5 King Johns Close, Wraysbury, Staines, Middlesex, TW19 5EJ

Flood Risk Assessment

For Redon Vishko

KRS.0341.030.R.001.A

November 2023

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5 King Johns Close, Wraysbury, Staines, Middlesex, TW19 5EJ

Project	Flood Risk Assessment
Client	Redon Vishko
Status	Final
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Date	November 2023

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EXECUTIVE SUMMARY

The Proposed Development would be expected to remain dry in all but the most extreme conditions. The Site is unlikely to flood except in extreme conditions. Providing the recommendations made in this Flood Risk Assessment (FRA) are instigated, flood risk from all sources would be minimised, the consequences of flooding are acceptable, and the development would be in accordance with the requirements of the National Planning Policy Framework (NPPF).

This FRA demonstrates that the Proposed Development would be operated with minimal risk from flooding, would not increase flood risk elsewhere and is compliant with the requirements of the NPPF. The development should not therefore be precluded on the grounds of flood risk.

1.0 INTRODUCTION

1.1 Background

This Flood Risk Assessment (FRA) has been prepared by KRS Enviro at the request of Redon Vishko to support a planning application for a replacement house ("the Proposed Development") at 5 King Johns Close, Wraysbury, Staines, Middlesex, TW19 5EJ ("the Site"). This FRA includes an assessment of the existing and proposed surface water drainage of the Site.

This FRA has been carried out in accordance with guidance contained in the National Planning Policy Framework (NPPF)[1], associated Planning Practice Guidance on flood risk and coastal change[2] (PPG) and the PPG 'Site-specific flood risk assessment checklist. This FRA identifies and assesses the risks of all forms of flooding to and from the development and demonstrates how these flood risks will be managed so that the development remains safe throughout the lifetime, taking climate change into account.

It is recognised that developments which are designed without regard to flood risk may endanger lives, damage property, cause disruption to the wider community, damage the environment, be difficult to insure and require additional expense on remedial works. The development design should be such that future users will not have difficulty obtaining insurance or mortgage finance, or in selling all or part of the development, as a result of flood risk issues.

1.2 National Planning Policy Framework (NPPF)

One of the key aims of the NPPF is to ensure that flood risk is taken into account at all stages of the planning process; to avoid inappropriate development in areas at risk of flooding and to direct development away from areas of highest risk.

It advises that where new development is exceptionally necessary in areas of higher risk, this should be safe, without increasing flood risk elsewhere, and where possible, reduce flood risk overall. A risk-based approach is adopted at stages of the planning process, applying a source pathway receptor model to planning and flood risk. To demonstrate this, an FRA is required and should include:

- whether a Proposed Development is likely to be affected by current or future flooding from all sources;
- whether it will increase flood risk elsewhere;
- whether the measures proposed to deal with these effects and risks are appropriate;
- if necessary, provide the evidence to the Local Planning Authority (LPA) that the Sequential Test can be applied; and
- whether the development will be safe and pass part c) of the Exception Test if this is appropriate.

[1] Ministry for Housing, Communities and Local Government (2023) National Planning Policy Framework: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf
[2] Communities and Local Government (2022) Planning Practice Guidance - Flood Risk and Coastal Change: https://www.gov.uk/guidance/flood-risk-and-coastal-change

2.0 LOCATION & DEVELOPMENT DESCRIPTION

2.1 Site Location

The Site is located at 5 King Johns Close, Wraysbury, Staines, Middlesex, TW19 5EJ (see Figure 1).

