additional roof area (32.50m²), proving significant betterment over the existing run off situation.

The applicant has confirmed that:

- The additional footprint created by the development will not exceed 250m².
- Floor levels within the extension will be set no lower than existing adjacent floor levels.
- No new bedrooms will be created on the ground floor.
- Flood proofing of the house will be incorporated as appropriate.
- The applicant will register with the free Environment Agency Floodline Warnings Direct service.
- Rainwater harvesting system is proposed to reduce the use of water and minimise current and future surface water flood risk.

Assuming accordance with these flood risk management measures, Unda Consulting Limited consider the proposed application to be suitable in flood risk terms.

Appendix A

Pages 24 - 26: Site location, existing and proposed site plans (Pages 3);

34 Oak Avenue, Uxbridge, UB10 8LR

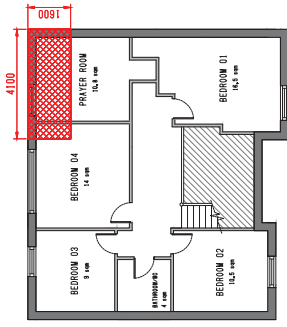
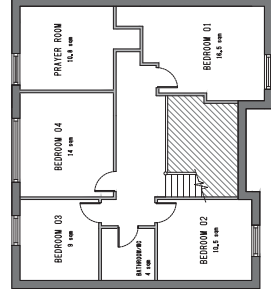
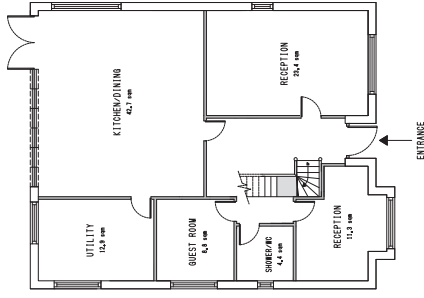


Site Plan shows area bounded by: 507831.25, 186697.33 507972.67, 186838.75 (at a scale of 1:1250) The representation of a road, track or path is no evidence of a right of way. The representation of features as lines is no evidence of a property boundary.

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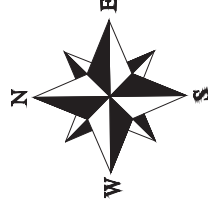
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GROUND FLOOR
PROPOSAL 1:100

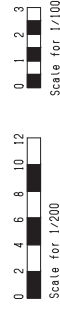


NOTES

- ROOF PLAN
PROPOSED 1:100



1. Dimensions should not be ascribed from the drawings where accuracy is essential.
2. Details of dimensions and levels to be checked on site by builder prior to commencement of works, any works commenced prior to all necessary local authority approvals are at local authority's risk of the owner and builder.
3. Structural details are the subject and exposure of existing construction and verification by local authority surveyor and any necessary revised details are to be agreed with the local authority prior to construction, carrying out the affected works.
4. All materials are to be used in accordance with the manufacturers guidelines and all relevant British Standards Codes of Practice & Regulation of building regulations.
5. All works to be carried out in accordance with local authority requirements.



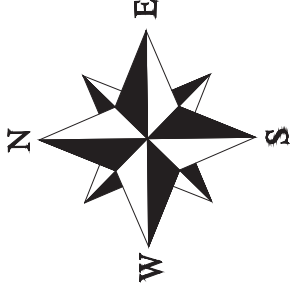
FRONT ELEVATION
PROPOSED 1-100



0208 454 7869
ilikam@dotopanning.com

Site Address: 34 Oak Avenue,
London,
UB10 8LR

Scale: 1:100 & 1:200 @
Drawing: 5040/002



General Notes

1. Dimensions should not be scaled from the drawings where accuracy is essential.
2. Details of dimensions and levels to be checked on site by builder prior to commencement of works. Any works commenced prior to all necessary local authority approvals are entirely at the risk of the owner and builder.
3. Structural details are subject to exposure of existing construction and verification by local authority surveyor and any necessary revised details are to be agreed with the local authority surveyor prior to carrying out the affected works.
4. All materials are to be used in accordance with the manufacturers guidelines and all relevant British Standards Codes of Practice & Regulation 7 of building regulations.
5. All works to be carried out in accordance with local authority requirements.

This document has been printed to scale, however deformations do occur in the printing and drafting. Therefore all dimensions must be checked on site and any alterations made.



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Client: Mr Manjunath Naik

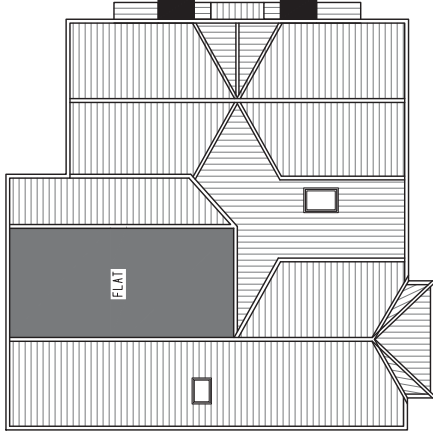
Site Address: 34 Oak Avenue,
London,
UB10 8LR

Project: Single storey rear extension, 2 storey extension, adjusted roof height to give 2 rooms full head height at rear.

