



Orchard House Emsworth

Flood Risk Assessment
and Drainage Statement
(Part 1 of 3)

McCarthy & Stone



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DELIVERING SUSTAINABLE, TRANSPORT PLANNING AND ENGINEERING SOLUTIONS

**RETIREMENT REDEVELOPMENT
ORCHARD HOUSE, WESTERN AVENUE, EMSWORTH**

**FLOOD RISK ASSESSMENT
AND DRAINAGE STATEMENT**

CONTROLLED DOCUMENT

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RETIREMENT REDEVELOPMENT ORCHARD HOUSE, WESTERN AVENUE, EMSWORTH

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1. INTRODUCTION

- 1.1 This Flood Risk Assessment (FRA) has been prepared by Paul Basham Associates (PBA) to support a planning application for McCarthy & Stone's proposed retirement redevelopment of Orchard House, Western Avenue, Emsworth. The site is approximately 0.58 Ha. in total area and a location plan of the application site is shown in **Figure 1**.



Figure 1: Location Plan

- 1.2 The Environment Agency flood mapping has identified that the site falls entirely within Flood Zone 1, an area with a low risk of flooding from rivers or tidal waters in any given year. The extract of the Environment Agency's Flood Map overlaid with the site boundary is provided in **Figure 2**.
- 1.3 This FRA has been prepared taking into account the National Planning Policy Framework (NPPF) Technical Guidance and the Environment Agency Flood Risk Standing Advice. This report will seek to quantify the flood risk posed to the site and the proposed development and to identify potential mitigation measures. The drainage of foul and surface water run-off generated by the site is also considered to ensure that the re-development proposals would not pose an adverse effect on the flood risk to the surrounding area.