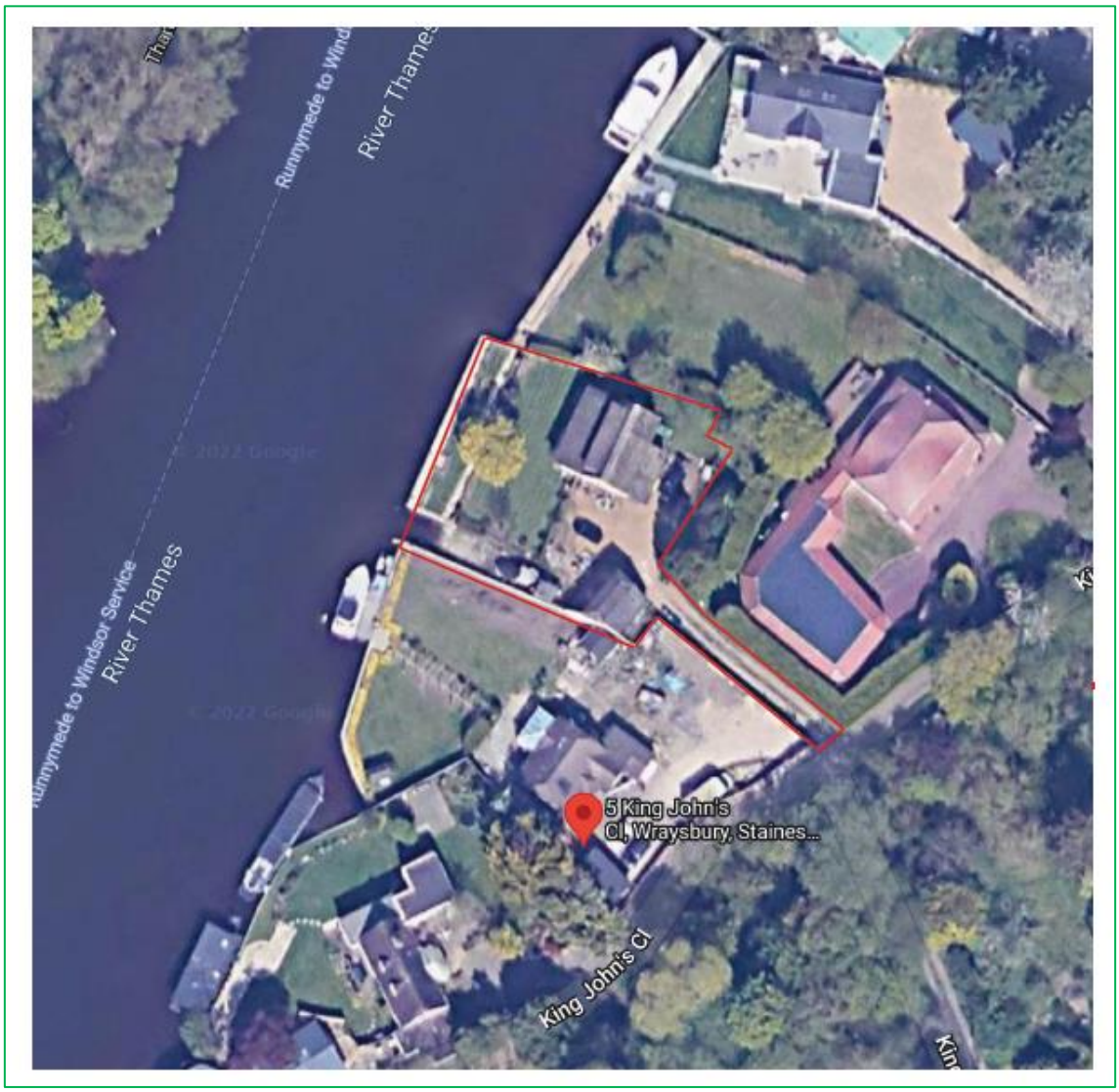

Figure 1 - Site Location

2.2 Existing Development

The Site comprises a house and garage/annex, the existing house has a basement which is set lower than the general ground level of the Site (see Appendix 1). The existing house does not utilise flood voids with a finished floor level of 17.25 metres Above Ordnance Datum (mAOD). The existing house has a footprint area of 113.60m^2, previously planning permission/s have been granted for a house with a footprint area of 124m^2.

2.3 Proposed Development

It is understood the Proposed Development is for a replacement house which will rebuilt on the existing footprint and will be no nearer to the River Thames than the existing house (see Appendix 1). The proposed house will utilise flood voids, with a finished floor level of 18.25mAOD and the underside the void will be 17.85mAOD. The proposed house will not include a basement. The proposed house will have footprint area of 133m^2, an increase of 19.40m^2 compared to the existing house and an increase of 9m^2 compared to the previously planning permission/s.

The application is for a new, suitable flood-resilient design. The exposure of people and property will be reduced and minimised compared to existing Site conditions. The finished floor level of the house cannot be raised any higher. It would not be possible to safely access the house, the house would look out of place compared to the other house on the street, there would not be the required headroom and other planning constraints mean that the finished floor level cannot be raised higher. The finished floor levels are proposed to be raised as much as possible without causing impact on the amenity of neighbouring properties.

Further details with regard to the Proposed Development can be found in the accompanying information submitted with the planning application.

2.4 Ground Levels

The ground level of the Site is 15.80 metres Above Ordnance Datum (mAOD) to 16.40mAOD.

