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Farnham & Hildene, Havering.

Flood Risk Assessment

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Prepared by:	Paul White, HND Civil Eng, Civil Engineer
Checked by:	Lance Greenaway, Associate

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1 Introduction

1.1 Site Proposals

Evolve Consulting Engineers Limited has been appointed by Wates Construction Limited in respect to the proposed development centred at approximate National Grid Reference TQ 53760 92071 (E 553760, N 192071) What3Words loving.doll.flame Farnham Road, Harold Hill, London Borough of Havering, RM3 8ED. Refer to Appendix A – Site Location Plan.

The planning application area is 3.2687ha

The proposed development comprises the demolition of all structures that currently occupy the parcel land bound by Hilldene Avenue to the North, Chippenham Road to the South, East Dene Drive to the East and West Dene Drive to the West with the exclusion of the library building, which will be retained.

Following demolition, it is proposed to construct a new residential development comprising of 479 units split 60% private and 40% affordable along with retail and community space. These developments will be constructed along with associated landscaping, hardstanding and paving.

1.2 Planning Policy

The aim of the Flood Risk Assessment (FRA) is to outline the potential for the site to be impacted by flooding, the impacts of the proposed development on flooding in the vicinity of the site, and the proposed measures which could be incorporated into the development to mitigate the identified risk. The report has been prepared in accordance with the guidance detailed in the current National Planning Policy Framework (NPPF) and the associated Planning Practice Guidance (PPG).

Reference has also been made to the CIRIA SuDS manual (C753) and the London Borough of Havering - Level 1 Strategic Flood Risk Assessment (2016).

The desk study was undertaken by reference to information provided / published by the following bodies:

1. Environment Agency (EA)
2. British Geological Survey (BGS)
3. Ordnance Survey (OS)
4. Thames Water.
5. Defra

2 Introduction

2.1 Existing Site

The site is located northeast of Romford Town, approximately 1.75km northwest of Harold Wood train station.

The majority of the site comprises four storey brick built mixed use buildings with commercial/retail at ground floor with 3 stories of residential over. The northern boundary and Farnham Road through the centre of the site has offroad parking on both sides associated to the commercial/retail at ground level. To the rear of the buildings adjacent to the eastern and western boundaries are the service areas delivery and parking and back of house areas for the retail.

The total development area is 3.2687ha. Reference to online mapping and aerial photography shows that the majority of the site is taken up by impermeable areas (either building or hardstanding) with a small amount of landscaping along the northern boundary. Initial estimates show a n approximate spit of 90% impermeable and 10% permeable areas. This will be confirmed upon receipt of the topographical survey.

According to the London Borough of Havering - Level 1 Strategic Flood Risk Assessment there are 15 areas within Havering that are classed as Critical Drainage Areas (CDA). According to Figure 109 of the SFRA, the site is not located in a CDA.

2.2 Topography

At the time of writing, no topographical survey was made available. This section will be updated once survey information is received.

3 Hydrogeological Setting

At the time of writing, no site-specific geotechnical survey was made available. However we have referenced data provided in reports from Clarkebond (CPN-CLB-XX-XX-RP-GT-0001 dated Feb 2020) & RSK Geosciences Phase 1 & 2 Geo-environmental and Geotechnical Investigation (372938-R01(00) dated Dec 2023) for a development located on the southern side of Chippenham road which bounds the proposed development site to the south.

The distance from the centre point of the proposed development to the centre point of the adjacent site is 50m, therefore, the report ground conditions contained in the site investigation will be comparable to what underlies the proposed site.

3.1 Groundwater and Water Resources

The BGS's online geology map shows a superficial geology of Lowestoft Formation – Diamicton on the site with a bedrock geology shown to be London Clay Formation which is a sedimentary bedrock of clay site and sand.