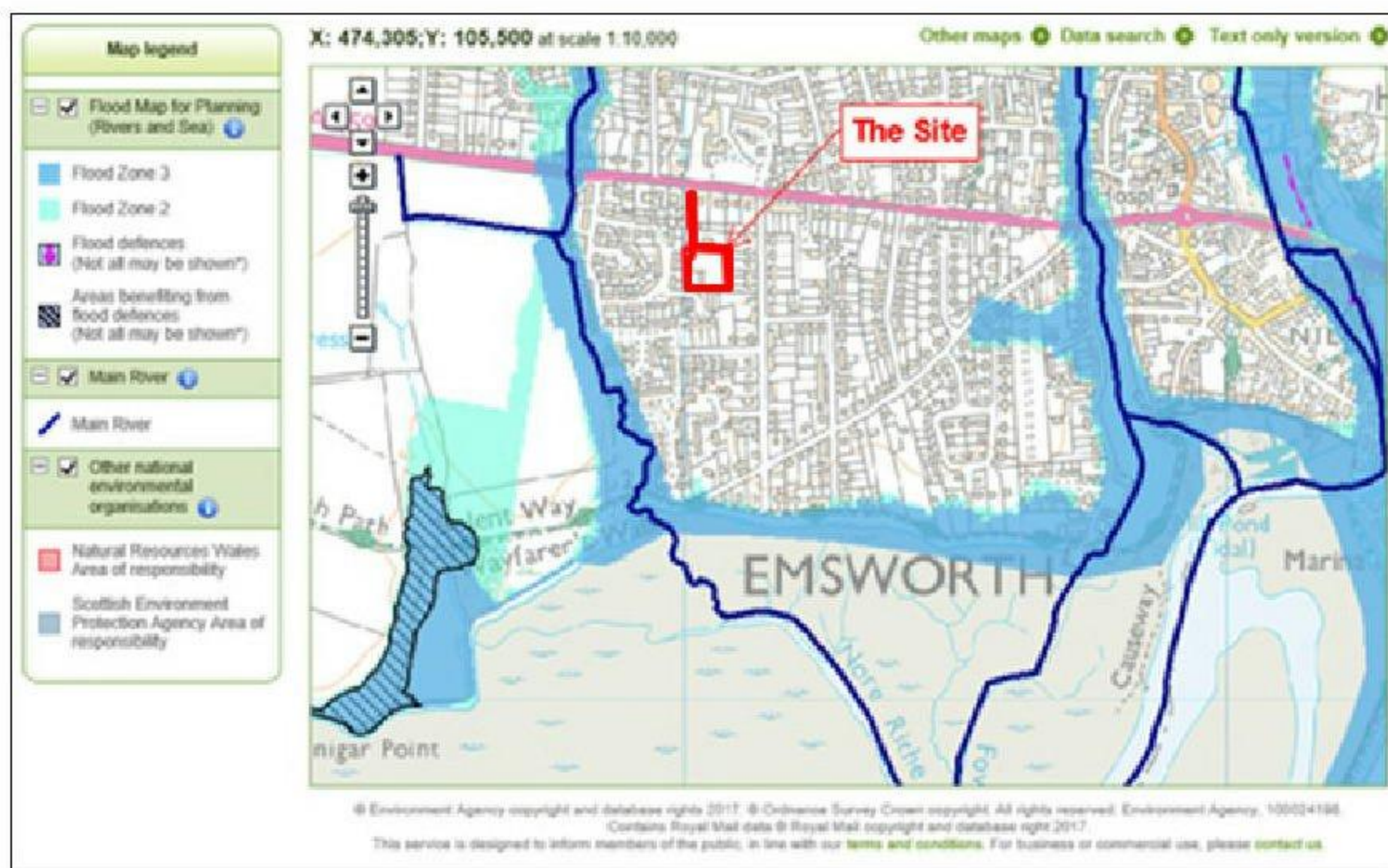


Figure 2: Environment Agency Flood Map

1.4 Table 3 from the NPPF Technical Guidance has been included as **Table 1** below. This gives the classes of development (based on flood risk vulnerability) that are permitted within each of the flood zones.

Flood risk vulnerability classification (see table 2)		Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
Flood zone (see table 1)	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	✗	Exception Test required	✓
	Zone 3b functional floodplain	Exception Test required	✓	✗	✗	✗

Key: ✓ Development is appropriate.
✗ Development should not be permitted.

Table 1: NPPF Planning Practice Guidance Table 3 – Flood risk vulnerability and flood zone compatibility

1.5 Table 2 from the NPPF Technical Guidance has been included as **Table 2**. This sets out the flood risk vulnerability classifications for various types of development. The proposed development of the site is for 25 retirement dwellings which would be classed as “More Vulnerable” and would therefore be acceptable within its Flood Zone classification (Zone 1). The site is located within Flood Zone 1, therefore there is no need for Sequential or Exception Test. **Table 1** shows that no Exception Test is required.

Essential Infrastructure • Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk. • Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including electricity generating power stations and grid and primary substations; and water treatment works that need to remain operational in times of flood. • Wind turbines.
Highly Vulnerable • Police and ambulance stations; fire stations and command centres; telecommunications installations required to be operational during flooding. • Emergency dispersal points. • Basement dwellings. • Caravans, mobile homes and park homes intended for permanent residential use. • Installations requiring hazardous substances consent. (Where there is a demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities, or such installations with energy infrastructure or carbon capture and storage installations, that require coastal or water-side locations, or need to be located in other high flood risk areas, in these instances the facilities should be classified as ‘Essential Infrastructure’).
More Vulnerable • Hospitals • Residential institutions such as residential care homes, children’s homes, social services homes, prisons and hostels. • Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels. • Non-residential uses for health services, nurseries and educational establishments. • Landfill* and sites used for waste management facilities for hazardous waste. • Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.
Less Vulnerable • Police, ambulance and fire stations which are not required to be operational during flooding. • Buildings used for shops; financial, professional and other services; restaurants, cafes and hot food takeaways; offices; general industry, storage and distribution; non-residential institutions not included in the ‘More Vulnerable’ class; and assembly and leisure. • Land and buildings used for agriculture and forestry. • Waste treatment (except landfill* and hazardous waste facilities). • Minerals working and processing (except for sand and gravel working). • Water treatment works which do not need to remain operational during times of flood. • Sewage treatment works, if adequate measures to control pollution and manage sewage during flooding events are in place.
Water-Compatible Development • Flood control infrastructure. • Water transmission infrastructure and pumping stations. • Sewage transmission infrastructure and pumping stations. • Sand and gravel working. • Docks, marinas and wharves. • Navigation facilities. • Ministry of Defence defence installations. • Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location. • Water-based recreation (excluding sleeping accommodation). • Lifeguard and coastguard stations. • Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms. • Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to a specific warning and evacuation plan.

Table 2: NPPF Planning Practice Guidance Table 2 – Flood risk vulnerability classification

- 1.6 Although the site is located in Flood Zone 1 and is less than 1ha in size, McCarthy & Stone have requested that this FRA is undertaken in order to demonstrate the impact on development as well as the impact of development on flood risk elsewhere. Therefore, in-line with NPPF Technical Guidance, this report identifies the risks of flooding from all sources, possible mitigation measures, assesses the development impacts on flood risk to the surrounding areas, and provides recommendations to ensure flood risk is not increased off site.

2. EXISTING CONDITIONS

- 2.1 The site is currently occupied by a large residential dwelling (Orchard House) in conjunction with two garages, access road (extending southwards from Western Avenue), various sheds and glasshouses, and a large garden. The site is located approximately 100m to the south of the A259 (Havant Road) and is approximately 800m to the west of Emsworth town centre. The red line boundary is approximately 0.58 Ha. and is shown in **Figure 3** below.