2.5 Catchment Hydrology

The River Thames is located adjacent to the north western boundary of the Site (see Figure 1).

2.6 Ground Conditions

The British Geological Survey (BGS) map[3] shows that the bedrock underlying the Site consists of the London Clay Formation – clay, silt and sand. Sedimentary bedrock formed between 56 and 47.80 million years ago during the Palaeogene period. The superficial deposits consist of Alluvium - clay, silt, sand and gravel.

[3] https://mapapps2.bgs.ac.uk/geoindex/home.html?_ga=2.14476159.932338379.1655890995-1831306757.1655472887

3.0 FLOOD RISK

3.1 Sources of Flooding

All sources of flooding have been considered, these are; fluvial (river) flooding, tidal (coastal) flooding, groundwater flooding, surface water (pluvial) flooding, sewer flooding and flooding from artificial drainage systems/infrastructure failure.

3.2 Environment Agency

Information regarding the current flood risk at the application Site and local flood defences has been obtained from the Environment Agency (see Appendix 2).

3.3 Climate Change

Projections of future climate change, in the UK, indicate more frequent, short-duration, high intensity rainfall and more frequent periods of long duration rainfall. Guidance included within the NPPF recommends that the effects of climate change are incorporated into FRA's. Recommended precautionary sensitivity ranges for peak rainfall intensities and peak river flows are outlined in the flood risk assessments: climate change allowances guidance[4]. Table 1 shows the peak river flow allowances by river management catchment.

The flood risk assessments: climate change allowances guidance recommends that for 'more vulnerable' uses the central allowances are used to assess climate change throughout the lifetime of the development which is 100 years. Therefore, the fluvial design event for the Site is the 1 in 100 year (+35%) event.

Table 1 - Peak River Flow Allowances by River Catchment

River Catchment	Allowance Category	2020s	2050s	2080s
Maidenhead and Sunbury Management Catchment	Upper	+32%	+45%	+81%
	Higher	+19%	+25%	+47%
	Central	+14%	+17%	+35%

3.4 Existing and Planned Flood Defence Measures

The Site location is not currently protected by any formal defences and the Environment Agency do not currently have any flood alleviation works planned for the area. Further property level protection measures will be used to protect the Site from flooding, these are discussed in Section 6.0.

3.5 Environment Agency Flood Zones

A review of the Environment Agency's Flood Zones indicates that the Site is located within Flood Zone 3 and therefore has a 'high probability' of flooding as shown in Figure 2, with a 1 in 100 or greater annual probability of river flooding (>1%) in any year.

The Site should not be designated as Flood Zone 3b 'Functional Floodplain'. The definition of Flood Zone 3b 'Functional Floodplain' as per the PPG is: "*This zone comprises land where water from rivers or the sea has to flow or be stored in times of flood. The identification of functional*

[4] https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#high-allowances

floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. Functional floodplain will normally comprise:

- *land having a 3.3% or greater annual probability of flooding, with any existing flood risk management infrastructure operating effectively; or*
- *land that is designed to flood (such as a flood attenuation scheme), even if it would only flood in more extreme events (such as 0.1% annual probability of flooding).*

Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency."

The Site does not comprise land where water has to flow or be stored in times of flood. The Site does not perform a water conveyance flood route or a flood storage area. The Site does not provide a function of flood conveyance (i.e. free flow) or flood storage, either through natural processes, or by design (e.g. washlands and flood storage areas). The Site is already developed with 2 house therefore, the Site is located within Flood Zone 3a.

The Flood Zones are the current best information on the extent of the extremes of flooding from rivers or the sea that would occur without the presence of flood defences, because these can be breached, overtopped and may not be in existence for the lifetime of the development. They show the worst case scenario. The Environment Agency Flood Zones and acceptable development types are explained in Table 2. Table 2 shows that some development types are generally acceptable in Flood Zone 3a.