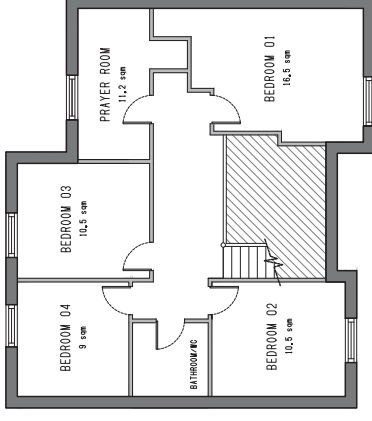
Scale: 1:100 & 1:200 @ A2

Drawing: 5040/001

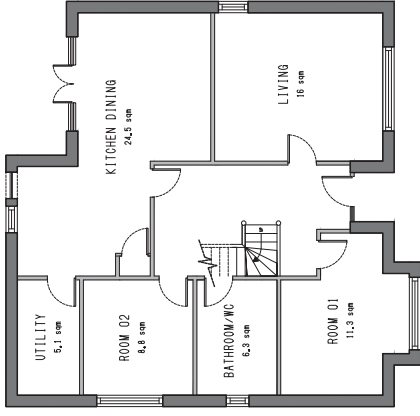
ROOF PLAN
EXISTING 1:100



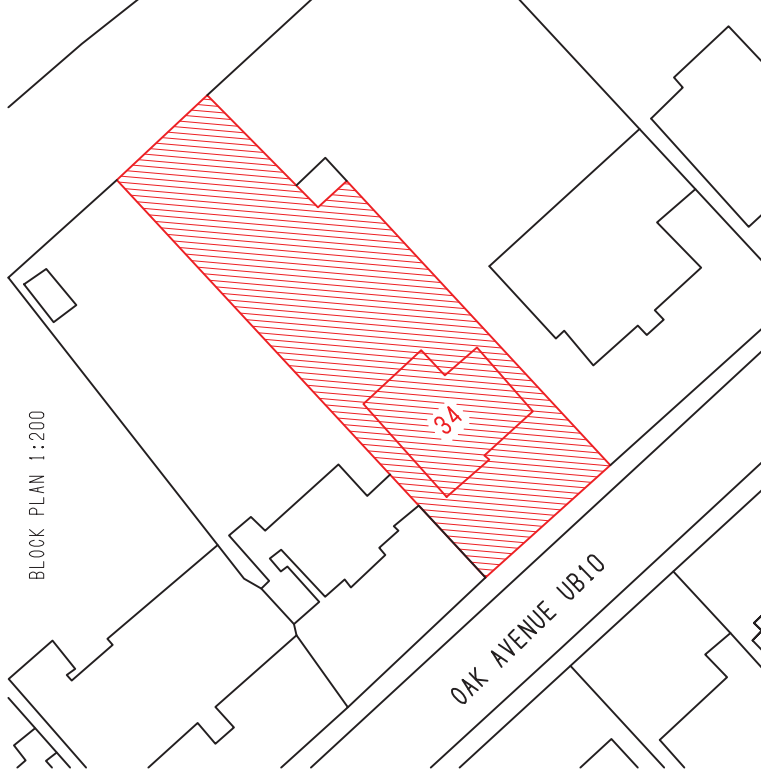
FIRST FLOOR
EXISTING 1:100



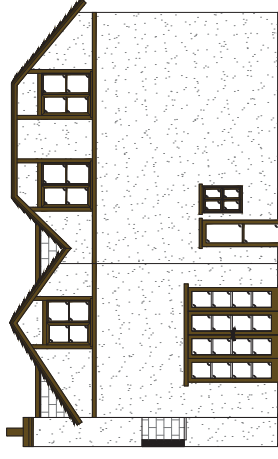
GROUND FLOOR
EXISTING 1:100



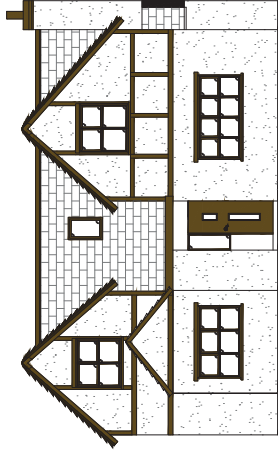
BLOCK PLAN 1:200



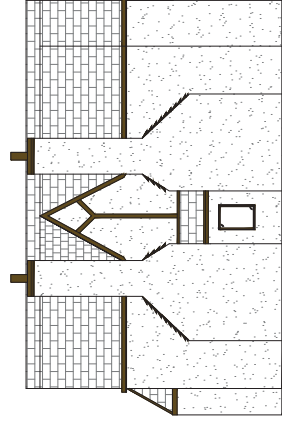
REAR ELEVATION
EXISTING 1:100



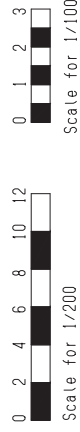
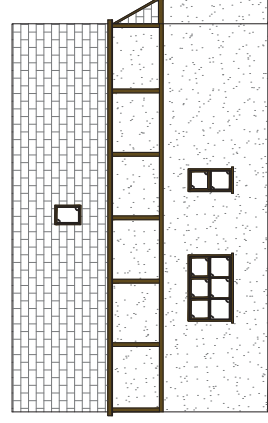
FRONT ELEVATION
EXISTING 1:100