Figure 3: Red Line Boundary

- 2.2 A topographical survey has been undertaken across the site and is included in **Appendix A**. The survey shows that the site has a gentle slope in a north-west to south-east direction. The high point is located in the north-west corner of the site where levels are in the order of 9.10m AOD. The site slopes down towards a low point of approximately 8.15m AOD located in the south-east corner.
- 2.3 The survey includes details of a drainage network which serves the northern part of the site and will be discussed further in Section 5 of this FRA report.

2.4 A review of the British Geological Society mapping indicates that the bedrock geology beneath the site is the Lambeth Group, comprising of Sand, Silt and Clay formed approximately 56 to 66 million years ago in an environment previously dominated by swamps, estuaries and deltas. The mapping also shows that the superficial deposits overlying the bedrock at the site are River Terrace Deposits (undifferentiated) comprising of Sand, Silt and Clay and formed up to 3 million years ago in the in an environment previously dominated by rivers.

3. THE PROPOSALS

- 3.1 A proposed development layout is included in **Appendix B**. However it should be noted that at the time of writing this FRA, the proposed development is in the planning process, and the enclosed Architects layout plan has “planning “ status.
- 3.2 The development proposals would involve the construction of 25 retirement dwellings, reception and lounge areas within a three-story block, associated car parking, open space and landscaping etc. Vehicle access would be provided from Western Avenue via the existing access.

4. SOURCES OF FLOODING

Fluvial/Tidal Flooding

- 4.1 The Environment Agency's Flood Map (refer to **Figure 2**) shows the site being located within Flood Zone 1, indicating a low risk of flooding, less than 0.1% (1 in 1000) from rivers and tidal sources in any given year.
- 4.2 A review of the OS Mapping indicates that the closest watercourse to the site is the Nore Farm Stream which is located approximately 250m to the west. The flood risk associated with this watercourse is tidal, however with minimum site levels of 8.15m AOD, the site would be several metres above the 1 in 1000 year flood level.
- 4.3 It is therefore concluded that the site would be at a low risk of flooding from tidal or fluvial sources.

Groundwater flooding

- 4.4 Groundwater flooding occurs when groundwater levels increase sufficiently for the water table to intersect the ground surface. Groundwater flooding can occur in a variety of geological settings including valleys, in areas underlain by chalk, and in river valleys with thick deposits of alluvium and river gravels.
- 4.5 The Landmark 'Sitecheck' Flood Report has been obtained as part of this study and is included in **Appendix C**. The report includes flood risk mapping associated with groundwater which has been generated by ESI Environmental consultants. A copy of this map is included as **Figure 4** and demonstrates that there is a negligible risk for groundwater flooding on the site with a return period of 100 years or more frequent.
- 4.6 The British Geological Society mapping indicates that the site maybe underlain by River Terrace Deposits, therefore, there could potentially be a risk of groundwater rising through these superficial deposits and breaking ground level. It is recommended that a Ground Investigation is undertaken on the site prior to the detailed design stage to determine groundwater levels beneath the site. This information will also be required for the foundation design.

- 4.7 In the unlikely event that the site was to incur groundwater flooding, it is considered that flood depths would be minimal and would follow the natural topography, allowing water to flow off the site in a south-easterly direction. Any associated flood risk could be satisfactorily mitigated by ensuring that ground floor slab levels are set at least 250mm above the adjacent external areas. Care should also be taken to ensure that external areas slope away from the new building. It is noted that the development proposals do not include for a basement.
- 4.8 Based on the Sitecheck report, it is concluded that the flood risk to the site associated with groundwater is low and if any such flooding were to occur, then this could be mitigated through appropriate design of the new development. A request for information has been submitted to both the Environment Agency and Havant Borough Council for the provision of any records that they may hold of flooding in the area associated with groundwater.
- 4.9 The response from the environment Agency is that they do not hold any records of groundwater flooding at the site. A copy of the consultation responses are included in **Appendix D**.