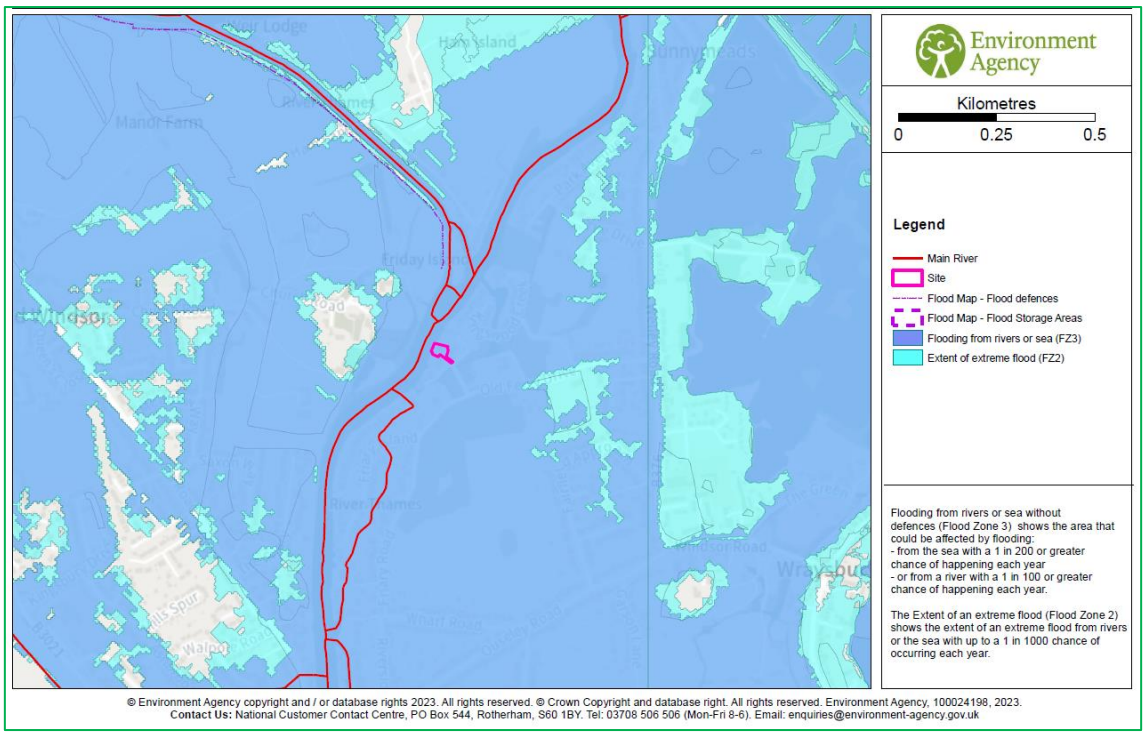

Figure 2 - Environment Agency Flood Zones

Table 2 - Environment Agency Flood Zones and Appropriate Land Use

Flood Zone	Probability	Explanation	Appropriate Land Use
Zone 1	Low	Less than a 1 in 1000 annual probability of river or sea flooding in any year (<0.1%)	All development types generally acceptable
Zone 2	Medium	Between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% - 0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% 0.1%) in any year	Most development type are generally acceptable
Zone 3a	High	A 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year	Some development types not acceptable
Zone 3b	'Functional Floodplain'	This zone comprises land where water from rivers or the sea has to flow or be stored in times of flood. The identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. Functional floodplain will normally comprise: • land having a 3.3% or greater annual probability of flooding, with any existing flood risk management infrastructure operating effectively; or • land that is designed to flood (such as a flood attenuation scheme), even if it would only flood in more extreme events (such as 0.1% annual probability of flooding). Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)	Some development types not acceptable

3.6 Flood Vulnerability

In the PPG, appropriate uses have been identified for the Flood Zones. Applying the Flood Risk Vulnerability Classification in the PPG, the existing and proposed use for residential uses is classified as 'more vulnerable'. The Proposed Development will not increase the vulnerability of the Site to flooding or introduce a new 'more vulnerable' use in the floodplain.

The proposals will not change the nature or times of occupation. The Proposed Development will improve the Sites resilience, resistance to flooding and by using property level protection measures to protect the Site from flooding the vulnerability of the Site will be improved (see Section 6.0).

Table 3 of this report and the PPG state that 'more vulnerable' uses are appropriate within Flood Zone 3a after the completion of a satisfactory FRA.

Table 3 - Flood Risk Vulnerability and Flood Zone 'Compatibility'

Flood Risk Vulnerability Classification	Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	✓	Exception test required	✓	✓
Zone 3a	Exception test required	✓	×	Exception test required	✓
Zone 3b 'Functional Floodplain'	Exception test required	✓	×	×	×

Key: *✓: Development is appropriate, ×: Development should not be permitted.*

3.7 Historic Flooding

The Environment Agency data shows that the Site has historically flooded, the channel capacity was exceeded as no raised flood defences were in place at the time (see Figures 3). These records do not give an indication of the depth of flooding on the Site. The British Hydrological Society "Chronology of British Hydrological Events[5]" has no information on flooding within the vicinity of the Site. No other historical records of flooding for the Site have been recorded.

