GeoSmart Information

FloodSmart Plus

Flood Risk Assessment

Site Address

Willow Marina
Willow Lane
Wargrave
Berkshire
RG10 8LH

Grid Reference

478540, 179277

Report Prepared for

Jodie Davis

Date

25/04/2025

Report Status

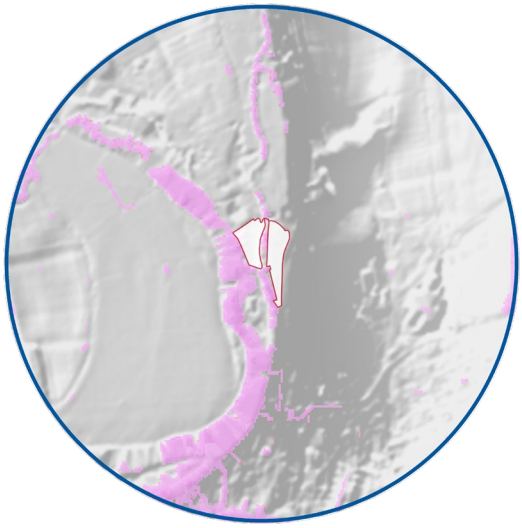
FINAL

Site Area

13,750 m^2

Report Reference

85719R1



RISK – Very Low to High

The Site is predominantly located in Flood Zone 3, which equates to a High probability of flooding from the River Thames and its associated channels. The risk of flooding from rivers and the sea considering defences (RoFRS) is classified as Low to High. Surface water (pluvial) flood risks are Very Low. Groundwater flood risks are High and flooding risks from artificial sources (i.e. canals, reservoirs and sewers) are Low. Mitigation measures are recommended in this report to reduce the risks to an acceptable level over the lifetime of the development.

Report Author

Harriet Parker
Consultant

Report Checker

Andy Singleton
Associate

Report Reviewer

Bob Sargent
Associate

GeoSmart Information Ltd
Suite 9-11, 1st Floor, Old Bank Buildings,
Bellstone, Shrewsbury, SY1 1HU
+44(0)1743 298 100
info@geosmartinfo.co.uk
www.geosmartinfo.co.uk

1. Executive summary

A review has been undertaken of national environmental data sets to assess the flood risk to the Site from all sources of flooding in accordance with the National Planning Policy Framework (NPPF) (2024) and National Planning Practice Guidance (NPPG) (published in 2014 and updated in August 2022). A site-specific flood risk assessment, to assess the flood risk to and from the development Site, is provided within this concise interpretative report written by an experienced GeoSmart consultant. Baseline flood risk and residual risks that remain after the flood risk management and mitigation measures are implemented are summarised in the table below.

Site analysis

Source of Flood Risk	Baseline[1]	After analysis[2]	After Mitigation[3]
River (fluvial) flooding	Low to High	High	Medium
Sea (coastal/tidal) flooding	Very Low		N/A
Surface water (pluvial) flooding	Very Low to Medium	Very Low	N/A
Groundwater flooding	High		Moderate
Other flood risk factors present	Yes (reservoirs, bridge blockage)		Yes
Is any other further work recommended?	Yes		Yes (see below)

1 BASELINE risks assigned for the whole Site, using national risk maps, including the benefit of EA flood defences.

2 AFTER ANALYSIS modification of risk assessment based on detailed site specific analysis including some or all of the following: flood model data, high resolution mapping, building location, access routes, topographic and CCTV surveys.

3 AFTER MITIGATION risks include risks to proposed development / asset and occupants if mitigation measures recommended in this report are implemented, including the impacts of climate change.

*N/A indicates where mitigation is not required.

Summary of existing and proposed development

The Site is currently used within a commercial capacity as a marina, with the Hennerton Blackwater water course flowing through the centre of the Site. There are three main

buildings (storage sheds) in the north west corner of the Site, and the remainder of the Site is covered by landscaped and hardstanding areas that are used for boat storage.

Development proposals comprise the renovation of the Site, including:

- Recladding and reroofing works;
- Installation of solar panels, new doors, windows and guttering;
- Resurfacing of the main marina driveway; and
- Installation of a sewage treatment plant and filtration system to capture boat wash off.

Summary of flood risks

The flood risks from all sources have been assessed as part of this report and are as follows:

River (fluvial) and Sea (Estuarine/Coastal) flooding

According to the Environment Agency's (EA) Flood Map for Planning Purposes, the Site is located within fluvial Flood Zones 2 (Medium Probability) and 3 (High Probability).

According to the EA's Risk of Flooding from Rivers and Sea (RoFRS) map, which considers the type, condition and crest height of flood defences, the Site has a Low to High risk of flooding from the adjacent watercourses, the River Thames and Hennerton Blackwater. The majority of the Site, including the planned development area, is at a High risk of flooding.

Several historical flood events related to the nearby rivers are understood to have previously occurred at the Site.

The Site could potentially be at risk from flooding due to blockage or failure of the bridge located on the water course in the north of the Site.

Modelled flood data obtained from the EA has been analysed in line with the most up to date guidance on climate change (EA, 2022), to confirm a maximum "design" flood level at the Site.

- During a 1 in 100 year plus 31% climate change allowance event the flood level at the Site would be 34.39 mAOD. During this event, flood depths in the area proposed for development could be up to 2.2 m. Flood mitigation measures are included in the next section.

Based on a review of flood mapping, flood model data, local topography and additional information, the fluvial flood risk is considered to be High.

Emergency evacuation routes are available to the east.

Surface water (pluvial) flooding

According to the EA's Risk of Flooding from Surface Water (pluvial) flood mapping, the Site has a risk of pluvial flooding ranging from Very Low to Medium. The majority of the Site, including the planned development area, is at a Very Low risk of flooding.

Flooding would not affect the area proposed for development in the 1 in 100 year present day or climate change scenario events.

Baseline mapping indicates a Very Low to Medium risk, however, a review of the flood model data, local topography and additional information indicates the risk is likely to be lower.

Groundwater flooding

Groundwater Flood Risk screening data indicates there is a High risk of groundwater flooding at the surface in the vicinity of the Site during a 1 in 100 year event.

- The Site is underlain by permeable superficial deposits (Alluvium, a Secondary (A) Aquifer) and permeable bedrock (Seaford Chalk Formation and Newhaven Chalk Formation, a Principal Aquifer).
- The underlying groundwater is likely to be in hydraulic continuity with the River Thames and its associated channels, and is therefore likely to be directly linked to the local fluvial flood risk.

A review of the flood model data, local topographic controls, borehole data and additional information indicates the flood risk is likely to remain High.

Artificial sources of flooding

The risk of flooding from artificial (man-made) sources such as reservoirs, sewers and canals has been assessed:

- The EA's Risk of Flooding from Reservoir map confirms the Site is at risk of reservoir flooding. However, the potential for a breach of a reservoir to occur and flooding affecting the Site is low.
- Ordnance Survey (OS) data confirms there are no canals near to the Site.
- The Strategic Flood Risk Assessment (SFRA)(JBA Consulting, 2023) has identified two incidences of flooding as a result of surcharging sewers within the RG10 8 postcode since 2000. Records held by Thames Water indicate that there have been no incidences of flooding related to the surcharging of public sewers at the Site itself.

The risk of flooding from artificial sources is considered to be Low.

The risk to the development has been assessed over its expected 75 year lifetime, including appropriate allowances for the impacts of climate change which could increase the flood risk to the Site. Risks identified include increases in river flooding and the increased potential for surface water flooding and appropriate mitigation measures are proposed.

Recommendations

Recommendations for flood mitigation are provided below, based upon the proposed development and the flood risk identified at the Site.

- As there is a risk of flooding from fluvial sources, where feasible, the base of the proposed sewage treatment plant should be set to 34.99 mAOD[1]. Standard flood resilient design measures should also be incorporated.
- Given that the majority of development proposals consist of external changes to existing on-Site buildings, it is unlikely to be feasible or within the scope of redevelopment to raise FFL's to the recommended elevation. Therefore, standard flood resistance and resilient design measures should be considered.
- Given there is a risk of flooding from groundwater sources at the surface, the risk to buried infrastructure should be considered along with water proofing of lower ground floor areas, standard flood resilient design and non-return valves on the sewer inlet. French drains and/or pumping systems may also be considered.
- A Flood Warning and Evacuation Plan (FWEP) is recommended to ensure persons using the Site can evacuate safely on receipt of a Flood Warning.
    - Users of the Site should also be signed up to receive EA Flood Alerts and Flood Warnings.
    - A business continuity plan is recommended to reduce risks to people, property and profit.
- The ongoing management and maintenance of existing and any proposed drainage networks, under the riparian ownership of the developer, should be undertaken in perpetuity with the development.

GeoSmart recommend the mitigation measures discussed within this report are considered as part of the proposed development where possible and evidence of this is provided to the Local Planning Authority as part of the planning application.

[1] 0.6 m above the 1 in 100 year plus climate change flood level of 34.39 mAOD.

2. Introduction

Background and purpose

A site-specific flood risk assessment has been undertaken, to assess the flood risk to and from the development Site. This assessment has been undertaken by firstly compiling information concerning the Site and the surrounding area. The information gathered was then used to construct a 'conceptual site model', including an understanding of the appropriateness of the development as defined in the NPPF (2024) and the source(s) of any flood risk present, guided by the NPPG (published in 2014 and updated in August 2022). Finally, a preliminary assessment of the steps that can be taken to manage flood risk to the development was undertaken.

This report has been prepared with reference to the NPPF (2024) and NPPG (2022).

"*The National Planning Policy Framework set out the Government's planning policies for England and how these are expected to be applied*" (NPPF, 2024).

The NPPF (2024) and NPPG (2022) promote a sequential, risk-based approach to the location of development. This also applies to locating a development within a Site which has a variable risk of flooding.

"*The approach is designed to ensure that areas at little or no risk of flooding from any source are developed in preference to areas at higher risk. This means avoiding, so far as possible, development in current and future medium and high flood risk areas considering all sources of flooding including areas at risk of surface water flooding*" (Paragraph: 023. NPPG, 2022).

The purpose of this report is to provide clear and pragmatic advice regarding the nature and potential significance of flood hazards which may be present at the Site.

Report scope

In accordance with the requirements set out within NPPG 2022 (Paragraph: 021 Reference ID: 7-021-20220825), a thorough review of publicly and commercially available flood risk data and EA supplied data indicating potential sources of flood risk to the Site from rivers and coastal sources, surface run-off (pluvial), groundwater and reservoirs, including historical flood information and modelled flood extent. Appropriate measures are recommended to manage and mitigate the flood risk to the Site.

Information obtained from the EA and a review of the Wokingham Borough Strategic Flood Risk Assessment (SFRA) (JBA Consulting, 2023) and the Woking Local Development Plan Core Strategy (Woking Borough Council, 2012) are used to ascertain local flooding issues and, where appropriate, identify information to support a Sequential and/or Exception test required as part of the NPPF (2024).

The existing and future flood risk to and from the Site from all flood sources is assessed in line with current best practice using the best available data. The risk to the development has been assessed over its expected lifetime, including appropriate allowances for the impacts of climate change. Residual risks that remain after the flood risk management and mitigation

measures are implemented, are considered with an explanation of how these risks can be managed to keep the users of the development safe over its lifetime.

An indication of whether the Site will potentially increase flood risk elsewhere is provided, including where the proposed development increases the building footprint at the Site. A drainage strategy to control runoff can be commissioned separately if identified as a requirement within this report.

Report limitations

It is noted that the findings presented in this report are based on a desk study of information supplied by third parties. Whilst we assume that all information is representative of past and present conditions, we can offer no guarantee as to its validity and a proportionate programme of site investigations would be required to fully verify these findings.

The basemap used is the OS Street View 1:10,000 scale, however, the Site boundary has been drawn using BlueSky aerial imagery to ensure the correct extent and proportion of the Site is analysed.

This report excludes consideration of potential hazards arising from any activities at the Site other than normal use and occupancy for the intended land uses. Hazards associated with any other activities have not been assessed and must be subject to a specific risk assessment by the parties responsible for those activities.

Datasets

The following table shows the sources of information that have been consulted as part of this report:

Table 1. Datasets consulted to obtain confirmation of sources of flooding and risk

Source of flooding	Datasets consulted				
	Commercial Flood Maps	Local Policy & Guidance Documents*	Environment Agency (Appendix B)	Utility provider (Appendix C)	OS Data
Historical	X	X	X		
River (fluvial) / Sea (tidal/coastal)	X	X	X		

Source of flooding	Datasets consulted				
	Commercial Flood Maps	Local Policy & Guidance Documents*	Environment Agency (Appendix B)	Utility provider (Appendix C)	OS Data
Surface water (pluvial)	X	X	X		
Groundwater	X	X			
Sewer		X		X	
Culvert/bridges		X			X
Reservoir		X	X		

*Local guidance and policy, referenced below, has been consulted to determine local flood conditions and requirements for flood mitigation measures.

Local policy and guidance

For this report, several documents have been consulted for local policy and guidance and relevant information is outlined below:

Woking Local Development Plan Core Strategy (Woking Borough Council, 2012):

Policy CS9: Flooding and water management

The Council will determine planning applications in accordance with the guidance contained within the NPPF. The SFRA will inform the application of the Sequential and Exceptional Test set out in the NPPF.

The Council expects development to be in Flood Zone 1 as defined in the SFRA. Applications or allocations within Flood Zone 2 will only be considered if it can be demonstrated that there are no suitable alternatives in areas at lower risk.

The Council will not encourage development in Flood Zones 3a and 3b, however, it accepts that this is possible in exceptional circumstances. Development proposals in Flood Zones 3a and 3b will be required to be accompanied by a comprehensive Flood Risk Assessment to demonstrate that the development will not increase flood risk elsewhere or exacerbate the existing situation. A sequential approach will apply to all developments in Flood Zone 3 and

areas at risk of flooding from sources other than river. Any development in Flood Zone 3b will only be acceptable when it is either water compatible, essential infrastructure, or if brownfield land, does not increase the net number of residential units or business floorspace and improves local flood risk.

The Council will require all significant forms of development to incorporate appropriate sustainable drainage systems (SUDS) as part of any development proposals. If this is not feasible, the Council will require evidence illustrating this.

A Flood Risk Assessment will be required for development proposals within or adjacent to areas at risk of surface water flooding as identified in the SFRA. To further reduce the risk from surface water flooding, all new development should work towards mimicking greenfield run-off situations. Proposals which relate specifically to reducing the risk of flooding (e.g. defence/ alleviation work) will be supported so long as they do not conflict with other objectives of the Core Strategy for example, those relating to landscape and townscape character.

In areas at risk of flooding, proposals (including flood compensation proposals) with implications for biodiversity will be carefully considered for all levels of ecological designation. Where the development proposals are demonstrated to adversely affect an SPA, SAC or RAMSAR site, permission will not be granted.

All development, particularly on brownfield land, should seek to remediate contaminated land to ensure that risk to water quality as a result of development is minimised.

Wokingham Borough Council Level 1 Strategic Flood Risk Assessment (JBA Consulting, 2023):

Recommendations from the SFRA

Reduction of flood risk through site allocations and appropriate site design:

- To locate new development in areas of lowest risk, in line with the sequential test, by steering sites to Flood Zone 1 from the Flood Map for Planning and avoiding where possible areas with a higher risk of surface water flooding. If a sequential test is undertaken and a site at flood risk is identified as the only appropriate site for the development, the exception test shall be undertaken. If development can't be avoided in the higher risk surface water Zone (Zone B), then part "b" of the exception test should be satisfied.
- After application of the exception test, a sequential approach to site design will be used to reduce risk. Any re-development within areas of flood risk which provide other wider sustainability benefits will provide flood risk betterment and made resilient to flooding.
- Identification of long-term opportunities to remove development from the floodplain and to make space for water.

- Ordinary watercourses not currently afforded flood maps should be modelled to an appropriate level of detail to enable a sequential approach to the layout of the development.
- Confirm development is 'safe', dry pedestrian egress from the floodplain and emergency vehicular access should be possible for all residential development. If at risk, then an assessment should be undertaken to detail the flood duration, depth, velocity, and flood hazard rating in the 1% AEP plus climate change flood event, in line with FD2320.
- Raise residential and commercial finished floor levels 600mm above the 1% AEP plus climate change flood level. Protect and promote areas for future flood alleviation schemes.
- Identify opportunities for brownfield sites in functional floodplain to reduce risk and provide flood risk betterment.
- Identify opportunities to help fund future flood risk management through developer contributions to reduce risk for surrounding areas.
- Seek opportunities to make space for water to accommodate climate change.

Promote SuDS to mimic natural drainage routes to improve water quality:

- SuDS design should demonstrate how constraints have been considered and how the design provides multiple benefits e.g. landscape enhancement, biodiversity, recreation, amenity, leisure and the enhancement of historical features.
- Planning applications for phased developments should be accompanied by a drainage strategy, which takes a strategic approach to drainage provision across the entire site and incorporates adequate provision for SuDS within each phase.
- Use of the SuDS management train to prevent and control pollutants to prevent the 'first flush' polluting the receiving waterbody.
- SuDS are to be designed so that they are easy to maintain, and it should be set out who will maintain the system, how the maintenance will be funded and should be supported by an appropriately detailed maintenance and operation manual.

Reduce surface water runoff from new developments and agricultural land:

- Space should be provided for the inclusion of SuDS on all allocated sites, outline proposals and full planning applications.
- Promote biodiversity, habitat improvements and Countryside Stewardship schemes help prevent soil loss and to reduce runoff from agricultural land.
- Identify opportunities to maintain and enhance permeable surfaces and greenspaces to help reduce surface water runoff whilst promoting other benefits, including biodiversity and wellbeing.

Enhance and restore river corridors and habitat:

- Assess condition of existing assets and upgrade, if required, to confirm that the infrastructure can accommodate pressures/flows for the lifetime of the development.

- Natural drainage features should be maintained.
- Identify opportunities for river restoration/enhancement to make space for water.
- A presumption against culverting of open watercourses except where essential to allow highways and/or other infrastructure to cross, in line with CIRIA's Culvert design and operation guide, (C689) and to restrict development over culverts.
- There should be no built development within 8m from the top of a watercourse or main river for the preservation of the watercourse corridor, wildlife habitat, flood flow conveyance and future watercourse maintenance or improvement.

Mitigate against risk, improved emergency planning and flood awareness:

- Work with emergency planning colleagues and stakeholders to identify areas at highest risk and locate most vulnerable receptors.
- Exceedance flows, both within and outside of the site, should be appropriately designed to minimise risks to both people and property.
- For a partial or completely pumped drainage system, an assessment should be undertaken to assess the risk of flooding due to any failure of the pumps to be assessed. The design flood level should be determined if the pumps were to fail; if the attenuation storage was full, and if a design storm occurred.
- An emergency overflow should be provided for piped and storage features above the predicted water level arising from a 1% AEP rainfall event, inclusive of climate change and urban creep.
- Consideration and incorporation of flood resilience measures up to the 0.1% AEP event.
- Produce and implement robust emergency (evacuation) plans for major developments.
- Increase awareness and promote sign-up to the EA Flood Warnings Direct (FWD) within the Wokingham Borough.

Flood Zone 3b

Flood Zones 2 and 3a show the same extent as the online Environment Agency's Flood Map for Planning (which incorporates latest modelled data) other than for the watercourses listed below. In these instances, where additional detailed modelling was available that has not been incorporated into the Flood Map for Planning, the modelled extent was used in preference:

- Blackwater (in the west of the area where the 2007 model extent is wider than the 2009 extent, only the 1% AEP output was available for Flood Zone 3a, so the Flood Zone 2 output remains the same as the Flood Map for Planning).
- River Loddon (hydrology was updated as part of this SFRA) • Arborfield (a new detailed hydraulic model was developed for the unnamed watercourse through Arborfield as part of this SFRA).
- Emm Brook (a detailed hydraulic model was provided by WSP for use within this SFRA).