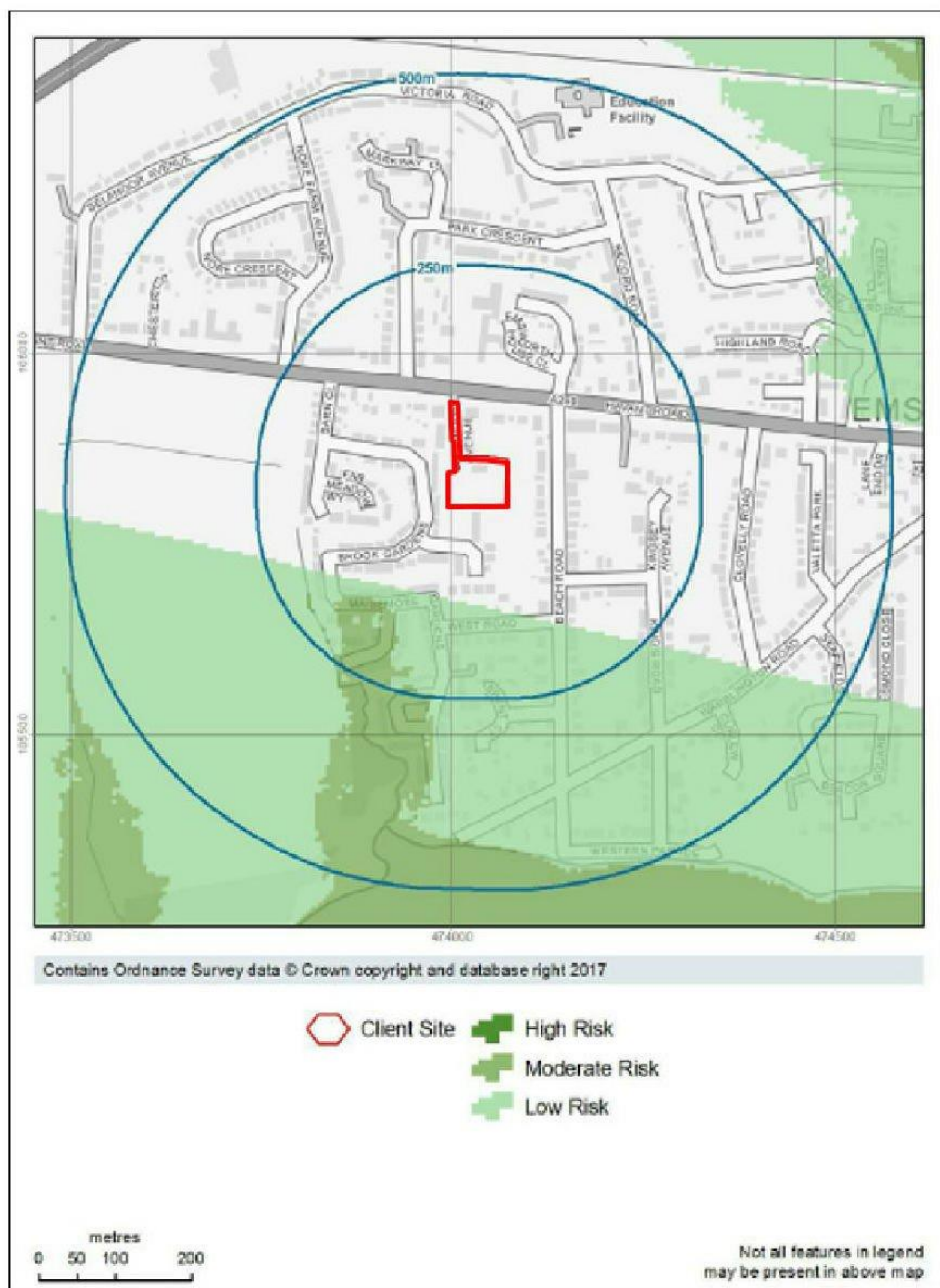


Figure 4: Groundwater Flood Risk (Extract from Landmark 'Sitecheck' Flood Report)

Artificial Sources of Flooding

4.10 There are no artificial water sources (canals, reservoirs, etc.) within vicinity of the site that could potentially be the source of flood risk. The Environment Agency's Flooding from

Reservoirs Map is included as **Figure 5** and confirms that there is no risk to the site associated with flooding from artificial sources.



Figure 5: Environment Agency Flooding from Reservoirs Map

Surface Water Flooding

- 4.11 Surface water or 'pluvial' flooding results from rainfall running over ground before entering a watercourse or sewer. It is usually associated with high intensity rainfall events but can also occur with lower intensity rainfall or melting snow where the ground is already saturated, frozen, developed (for example in an urban setting) or otherwise has low permeability.
- 4.12 The Environment Agency's Flooding from Surface Water Map is included as **Figure 6** and indicates that the site is at a very low risk of flooding from surface water. An area of low risk is shown to occur at the southern end of Western Avenue however this would not significantly impact on the site.
- 4.13 Additional surface water flood mapping is given in the Landmark 'Sitecheck' Flood Report which has been included as **Figure 7**. This flood mapping is based on modelling undertaken by JBA consultants and indicates that there is a negligible risk of surface water flooding on the site during a 1 in 1000 year rainfall event. The E.A. has been contacted and they have no record of flooding to this area.
- 4.14 It is concluded that the flood risk to the site associated with surface water is low and if any such flooding were to occur, then this could be mitigated through appropriate design of the new development (as stated in Paragraph 4.7), in conjunction with a suitably designed on-site drainage system. A request for information has been submitted to both the

Environment Agency and Havant Borough Council for the provision of any records that they may hold of flooding in the area associated with surface water. A response has yet to be obtained, and when received, the FRA will be updated to reflect any additional information.