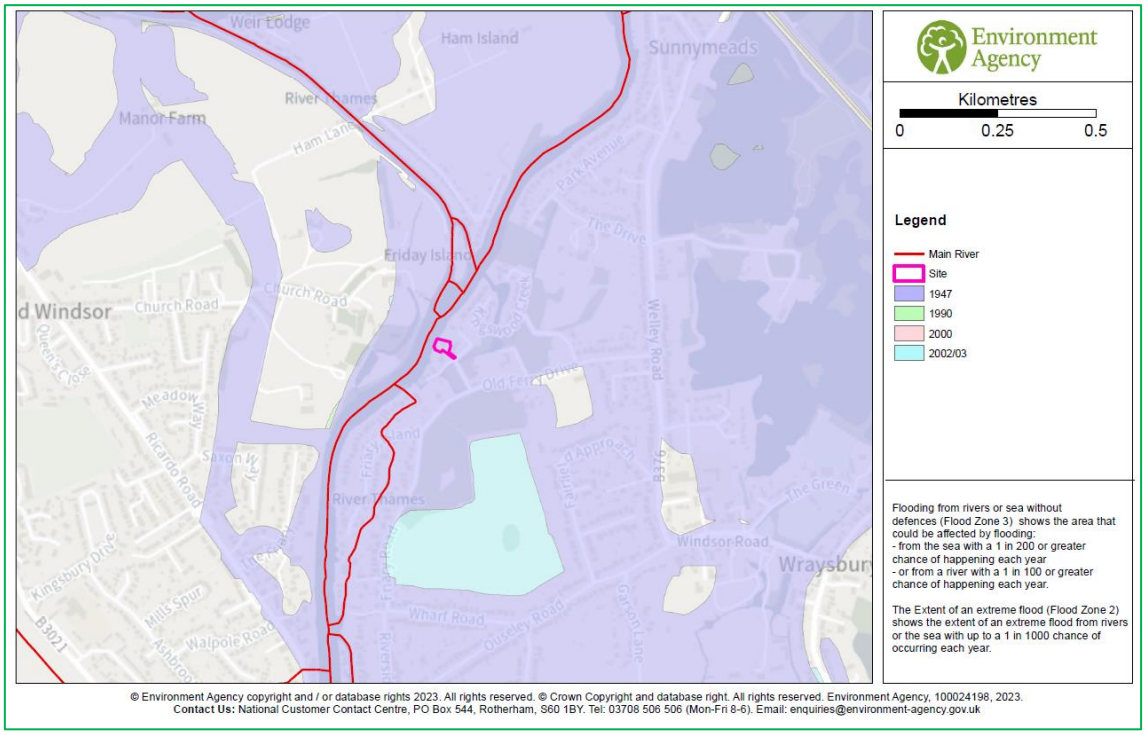

Figure 3 - Environment Agency Historic Flood Map

[5] http://www.dundee.ac.uk/geography/cbhe/

3.8 Fluvial (River) Flooding

The principal flood risk posed to the Site is from fluvial flooding from the River Thames. The mechanism for flooding at this location is generally prolonged episodes of high rainfall, which affords good time for flood warnings to be issued. The likelihood of a rapid water level rise and possible rapid inundation of urban areas posing a risk to life is considered to be minimal with a forewarning of two (2) days of a pending flood event.

The Site is located within a low risk area where the onset of flooding is very gradual (many hours) as per Flood Risk Assessment Guidance for New Development Phase 2, R&D Technical Report FD2320/TR2.

Table 4 shows the Environment Agency's in-channel water levels for the Site. The 1 in 5 year, 1 in 20 year, 1 in 100 year, 1 in 100 year (+20%) 1 in 100 (+35%), 1 in 100 year (+70%) and 1 in 1000 year water levels have been provided. The modelled water levels have been compared to the ground level of the Site and areas within the vicinity of the Site to assess the flood risk at the Site in detail.

The design flood level is the 1 in 100 year (+35%) water level at 17.85mAOD. Figures 4 and 5 show the Environment Agency modelled flood outlines. The ground level of the Site is 15.80mAOD to 16.40mAOD therefore, the Site may be inundated with floodwater. However, the proposed finished floor levels including the decking area will be located at 18.25mAOD which provides a freeboard of 0.40m above the 1 in 100 year (+35%) event. The proposed house will be flood free during the 1 in 100 year (+35%), 1 in 100 year (+70%) and 1 in 1000 year events.