The following typical strata taken from 2 boreholes and 8 window samples across the site:

Ground Type	Top (mbgl)	Bottom (mbgl)	Thickness (m)	Description
Made Ground	0.00	0.4 to 0.8	0.5	Generally sandy gravelly clay, locally with cobbles. Anthropogenic materials include brick and concrete with rare glass, metal, tarmac, charcoal.
Head Deposits	0.4 to 0.8*	1.0 to 1.2*	0.4*	Gravelly, locally sandy clay. Locally with rare rootlets.
London Clay Formation	0.4 to 1.2	30.45	Unproven	Clay with rare lenses of orange and cream sand. Becomes silty clay with depth.

*Where Present

The London Clay Formation member is classified as a unproductive in regard to Aquifer Designation, defined as rocks having negligible significance for water supply or baseflow to rivers, lakes and wetlands.

Groundwater provides a third of the drinking water in England and Wales and maintains the flow in many of our rivers. In some areas of Southern England, groundwater supplies up to 80% of the drinking water, therefore it is crucial that these sources are looked after thus ensuring that the water is completely safe to drink.

The Environment Agency has identified Source Protection Zones (SPZs) for 2000 groundwater sources such as wells, boreholes and springs used for public drinking water supply. These zones show the risk of contamination from any activities that might cause pollution in the area. The maps show three main zones (inner, outer and total catchment) and a fourth zone of special interest, which is occasionally applied to a groundwater source.

According to Environment agency data, the site is not located in a groundwater Source Protection Zone (SPZ) and there are no SPZs recorded within 500m.

3.2 Groundwater Levels

Groundwater levels are subjected to variations caused by changes in the local drainage conditions and also by seasonal effects. The Phase 2 Ground Investigation by Clarkebond encountered no groundwater on site during the site investigations. During subsequent monitoring, groundwater was generally encountered between 0.28mbgl and 2.78mbgl. The groundwater observations indicate the groundwater maybe present within the London Clay Formation.

Groundwater levels are likely to vary through the year, with the highest values expected during the winter months. Given the cohesive nature of the London Clay Formation, it's anticipated to be slow responsive.

Limited perched groundwater may be present within any Made Ground across the Site. However, perched water levels can vary seasonally and are prone to rapid changes through heavy rain events on permeable surfaces, accidental events (such as burst water mains) and the introduction of new underground construction causing blockages to natural perched water flow.

4 Hydrological Setting

4.1 Nearby Watercourses

Reference to OS Mapping shows that the Paines Brook flows broadly south approximately 0.375km to the east of the site. This is tributary to the Ingrebourne River which subsequently discharges to the River Thames. Paines Brook is identified as an Environment Agency Main River.

4.2 Existing Flood Protection Measures

The Environment Agency (EA) defines a Flood Warning Area as “geographical areas where we expect flooding to occur and where we provide a Flood Warning Service. They generally contain properties that are expected to flood from rivers or the sea and in some areas, from groundwater.”

The EA shows areas of land that benefit from flood defences built to protect against river floods with a 1% (1 in 100) chance of happening each year, or floods from the sea with a 0.5% (1 in 200) chance of happening each year, together with some, but not all, older defences and defences which protect against smaller floods.

The EA’s website indicates that the site is not currently protected by formal flood defences.

4.3 Fluvial Flooding

Fluvial sources include rivers, streams, and ditches. Fluvial flooding occurs when a river cannot cope with the amount of water draining into it from the surrounding land.

The development boundary for the site sits entirely within flood zone 1 as identified on the EA flood zone mapping showing areas at risk of flooding from rivers or sea.

Refer to EA Flood Map in Appendix B.

Areas deemed to be in flood zone 1 have a low probability of flooding – less than 0.1% annual probability of river or sea flooding. Areas in flood zone 1 can also be described as: Land having a less than 1 in 1,000 annual probability of river or sea flooding.

The extents of the current flood zones across the site are tabulated below and can be seen in Appendix B

Flood Zone	1	2	3a	Total
Extent (ha)	3.2687	0.000	0.000	3.2687
Coverage (%)	100	0	0	

4.4 Costal/Tidal Flooding

Tidal flooding happens when there are high tides and stormy conditions.