SIDE ELEVATION
EXISTING 1:100



SIDE ELEVATION
EXISTING 1:100



Scale for 1/200



Scale for 1/100

EXISTING PLANS AND ELEVATIONS FOR 34 OAK AVENUE



Observations

Office r	Liz Arnold		
Site	34 OAK AVENUE ICKENHAM		
Ref	49839/APP/2016/4522	Date	03/02/2017

Proposal: Part two storey, part single storey rear extension

RECOMMENDATIONS: Refusal - No Flood Risk Assessment

The property is shown in Flood Zone 2, which can be found on the Environment Agency website and so a Flood Risk Assessment (FRA) must be submitted.

Comments on the Planning Application:

The application should be refused as an FRA has not been provided to assess the risk to the property and show how it is managed to ensure the future occupants will be safe. *Please note that the provision of an FRA does not automatically make an application acceptable.*

The Environment Agency Standing Advice should be applied and more information can be found at:

<https://www.gov.uk/flood-risk-assessment-standing-advice#minor-extensions-standing-advice>.

The FRA must establish the risk to the property ie the flood level.

(This should be done by obtaining that flood level from the EA as a data request, not using a screenshot of the flood map from their website and providing it within the FRA alongside a topographic survey).

- (A) Set floor levels no lower than existing levels AND include flood proofing where appropriate, OR,



(B) set floor levels 300mm above the 1 in 100 year flood level plus climate change.

- To comply with these requirement **(A)** details of Flood Resilience or Resistant techniques to be included including drawings must be provided to demonstrate this. The FRA needs to be specific and list actually what is to be applied to the proposed development not just provide recommendations.
(<https://www.gov.uk/guidance/flood-risk-assessment-in-flood-zones-2-and-3#extra-flood-resistance-and-resilience-measures>)
- To comply with **(B)** details of the finished floor levels compared to the Environment Agency flood level must be provided.

REASON

The application should be refused as the applicant does not demonstrate that the site is safe and flood risk is suitably mitigated through the provision of an appropriate flood risk assessment as required by:

- Policy EM6 Flood Risk Management in Hillingdon Local Plan: Part 1- Strategic Policies (Nov 2012).
- Policy DME1 9 Management of Flood Risk in emerging Hillingdon Local Plan Part 2 - Development Management Policies.
- Policy 5.12 Flood Risk Management of the London Plan (March 2016) and
- National Planning Policy Framework (March 2012) and the
- Planning Practice Guidance (March 2014).

Darragh Creegan
Drainage Officer

Date: 03/02/2017

Appendix B

Pages 29 - 30: MicroDrainage Greenfield Runoff and Rainwater Harvesting calculation sheets.

Unda Consulting Ltd		Page 1
Southpoint Old Brighton Road Gatwick RH11 0PR	34 Oak Avenue Ickenham UB10 8LR	
Date 14/03/2017 File	Designed by EB Checked by EJ	
XP Solutions Source Control 2016.1		

ICP SUDS Mean Annual Flood

Input

Return Period (years)	100	Soil	0.300
Area (ha)	0.060	Urban	0.000
SAAR (mm)	696	Region Number	Region 6

Results l/s

QBAR Rural	0.1
QBAR Urban	0.1
Q100 years	0.3
Q1 year	0.1
Q30 years	0.2
Q100 years	0.3

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Unda Consulting Ltd		Page 1
Southpoint Old Brighton Road Gatwick RH11 0PR	34 Oak Avenue Ickenham UB10 8LR	
Date 14/03/2017 File	Designed by EB Checked by EJ	
XP Solutions Source Control 2016.1		

Rainwater Harvesting

Annual Demand

Daily requirement per person (l) 50.0
Number of persons 3

Annual Yield

Collection area (m²) 33
Runoff Coefficient 0.950
AAR (mm) 696
Hydraulic Filter Efficiency 0.90
Depression Storage (mm) 1.0
Number of Rainfall Events/Year 150

Feasibility

Annual non-potable water demand (l) 54750.0
Annual rainfall yield (l) 15405.4

Demand exceeds rainfall yield, rainwater harvesting is feasible for storm water control under BS8515:2009+A1:2013 detailed design approach.

Volume

Return Period (years) 100
Region England and Wales
M5-60 (mm) 20.100
Ratio R 0.408
Storm Duration (mins) 360
Normal rainwater harvesting (%) 5.0

Results

Total Rainfall Depth (mm) 56
CS 1.000
Additional Rainfall Depth Allowance (Ad) 7.062
Effective proportion of additional storage 1.000
available for increasing tank size from 1m³ (CP50)
Rainfall depth for 1m³ of storage tank (sP50) 30.303
Total Storage Volume (m³) 2.083

Available Stormwater Control Storage Volume (m³) 1.979

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