The raised finished floor levels and flood voids will provide betterment compared to the existing situation as the existing house has lower finished floor levels at 17.25mAOD and does not utilise flood voids.

Table 4 - Modelled Water Levels (mAOD)

2D Grid Cell Ref	Return Period (years)						
	5	20	100	100 +25%	100 +35%	100 +70%	1000
Flood Point 1	16.46	17.13	17.46	17.73	17.85	17.96	17.89
Flood Point 2	No Data	17.10	17.31	17.71	17.83	17.95	17.87

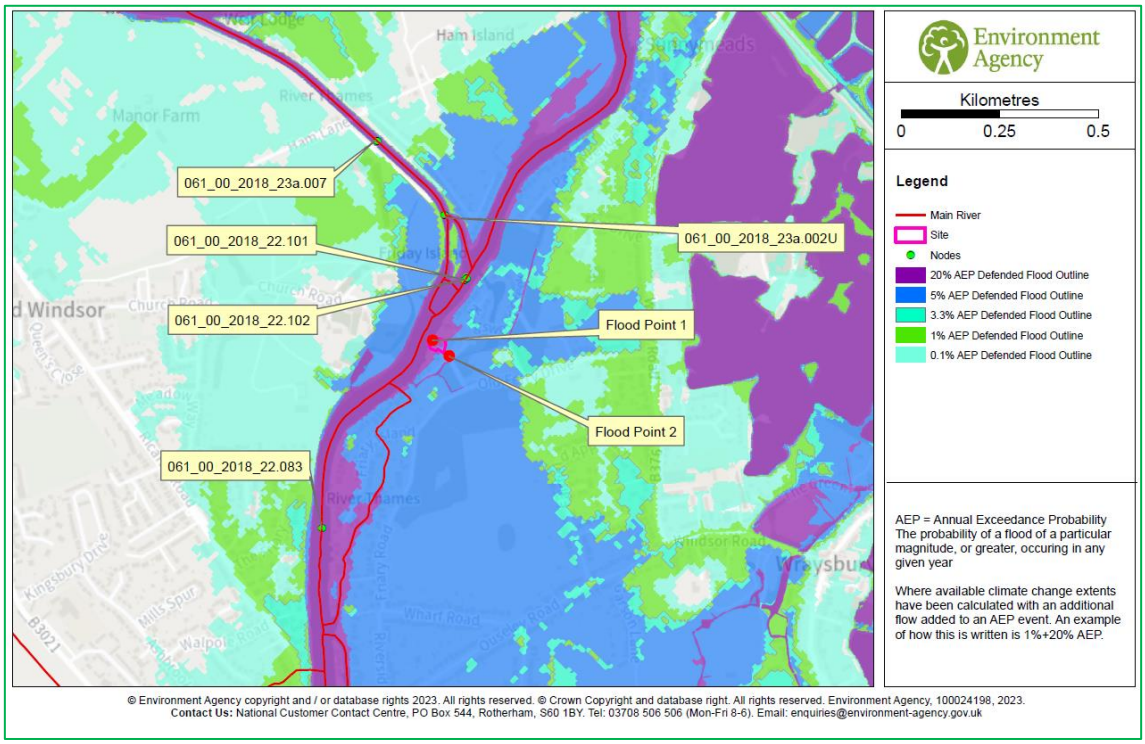

Figure 4 - Environment Agency Modelled Flood Outlines

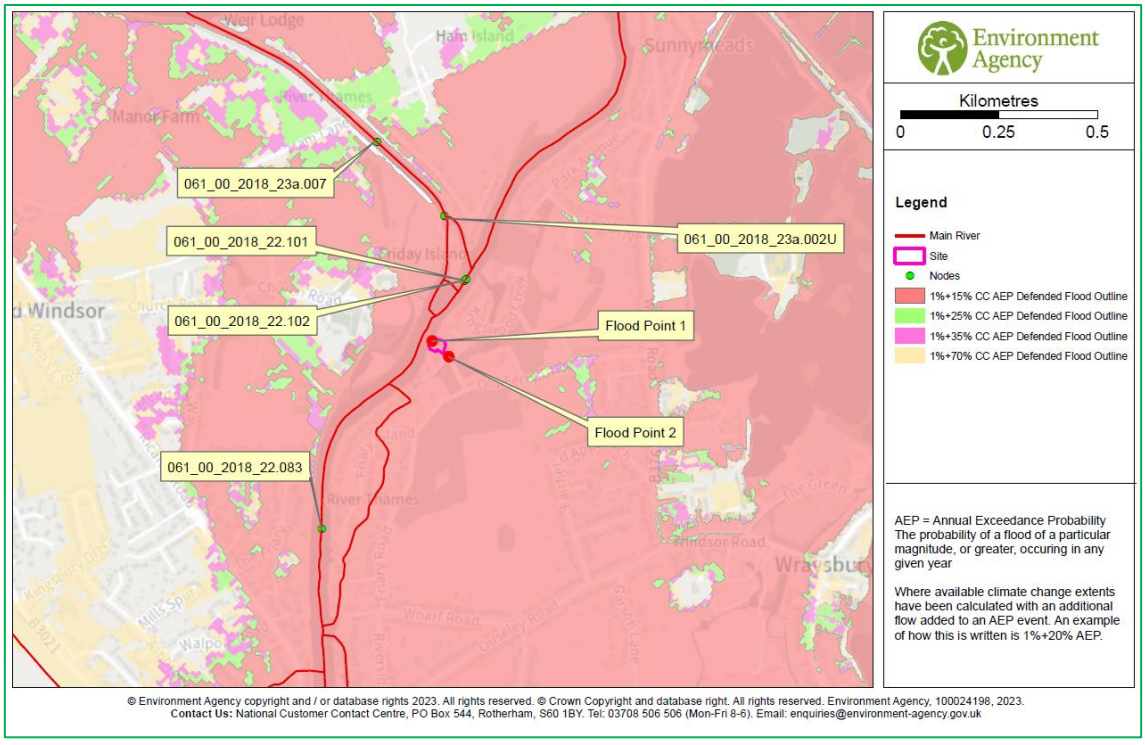

Figure 5 - Environment Agency Modelled Climate Change Flood Outlines

Given the scale and nature of the Proposed Development and the size and location of the fluvial flooding sources it has been concluded that fluvial flooding poses a low flood risk to the Site and the risk of fluvial flooding is considered to be of medium significance. The risk from fluvial

flooding will be mitigated by using a number of property level protection measures to manage and reduce the overall flood risk at the Site (see Section 6.0).

3.9 Tidal (Coastal) Flooding

The Site is located upstream of the tidal limit of the River Thames. The Site is not located within the vicinity of tidal flooding sources and the risk of tidal flooding is considered to be not significant.

3.10 Groundwater Flooding

Groundwater flooding is defined as the emergence of groundwater at the ground surface or the rising of groundwater into man-made ground under conditions where the normal range of groundwater levels is exceeded.

Groundwater flooding tends to occur sporadically in both location and time. When groundwater flooding does occur, it tends to mostly affect low-lying areas, below surface infrastructure and buildings (for example, tunnels, basements and car parks) underlain by permeable rocks (aquifers). Site ground conditions suggest a low potential for groundwater flooding. The risk of flooding from groundwater flooding is considered to be not significant.

3.11 Surface Water (Pluvial) Flooding

The Site is not situated near to large areas of poor permeability or areas with the geology and/or topography which may result in surface water flooding. The Site surroundings are relatively flat and there are no large catchments that would tend to generate surface water runoff towards the Site. Surface water flow flooding tends to occur sporadically in both location and time such surface water flows would tend to be confined to the streets around the development.

The Environment Agency Surface Water flood map shows that the Site has a very low risk of surface water flooding with a chance of flooding of less than 1 in 1000 (0.1%) years (see Figure 6). Therefore, the risk of flooding from surface water flooding is considered to be of low significance. The risk from this source will be further mitigated by using a number of property level protection measures to manage and reduce the overall flood risk at the Site (see Section 6.0).