The site is not located in an area close to a tidal body of water. The EA flood map shows that the site is not at risk from tidal flooding.

Refer to EA Flood Map in Appendix B

4.5 Groundwater

Groundwater flooding can occur when groundwater rises from the underlying aquifer to flood subsurface infrastructure or to emerge at the ground surface. This is generally caused by the rise of groundwater levels to extreme high levels in permeable consolidated aquifers (primarily chalk) in response to prolonged above average rainfall, - or from hydraulic continuity with high water levels in adjacent rivers.

The Environment Agency have developed a map which identifies the Susceptibility to Groundwater flooding. Reference to Figure 111 within the London Borough of Havering SFRA shows the proportion of each 1km² grid square where geological and hydrogeological conditions show that groundwater might emerge. According to the map, the site is located in an area that is not affected by groundwater flooding.

Given the widespread London Clay and a nonproductive Aquifer, this site has a low probability of being at risk of flooding from this source.

4.6 Surface Water Overland Flow

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.

Reference to the Defra Risk of Surface Water Flooding (RoFSW) data contained in tile TQ59.

Event AEP	3.33% (1:30)	1% (1:100)	0.1% (1:1000)
Extent (ha)	0.088	0.241	0.861
Coverage (%)	2.69	7.37	26.3

The site is shown to be affected by surface water flooding for the 1:30yr, 1:100yr events based on the information taken from the RoFSW. Approx. 26.3% of the site is at risk of surface water flooding from a 0.1% (1 in 1000) AEP event.

The small amounts of surface water flooding shown for the 1:30yr and 1:100yr is most likely rainfall filling localised depressions in the hydraulic model used to develop the extents rather than distinct flow paths. The flooding shown for the 1:1000yr event follows the path of the existing roads through the site. Future development should pay attention to this flow path and ensure that it is not impeded.

The EA shows the site to be at low risk from surface water flooding with a depth of water between 300mm and 900mm which is a standard interval set by the EA. This means that this area has a chance of flooding of between 0.1% and 1% each year.

Refer to EA Risk of Surface Water Flooding and Extent maps in Appendix B.

4.7 Sewer Flow

Sewer flooding is often caused by excess surface water entering the drainage network. Water companies, in this case Thames Water, are obliged under the Water Industry Act to facilitate drainage of surface water up to a 1 in 20-year return period event.

London Borough of Havering SFRA contains information from Thames Water showing the number of properties that have experienced sewer flooding in the Borough of Havering.

Postcode	Internal			External			Total
	2 in 10	1 in 10	1 in 20	2 in 10	1 in 10	1 in 20	
RM2	0	3	13	4	16	30	66
RM3	0	0	9	0	2	30	41
RM4	0	0	0	0	0	2	2

Internal flooding is generally considered more disruptive than external or curtilage flooding. For each classification a frequency is provided; for example, whether the property has been flooded twice in a ten-year period, once in ten, or once in twenty.

Figure 110 contained in the SFRA shows that the site is located in an area that has had 1-10 properties with internal flooding and 55-75 external sewer floods.

Considering this information, a low risk can be assumed.

4.8 Reservoir Failure and Other Artificial Resources

The requirement for regular inspections by a Supervising Panel Engineer means that the likelihood of structural failure of reservoirs is considered to be minimal. The risk of failure remains, however, and the EA has mapped the potential extent of flooding resulting from the failure of a covered water supply reservoir to the west of Harold Hill which is the closest reservoir to the site. The mapped flood path does not place the site at risk of reservoir flooding.

The EA state that the site is unlikely to be affected by reservoir flooding.

Considering this information, a very low risk can be assumed.

4.9 Land Drainage

There is no known land drainage on the site.

4.10 Hydraulic Structures

No hydraulic structures are present on-site.

5 Flood Risk and Mitigation

5.1 Fluvial/Tidal Flooding

- The EA Flood Map for Planning shows the site is located entirely within Flood Zone 1.