The EA Flood Zones do not cover all catchments or ordinary watercourses with areas <3km². As a result, whilst the EA Flood Zones may show an area is in Flood Zone 1, there may be a flood risk from a smaller watercourse(s) not shown in the Flood Zones. Functional floodplain (Flood Zone 3b) is identified as land which would flood with an annual probability of 3.3% AEP (1 in 30 years), where detailed hydraulic modelling exists. The 3.3% AEP modelled flood extents have been used to represent Flood Zone 3b, where available from the EA. 3.3% AEP extents were available for the following models:

- Kennet
- Loddon
- Arborfield
- Thames (Hurley to Teddington)
- Thames (Pangbourne to Sonning)
- Thames (Sonning to Hurley)

For areas covered by detailed models, but with no 3.3% AEP output available, the 1% AEP outputs were used as a proxy. This was the case for the following models:

- Blackwater (2007)
- Blackwater (2009)
- Foudry Brook
- Emm Brook

As this is quite a conservative approach, the 5% AEP outputs have been used to identify areas where the Flood Zone 3b extent is likely to be similar/ considerably different from the 1% AEP output and this has been used to inform the site screening as an additional process to assess the sensitivity between the 5% AEP and 1% AEP extents.

For areas outside of the detailed model coverage, Flood Zone 3a (1% AEP) has been used as a conservative indication. Further work should be undertaken as part of a detailed site-specific FRA to define the extent of Flood Zone 3b where no detailed modelling exists.

Guidance

Strategic Flood Risk Assessments are carried out by local authorities, in consultation with the Environment Agency, to assess the flood risk to the area from all sources both now and in the future due to climate change. They are used to inform planning decisions to ensure inappropriate development is avoided (NPPF, 2024).

3. Site analysis

Site information

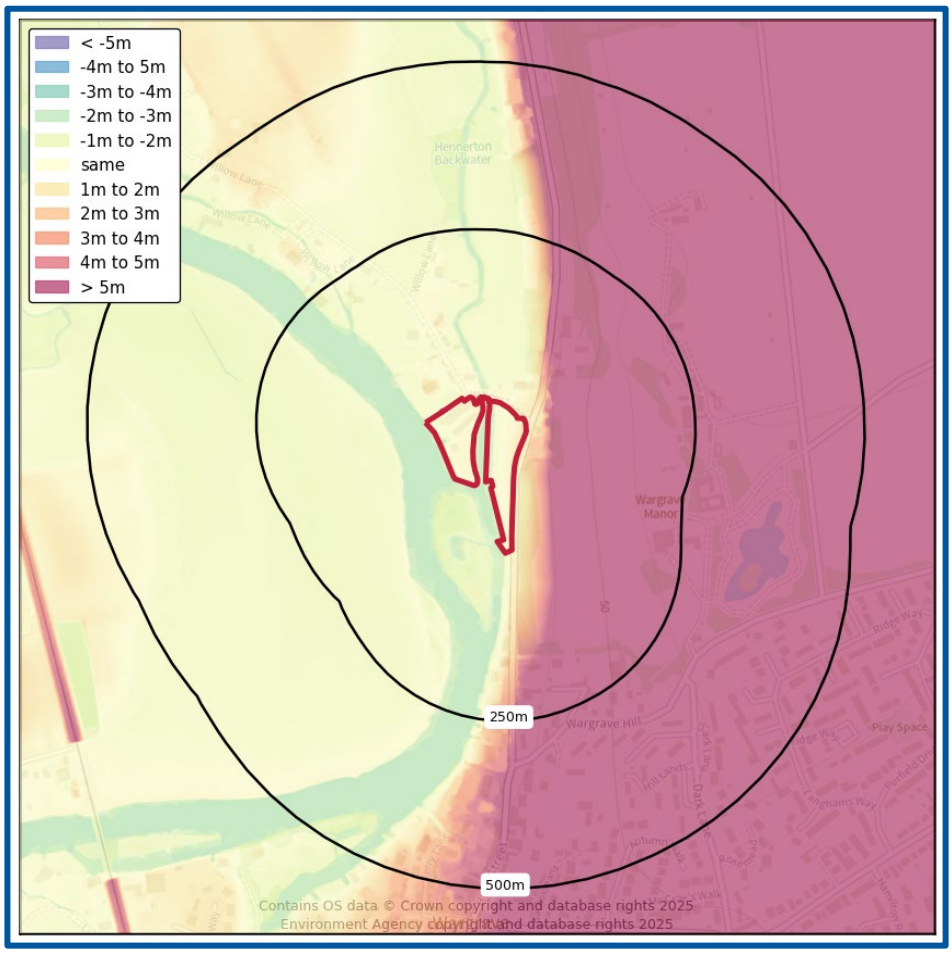
The Site is located north of Wargrave in a setting of commercial and residential land use at National Grid Reference SU 78540 79277.

Figure 1. Aerial imagery of the Site (Bluesky, 2025)

Figure 2 indicates that ground levels within 500 m of the Site rise rapidly to the east, and are generally level to the west.

The general ground levels on-Site are between 31.93 mAOD and 34.44 mAOD with the Site falling gradually in a westerly direction. This is based on EA elevation data obtained for the Site to a 1 m resolution with a vertical accuracy of ±0.15 m (Appendix D). A topographic survey (see Appendix A) was provided for the western part of the Site, which indicates that ground levels within this area range from 32.19 mAOD to 33.81 mAOD (Glanville, 2023).

Figure 2. Site Location and Relative Elevations (GeoSmart, 2025)



Development

The Site is currently used within a commercial capacity as a marina, with the Hennerton Blackwater water course flowing through the centre of the Site. There are three main buildings (storage sheds) situated in the north west corner of the Site; the remainder of the Site is covered by landscaped and hardstanding areas that are used for boat storage.

Development proposals comprise the renovation of the Site, including:

- Recladding and reroofing works;
- Installation of solar panels, new doors, windows and guttering;
- Resurfacing of the main marina driveway; and
- Installation of a sewage treatment plant and filtration system to capture boat wash off.

Site plans are included within Appendix A.

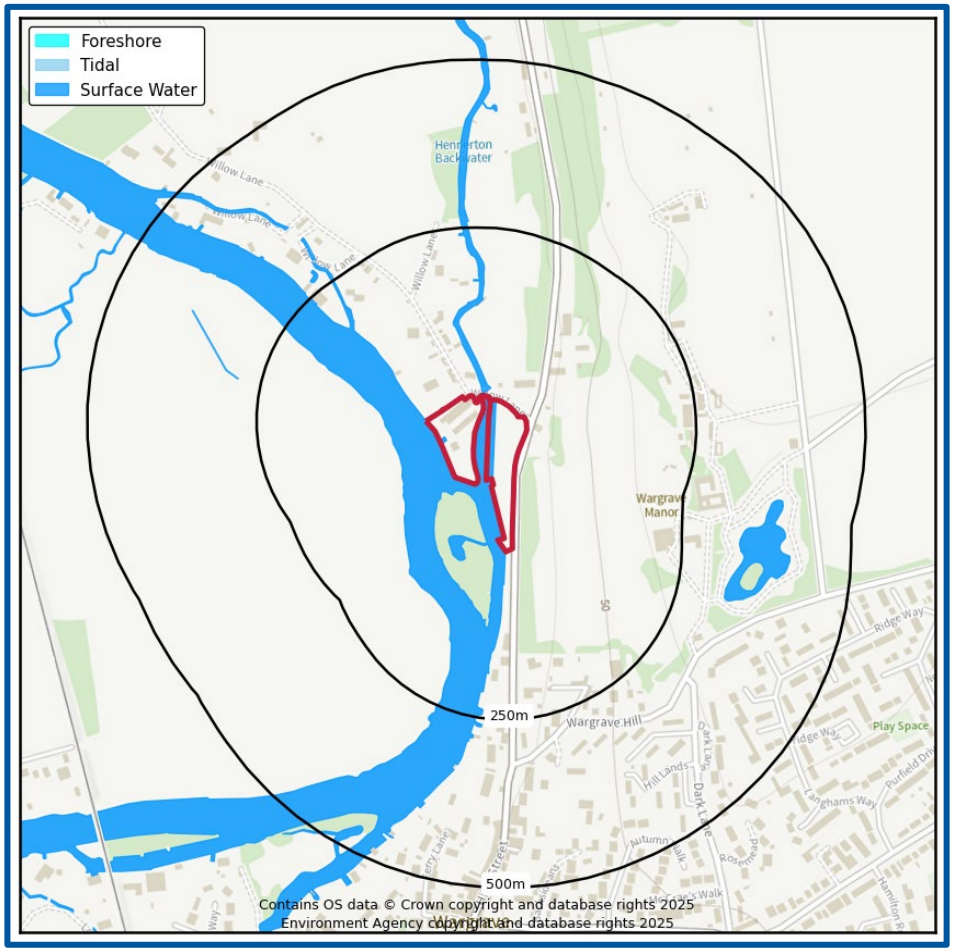
The effect of the overall development will not result in an increase in number of occupants and/or users of the Site and will not result in the change of use, nature or times of occupation. According to Annex 3 of the NPPG (2022), the vulnerability classification of the existing development is Water Compatible and proposed development is Water Compatible. The estimated lifespan of the development is 75 years.

Hydrological features

According to Ordnance Survey (OS) mapping included in Figure 3, there are numerous surface water features within 500 m of the Site:

- The River Thames is located adjacent to the west and south of the Site.
- Hennerton Blackwater (a channel associated with the River Thames) flows through the centre of the Site.
- Assorted drainage ditches are located within area surrounding the Site, the closest of which is located approximately 185 m north west of the Site.
- An unnamed lake is located approximately 355 m east of the Site.

Figure 3. Surface water features (EA, 2025)



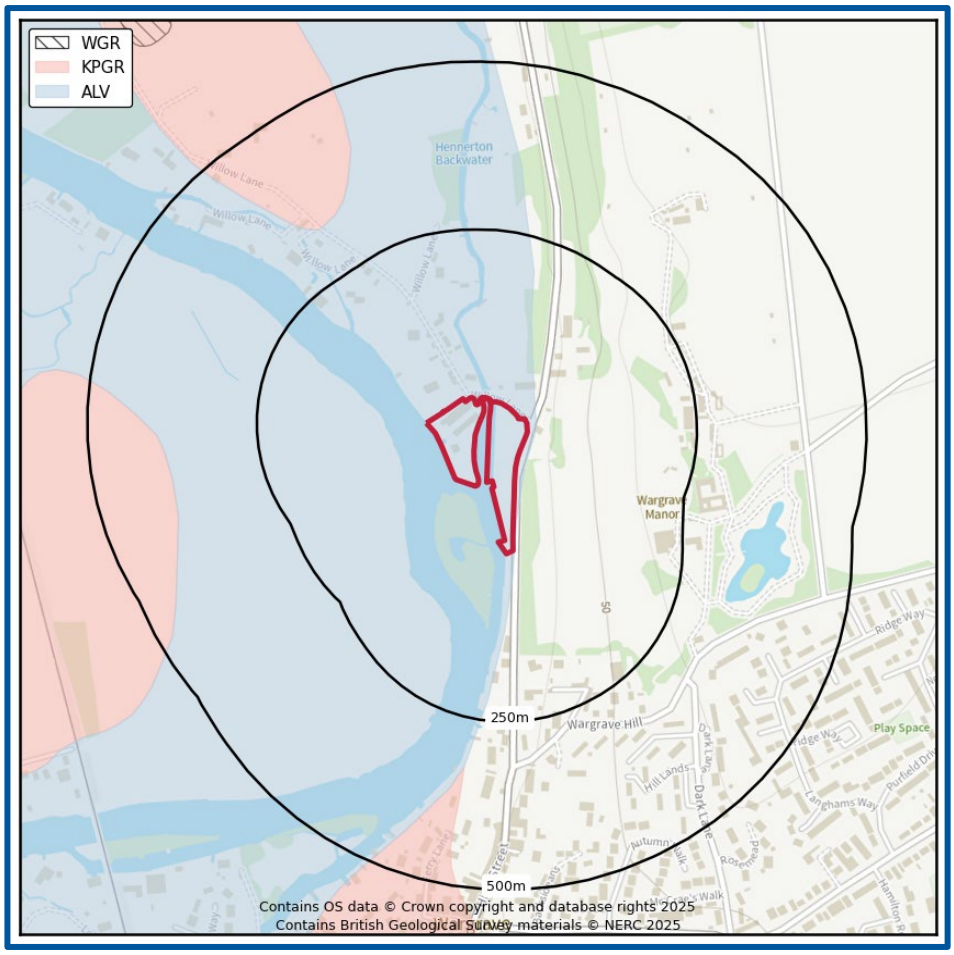
Proximity to relevant infrastructure

A road bridge on Willow Lane crosses Hennerton Blackwater in the north of the Site.

Hydrogeological features

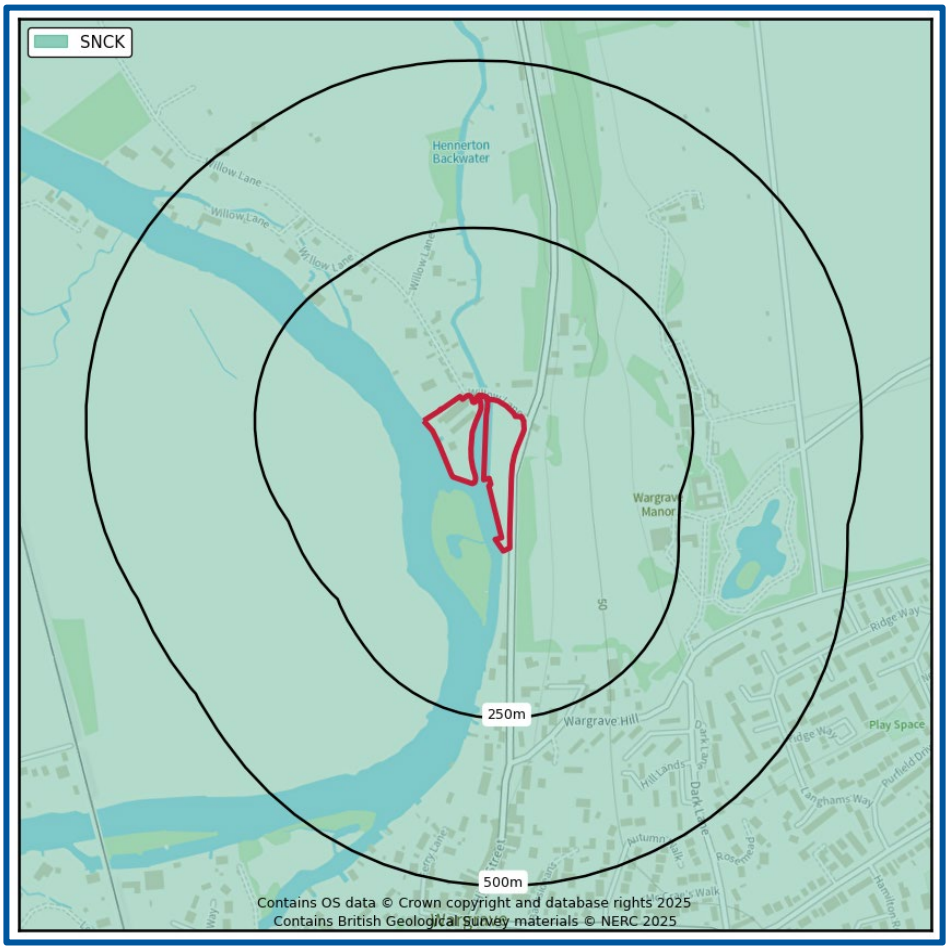
British Geological Survey (BGS) mapping indicates that the underlying superficial geology (Figure 4) consists of Alluvium (ALV) (BGS, 2025) which is classified as a Secondary (A) Aquifer (EA, 2025).

Figure 4. Superficial Geology (BGS, 2025)



BGS mapping indicates that the underlying bedrock geology (Figure 5) consists of the Seaford Chalk Formation and Newhaven Chalk Formation (SNCK) (BGS, 2025) which are classified as a Principal Aquifer (EA, 2025).

Figure 5. Bedrock Geology (BGS, 2025)



Geological conditions

A review of the BGS borehole database (BGS, 2025) indicates that the nearest and most relevant borehole to the Site (ref: SU77NE31) is located approximately 235 m to the north west of the Site at an elevation of 36.57 mAOD; the corresponding borehole record indicates that the underlying geology consists of drift to a depth of 7.62 m below ground level (bgl) overlying upper chalk to a depth of 12.19 m bgl.

Groundwater

A groundwater level of 6.1 m bgl was recorded at borehole ref: SU77NE31 in 1895. It is acknowledged that groundwater levels will vary spatially and temporally; as such, the recorded water level may not be entirely representative of conditions beneath the Site.

Given the close proximity to adjacent surface water courses, a shallow groundwater body is anticipated beneath the Site.

4. Flood risk to the development

Historical flood events

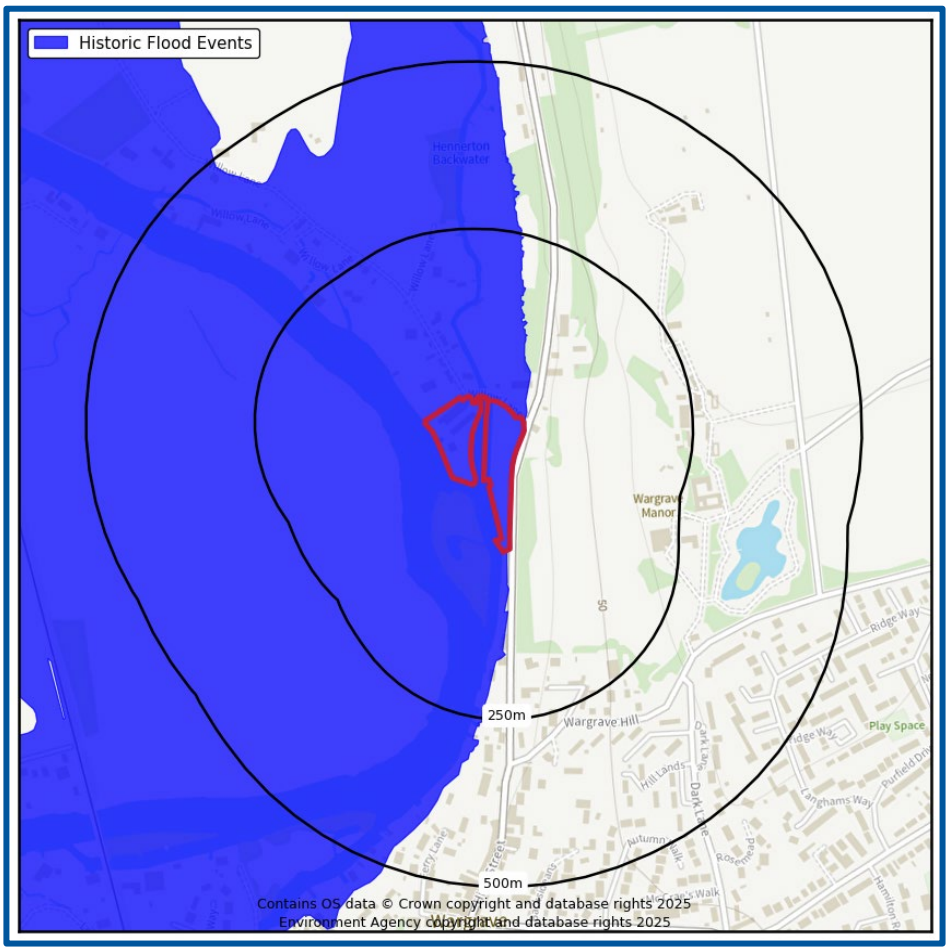
According to the EA's Historical Flood Map (Figure 6) and Table 5-1 of the SFRA (JBA Consulting, 2023), there have been several recorded flood events that have affected the Site, associated with the channel capacity of the River Thames and Hennerton Blackwater being exceeded:

- In March 1947 flooding occurred across the entire Site, excluding a minor area on the eastern boundary.
- In November 1974 flooding occurred on the western half of the Site.
- In December 2000 flooding occurred across the majority of the Site and the SFRA states that at least 4 properties within the local area flooded internally.
- In January 2003 flooding occurred across the majority of the Site area.
- In July 2007 flooding occurred predominantly on the western boundary of the eastern half of the Site. According to the SFRA, at least 58 highways and 120 properties flooded externally across the borough, and 80 properties flooded internally.
- In the winter of 2013/2014 partial flooding occurred on Site. The SFRA states that over 30 highways and 50 properties flooded externally across the borough, with 35 of the properties flooding internally.

It should be noted that anecdotal evidence from users of the Site identifies a flood event in March 2024 in which channel capacity of the river was exceeded and resulted in the entire Site flooding.

The purpose of historical flood data is to provide information on where and why flooding may have occurred in the past. The absence of any recorded events does not mean flooding has never occurred on-Site or that flooding will never occur at the Site.