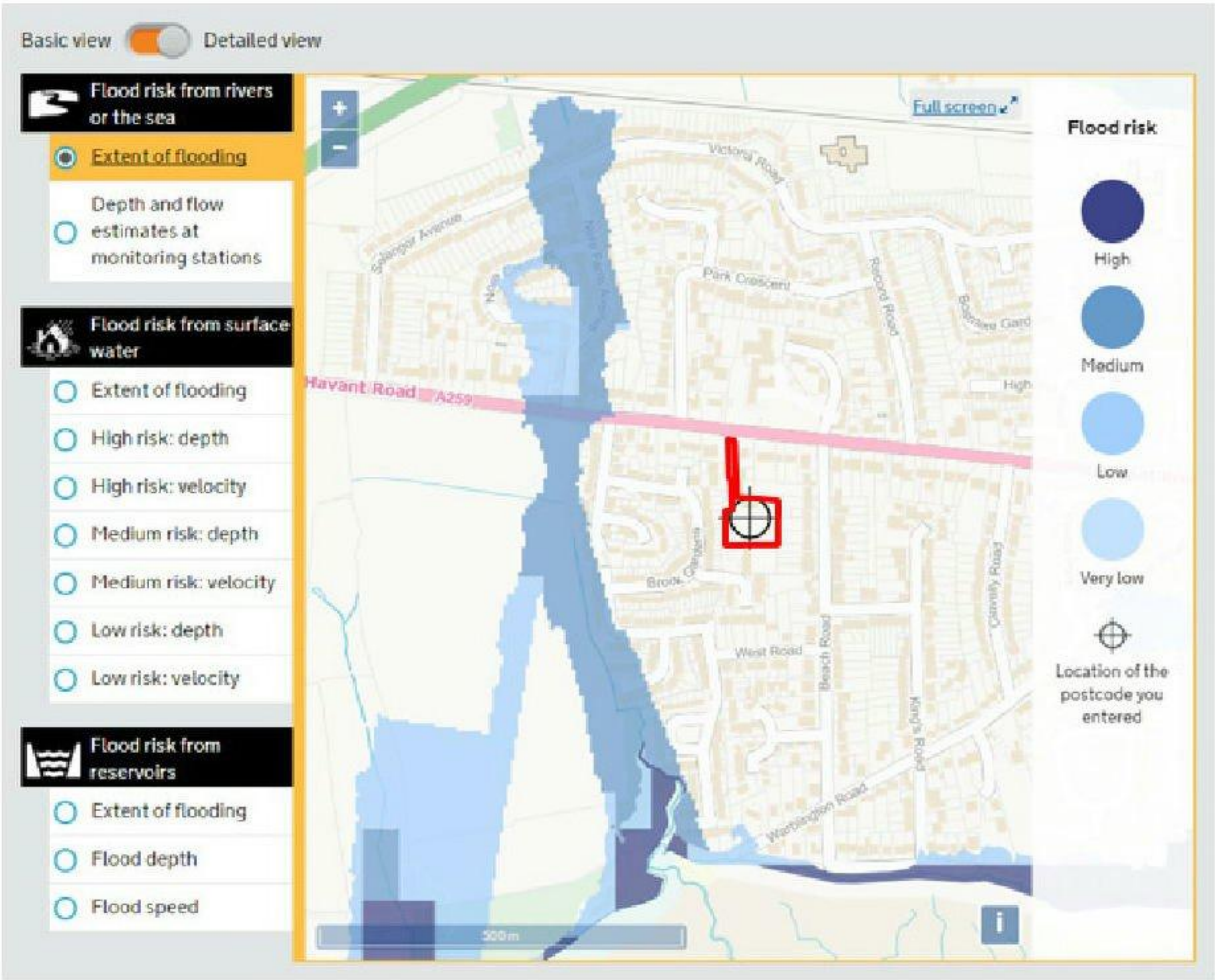


Figure 6: Environment Agency Surface Water Flood Map

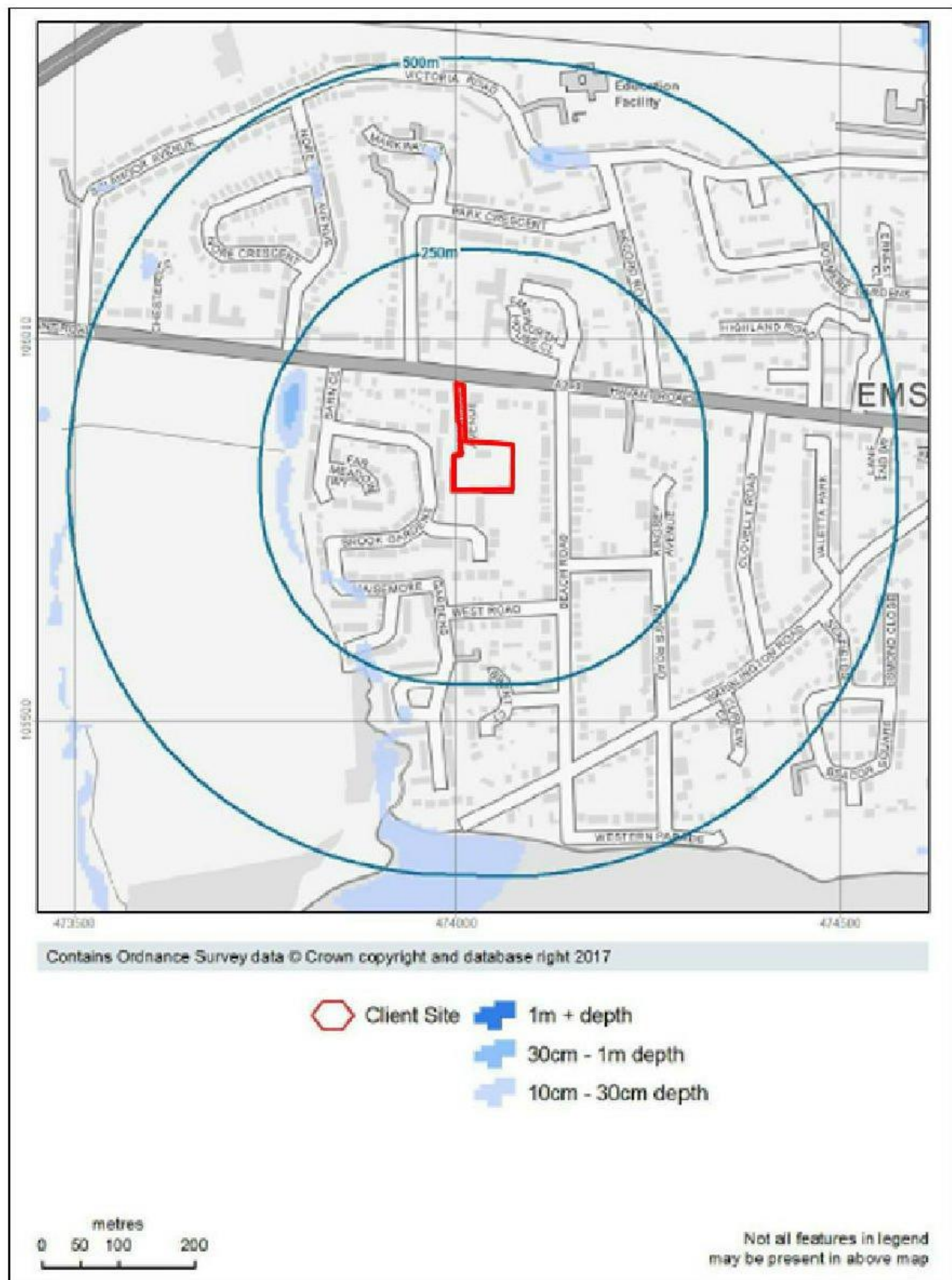


Figure 7: Surface Water Flood Risk (Extract from Landmark 'Sitecheck' Flood Report)

Sewer Flooding

4.15 A copy of the Southern Water sewer records is included in **Appendix E** which shows that there is a 225mm diameter public foul water sewer running through the western part of the site in a south to north direction. This sewer continues along Western Avenue and

discharges into a 225mm diameter public foul water sewer within Havant Road. The topographic survey identifies that the depth to invert of the public sewer within Manhole 0801 adjacent to the site boundary is 3.8m.

- 4.16 The sewer records indicate that there are no public surface water sewers either within or immediately adjacent to the site. The closest public surface water sewers include a 300mm diameter sewer within Brook Gardens approximately 50m to the west of the site; a 375mm diameter sewer within Havant Road approximately 90m to the north of the site; and a 225mm diameter sewer within Havant Road approximately 90m to the north of the site.
- 4.17 It is not considered that the aforementioned public surface water sewers would pose any flood risk to the site. Any flooding from the sewer within Brook Gardens would be conveyed southwards along the carriageway due to the falling levels as identified by the cover levels on the sewer records and away from the site.
- 4.18 The head of runs for the 375mm and 225mm diameter surface water sewers within Havant Road are set back (to the west and east respectively) from the Western Avenue junction. It is also noted that the Western Avenue junction is located at a high point along Havant Road (according to the cover levels given on the sewer records). Therefore any flooding from the 375mm and 225mm diameter surface water sewers would be conveyed along the carriageway of Havant Road in a western and eastern direction respectively, and not towards the site via Western Avenue.
- 4.19 It is usually the surface water sewers that pose the greatest flood risk to a site, however there is also a potential flood risk associated with the public foul water sewer adjacent to the site. A drainage survey of the site was recently undertaken by Such Salinger Peters Consulting Engineers who identified a level monitoring device was within Manhole 0801 as shown in **Figure 8**.
- 4.20 It has also been noted from the Sewer Record plans that anti flooding devices (AFD's) have been installed in manholes 0701 and 0702