No mitigation is considered necessary in relation to Fluvial/Tidal flood risk.

5.2 Groundwater Flooding

- Given the widespread London Clay and a nonproductive Aquifer, this site has a low probability of being at risk of flooding from this source.
- No basements are planned as part of the development and any new structures within the ground will be designed and constructed considering the local groundwater levels.

No mitigation is considered necessary in relation to groundwater flood risk.

5.3 Surface Water Flooding

- The EA shows the site to be at low risk from surface water flooding. This means that this area has a chance of flooding of between 0.1% and 1% each year.

No mitigation is required in relation to surface water flood risk.

Priority will be given to use of SuDS. Runoff from the site (post development) will not exceed greenfield runoff rates, where feasible.

5.4 Sewer Flooding

- Although Thames Water do show some properties in the area having been affected by sewer flooding, the numbers are very low.
- The discharge rate to the existing sewer will be agreed with Thames Water to ensure that there is capacity to receive discharge from the site without significantly increasing flood risk.

No mitigation is considered necessary in relation to sewer flood risk.

6 Sequential and Exception Test

The Sequential Test is used to ensure that areas at little or no risk of flooding are developed in preference to areas of higher risk. A sequential test is often required when the proposed development site is within Flood Zones 2 or 3. In this case, the site is located entirely within Flood Zone 1.

The NPPF requires that, if following the application of the Sequential Test, it is not possible for development to be located in lower risk zones then the Exception Test must be applied where development is more vulnerable to flooding.

6.1 Sequential Test

Sequential Test	Response
Site	Farnham Road, Harold Hill, London Borough of Havering, RM3 8ED
Allocation	Residential/Commercial
Flood Zone	Zone 1
Reasonable alternative site available in same or lower flood zone?	No. There are no reasonable alternatives located within the area.

Overall, given that the site is not at a significant risk of flooding and is therefore already in a sequentially preferable location, the site is considered to pass the Sequential Test.

6.2 Exception Test

The development of the proposed site to be used as a residential development is classed as More Vulnerable according to Annex 3: Flood risk vulnerability classification of the NPPF. Reference to table 3 of the NPPF shows that Less vulnerable development in flood zone 1 is appropriate and does not require an exception test.

Flood Risk Vulnerability Classification	Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Zone 1	Development is Appropriate	Development is Appropriate	Development is Appropriate	Development is Appropriate	Development is Appropriate
Zone 2	Development is Appropriate	Development is Appropriate	Exception Test Required	Development is Appropriate	Development is Appropriate
Zone 3a	Exception Test Required	Development is Appropriate	Development Not Permitted	Exception Test Required	Development is Appropriate
Zone 3b	Exception Test Required	Development is Appropriate	Development Not Permitted	Development Not Permitted	Development Not Permitted

The Exception Test is not required, and the development is appropriate in flood zone 1.