Figure 6. EA Historic Flood Map (EA, 2025)



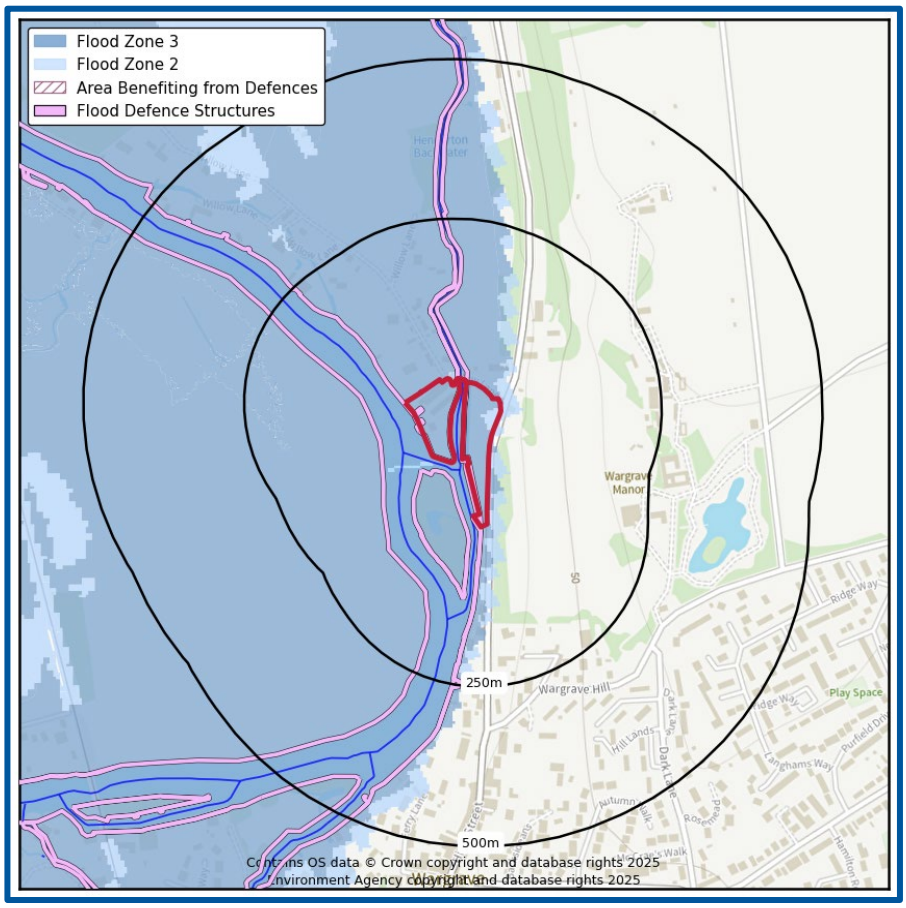
Rivers (fluvial) / Sea (coastal) / Estuarine (tidal) flooding

The predominant risk at the Site is from flooding from rivers, termed as fluvial flooding. The Site is located in an inland location and the risk of flooding from coastal and tidal processes are therefore considered to be Negligible.

River (fluvial) flooding occurs during times of heavy rainfall or snow melt when watercourses' capacity can be exceeded, over topping the banks and flood defences.

According to the EA's Flood Map for Planning Purposes (Figure 7), the Site is located within fluvial Flood Zones 2 and 3 and is therefore classified as having a Medium to High probability of fluvial flooding from the River Thames and associated channels. The majority of the Site is located within Flood Zone 3.

Figure 7. EA Flood Map for Planning Purposes (EA, 2025)



Guidance

As defined in the NPPF (2024):

Ignoring the presence of any defences, land located in a Flood Zone 2 is considered to have a Medium probability of flooding, with between a 1 in 100 and 1 in 1000 annual probability of fluvial flooding or between a 1 in 200 and 1 in 1000 annual probability of coastal flooding in any one year.

Development of "Water-Compatible", "Essential Infrastructure", "Less Vulnerable" and "More Vulnerable" land uses are suitable for this zone with "Highly Vulnerable" land uses requiring an Exception Test to be passed prior to development taking place (see glossary for terminology).

Ignoring the presence of any defences, land located in a Flood Zone 3 is considered to have High probability of flooding with a 1 in 100 year or greater annual probability of fluvial flooding or a 1 in 200 or greater annual probability of coastal flooding in any one year.

The site is located in a functional flood plain therefore only development of "Water-Compatible" and "Essential Infrastructure" land uses are suitable for this zone (see glossary for terminology).

Flood defences

Guidance
Sites that are located close to flood defences are likely to be zones where rapid inundation will occur in the event of the flood defences being overtopped or breached. A Site located close to flood defences (within 250 m) may require a more detailed FRA subject to local topography.

Existing flood defences

The Environment Agency Asset Information Management Systems (AIMS) dataset identifies natural high ground on the banks of the River Thames and Hennerton Blackwater (Asset IDs: 44821, 44820, 44813, 15586, 43136, 44820 and 43131), as shown on Figure 7. The crest height and condition of these features could not be ascertained at the time of writing. The standard of protection ranges from a 1 in 2 year to 1 in 5 year flood event. Based on this information it can be considered that the Site does not benefit from formal flood defences with the only protection afforded to the Site through the capacity of the adjacent watercourses.

Model data

As the Site is located within the EA's fluvial floodplain, modelled flood elevation data was obtained from the EA and has been used to assess flood risk and to provide recommendations for mitigation for the proposed development.

Defended modelled data from the Reading and Caversham Flood Alleviation Scheme Modelling Study (Jacobs, 2021) has been extracted from the 2D floodplain data provided at the Site.[2] The data is provided in Table 2 and also within Appendix B.

The Reading and Caversham Flood Alleviation Scheme Modelling Study (Jacobs, 2021) covers the extent of the Thames from Pangbourne to Henley-on-Thames, however this has been superseded for locations downstream of Sonning by the Sonning to Hurley (2019) model. The Reading and Caversham Flood Alleviation Scheme Modelling Study has been used in this instance, however, due to the Sonning to Hurley model not being available within the timeframe of this report.

[2] The accuracy of the modelled flood levels is not known. These are dependent on the accuracy of input datasets such as LiDAR data, used to model the impacts of flooding within the 2D domain. Confirmation of the accuracy of the modelled flood data can be obtained separately from the Environment Agency.

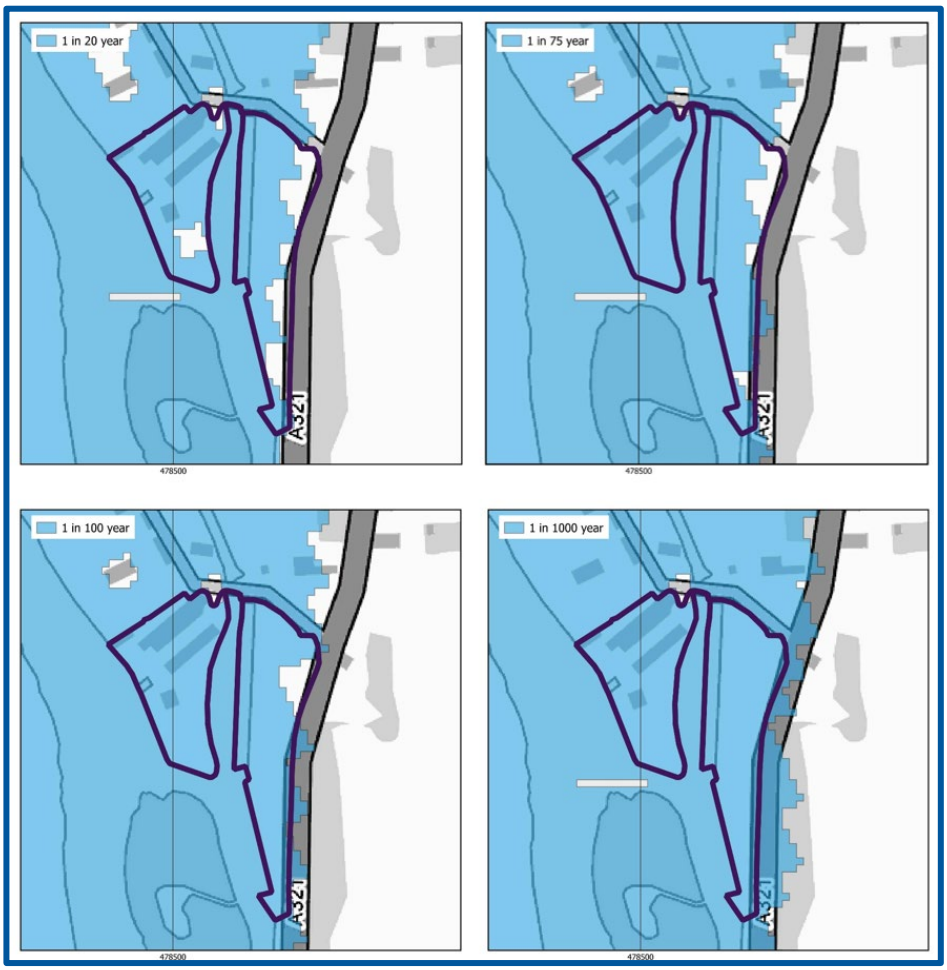
Table 2. EA present day modelled flood data

Ground levels on-Site and in development area (mAOD)	Modelled Flood Levels (mAOD)			
	1 in 20 year	1 in 75 year	1 in 100 year	1 in 1000 year
32.19 to 33.81* (dev area) 31.93 to 34.44 (entire Site)	33.73	33.99	34.04	34.51
Flood depths in development area (m)	Up to 1.54	Up to 1.80	Up to 1.85	Up to 2.32
Flood depths across entire Site (m)	Up to 1.80	Up to 2.06	Up to 2.11	Up to 2.58

* Ground levels of 32.19 to 33.81 mAOD in the western part of the Site, taken from the topographic survey included in Appendix A (Glanville, 2023).

Figure 8 illustrates the flood extent associated with overtopping of the flood defences in the present day flooding scenarios.

Figure 8. Modelled present day flooding scenarios (Jacobs, 2021)



Climate change factors

The EA's *Flood risk assessments: climate change allowances* guidance (published 19 February 2016 and updated May, 2022) has been used to inform a suitable increase in peak river flows for the proposed development. The updated guidance confirms 'Water Compatible' developments are required to undertake a Basic assessment approach.

As the Site is located within the Thames and South Chilterns Management Catchment, within the Thames and the proposed development is classed as Water Compatible, where the proposed lifespan is approximately 75 years, the Central (31%) allowance has been used to determine a suitable climate change factor to apply to river data.

Modelled in-channel flow data for the required climate change allowances has not been provided and so a stage graph has been produced (Appendix B) using the EA's modelled flood level data. The climate change allowances have been derived as a proportion of the 100 year peak flow to the 1 in 1000 year event, using the Flood Studies Report (FSR) (1975) growth curves.

In the Thames region, the 1 in 1000 year event flow is approximately 60% greater than the 1 in 100 year flow, therefore the following flood levels apply.

Table 3. Flood levels plus climate change allowances

Ground levels on-Site (mAOD)	Modelled Flood Levels (mAOD)	
	1 in 100 year plus 14% 2050 central allowance for climate change flood level	1 in 100 year plus 31% 2080 central allowance for climate change flood level
32.19 to 33.81* (dev area) 31.93 to 34.44 (entire Site)	34.20	34.39
Flood depths in development area* (m)	Up to 2.01	Up to 2.20
Flood depths on Site (m)	Up to 2.27	Up to 2.46

* Ground levels of 32.19 to 33.81 mAOD in the western part of the Site, taken from the topographic survey included in Appendix A (Glanville, 2023).

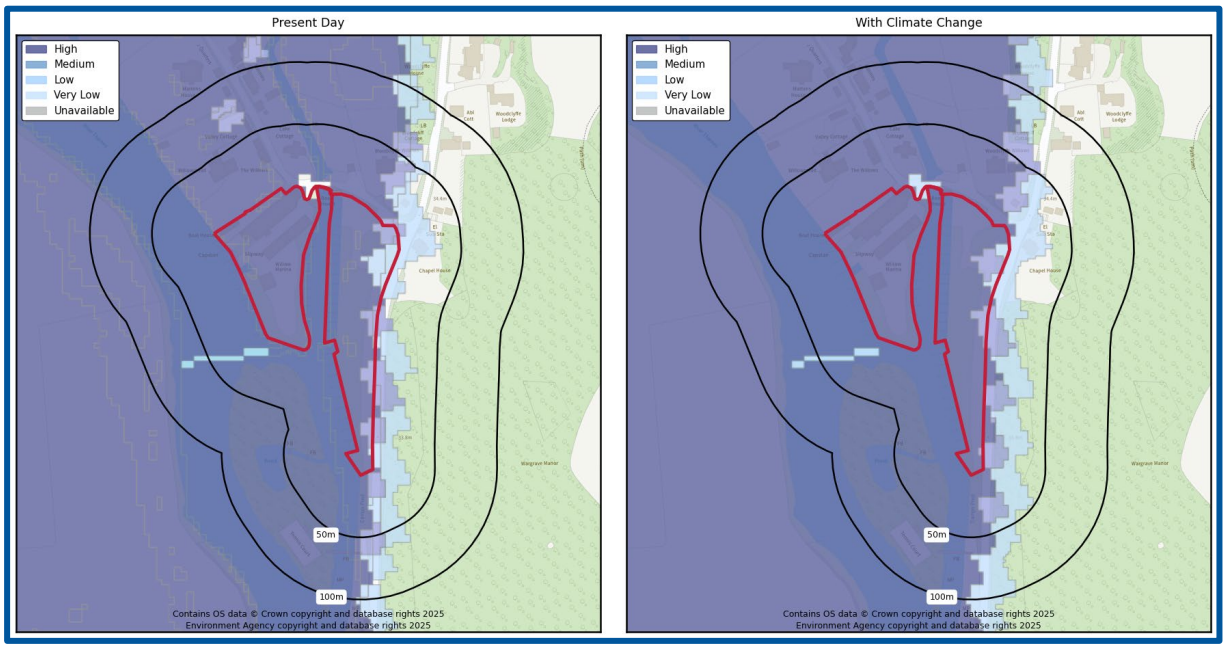
Flood risk including the benefit of defences

The type and condition of existing flood defences influence the 'actual' risk of fluvial flooding to the Site, albeit the long-term residual risk of flooding (ignoring the defences) should be considered when proposing new development

According to the EA's Risk of Flooding from Rivers and Sea (RoFRS) map (Figure 9), which considers the type, condition and crest height of flood defences, the Site has a Low to High risk of flooding from the adjacent watercourses, the River Thames and Hennerton Blackwater. The majority of the Site (including the proposed development area) is at High risk.

According to the RoFRS climate change modelling, the risk rating is considered to remain Low to High across the entire Site, with the majority of the Site (including the proposed development area) at High risk.

Figure 9. Risk of Flooding from Rivers and Sea map (EA, 2025)



Surface water (pluvial) flooding

Surface water flooding occurs when intense rainfall exceeds the infiltration capacity of the ground and overwhelms the drainage systems. It can occur in most locations even at higher elevations and at significant distances from river and coastal floodplains.

According to the EA's Risk of Flooding from Surface Water (pluvial) flood mapping, the Site is at a variable risk of pluvial flooding ranging from Very Low to Medium[3].

Figure 10 (overleaf) confirms the extent and depth of flooding in multiple modelled flood scenarios:

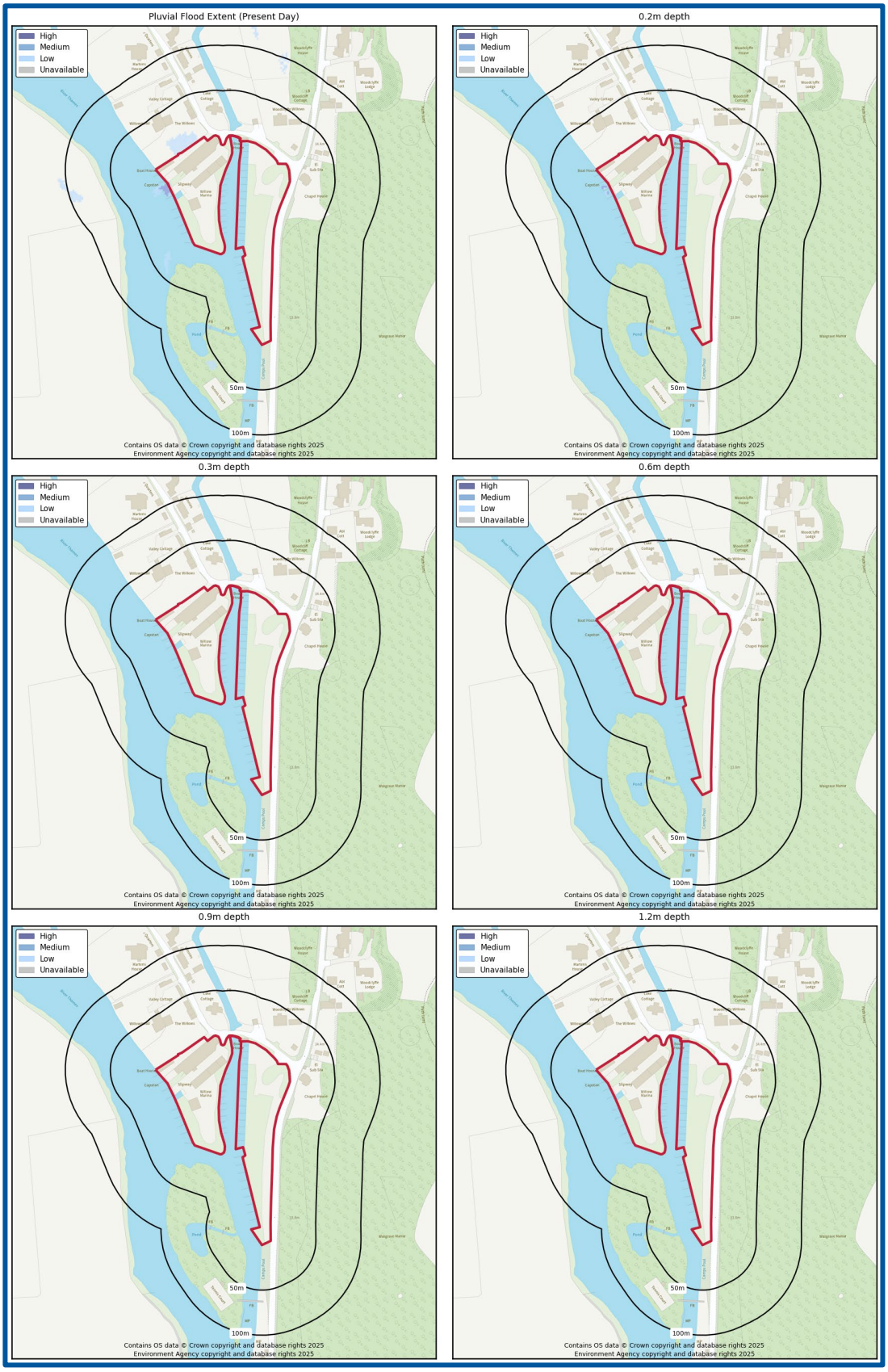
- During the High risk event (>3.3% AEP), the Site is modelled to be unaffected by pluvial flooding.
- During the Medium risk event (3.3 - 1% AEP), localised flooding is anticipated on the western boundary of the Site. The on-Site flooding is confined to an area of less than 10 m^2, and flood depths are anticipated to be less than 0.20 m.
- During the Low risk event (1 - 0.1% AEP) , flooding is again confined to the western Site boundary, as well as an area to the north west of the Site. Flood depths are anticipated to be less than 0.20 m and the extent of flooding covers a total area of less than 15 m^2.

The on-Site buildings are located outside of modelled flood extents and are not anticipated to be impacted by pluvial flooding.

The SFRA does not confirm whether any incidents of historical surface water flooding have occurred within 50 m of the Site, but does confirm that the Site is not located within a Critical Drainage Area (CDA) as there are no CDAs within the Wokingham Borough (JBA Consulting, 2023).

[3] Environment Agency. January 2025. Risk of Flooding from Surface Water - Product Description. Accessed from: https://www.data.gov.uk/dataset/d28b166a-2624-408f-93ba-e7257aa0c26a/risk-of-flooding-from-surface-water-direction-25m-1-percent-annual-chance

Figure 10. EA present day surface water flood extent and depth map (EA, 2025)



Guidance

According to EA's surface water flood risk map the Site is at:

- Very Low risk - chance of flooding of less than 1 in 1000 (0.1%).
- Low risk - chance of flooding of between a 1 in 1000 & 1 in 100 (0.1% and 1%).
- Medium risk - chance of flooding of between a 1 in 100 and 1 in 30 (1% and 3.3%).