- 4.21 From information provided by Southern Water, the AFD's have been installed since the mid-2000's to the foul drainage manholes in Brook Gardens/Western Avenue, to prevent surcharging entering the Brook Gardens system. It is worth noting that none of the residents of Western Avenue has reported any flooding from the public foul water sewer. If this sewer surcharges, which we understand it did in the early 2000's, it is the low point in Brook Gardens that floods. The residents of numbers 68, 70, 72 have reported being affected.
- 4.22 We understand that there have been no foul water flood incidents since Spring 2013, when an AFD was fitted in the road within Brook Gardens. In the event of a surcharge the AFD's send an alarm signal via a telemetry link and tankers are then dispatched to pump the excess.



Figure 8: Photo of Southern Water Manhole 0801

- 4.23 The topographic survey suggests that any flooding from Manhole 0801 is likely to be conveyed southwards along the access road (which will become the car park as part of the development) although there is potential for some flooding to spill onto the main part of the site based on existing levels. Finished levels in this area must be set to ensure that they slope away from the main part of the site which would provide containment within the car parking area. Additionally, the finished floor level (FFL) of the building should be set at least 300mm above the cover level Manhole 0801, i.e., a minimum level of 9.28 m AOD.
- 4.24 The on-site drainage system would be designed and constructed to prevent flooding for rainfall events with a return period of up to 100 years (including climate change). As a result of this, the flows to the foul system will be significantly reduced during all rainfall events.

Historical Flooding

- 4.25 The Landmark 'Sitecheck' Flood Report includes a section on historical flood events and it is understood that this is based on information that has been collated by the Environment Agency. The report states that there are no recorded incidents of flooding within 500m of the site.

Flood Risk Summary

- 4.26 It is concluded that flood risk to the site and the proposed development from all flood risk sources is generally low.
- 4.27 The potential risk from groundwater or surface water flooding could be mitigated against using best practice through the provision of an adequately designed on-site drainage system in conjunction with appropriate threshold levels for buildings above the adjacent ground. A threshold level of 200mm is likely to be adequate and it will also important to ensure that hardstanding areas slope away from buildings.
- 4.28 The potential flood risk associated with the public foul water sewer adjacent to the site could be mitigated by setting the finished levels in the surrounding area to direct any sewerage spill into the car park area and away from the new development. It is recommended that the FFL of the building to be at least 9.28 m AOD.
- 4.29 As the site is located within Flood Zone 1, safe access and egress to/from the site does not require any further consideration.
- 4.30 As the site currently drains surface water into the foul system, and the proposed development will remove this and discharge to the public surface water sewer at greenfield rates, the development will not cause any flooding downstream of the site and will improve the flow characteristics of the foul drainage system

5. DRAINAGE STATEMENT

Introduction

- 5.1 It is understood that McCarthy & Stone have engaged Such Salinger Peters Consulting Engineers (SSP) as the drainage consultants for the development. As such, they have provided a proposed drainage layout which is included in **Appendix G**. However for completeness of this FRA, a brief description of the existing site drainage in conjunction with the concepts that have been followed by Such Salinger Peters are provided below.

Surface Water Drainage

- 5.2 From the drainage survey of the existing site undertaken by Such Salinger Peters, the majority of the surface water run-off generated by the existing impermeable areas was found to drain to an existing soakaway within the garden of the property. However approximately half the roof area of the main building was found to discharge to the public foul water sewer.
- 5.3 The British Geological mapping has indicated that the superficial geology underlying the site is made up of River Deposits. (**1:50 000 scale superficial deposits description:** *River Terrace Deposits (undifferentiated) - Sand, Silt and Clay. Superficial Deposits formed up to 3 million years ago in the Quaternary Period. Local environment previously dominated by rivers.*) Which may offer the potential to use infiltration techniques to dispose of the surface water run-off generated by the impermeable (roofed and hardstanding) areas created by the new development. This is further supported by the majority of the existing site already discharging to a soakaway.
- 5.4 It is noted that infiltration is the preferred option in line with the Building Regulations Part H3 which states that surface water shall discharge to one of the following, listed in order of priority:
- • An adequate infiltration system: or, where not reasonably practicable,
 - • A watercourse; or, where not reasonably practicable,
 - • A sewer.

5.5 A preliminary geotechnical investigation has been carried out by ACS and the following is taken from the summary

6.3.1 The borehole infiltration test revealed a permeability of $3.48 \times 10^{-7} \text{m/s}$ indicating the shallow underlying ground conditions may not be suitable for surface water drainage. The shallow soils have been revealed to be variable with both cohesive and granular material. Furthermore shallow groundwater has been recorded across the site which may further negate the potential for soakaways.