7 Conclusion

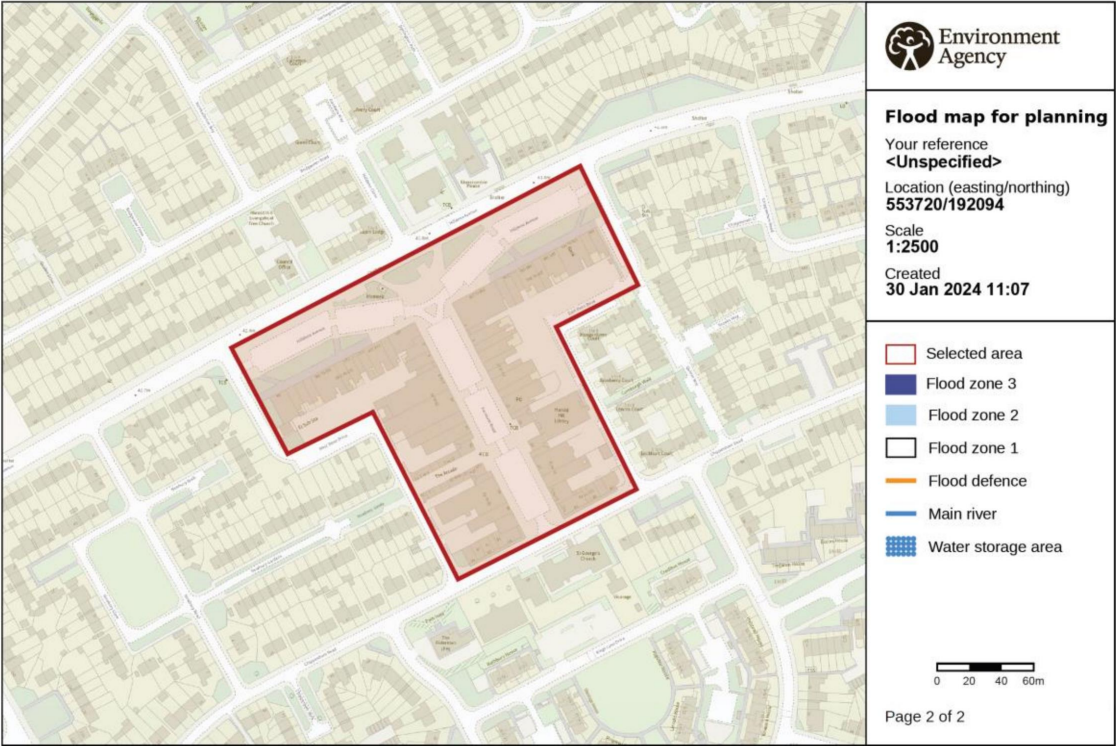
- There is a very low risk of flooding from Fluvial and/or Tidal sources.
- There is a low risk of flooding from Surface Water sources.
- There is a very low risk of flooding from Reservoirs.
- There is a very low risk of flooding from Groundwater.
- The proposed site satisfies relevant national and local policy in regards to flood risk.

The Flood Risk Assessment demonstrates that the Proposed Development would be safe, without increasing flood risk elsewhere, and that a positive reduction in flood risk would be achieved through the inclusion of surface water attenuation in accordance with national policy.