Guidance

According to EA's surface water flood risk map the following advisory guidance applies to the Site:

Flood depths:

- 0.15 to 0.3 m - Flooding would: typically exceed kerb height, likely exceed the level of a damp-proof course, cause property flooding in some areas.

Surface water flooding flow routes

Analysis of OS mapping, ground elevation data and the EA's pluvial flow route mapping in the 1 in 1000 year (Low probability) event and Overland Flow Pathways mapping confirms the Site is not located on a potential overland flow route.

Based on the available data, the mapped pluvial flood risk during this event is considered representative of isolated ponding in topographic low points rather than significant overland flow.

Climate change factors

Paragraph 002 of the National Planning Practice Guidance (August, 2022) requires consideration of the 1% AP (1 in 100 year) event, including an appropriate allowance for climate change.

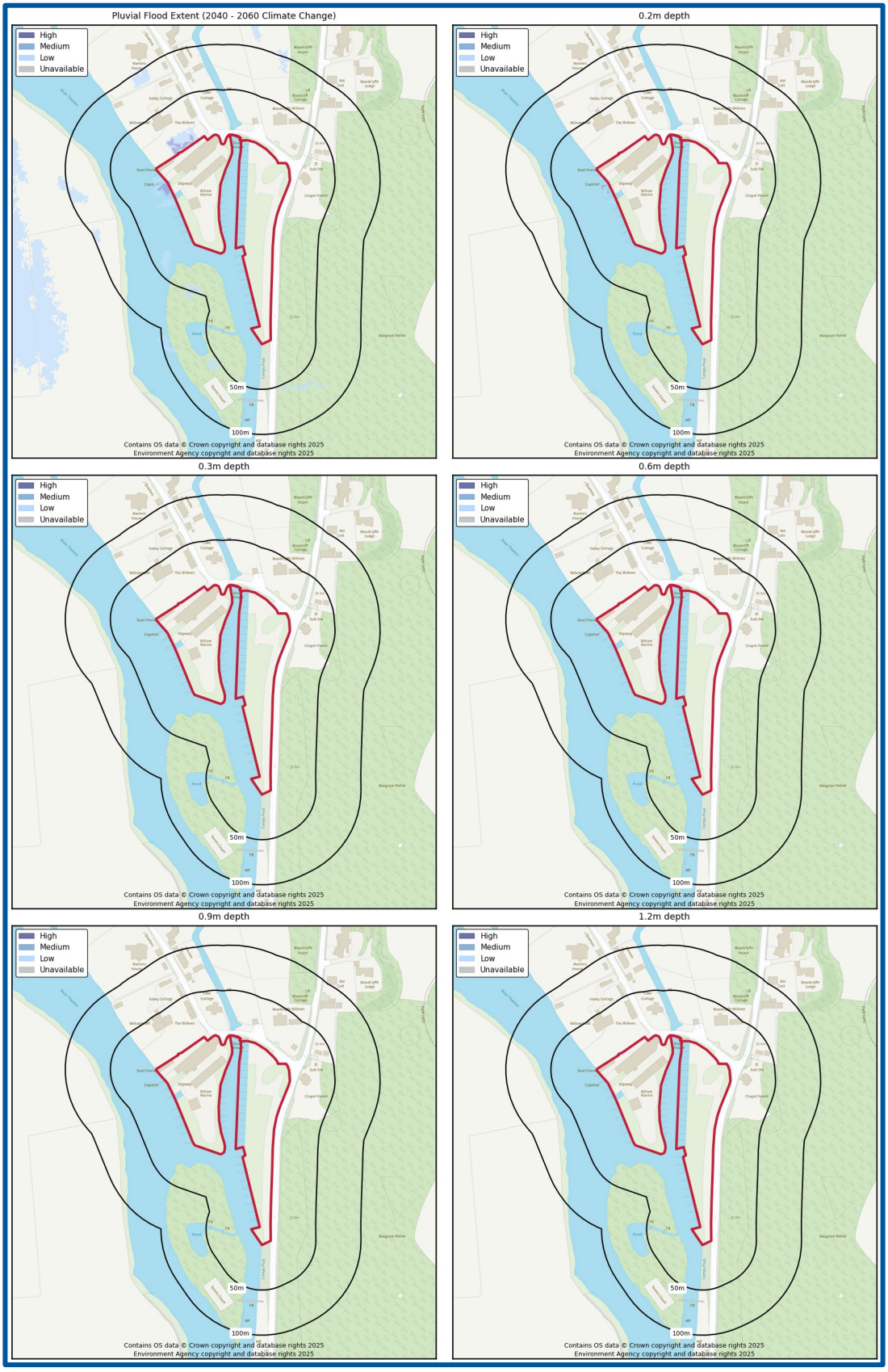
As the Site is located within the Thames and South Chilterns Management Catchment and the proposed development is classed as Water Compatible, where the proposed lifespan is approximately 75 years, the Upper End (40%) allowance is required to determine a suitable climate change factor to apply to rainfall data.

As part of RoFSW mapping, climate change modelling has been applied exclusively for the central allowance up to the 2050s epoch. Whilst it should be noted that the risk of pluvial flooding is likely to be greater than this dataset indicates for the lifetime of the development, in the absence of more extensive modelling scenarios this data is considered the best resource at the time of writing.

- During the High risk event (>3.3% AEP), the Site is modelled to be unaffected by pluvial flooding.
- During the Medium risk event (3.3 - 1% AEP), localised flooding is anticipated on the western and north western boundaries of the Site. Flooding is not anticipated to inundate the on-Site buildings, and flood depths do not exceed 0.20 m.
- During the Low risk event (1 - 0.1% AEP) , flooding is again confined to the western and north western Site boundaries. Flood depths in these areas could be up to 0.20-0.29 m.

Due to surface water flood extents being confined to the Site boundaries as well as the modest anticipated flood depths, the risk from surface water flooding after analysis is considered to be Very Low.

Figure 11. EA future surface water flood extent and depth map (EA, 2025)

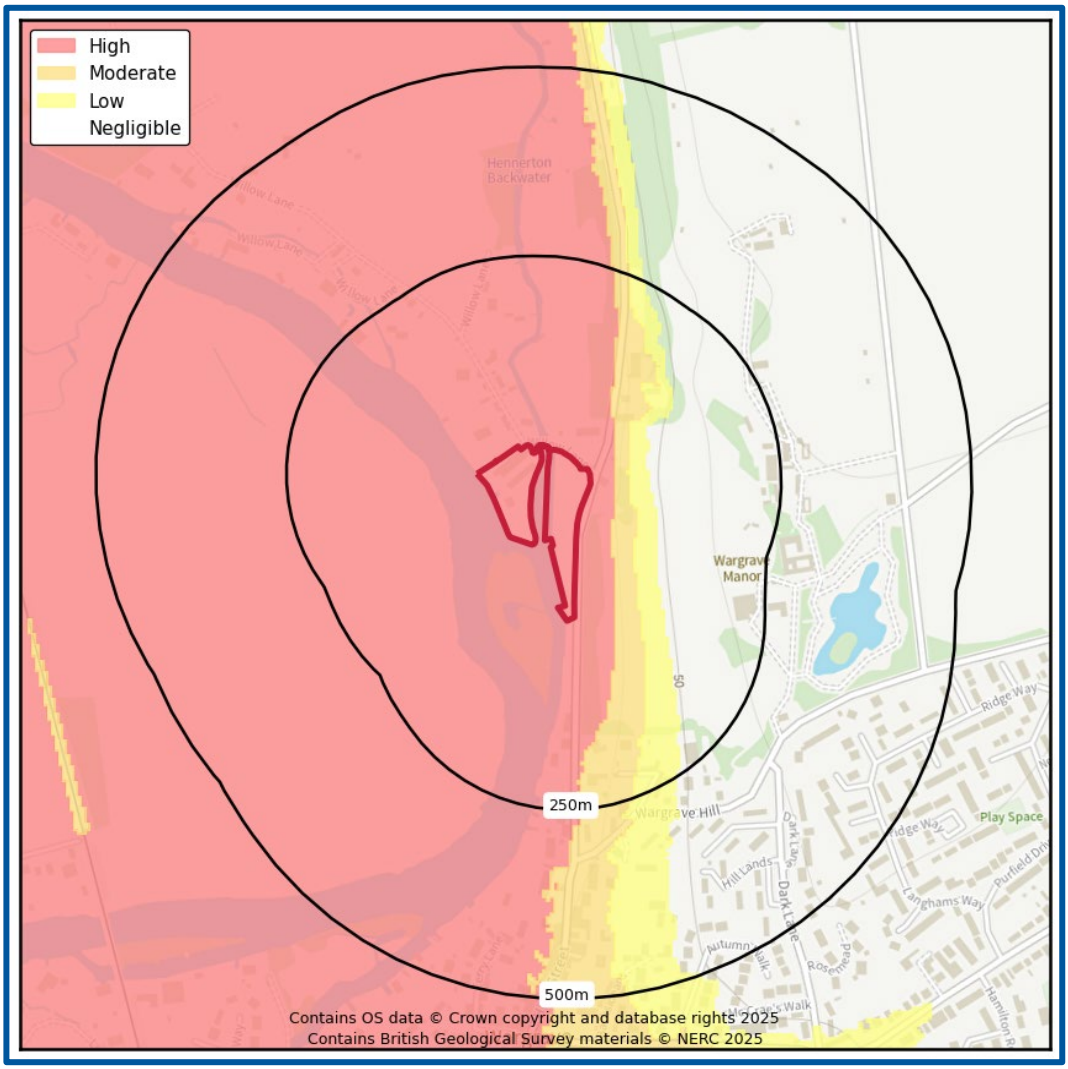


Groundwater flooding

Groundwater flooding occurs when sub-surface water emerges from the ground at the surface or into Made Ground and structures. This may be as a result of persistent rainfall that recharges aquifers until they are full; or may be as a result of high river levels, or tides, driving water through near-surface deposits. Flooding may last a long time compared to surface water flooding, from weeks to months. Hence the amount of damage that is caused to property may be substantially higher.

Groundwater Flood Risk screening data (Figure 12) indicates there is a High risk of groundwater flooding at surface in the vicinity from permeable bedrock and superficial deposits during a 1 in 100 year event.

Figure 12. GeoSmart GW5 Groundwater Flood Risk Map (GeoSmart, 2025)



Mapped classes within the screening map combine likelihood, possible severity and the uncertainty associated with predicting the subsurface system. The map is a national scale screening tool to prompt site-specific assessment where the impact of groundwater flooding would have significant adverse consequences. Mapping limitations and a number of local

factors may reduce groundwater flood risk to land and property even where it lies within mapped groundwater flood risk zones, which do not mean that groundwater floods will occur across the whole of the risk area.

A site-specific assessment has been undertaken to refine the groundwater risk screening information on the basis of site-specific datasets (see Section 3) including BGS borehole data, and the EA's fluvial and tidal floodplain data (where available) to develop a conceptual groundwater model. The risk rating is refined further using the vulnerability of receptors including occupants and the existing and proposed Site layout, including the presence of basements and buried infrastructure. The presence of any nearby or on-Site surface water features such as drainage ditches, which could intercept groundwater have also been considered.

- It is understood there are no existing basements and a basement is not proposed as part of the development. Note: the risks are higher for basements, buried infrastructure and soakaway systems which may be affected by high groundwater levels.
- According to a review of the hydrogeology (Section 3), the Site is underlain by permeable superficial deposits above permeable bedrock. Groundwater levels may rise in the bedrock and superficial aquifers in a seasonal response to prolonged rainfall recharge which may cause an unusually high peak in groundwater levels during some years.
- Groundwater levels may also rise in the bedrock and superficial aquifer in response to high river events due to the likely hydraulic continuity with the adjacent River Thames and its tributaries.
- It is noted groundwater flooding may occur in response to prolonged high water levels, by-passing flood defences even if overtopping does not occur.

  The design of the property should consider the groundwater pathway through permeable formations.
- Despite the presence of underlying aquifers, the Site would only be at risk of groundwater flooding if the water table reaches the base of the Site development or the ground surface when groundwater seepage could lead to overland flow and ponding.
- The nearest available BGS borehole (ref: SU77NE31) encountered groundwater at a depth of 6.1 m bgl within the superficial deposits, however, it is noted that this measurement was taken over 100 years ago and relates to a borehole situated c. 235 m from the Site.
- The groundwater level may be influenced by the adjacent river levels with the 1 in 100 year present day flood level estimated to be 34.04 mAOD at the Site; this compares with Site levels of between 31.93 mAOD and 34.44 mAOD. Due to the immediate proximity of the surface water features, groundwater flooding is likely to be directly linked to episodes of river flooding.
- The SFRA does not record reported incidents of historical groundwater flooding local to the Site (JBA Consulting, 2023).

- The hydrogeological characteristics suggest there is likely to be a groundwater table beneath the Site.

On the basis of the site-specific assessment the groundwater flood risk is considered to remain High.

Guidance
High Risk - It is likely that incidence of groundwater flooding will occur which could lead to damage to property or harm to other sensitive receptors at, or near, this location.

Climate change predictions suggest an increase in the frequency and intensity of extremes in groundwater levels. The impact of climate change on groundwater levels beneath the Site is linked to the predicted risk in both peak river levels and also the variation in rainfall recharge which is uncertain.

- Rainfall recharge patterns will vary regionally resulting in changes to average groundwater levels.
- A rise in peak river levels will lead to a response of increased groundwater levels in adjacent aquifers subject to the predicted climate change increases in peak river level for the local catchment.

Flooding from artificial sources

Artificial sources of flood risk include waterbodies or watercourses that have been amended by means of human intervention rather than natural processes. Examples include reservoirs (and associated water supply infrastructure), docks, sewers and canals. The flooding mechanism associated with flood risk from artificial sources is primarily related to breach or failure of structures (reservoir, lake, sewer, canal, flood storage areas, etc.).

Sewer flooding

Table 5-3 of the SFRA has identified two incidences of flooding as a result of surcharging sewers within the RG10 8 postcode since 2000 (JBA Consulting, 2023). However, it is recognised that this five digit postcode covers a large area and instances of flooding are not specific to the Site.

Records held by Thames Water indicate that there have been no incidences of flooding related to the surcharging of public sewers at the Site (Thames Water, 2025; Appendix C).

Guidance

Properties classified as "at risk" are those that have suffered, or are likely to suffer, internal flooding from public foul, combined or surface water sewers due to overloading of the sewerage system either once or twice in the ten year reference period. Records held by the sewage utility company provide information relating to reported incidents, the absence of any records does not mean that the Site is not at risk of flooding.

Canal failure

According to Ordnance Survey (OS) mapping, there are no canals within 500 m of the Site.

Water supply infrastructure

Water supply infrastructure is comprised of a piped network to distribute water to private houses or industrial, commercial or institution establishments and other usage points. In urban areas, this represents a particular risk of flooding due to the large amount of water supply infrastructure, its condition and the density of buildings. The risks of flooding to properties from burst water mains cannot be readily assessed.

If more information regarding the condition and history of the water supply infrastructure within the vicinity of the Site is required, then it is advisable to contact the local water supplier (Thames Water).

Culverts and bridges

The blockage of watercourses or structures by debris (that is, any material moved by a flowing stream including vegetation, sediment and man-made materials or refuse) reduces flow capacity and raises water levels, potentially increasing the risk of flooding. High water levels can cause saturation, seepage and percolation leading to failure of earth embankments or

other structures. Debris accumulations can change flow patterns, leading to scour, sedimentation or structural failure.

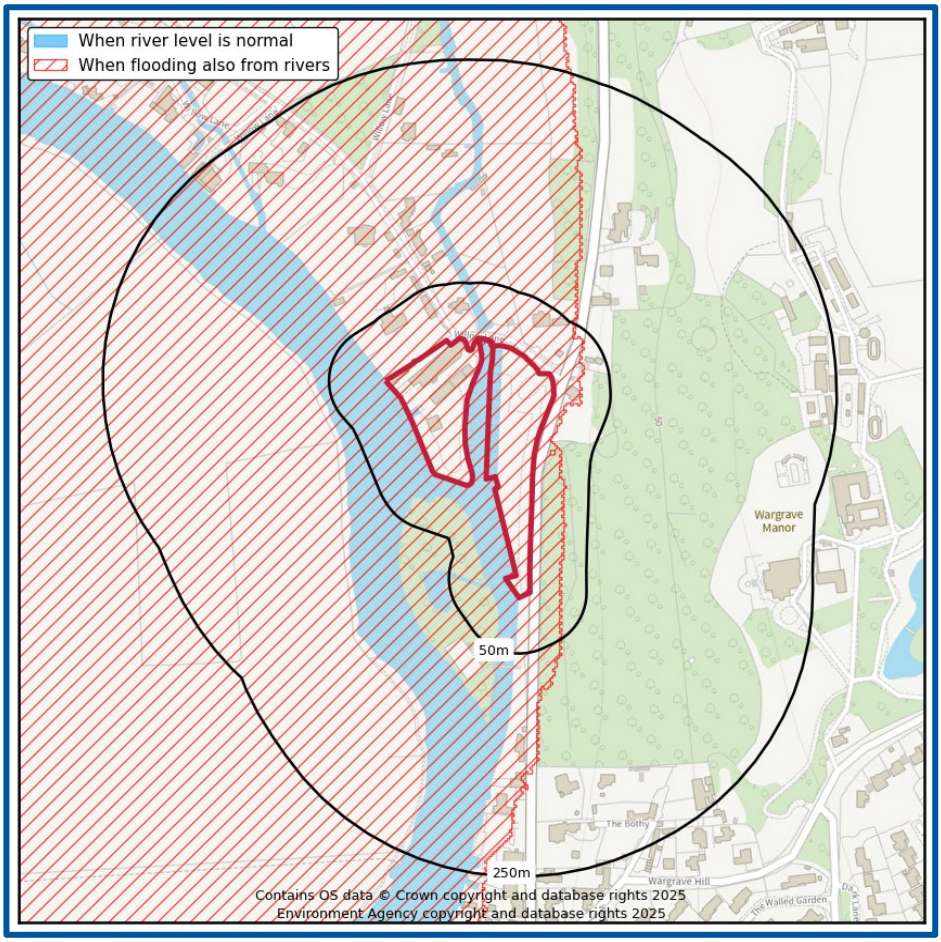
Culverts and bridges have been identified within 50 m of the Site. These structures may pose a flood risk to the Site should they become blocked or damaged.

The SFRA has not identified any historical drainage issues within the Site area (JBA Consulting, 2023).

Reservoir flooding

According to the EA's Risk of Flooding from Reservoir mapping the Site is at risk of flooding from the Farmoor No. 1 and Farmoor No. 2 reservoirs (Figure 13) (EA, 2025).

Figure 13. EA Risk of Reservoir Flooding (EA, 2025)



Guidance

The risk of reservoir flooding is related to the failure of a large reservoir (holding over 25,000 m^3 of water) and is based on the worst-case scenario. Reservoir flooding is extremely unlikely to occur (EA, 2025).

5. Flood risk from the development

Floodplain storage

Where flood storage from any source of flooding is to be lost as a result of development, on-site level-for-level compensatory storage, accounting for the predicted impacts of climate change over the lifetime of the development, should be provided. Where it is not possible to provide compensatory storage on-site, it may be acceptable to provide it off-site if it is hydraulically and hydrologically linked.

The development is located within a fluvial Flood Zones 2 and 3, but does not involve an increase in building footprint. Therefore, there would be no displacement of flood water and compensatory flood storage is not required.

Drainage and run-off

Based on the topography and low surface water flood risk in the vicinity, interference or interaction with overland flow paths and inflows from off-Site is considered unlikely.

The potential surface water run-off generated from the Site during a 1 in 100 year return period should be calculated, using FEH 2013 rainfall data from the online Flood Estimation Handbook (FEH), developed by NERC (2009) and CEH (2016).

The NPPF (2024) recommends the effects of climate change are incorporated into FRA's. As per the most recent update to the NPPG (May 2022) the applicable climate change factor for the 1 in 30 (≥ 3.3% AEP) and 1 in 100 (< 3.3 to 1% AEP) year event to apply to surface water flooding is dependent upon the management catchment.

As the proposed development is water compatible, the lifespan of the development and requirements for climate change should allow up to the 1% AEP upper end allowance. As the Site is located within the Thames and South Chilterns Management Catchment the following peak rainfall allowances are to be applied.