5.6 As on-site testing indicates that the ground conditions are not conducive to infiltration techniques, the next preferred option would be to discharge the surface water run-off to a watercourse. However there are no watercourses either within or immediately adjacent to the site that could be utilised.

5.7 The final and least preferred option would be to discharge to the public surface water sewer network, given the aforementioned constraints, the solution selected by Messrs SSP includes an attenuation tank, with a pumped discharge to the public surface water network within Havant Road at Manhole 9951.

This system has been designed to cater for a 1: 100 year rainfall event plus an allowance of 40% for climate change.

Foul Water Drainage

5.8 From the drainage survey of the existing site undertaken by Such Salinger Peters, the foul water generated by the existing dwelling was found to discharge into Southern Water Manhole 0801 via a private 100mm diameter connection.

5.9 Based on the Sewers for Adoption design criteria of 4,000 litres per dwelling per day, the design foul water discharge from the existing site would be 0.05 l/s. For a 25 dwelling development the design foul water discharge would be expected to be 125 l/ per person per day, based on McCarthy and Stone design criteria. Also based on McCarthy and Stone design criteria, it is anticipated that room occupancy rates would be 1.5 persons per 2 bed room and 1.25 per 1 bed room resulting in a daily flow of 5,624 l/day. From the SSP calculations the peak flow from the site will be 0.0651l/s and Southern Water have confirmed that sufficient capacity exists for this predicted flow rate. A copy of the Southern Water response is included in **Appendix F**.

6. SUMMARY AND RECOMMENDATIONS

- 6.1 This Flood Risk Assessment has been prepared by Paul Basham Associates to support a planning application for McCarthy & Stone's proposed retirement redevelopment of Orchard House, Western Avenue, Emsworth. The site is approximately 0.58 Ha. in total area and is currently occupied by a large residential dwelling (Orchard House) in conjunction with garages and other out-buildings, along with a large garden.
- 6.2 The development proposals would involve the construction of 25 retirement dwellings, reception and lounge areas within a multi-story block, associated car parking, open space and landscaping etc. Vehicle access would be provided from Western Avenue via the existing access.
- 6.3 It has been identified that the site falls wholly within Flood Zone 1, an area with a low risk of flooding from rivers or tidal waters. As a result of the site being located in Flood Zone 1, no Sequential or Exception Testing is required.
- 6.4 The site has also been assessed for other potential sources of flood risk such as groundwater, canals, reservoirs, surface water (pluvial flooding), and sewers. It was concluded based on the Environment agency data, that flood risk to the site and the proposed development is low and that any potential risk from groundwater or surface water flooding could be mitigated using best practice through the provision of an adequately designed on-site drainage system in conjunction with appropriate threshold levels for buildings above the adjacent ground. A threshold level of 200mm is likely to be adequate and it will also be important to ensure that hardstanding areas slope away from buildings.
- 6.5 The potential flood risk associated with the public foul water sewer adjacent to the site could be mitigated by setting the finished levels in the surrounding area to direct any sewerage spill into the car park area and away from the new development. It is recommended that the FFL of the building to be at least 9.28 m AOD.
- 6.6 The surface water run-off generated by the majority of the existing impermeable areas on the site currently drain to an existing soakaway within the garden of the property. However it is noted that approximately half the roof area of the main building discharges to the public foul water sewer.

- 6.7 The British Geological mapping has indicated that the superficial geology underlying the site is made up of River Deposits which may offer the potential to use infiltration techniques to dispose of the surface water run-off generated by the impermeable (roofed and hardstanding) areas created by the new development. However as noted in the preliminary geotechnical investigation, initial testing, indicates that the ground conditions are not conducive to infiltration techniques
- 6.8 The surface water drainage solution selected by Messrs SSP includes an attenuation tank, with a pumped discharge to the public surface water network within Havant Road at Manhole 9951. This system has been designed to cater for a 1: 100 year rainfall event plus an allowance of 40% for climate change.
- 6.9 It is proposed that the foul water discharge generated by the new development would utilise the existing private 100mm diameter connection to Southern Water Manhole 0801. However it is noted that there would be a marginal increase in the design discharge as a result of the proposed 25 units, however this will be mitigated by the significant reduction in surface water flows which currently drain into the foul water system.
- 6.10 From the SSP calculations the peak flow from the site will be 0.0651l/s and Southern Water have confirmed that sufficient capacity exists for this predicted flow rate.
- 6.11 SSP, have produced a detailed surface water drainage layout for the development and a copy of this is included in **Appendix G**.
- 6.12 Overall it is concluded that the flood risk posed to the new development including the section of Western Avenue would be low and that any issues associated with the public foul water sewer adjacent to the site could be mitigated. The surface water run-off generated by the new development would be managed in a sustainable manner and would not increase the flood risk to the surrounding area.