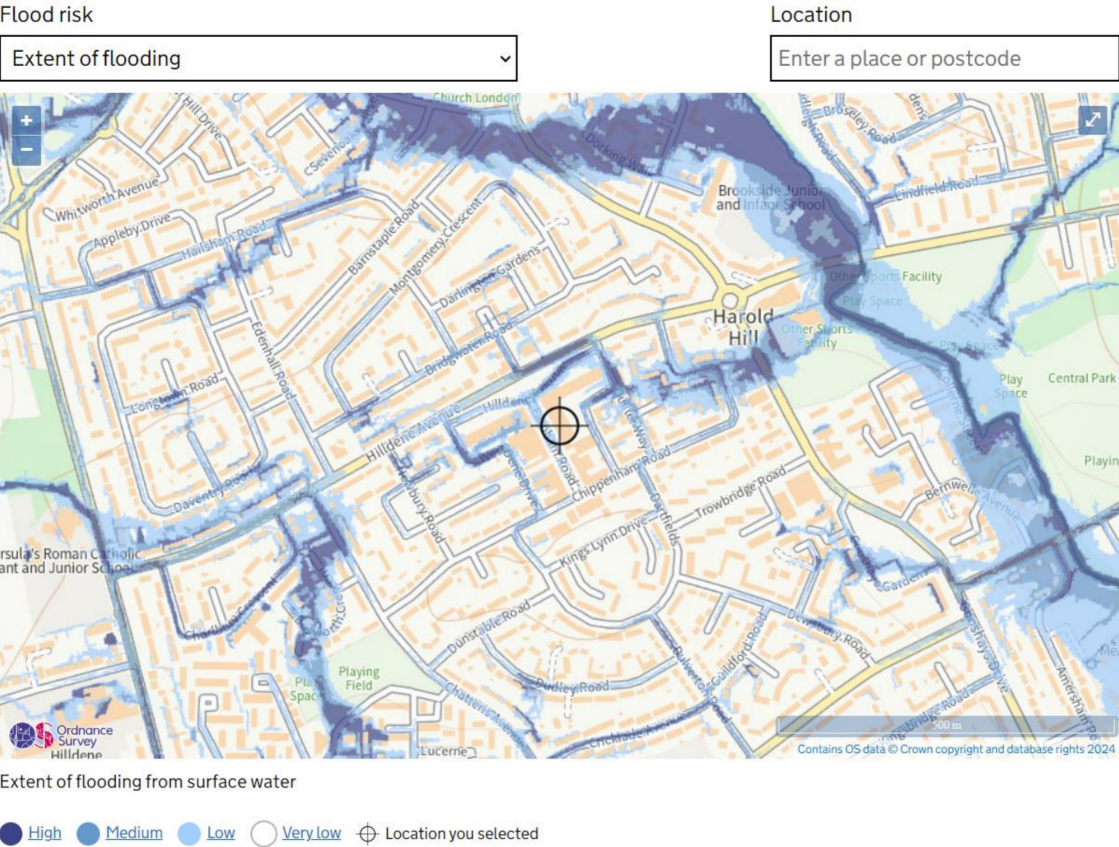
Appendix A – Site Plan



Appendix B – Flood Risk Mapping



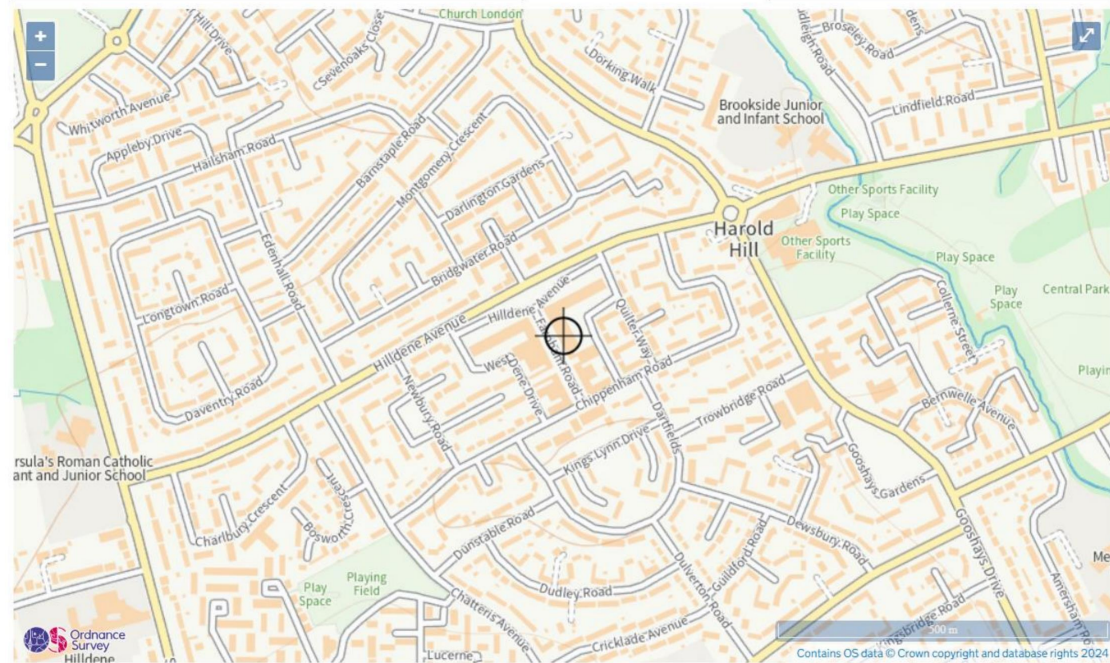
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Flood risk

Extent of flooding

Location

 Enter a place or postcode

Maximum extent of flooding from reservoirs:

 when river levels are normal
  when there is also flooding from rivers
  Location you selected

Appendix C – Thames Water Assets



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