Table 4. Climate change rainfall allowances

Thames and South Chilterns Management Catchment	3.3% Annual exceedance rainfall event		1% Annual exceedance rainfall event	
	2050s	2070s	2050s	2070s
Upper end	35%	35%	40%	40%
Central	20%	25%	20%	25%

Sustainable Drainage System (SuDS)

It is recommended that attenuation of run-off is undertaken on-Site to compensate for any proposed increases in impermeable surface areas. Attenuation may comprise the provision of storage within a Sustainable Drainage System (SuDS). SuDS can deliver benefits from improving the management of water quantity, water quality, biodiversity and amenity. Potential SuDS options are presented in the table below, subject to further investigation:

Table 5. SuDS features which may be feasible for the Site

Option	Description
Rainwater harvesting	Rainwater harvesting can collect run-off from the roofs for use in non-potable situations, using water butts for example.
Green roof	Having part/all of the roof as a green roof covered in vegetation can intercept and store a proportion of the rainfall to result in an overall reduction in the amount of surface water run-off generated from a building structure. They comprise a substrate (growth medium) layer which can be seeded with specially selected plants suitable for the local climatic conditions. Beneath the growth medium is a geotextile filter layer which filters out the substrate from entering the aggregate/geo-composite drainage layer below. At the very bottom of the green roofing, a waterproof membrane protects the roof structure below.
Permeable paving	Permeable pavements can be used for driveways, footpaths and parking areas to increase the amount of permeable land cover. Suitable aggregate materials (angular gravels with suitable grading as per CIRIA, 2007) will improve water quality due to their filtration capacity. Plastic geocellular systems beneath these surfaces can increase the void space and therefore storage but do not allow filtration unless they are combined with aggregate material and/or permeable geotextiles.
Swales	Shallow, wide and vegetated channels that can store excess run-off whilst removing any pollutants.
Attenuation basins/pond	Dry basin or a permanent pond that is designed to hold excess water during a rainfall event.

6. Suitability of the proposed development

The information below outlines the suitability of proposed development in relation to national and local planning policy.

National policy and guidance

The aims of the national planning policies are achieved through application of the Sequential Test and in some cases the Exception Test.

Guidance

Sequential test: The aim of this test is to steer new development towards areas with the lowest risk of flooding (NPPF, 2024). Reasonably available sites located in Flood Zone 1 should be considered before those in Flood Zone 2 and only when there are no reasonably available sites in Flood Zones 1 and 2 should development in Flood Zone 3 be considered.

Exception test: In some cases, this may need to be applied once the Sequential Test has been considered. For the exception test to be passed it must be demonstrated that the development would provide wider sustainability benefits to the community that outweigh flood risk and a site-specific FRA must demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

Suitability of the proposed development, and whether the Sequential and Exception Tests are required, is based on the Flood Zone the Site is located within and the flood risk vulnerability classification of the existing and proposed development. Some developments may contain different elements of vulnerability and the highest vulnerability category should be used, unless the development is considered in its component parts.

This report has been produced to assess all development types, prior to any development. The vulnerability classification and Flood Zones are compared within the table overleaf (Table 2 of the NPPG (2022)).

As the Site is located within Flood Zone 3b and the proposed development is defined as Water Compatible; the proposals would be acceptable, but may be subject to the Sequential Test. As proposals are for minor modifications to existing developed areas of the Site, it is unlikely that the sequential test is required.

Table 6. Flood risk vulnerability and flood zone 'incompatibility (taken from NPPG, 2022)

Flood risk vulnerability classification		Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
Flood Zone	Zone 1 – low probability	✓	✓	✓	✓	✓
	Zone 2 – medium probability	✓	✓	Exception test required	✓	✓
	Zone 3a - high probability	Exception test required	✓	X	Exception test required	✓
	Zone 3b – functional flood plain	Exception test required	✓	X	X	X

EA Flood Risk Standing Advice for vulnerable developments located in Flood Zones 2 or 3 (February, 2022)

For all relevant vulnerable developments (i.e. more vulnerable, less vulnerable and water compatible), advice on the points should be followed:

- Surface water management;
- Access and evacuation; and
- Floor levels.

Surface water management

Plans for the management of surface water need to meet the requirements set out in either the local authority's:

- Surface water management plan where available; OR
- Strategic flood risk assessment.

They also need to meet the requirements of the approved building regulations Part H: drainage and water disposal. Read section H3 rainwater drainage.

Planning permission is required to use a material that can't absorb water (e.g. impermeable concrete) in a front garden larger than 5m^2.

Access and evacuation

Details of emergency escape plans should be provided for any parts of a building that are below the estimated flood level:

Plans should show:

- Single storey buildings or ground floors that don't have access to higher floors can access a space above the estimated flood level, e.g. higher ground nearby;
- Basement rooms have clear internal access to an upper level, e.g. a staircase;
- Occupants can leave the building if there's a flood and there's enough time for them to leave after flood warnings.

Floor levels

The following should be provided:

- Average ground level of your site;
- Ground level of the access road(s) next to your building;
- Finished floor level of the lowest room in your building.

Finished floor levels should be a minimum of whichever is higher of 300 mm above the:

- Average ground level of the site;
- Adjacent road level to the building;
- Estimated river or sea flood level.

You should also use construction materials that have low permeability up to at least the same height as finished floor levels.

If you cannot raise floor levels to meet the minimum requirement, you will need to:

- Raise them as much as possible;
- Consider moving vulnerable uses to upper floors;
- Include extra flood resistance and resilience measures.

When considering the height of floor levels, you should also consider any additional requirements set out in the SFRA. Flood water can put pressure on buildings causing structural issues. If your design aims to keep out a depth of more than 600 mm of water, you should get advice from a structural engineer. They will need to check the design is safe.

Extra flood resistance and resilience measures

Follow the guidance in this section for developments in flood risk areas where you cannot raise the finished floor levels to the required height. You should design buildings to exclude flood water where possible and to speed recovery in case water gets in.

Make sure your flood resilience plans for the development follow the guidance in the CIRIA Property Flood Resilience Code of Practice. Please note that the code of practice uses the term 'recovery measures'. In this guide we use 'resilience measures'.

Flooding can affect the structural stability of buildings. If your building design would exclude more than 600 mm of flood water, you should get advice from a structural engineer. They will need to check the design is safe. Only use resistance measures that will not cause structural stability issues during flooding. If it is not possible to safely exclude the estimated flood level, exclude it to the structural limit then allow additional water to flow through the property.

The design should be appropriately flood resistant and resilient by:

- Using flood resistant materials that have low permeability to at least 600 mm above the estimated flood level;
- Making sure any doors, windows or other openings are flood resistant to at least 600 mm above the estimated flood level;
- Using flood resilient materials (for example lime plaster) to at least 600 mm above the estimated flood level;
- By raising all sensitive electrical equipment, wiring and sockets to at least 600 mm above the estimated flood level;
- Making it easy for water to drain away after flooding such as installing a sump and a pump;
- Making sure there is access to all spaces to enable drying and cleaning;
- Ensuring that soil pipes are protected from back-flow such as by using non-return valves.

Temporary or demountable flood barriers are not appropriate for new buildings. Only consider them for existing buildings when:

- There is clear evidence that it would be inappropriate to raise floor levels and include passive resistance measures;
- An appropriate flood warning or other appropriate trigger is available.

If proposals involve the development of buildings constructed before 1919, refer to Flooding and Historic Buildings guidance produced by Historic England.

7. Resilience and mitigation

Based on the flood risk identified at the Site, the national and local policies and guidance and proposed development, the mitigation measures outlined within this section of the report are likely to help protect the development from flooding.

Sea (coastal/tidal) flood mitigation measures

As the Site is not identified as being at risk of flooding from the sea, mitigation measures are not required.

Rivers (fluvial) flood mitigation measures

The Site is located within an area which is affected by flooding from rivers, the following table confirms the flood depths anticipated on-Site, including the area proposed for development.

Table 7. Flood levels compared to ground levels on Site

Ground levels on-Site (mAOD)	Modelled Flood Levels (mAOD)		
	1 in 100 year plus 14% CC (Central 2050s)	1 in 100 year plus 31% CC (Central 2080s)	1 in 1000 year
32.19 to 33.81* (dev area) 31.93 to 34.44 (entire Site)	34.20	34.39	34.51
Flood depths in development area* (m)	Up to 2.01	Up to 2.20	Up to 2.32
Flood depths on Site (m)	Up to 2.27	Up to 2.46	Up to 2.58

* Ground levels of 32.19 to 33.81 mAOD in the western part of the Site, taken from the topographic survey included in Appendix A (Glanville, 2023).

Raising minimum floor levels

The vulnerability classification of the Site and the Flood Zone means proposals for the Site fall under the EA's Flood Risk Standing Advice (FRSA) for water compatible developments.

In this instance, in line with the SFRA's requirements, the recommended minimum Finished Floor Level (FFL) should be set at least 0.6 m above the 1 in 100 year plus 31% allowance for climate change flood level of 34.39 mAOD, to 34.99 mAOD. However, as the development proposals consist predominantly of external changes to existing structures, the raising of FFLs is only likely to be feasible for the new sewage treatment works, for which the base of the structure should be raised to 34.99 mAOD, if feasible.

Alternative Mitigation

A water exclusion strategy could be considered for flood depths up to 0.3 m in line with the EA's Standing Advice. A water exclusion strategy, using avoidance and resistance measures, is appropriate where floods are expected to last for short durations. Potential water exclusion strategies include:

- Passive flood door systems;
- Air brick covers (manual or automatic closing);
- Non-return flap valves on sewer outfalls.
- Construction of local bunds;
- Landscaping to divert water away from the property;
- Sustainable Drainage Systems (SuDS) to store/intercept flood water;
- Boundary walls/fencing;

Due to the frequency of flooding at the Site, avoidance and resistance measures may not be suitable. These are unlikely to completely prevent floodwater entering a structure, particularly during longer duration flood events, and may not be cost effective. Therefore, it may be more appropriate that the following flood resilience measures are implemented.

- Flood resilient materials and designs:
    - Use of low permeability building materials up to 0.3 m such as engineering bricks (Classes A and B) or facing bricks;
    - Hard flooring and flood resilient metal staircases;
    - Water, electricity and gas meters and electrical sockets should be located above the predicted flood level;
    - Communications wiring: wiring for telephone, Internet and other services should be protected by suitable insulation in the distribution ducts to prevent damage.

Where flood depths are expected to exceed 0.6 m at the Site, a water entry strategy should be adopted to preserve building integrity and to promote flood resilience rather than resistance (which is more difficult to achieve for significant flood depths). A structural engineer should be consulted to confirm this would be a suitable strategy for the proposed development, to ensure flood flows would not impact the structural integrity of the building. Potential strategies include:

- Ground floors designed to permit water passage at high flood depths;

- Hard flooring and flood resilient metal staircases;
- Heating systems, electrical sockets and utility meters should be raised above the predicted flood level where possible; and
- Sump and pump.

Where flood depths are expected to be between 0.3 m and 0.6 m both water exclusion and water entry strategies should be adopted depending on a structural assessment of the building.

If these mitigation measures are implemented this could reduce the flood risk to the development from High to Medium.

Surface water (pluvial) flood mitigation measures

As the Site is not identified as being at significant risk of pluvial flooding, mitigation measures are not required. Furthermore, the mitigation measures detailed above for fluvial flood risk are likely to manage the modest risk of surface water flooding on the Site boundaries.

Groundwater flood mitigation measures

It is likely the flood mitigation measures recommended for fluvial flood risk will reduce the groundwater flood risk at the development. However, specific additional groundwater measures that may also be considered for the High risk identified include:

- Waterproof tanking of the ground floor levels;
- Interceptor drains;
- Automatic sump to extract flood water; and
- Non-return flap valves on the proposed foul and surface water sewer lines.

If these mitigation measures are implemented this could reduce the flood risk to the development from High to Moderate.

Reservoir flood mitigation measures

According to EA data, there is a risk of flooding from Farmoor No.1 and Farmoor No. 2 reservoirs.

There would be a relatively high rate and onset of flooding associated with a reservoir breach, it is therefore unlikely that safe access could be achieved unless a long warning period was provided. Therefore, Site users should either evacuate the Site (to the east) or get to the highest level of the on-Site buildings as possible and contact the emergency services.

Other flood risk mitigation measures

There is a risk of flooding associated with blockage of the bridge located in the north of the Site, however, the mitigation measures provided for fluvial flood risk are likely to provide sufficient protection to the Site in the unlikely event of a blockage or damage to this structure.

As the Site is not identified as at risk from any other sources, no specific mitigation measures are required.

Residual flood risk mitigation measures

The risk to the Site has been assessed from all sources of flooding and appropriate mitigation and management measures proposed to keep the users of the development safe over its lifetime. There is however a residual risk of flooding associated with the potential for failure of mitigation measures if regular maintenance and upkeep isn't undertaken. If mitigation measures are not implemented or maintained, the risk to the development will remain as the baseline risk.

Further flood mitigation information

More information on flood resistance, resilience and water entry can be found here: http://www.planningportal.gov.uk/uploads/br/flood_performance.pdf

www.knowyourfloodrisk.co.uk

Emergency evacuation - safe access / egress and safe refuge

Emergency evacuation to land outside of the floodplain should be provided if feasible. Where this is not possible, 'more vulnerable' developments and, where possible, development in general (including basements), should have internal stair access to an area of safe refuge within the building to a level higher than the maximum likely water level. An area of safe refuge should be sufficient in size for all potential users and be reasonably accessible to the emergency services.

Emergency evacuation from the development and the Site should only be undertaken in strict accordance with any evacuation plans produced for the Site, with an understanding of the flood risks at the Site including available mitigation, the vulnerability of Site users and preferred evacuation routes.

Flood warnings

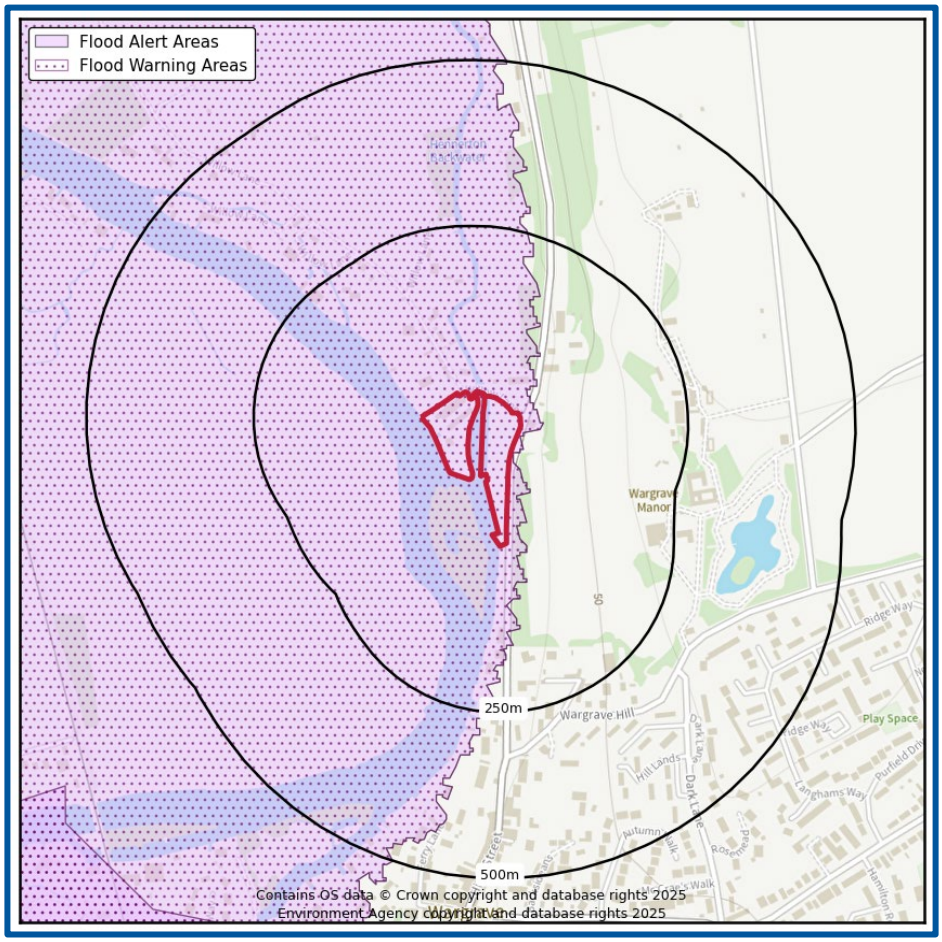
The EA operates a flood warning service in all areas at risk of flooding; this is available on their website: https://www.gov.uk/check-flood-risk. The Site is located within an EA Flood Alerts and Warning coverage area (Figure 14) so is able to receive alerts and warnings:

- Flood Warning Area ref: 061WAF23ShipWar - River Thames from Shiplake to Bolney Court near Henley including Lower Shiplake, Wargrave including Loddon Drive, and Thames Drive, Charvil (the quick dial code for this area is 171217)
- Flood Alerts Area ref: 061WAF23ShipWar River Thames for Shiplake, Lower Shiplake, Wargrave including Loddon Drive, and Thames Drive, Charvil (the quick dial code for this area is 171218)

All warnings are also available through the EA's 24 hour Floodline Service 0345 988 1188.

The EA aims to issue Flood Warnings 2 hours in advance of a flood event. Flood Warnings can provide adequate time to enable protection of property and evacuation from a Site, reducing risk to life and property.

Figure 14. EA Flood Warning Coverage for the local area (EA, 2025).



Emergency evacuation

Where possible, a safe access and egress route with a 'very low' hazard rating from areas within the floodplain to an area wholly outside the 1 in 100 year flood event including an allowance for climate change should be demonstrated.

Based on the EA's Flood Zone Map the closest dry evacuation area within Flood Zone 1 is along Wargave Road (c. 25 m east – direct measurement). It is advised that evacuation from the Site would be the preferred option in a flood event if safe to do so. It is recommended that users prepare to evacuate as soon as an EA Flood Warning is issued in order to completely avoid flood waters.

On-Site refuge

Evacuation should be the primary action in preference, however, safe refuge may be sought at first floor level (where available) in a worst-case scenario.

Other relevant information

A Business Continuity and Flood Warning and Evacuation Plan (BCFWEP) is recommended to reduce risks to people, property and profit.

Site users should be signed up to receive EAs Flood Alerts and Warnings.

Registration to the Environment Agency's flood warning scheme can be done by following this link: https://www.gov.uk/sign-up-for-flood-warnings.

It is recommended that main communication lines required for contacting the emergency services, electricity sockets/meters, water supply and first aid stations and supplies are not compromised by flood waters. Where possible these should all be raised above the extreme flood level.

8. Conclusions and recommendations

Table 8. Risk ratings following Site analysis

Source of Flood Risk	Baseline[1]	After analysis[2]	After Mitigation[3]
River (fluvial) flooding	Low to High	High	Medium
Sea (coastal/tidal) flooding	Very Low		N/A
Surface water (pluvial) flooding	Very Low to Medium	Very Low	N/A
Groundwater flooding	High		Moderate
Other flood risk factors present	Yes (reservoirs, bridge blockage)		Yes
Is any other further work recommended?	Yes		Yes (see below)

1 BASELINE risks assigned for the whole Site, using national risk maps, including the benefit of EA flood defences.

2 AFTER ANALYSIS modification of risk assessment based on detailed site specific analysis including some or all of the following: flood model data, high resolution mapping, building location, access routes, topographic and CCTV surveys.

3 AFTER MITIGATION risks include risks to proposed development / asset and occupants if mitigation measures recommended in this report are implemented, including the impacts of climate change.

*N/A indicates where mitigation is not required.

Table 9 provides a summary of where the responses to key questions are discussed in this report.

Water-compatible developments in Flood Zones 2 and 3 are acceptable according to the NPPF and providing the recommended mitigation measures are put in place (see previous sections) it is likely that flood risk to this Site will be reduced to an acceptable level.

Table 9. Summary of responses to key questions in the report

Key sources of flood risks identified	Fluvial, groundwater, reservoirs (see Section 4).
Are standard mitigation measures likely to provide protection from flooding to/from the Site?	Yes (see Section 7).
Is any further work recommended?	Yes (see executive summary and Section 7).

9. Further information

The following table includes a list of additional products offered by GeoSmart:

Additional GeoSmart Products			
✓	Additional assessment: SuDSmart Report		The SuDSmart Report range assesses which drainage options are available for a Site. They build on technical detail starting from simple infiltration screening and work up to more complex SuDS Assessments detailing alternative options and designs. Please contact info@geosmartinfo.co.uk for further information.
✓	Additional assessment: EnviroSmart Report		Provides a robust desk-based assessment of potential contaminated land issues, taking into account the regulatory perspective. Our EnviroSmart reports are designed to be the most cost effective solution for planning conditions. Each report is individually prepared by a highly experienced consultant conversant with Local Authority requirements. Ideal for pre-planning or for addressing planning conditions for small developments. Can also be used for land transactions. Please contact info@geosmartinfo.co.uk for further information.

10. References and glossary

References

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Thames Water (2025). Thames Water Property Searches – Sewer Flooding History Enquiry. SFH/SFH Standard/2025_5146303.

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Glossary

General terms

BGS	British Geological Survey
EA	Environment Agency
GeoSmart groundwater flood risk model	GeoSmart's national groundwater flood risk model takes advantage of all the available data and provides a preliminary indication of groundwater flood risk on a 50m grid covering England and Wales. The model indicates the risk of the water table coming within 1 m of the ground surface for an indicative 1 in 100 year return period scenario.
Dry-Island	An area considered at low risk of flooding (e.g. In a Flood Zone 1) that is entirely surrounded by areas at higher risk of flooding (e.g. Flood Zone 2 and 3)
Flood resilience	Flood resilience or wet-proofing accepts that water will enter the building, but through careful design will minimise damage and allow the re-occupancy of the building quickly. Mitigation measures that reduce the damage to a property caused by flooding can include water entry strategies, raising electrical sockets off the floor, hard flooring.
Flood resistance	Flood resistance, or dry-proofing, stops water entering a building. Mitigation measures that prevent or reduce the likelihood of water entering a property can include raising flood levels or installation of sandbags.
Flood Zone 1	This zone has less than a 0.1% annual probability of river flooding
Flood Zone 2	This zone has between 0.1 and 1% annual probability of river flooding and between 0.1% and 0.5 % annual probability sea flooding
Flood Zone 3	This zone has more than a 1% annual probability of river flooding and 0.5% annual probability of sea flooding
Functional Flood Plain	An area of land where water has to flow or be stored in times of flood.

Hydrologic model	A computer model that simulates surface run-off or fluvial flow. The typical accuracy of hydrologic models such as this is ±0.25m for estimating flood levels at particular locations.
OS	Ordnance Survey
Residual Flood Risk	The flood risk remaining after taking mitigating actions.
SFRA	Strategic Flood Risk Assessment. This is a brief flood risk assessment provided by the local council
SuDS	A Sustainable drainage system (SuDS) is designed to replicate, as closely as possible, the natural drainage from the Site (before development) to ensure that the flood risk downstream of the Site does not increase as a result of the land being developed. SuDS also significantly improve the quality of water leaving the Site and can also improve the amenity and biodiversity that a Site has to offer. There are a range of SuDS options available to provide effective surface water management that intercept and store excess run-off. Sites over 1 Ha will usually require a sustainable drainage assessment if planning permission is required. The current proposal is that from April 2014 for more than a single dwelling the drainage system will require approval from the SuDS Approval Board (SABs).

Aquifer Types

Principal aquifer	These are layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale.
Secondary A aquifer	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.
Secondary B aquifer	Predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering.
Secondary undifferentiated	Has been assigned in cases where it has not been possible to attribute either category A or B to a rock type due to the variable characteristics of the rock type.
Unproductive Strata	These are rock layers or drift deposits with low permeability that has negligible significance for water supply or river base flow.

NPPF (2024) terms

Exception test	Applied once the sequential test has been passed. For the exception test to be passed it must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk and a site-specific FRA must demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.
Sequential test	Aims to steer new development to areas with the lowest probability of flooding.
Essential infrastructure	Essential infrastructure includes essential transport infrastructure, essential utility infrastructure and wind turbines.
Water compatible	Water compatible land uses include flood control infrastructure, water-based recreation and lifeguard/coastal stations.
Less vulnerable	Less vulnerable land uses include police/ambulance/fire stations which are not required to be operational during flooding and buildings used for shops/financial/professional/other services.
More vulnerable	More vulnerable land uses include hospitals, residential institutions, buildings used for dwelling houses/student halls/drinking establishments/hotels and sites used for holiday or short-let caravans and camping.
Highly vulnerable	Highly vulnerable land uses include police/ambulance/fire stations which are required to be operational during flooding, basement dwellings and caravans/mobile homes/park homes intended for permanent residential use.

Data Sources

Aerial Photography	Contains Ordnance Survey data © Crown copyright and database right 2025 BlueSky copyright and database rights 2025
Bedrock & Superficial Geology	Contains British Geological Survey materials © NERC 2025 Ordnance Survey data © Crown copyright and database right 2025
Flood Risk (Flood Zone/RoFRS/Historic Flooding/Pluvial/Surface Water Features/Reservoir/ Flood Alert & Warning)	Environment Agency copyright and database rights 2025 Ordnance Survey data © Crown copyright and database right 2025

Flood Risk (Groundwater)	GeoSmart, BGS & OS GW5 (v2.4) Map (GeoSmart, 2025) Contains British Geological Survey materials © NERC 2025 Ordnance Survey data © Crown copyright and database right 2025
Location Plan	Contains Ordnance Survey data © Crown copyright and database right 2025
Topographic Data	OS LiDAR/EA Contains Ordnance Survey data © Crown copyright and database right 2025 Environment Agency copyright and database rights 2025

11. Appendices

GeoSmart Information

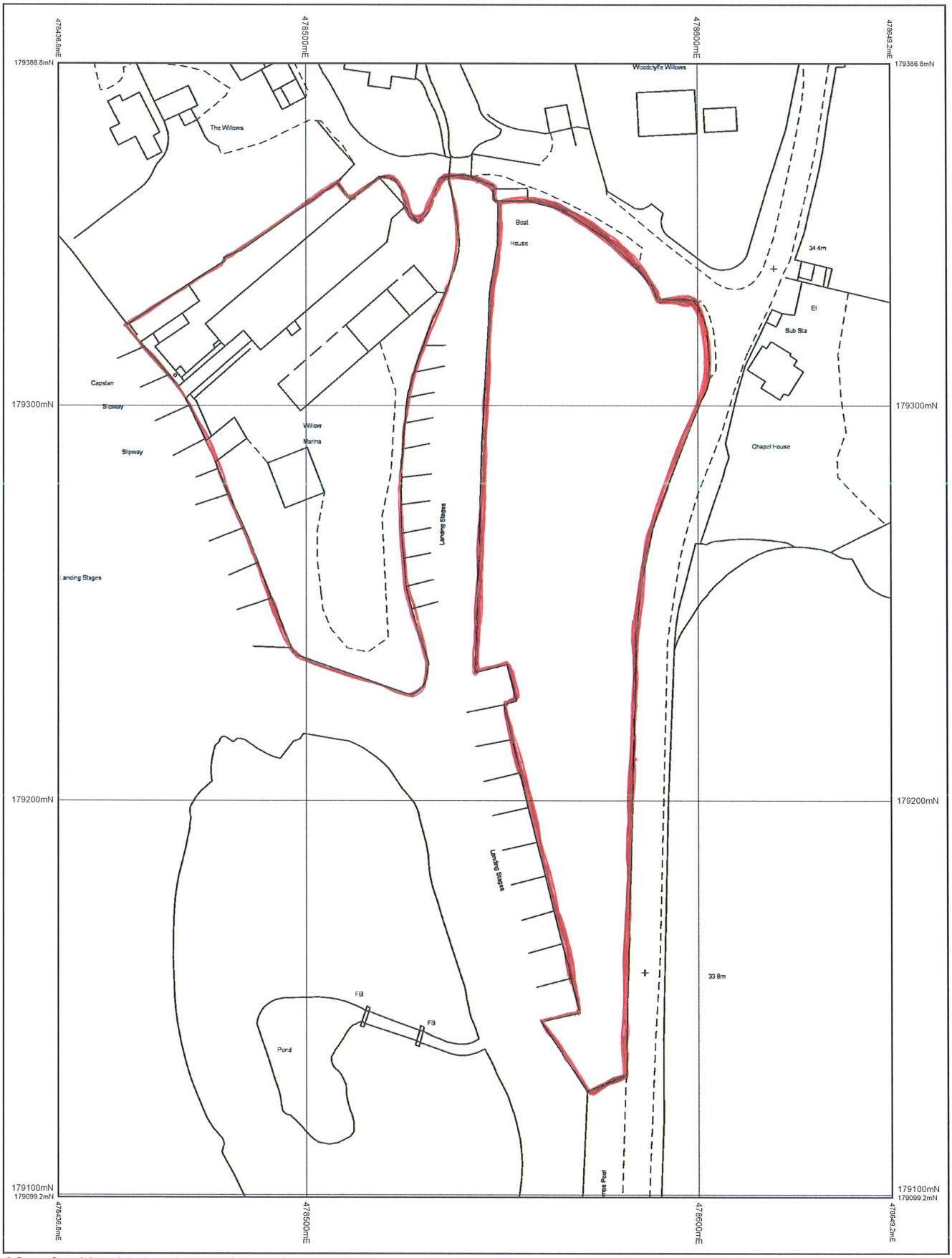
Appendix A

Site plans

Ordnance Survey
Mapping and Data Centre

Val Wyatt OS

UK MAP CENTRE .com



0 20 m

Scale: 1:1250

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Supplied by: www.ukmapcentre.com
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Centre Coordinates: 478543,179243
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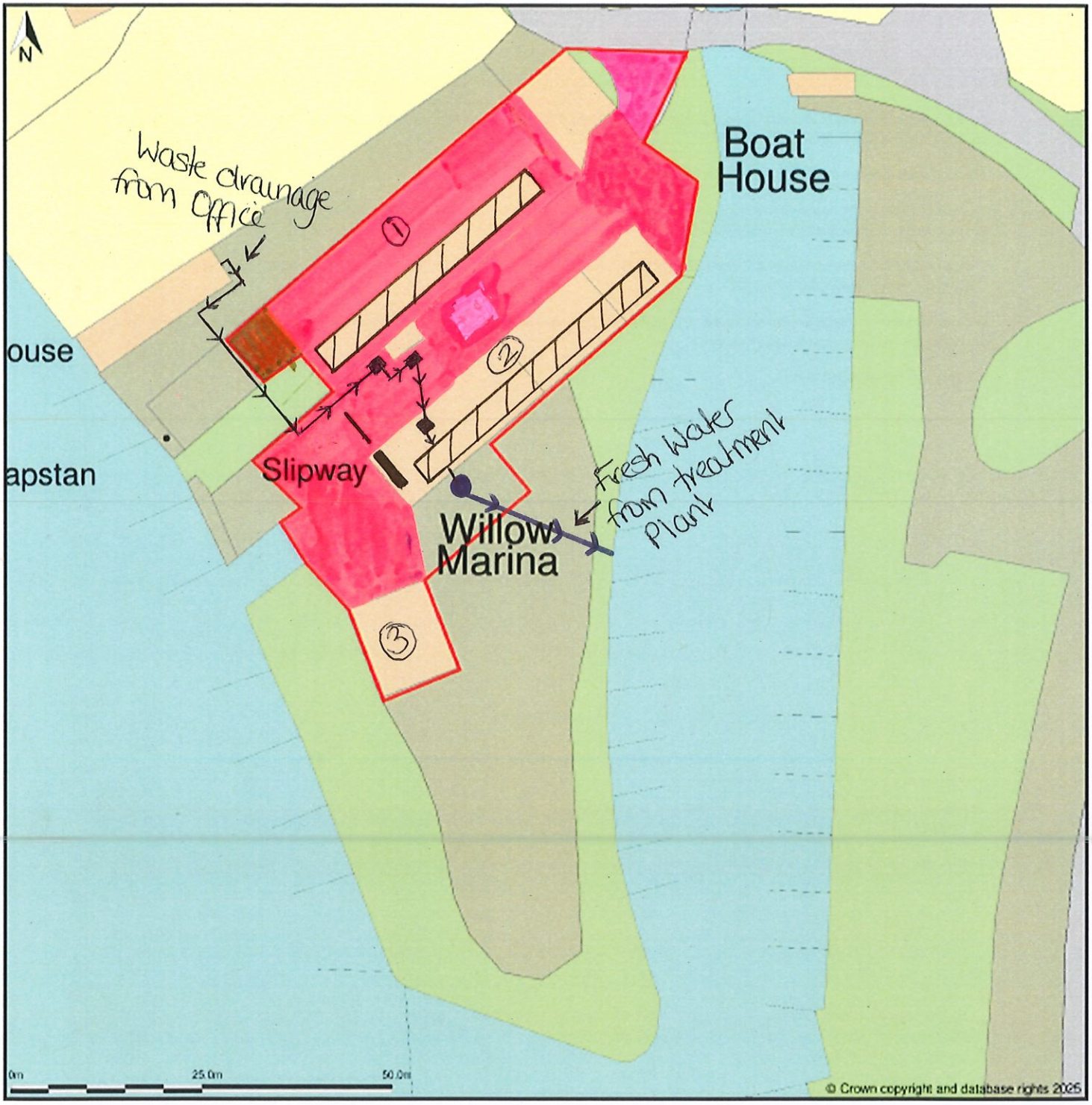

KEY:

- Resurfacing
- Solar Panels
- Filtration System and Aco Drain
- Sewage Treatment Plant
- Drainage

Location Plan shows area bounded by: 478445.6, 179222.2 478587.02, 179363.62 (at a scale of 1:1250), OSGridRef: SU78517929. 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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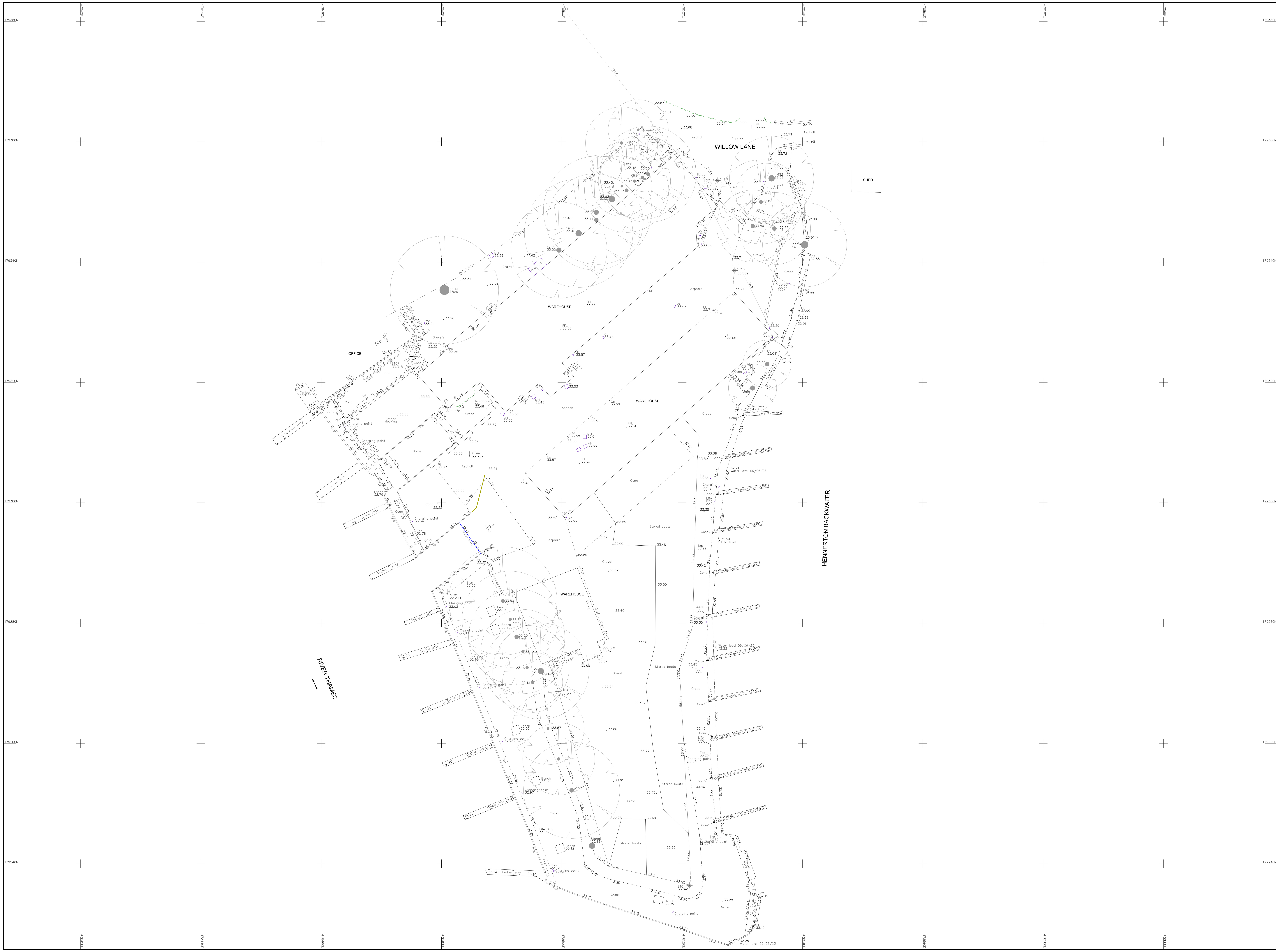


NOTES

Survey has been undertaken to an accuracy commensurate with a scale of 1:200.

Plan co-ordinates are based on Ordnance Survey National Grid co-ordinates derived from GNSS observations to the National GPS Network. Co-ordinates have been transformed using OSTN15 and are subject to a grid scale factor.

Levels are based on above ODN (Ordnance Datum Newlyn) based on GNSS observations to the National GPS Network, transformed using OSGM15.

Levels on kerb lines are channel levels unless specified.

The position and level of adjacent buildings that overlook the site have been obtained using non-contact measurements from within the site. For this reason some details may not be shown, as they are either below the line of sight or are obscured.

ABBREVIATIONS

ACU	Air Conditioning Unit	LB	Litter Bin
AL	Access Ladder	LP	Lamp Post
AR	Assumed Route	MH	Manhole
AV	Air Valve	MK	Marker Post
BB	Belisha Beacon	MP	Mooring Point
BH	Borehole	MPF	Mesh Panel Fence
BL	Basement Light	MRW	Metal Retaining Wall
BO	Bollard	MS (x)	Multi-Stemmed Tree (No. of Stems)
BP	Block Paving		
BRW	Brick Retaining Wall	NB	Notice Board
BS	Bus Stop	NP	Street Name Plate
BSh	Bus Shelter	OHW	Overhead Wire
BT	British Telecom IC	OSBM	OS Bench Mark Pillar
BW	Brick Wall		
BWF	Barbed Wire Fence	PB	Post Box
CB	Control Box	PC	Pedestrian Crossing
CBF	Close Board Fence	PCF	Post & Chain Fence
CCTV	Closed Circuit Television	PF	Palisade Fence
CIF	Corrugated Iron Fence	Pl	Planter
CK	Containment Kerb	PL	Plinth
CL	Cover Level	PM	Parking Meter
CLF	Chain Link Fence	PO	Post
CLSF	Chain Link Security Fence	PRF	Post & Rail Fence
Conc	Concrete	PSF	Palisade Security Fence
Co	Column	PWF	Post & Wire Fence
CPS	Concrete Paving Slabs	RBG	Resin Bound Gravel
CPF	Chestnut Paling Fence	RE	Rodding Eye
CR	Cycle Rack	RH	Road Hump
CRW	Concrete Retaining Wall	RL	Ridge Level
CS	Cobblestones	RS	Road Sign
CT	Cable TV IC	RW	Retaining Wall
CW	Concrete Wall	SEP	Service Entry Point
DC	Duct Covers	SL	Soffit Level
DCh	Drainage Channel	SM	Sump Level
DK	Drop Kerb	SP	Stand Pipe
DP	Down Pipe	SRW	Stone Retaining Wall
DPC	Damp-Proof Course Level	SW	Stone Wall
EIC	Electricity IC	SWMH	Surface Water Manhole
EL	Eaves Level (at Drip Edge)	SY	Stay Wire
EP	Electricity Pole	TCB	Telephone Call Box
ER	Earthing Rod	TCP	Traffic Control Plate
FB	Flower Bed	TDR	Traffic Direction Restrictor
FFL	Finished Floor Level	THL	Threshold Level
FH	Fire Hydrant	TK	Top of Kerb Level
FL	Flood Light	TL	Traffic Light
FP	Fuel Pump	TM	Ticket Machine
FR	Flat Roof	TP	Telegraph Pole
FS	Flag Stones	TPS	Tactile Paving Slabs
FWMH	Foul Water Manhole	TRW	Timber Retaining Wall
GA	Gate	TW	Top of Wall
GB	Grit Box	UTL	Unable To Lift:
GC	Grasscrete		UTL(1) Covered
GP	Gate Post		UTL(2) Immovable
GR	Guard Rail		UTL(3) Damaged
GU	Gully		UTL(4) Bolted Down
GV	Gas Valve		UTL(5) Traffic Management
HW	Head Wall	VP	Vent Pipe
IB	Illuminated Bollard	WB	Wheel Barrier
IC	Inspection Cover	WL	Water Level
IL	Invert Level	WM	Water Meter
IRF	Iron Railing Fence	WO	Washout
IRS	Illuminated Road Sign	WV	Water Valve
KD	Drainage Kerb	VDL	Vehicle Detector Loop
KO	Kerb Outlet		

CONTROL STATION INFORMATION

STATION	EASTING	NORTHING	LEVEL	TYPE
ST01	478521.223	179236.398	33.641	Nail
ST04	478499.338	179268.634	33.611	Nail
ST05	478480.972	179285.127	33.314	Nail
ST06	478484.665	179308.079	33.323	Nail
ST07	478471.508	179323.621	33.315	Nail
ST08	478514.524	179361.878	33.577	Nail
ST09	478525.886	179353.567	33.742	Nail
ST10	478528.719	179338.597	33.689	Nail

N

Rev.	Description	Date	Svyr	Chkd
-	-	14/06/23	AW	JHJ

Glanville
Cornerstone House
62 Foxhall Road, Didcot
Oxon, OX11 7AD
Tel: (01235) 515550 Fax: (01235) 817799
postbox@glanvillegroup.com www.glanvillegroup.com

Client : RICHARD SNOWBALL
VAL WYATT MARINE

Project : WILLOW MARINA
WILLOW LANE, WARGRAVE
RG10 8LH

Title : SITE SURVEY

Project Engineer : AW Scale : 1:200 @ A0

Project Director : JHJ Date : JUN 2023

Status :

Drawing No. 8230370/4101 Rev

VAL WYATT

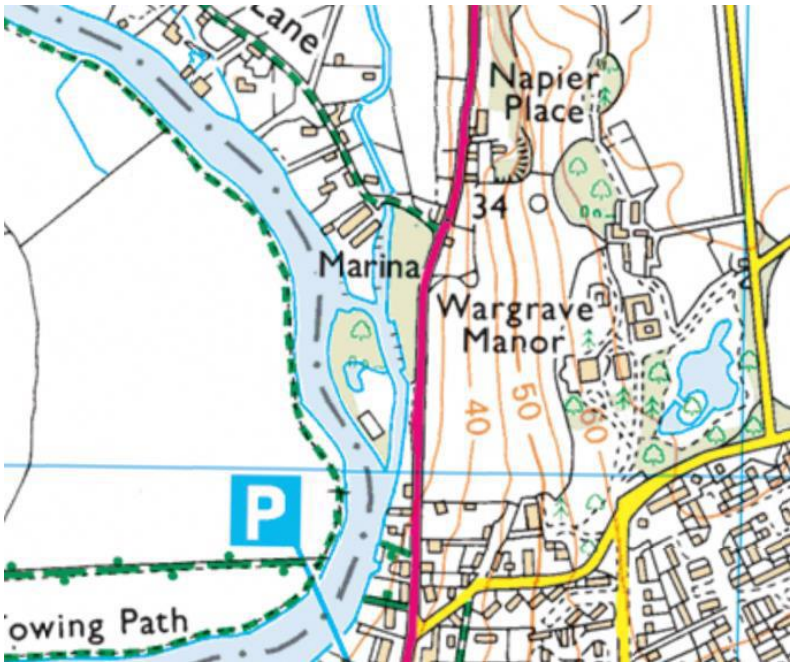
· EST 1845 ·

SITE AREA

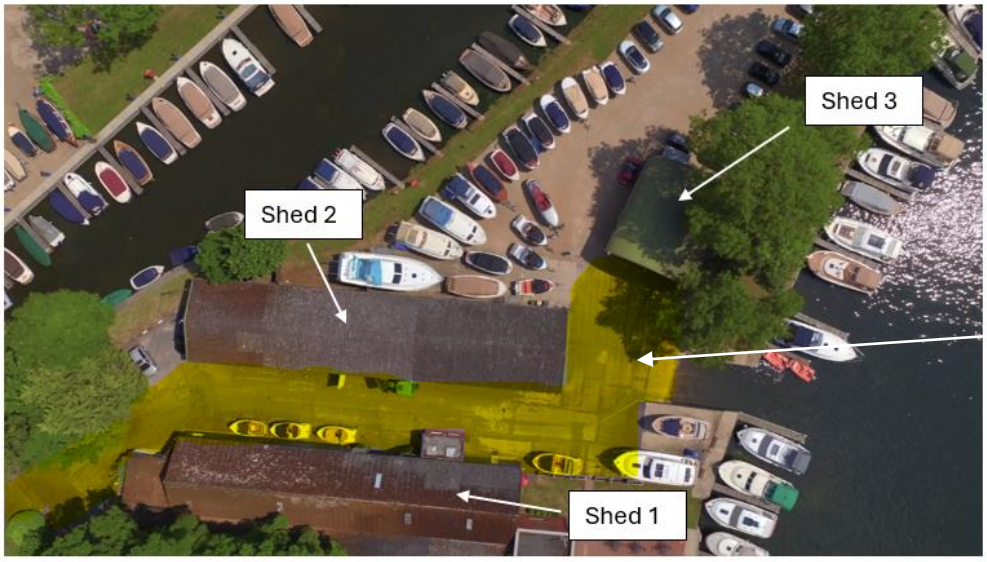
Site address: Willow Marina, Willow Lane, Wargrave, Berkshire, RG10 8LH

Ordnance Survey Grid Reference: SU 78504 79319

Supporting Documents Provided: 3x OS Maps, 1x Topo Survey, Aerial photo below.



RESURFACING



Resurfacing highlighted area + the inside of Shed 1 to the following spec:

- Breaking out damaged areas
- Base tarmac laid to existing height to level
- Saw cut and breakout around perimeter forming a chase for new tarmac
- Raise iron work
- K140 Tac coat sprayed over the area
- 50mm of 10mm Tufflex tarmac machine laid and power rolled
- Cold joints will be hot pitched
- Removal of waste to allow for new 115LM of square top concrete edgings
- Installation of heavy-duty Aco drainage alongside storage yard and entrance piped into existing drainage
- Aco drains in boat-wash area, with Aco sump to collect debris

V1.0 Dec 2024

VAL WYATT

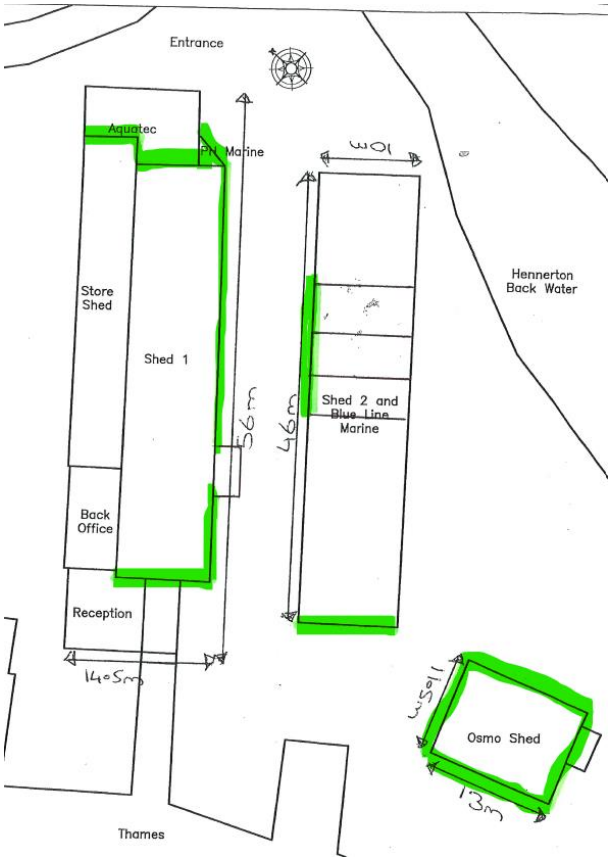
· EST 1845 ·

CLADDING

Shed 1: Removal of green powder coated galvanised corrugated sheet walls to sides and large double-leaf door highlighted in green below. Replaced with box profile metal sheet with anti-condensation skin cladding in “Slate Blue”, with dark grey aluminium guttering and downpipes. Large double-leaf door will also be clad in “Slate Blue”.

Shed 2: Removal of green powder coated galvanised corrugated sheet walls to sides highlighted in green below. Replaced with box profile metal sheet with anti-condensation skin cladding in “Slate Blue”, with dark grey aluminium guttering and downpipes. Current timber frontage of shop space to be replaced with “Slate Blue” cladding.

Shed 3 (Osmo Shed): Removal of asbestos cement sheeting to the sides highlighted in green below. Replaced with box profile metal sheet with anti-condensation skin cladding in “Slate Blue”.



VAL WYATT

• EST 1845 •

Current Shed 1

Current Shed 2

Current Gable End Shed 2

Current Front of Shed 3

Current Side of Shed 3

Current Rear of Shed 3

V1.0 Dec 2024

ROOFING

Shed 1: Removal of Profile 3 Asbestos (Chrysatile) sheets and replaced with box profile metal sheets in dark grey, with anti-condensation skin fitted to the underside.

Shed 2: Removal of Profile 6 Asbestos (Chrysatile) sheets and replaced with box profile metal sheets in dark grey, with anti-condensation skin fitted to the underside.

Shed 3: Remaining as currently is.

The supplier we will instruct is Tey Farm Solutions, who will have the relevant permits and H&S measures for removing asbestos legally and safely.

WINDOWS

Shed 1: All current windows are to be replaced with UPVC plain dark grey, with no openings.

Shed 2: Removal of 4 windows from frontage and replaced with aluminium windows with single opening. Windows to the storage area will be opaque, compared to the retail unit which will be clear.

Shed 3: None.

DOORS

Shed 1: Double-leaf main door to be reclad in “Slate Blue” cladding to match the walls. Current large sliding door to river-end gable end to be removed and replaced with cladding in “Slate Blue”. Personnel door to be fitted to right hand side of this door in dark grey. 4x Outa-Dor general purpose steel doors to be fitted for personnel access/exit. These to be dark grey. Outlined on the drawings provided.

Shed 2: Current timber double-leaf door to be replaced with new double-leaf door clad in “Slate Blue”. 2x current double-leaf timber personnel doors to be replaced with powder-coated double-leaf doors (in dark grey), one containing double-glazed vision panel (450mm x 450mm) and a letter box. Current sliding door on river-end gable end to be removed and replaced with cladding in “Slate Blue”. 4x personnel doors to the rear of the building to be replaced with Outa-Dor general purpose steel doors in dark grey as outlined on the drawings provided.

Shed 3: Replace current 2x timber sliding doors with 2x electric powered, plastisol-coated roller shutter doors in dark grey. Replace current timber personnel door with powder-coated fire door in dark grey. Installation of dark grey powder-coated personnel fire exit door to the river-side side of shed 3.

VAL WYATT

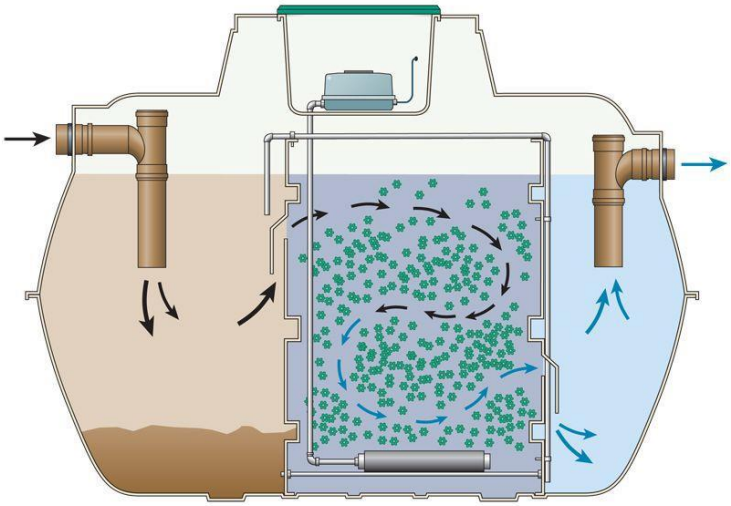
· EST 1845 ·

PROSEPTIC SEWAGE TREATMENT PLANT

Installation of 30 Population pumped outlet shallow Marsh sewage treatment plant.

Details from manufacturer Proseptic:

"The Marsh 30 population pumped outlet ensign sewage treatment plant. The Marsh Ensign is made from glass fibre and is tested to BS EN 12566 and CE marked to ensure compliance. It has a 3 chamber system correctly sized for separation and retention of solids providing optimum effluent quality. A low energy efficient compressor ensures minimal running, maintenance and servicing costs. Internal recirculation (from final to primary chamber) continues treatment process to provide higher effluent quality whilst balancing flow over 24 hour period or periods of intermittent use.



Install

The new system will be installed where discussed and in an area of your final agreement. We will excavate the installation pit at approximately 3 metres wide 6 metres long and 2.7 metres deep. On account of the size of the excavation we will be required to install interlocking sheet piles and hydraulic rams to provide a safe working environment for engineers as well as to prevent damaging the tank during installation, this will significantly aid us in managing the ingress of groundwater during works allowing us to pour a level and solid concrete base prior installation of the new system. Following excavation a 350mm layer of 40-60mm flint rejects will be laid throughout the base, this will act as our dewatering zone, allowing us to pump ground water which sits within the stone out of the hole, whist providing a dry platform for the installation of a 250mm thick reinforced concrete slab base above. Once the concrete has set the tank will be lifted into position then surround in concrete in a series of pours whilst the treatment plant is simultaneously filled with water to ensure equal pressure inside and out of the system during the installation. With the tanks now secured into position we

will make new inlet and outlet pipework connections. There will be a short period of up to a 1 hour window where we will require minimal use in order that live connection to the new Treatment plant can be successfully made (this could potentially be carried out early one morning prior to opening to minimise disruption). The pumped outlet connection will be made to waters edge as discussed. Finally the inlet pipework connection will be made. Using a diamond cutting floor saw an inlet trench will be cut through the boat house and out outside hard standing area towards the inlet of the Treatment plant. Approximately 15 metres of 110mm UPVC plastic pipework will now be laid on and surrounded in 10mm shingle, making the live drainage connection from the café and toilets. Full reinstatement will now take place and areas of cut concrete reinstated accordingly.

Power

As discussed the electric will be laid and connected back to the boathouse via the inlet pipework trench. The final connection will be made by our ELECSA registered electrician, he will also issue a certificate of safe connections required by Building Control.

Discharge

With the plot gifted with historical connection to the passing River Thames, we will simply be linking the tanks treated effluent outlet facility back to this existing point of discharge"

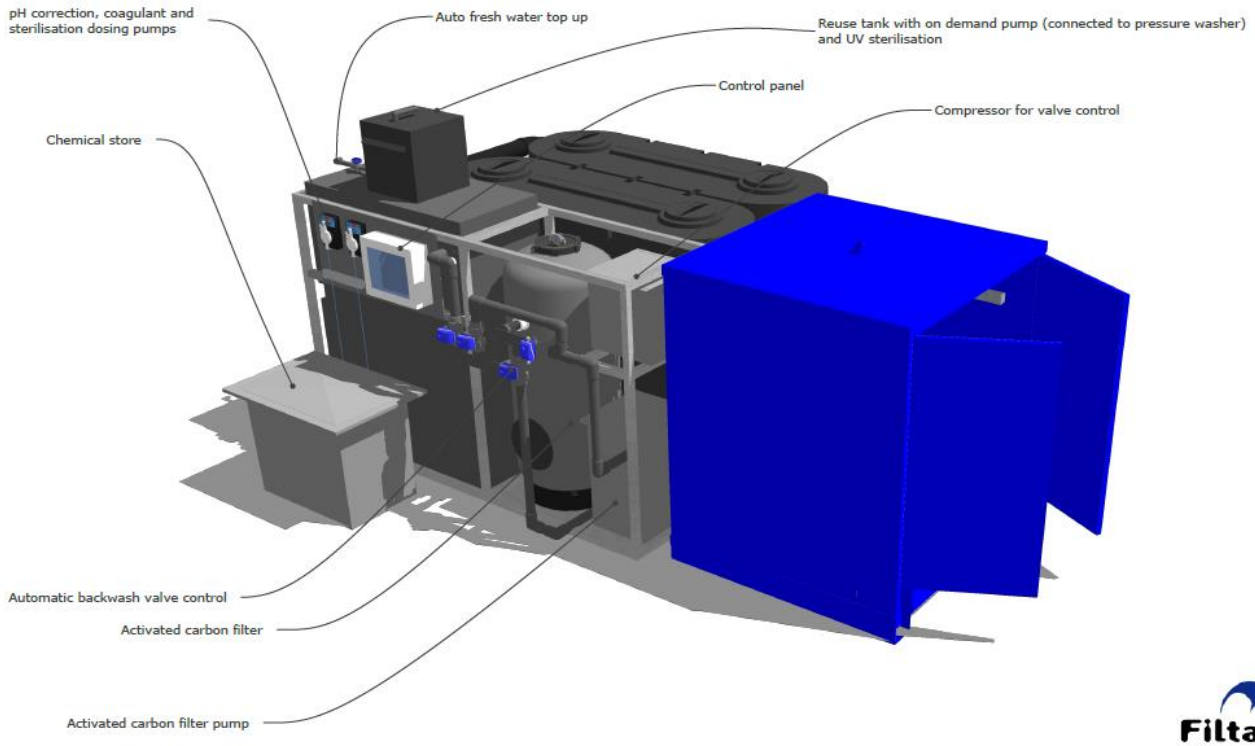
VAL WYATT

• EST 1845 •

FILTRATION SYSTEM

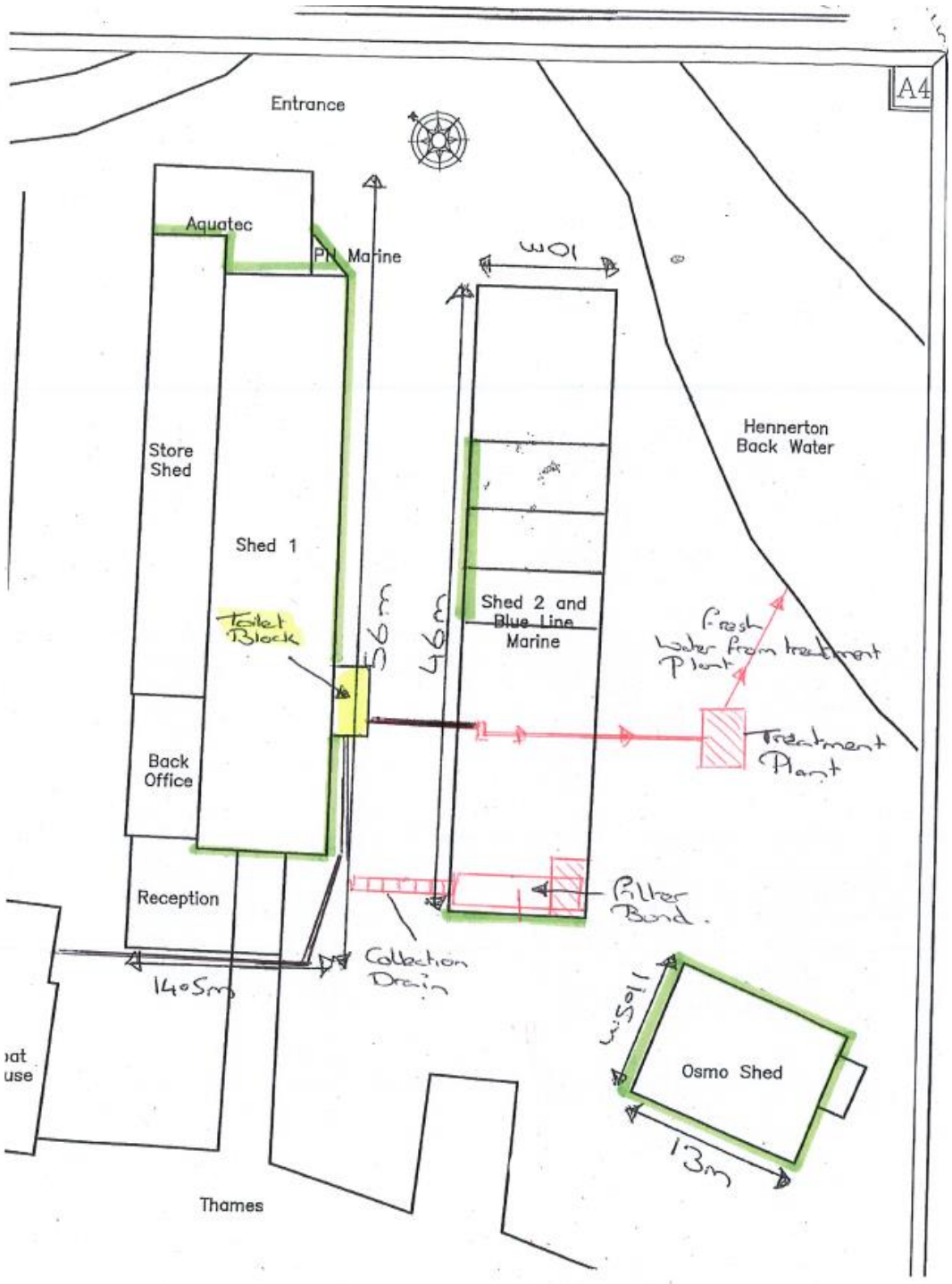
To be provided by Filtabund. I have requested the full specification sheet from them, but in the meantime, this is the option we wish to install. System footprint measurements: 4000mm L x 3000mm W x 2000mm H.

Option 3: Pre filter, pH correction tanks with settlement of silts and water recycling. Rydlyme can be used on the slipway.
May not require agreement from EA as water is recycled. System operates when power washer is used to avoid collection of rainwater.
Includes 6 month supply of chemicals and filter bags. Activated carbon changed annually.



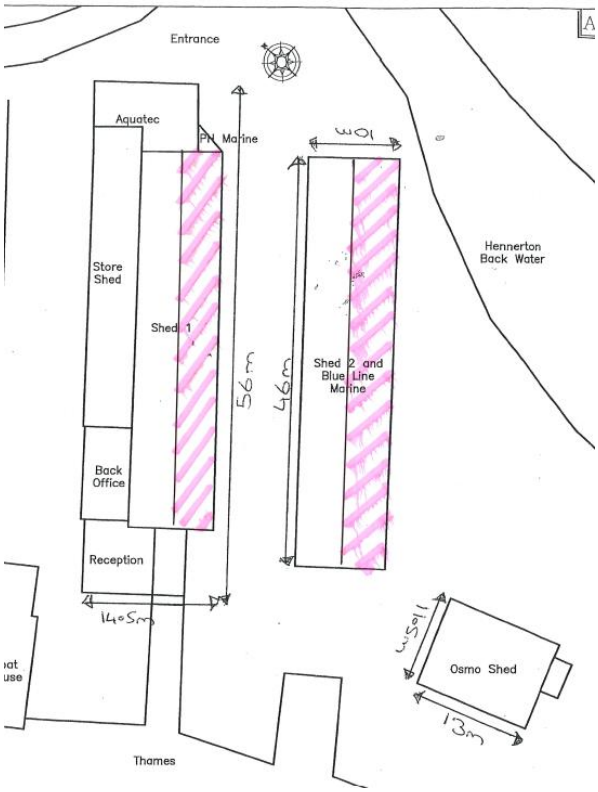
FiltaBund

Location of Filtration system and Sewage Treatment Plant (drawn in red)**:**



SOLAR PANELS

To be installed on the roofs of Shed 1 and Shed 2 by Spirit Energy.



Shed 1:

29.7 kWp installation, consisting of 66 x 450W Monocrystalline solar panels. The panels will be

mounted on a corrugated metal pitched roof, using non-penetrative K2 Multirail system. The panels will be wired to 1 x Solis 30 kW Triple MPPT inverter located in a top floor riser cupboard. The active PV cell area (not including any spaces between panels) will be approx 156 m2, and the system is anticipated to produce 27472.5 kWh/annum.

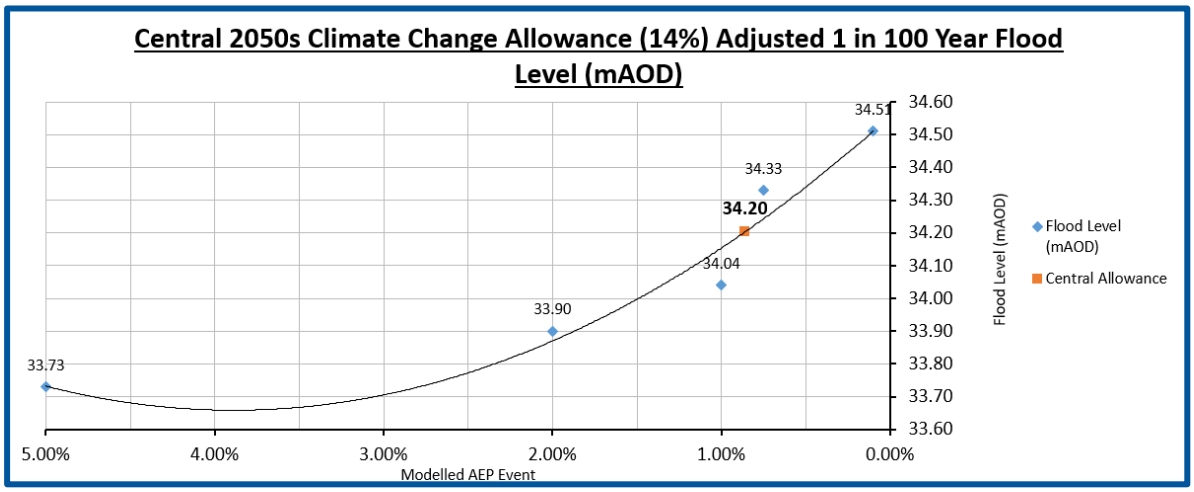
Shed 2:

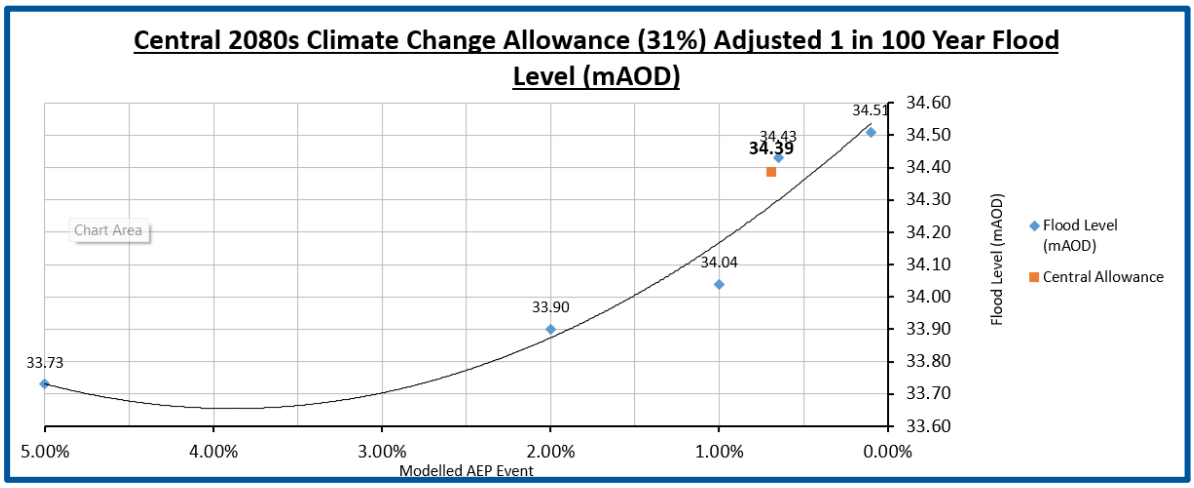
31.05 kWp installation, consisting of 69 x 450W Monocrystalline solar panels. The panels will be mounted on a corrugated metal pitched roof, using non-penetrative K2 Multirail system. The panels will be wired to 1 x Solis 30 kW Triple MPPT inverter located in a top floor riser cupboard. The active PV cell area (not including any spaces between panels) will be approx 163 m2, and the system is anticipated to produce 28721.25 kWh/annum.

GeoSmart Information

Appendix B

Environment Agency data





GeoSmart Information

Appendix C

Thames Water sewer flooding history

Sewer Flooding
History Enquiry

Property Searches

Geosmart Information Ltd

Suite 9-11
1st Floor
Old Bank

Search address supplied	Willow Marina Willow Lane Wargrave Berkshire RG10 8LH
Your reference	85719
Our reference	SFH/SFH Standard/2025_5146303
Received date	**8 April 2025**
Search date	**8 April 2025**

Thames Water Utilities Ltd
Property Searches, Clearwater Court, Vastern Road, Reading RG1 8DB

property.searches@thameswater.co.uk
thameswater.co.uk/propertysearches

0800 009 4540

Sewer Flooding
History Enquiry

Property Searches

Search address supplied: Willow Marina,Willow Lane,Wargrave,Berkshire,RG10 8LH

This search is recommended to check for any sewer flooding at a specific address or area

TWUL are responsible in respect of the following:-

(i) any negligent or incorrect entry in the records searched;

(ii) any negligent or incorrect interpretation of the records searched;

(iii) and any negligent or incorrect recording of that interpretation in the search report

(iv) compensation payments

Thames Water Utilities Ltd
Property Searches, Clearwater Court, Vastern Road, Reading RG1 8DB

property.searches@thameswater.co.uk
thameswater.co.uk/propertysearches

0800 009 4540

Sewer Flooding
History Enquiry

Thames Water Property Searches

History of Sewer Flooding

Is the requested address or area at risk of flooding due to overloaded public sewers?

The flooding records held by Thames Water indicate that there have been no incidents of flooding in the requested area as a result of surcharging public sewers.

For your guidance:

- A sewer is “overloaded” when the flow from a storm is unable to pass through it due to a permanent problem (e.g. flat gradient, small diameter). Flooding as a result of temporary problems such as blockages, siltation, collapses and equipment or operational failures are excluded.
- “Internal flooding” from public sewers is defined as flooding, which enters a building or passes below a suspended floor. For reporting purposes, buildings are restricted to those normally occupied and used for residential, public, commercial, business or industrial purposes.
- “At Risk” properties are those that the water company is required to include in the Regulatory Register that is presented annually to the Director General of Water Services. These are defined as properties that have suffered, or are likely to suffer, internal flooding from public foul, combined or surface water sewers due to overloading of the sewerage system more frequently than the relevant reference period (either once or twice in ten years) as determined by the Company’s reporting procedure.
- Flooding as a result of storm events proven to be exceptional and beyond the reference period of one in ten years are not included on the At Risk Register.
- Properties may be at risk of flooding but not included on the Register where flooding incidents have not been reported to the Company.
- Public Sewers are defined as those for which the Company holds statutory responsibility under the Water Industry Act 1991.
- It should be noted that flooding can occur from private sewers and drains which are not the responsibility of the Company. This report excludes flooding from private sewers and drains and the Company makes no comment upon this matter.
- For further information please contact Thames Water on Tel: 0800 316 9800 or website www.thameswater.co.uk

Thames Water Utilities Ltd
Property Searches, Clearwater Court, Vastern Road, Reading RG1 8DB

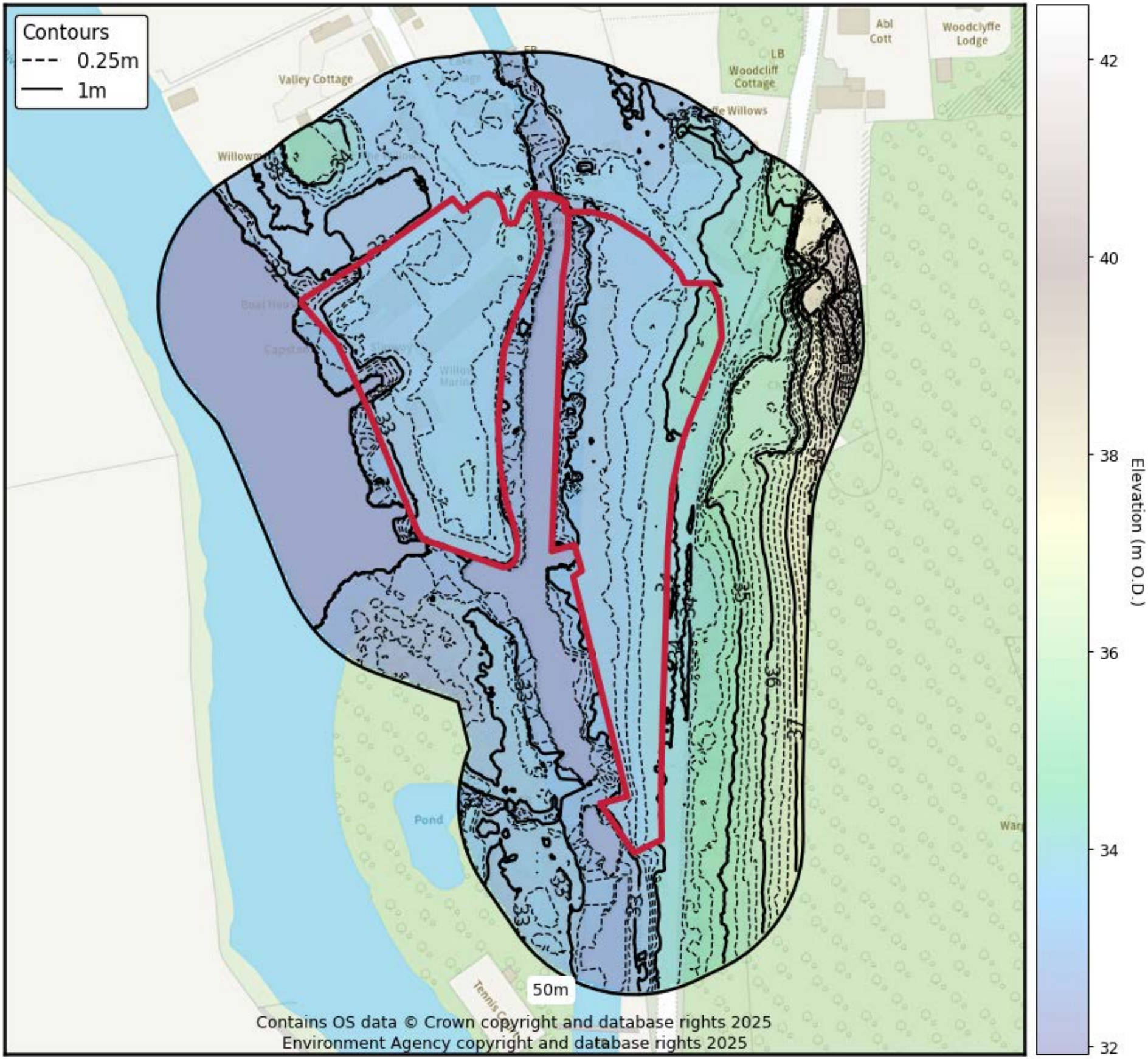
property.searches@thameswater.co.uk
thameswater.co.uk/propertysearches

0800 009 4540

GeoSmart Information

Appendix D

Environment Agency LiDAR ground elevation data



Disclaimer

This report has been prepared by GeoSmart in its professional capacity as soil, groundwater, flood risk and drainage specialists, with reasonable skill, care and diligence within the agreed scope and terms of contract and taking account of the manpower and resources devoted to it by agreement with its client and is provided by GeoSmart solely for the internal use of its client.

The advice and opinions in this report should be read and relied on only in the context of the report as a whole, taking account of the terms of reference agreed with the client. The findings are based on the information made available to GeoSmart at the date of the report (and will have been assumed to be correct) and on current UK standards, codes, technology and practices as at that time. They do not purport to include any manner of legal advice or opinion. New information or changes in conditions and regulatory requirements may occur in future, which will change the conclusions presented here.

This report is confidential to the client. The client may submit the report to regulatory bodies, where appropriate. Should the client wish to release this report to any other third party for that party's reliance, GeoSmart may, by prior written agreement, agree to such release, provided that it is acknowledged that GeoSmart accepts no responsibility of any nature to any third party to whom this report or any part thereof is made known. GeoSmart accepts no responsibility for any loss or damage incurred as a result, and the third party does not acquire any rights whatsoever, contractual or otherwise, against GeoSmart except as expressly agreed with GeoSmart in writing.

For full T&Cs see http://geosmartinfo.co.uk/terms-conditions

Important consumer protection information

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Tel: 01743 298 100

Email: info@geosmartinfo.co.uk

GeoSmart Information Limited is registered with the Property Codes Compliance Board (PCCB) as a subscriber to the Search Code. The PCCB independently monitors how registered search firms maintain compliance with the Code.

The Search Code:

- provides protection for homebuyers, sellers, estate agents, conveyancers and mortgage lenders who rely on the information included in property search reports undertaken by subscribers on residential and commercial property within the United Kingdom.
- sets out minimum standards which firms compiling and selling search reports have to meet.
- promotes the best practice and quality standards within the industry for the benefit of consumers and property professionals.
- enables consumers and property professionals to have confidence in firms which subscribe to the code, their products and services.
- By giving you this information, the search firm is confirming that they keep to the principles of the Code. This provides important protection for you.

The Code's core principles

Firms which subscribe to the Search Code will:

- display the Search Code logo prominently on their search reports.
- act with integrity and carry out work with due skill, care and diligence.
- at all times maintain adequate and appropriate insurance to protect consumers.
- conduct business in an honest, fair and professional manner.
- handle complaints speedily and fairly.
- ensure that products and services comply with industry registration rules and standards and relevant laws.
- monitor their compliance with the Code.

GeoSmart Information

Complaints

If you have a query or complaint about your search, you should raise it directly with the search firm, and if appropriate ask for any complaint to be considered under their formal internal complaints procedure. If you remain dissatisfied with the firm's final response, after your complaint has been formally considered, or if the firm has exceeded the response timescales, you may refer your complaint for consideration under The Property Ombudsman scheme (TPOs). The Ombudsman can award up to £5,000 to you if the Ombudsman finds that you have suffered actual financial loss and/or aggravation, distress or inconvenience as a result of your search provider failing to keep to the Code.

Please note that all queries or complaints regarding your search should be directed to your search provider in the first instance, not to TPOs or to the PCCB.

TPOs contact details:

The Property Ombudsman scheme

Milford House

43-55 Milford Street

Salisbury

Wiltshire SP1 2BP

Tel: 01722 333306

Fax: 01722 332296

Email: admin@tpos.co.uk

You can get more information about the PCCB from www.propertycodes.org.uk. Please ask your search provider if you would like a copy of the search code

Complaints procedure

GeoSmart Information Limited is registered with the Property Codes Compliance Board as a subscriber to the Search Code. A key commitment under the Code is that firms will handle any complaints both speedily and fairly. If you want to make a complaint, we will:

- Acknowledge it within 5 working days of receipt.
- Normally deal with it fully and provide a final response, in writing, within 20 working days of receipt.
- Keep you informed by letter, telephone or e-mail, as you prefer, if we need more time.
- Provide a final response, in writing, at the latest within 40 working days of receipt.
- Liaise, at your request, with anyone acting formally on your behalf.

If you are not satisfied with our final response, or if we exceed the response timescales, you may refer the complaint to The Property Ombudsman scheme (TPOs): Tel: 01722 333306, E-mail: admin@tpos.co.uk.

We will co-operate fully with the Ombudsman during an investigation and comply with his final decision. Complaints should be sent to:

Liz Lloyd

Finance Manager

GeoSmart Information Limited

Suite 9-11, 1st Floor,

Old Bank Buildings,

Bellstone, Shrewsbury, SY1 1HU

Tel: 01743 298 100

support@geosmartinfo.co.uk

12. Terms and conditions, CDM regulations and data limitations

Terms and conditions can be found on our website:

http://geosmartinfo.co.uk/terms-conditions/

CDM regulations can be found on our website:

http://geosmartinfo.co.uk/knowledge-hub/cdm-2015/

Data use and limitations can be found on our website:

http://geosmartinfo.co.uk/data-limitations/