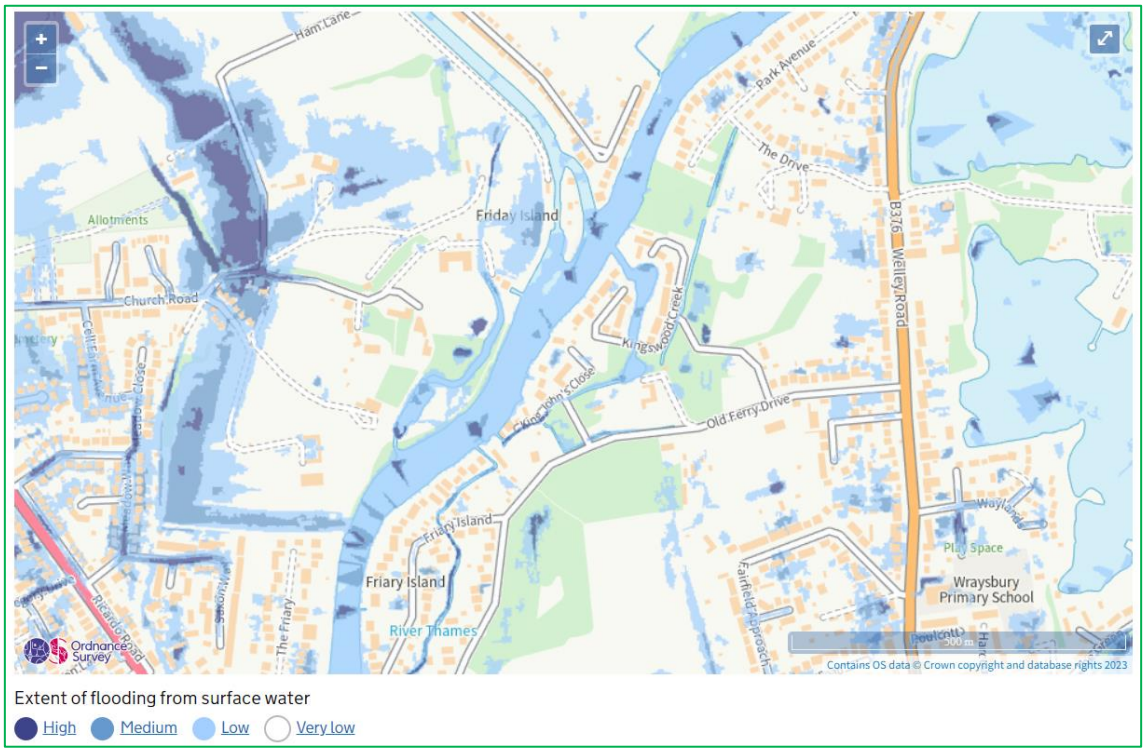

Figure 6 - Environment Agency Surface Water Flood Map

3.12 Sewer Flooding

Sewer flooding occurs when urban drainage networks become overwhelmed and maximum capacity is reached. This can occur if there is a blockage in the network causing water to back up behind it or if the sheer volume of water draining into the system is too great to be handled. Sewer flooding tends to occur sporadically in both location and time such flood flows would tend to be confined to the streets around the development.

There are existing sewers located within the vicinity of the Site and these will inevitably have a limited capacity so in extreme conditions there would be surcharges, which may in turn cause flooding. Flood flows could also be generated by burst water mains, but these would tend to be of a restricted and much lower volume than weather generated events and so can be discounted for the purposes of this assessment.

Given the design parameters normally used for drainage design in recent times and allowing for some deterioration in the performance of the installed systems, which are likely to have been in place for many years, an appropriate flood risk probability from this source could be assumed to have a return period in the order of 1 in 10 to 1 in 20 years. The provision of adequate level difference between the ground floors and adjacent ground level would reduce the annual probability of damage to property from this source to 1 in 100 years or less. Therefore, the risk of flooding from sewer flooding is considered to be not significant.

3.13 Flooding from Artificial Drainage Systems/Infrastructure Failure

The Site is located within the vicinity of reservoirs. The Environment Agency Reservoir flood map shows that the Site is at risk of flooding from reservoir failure (see Figure 7). This map shows the largest area that might be flooded if a reservoir were to fail and release the water it holds. The Environment Agency Reservoir flood map has been prepared for emergency

planning purposes and for this reason they reflect a worst-case scenario. Since this is a prediction of a worst-case scenario, it's unlikely that any actual flood would be this large.

Reservoir flooding is extremely unlikely; reservoirs in the UK have a very good safety record. There has been no loss of life in the UK from reservoir flooding since 1925. Since then reservoir safety legislation has been introduced to make sure reservoirs are well maintained.

The hazard is well managed through effective legislation and it is unlikely that the impact zone downstream of these reservoirs should not allow the Proposed Development. There are no other nearby artificial water bodies, reservoirs, water channels and artificial drainage systems that could be considered a flood risk to the Site. The risk of flooding from artifical drainage systems/infrastructure failure is considered to be not significant.

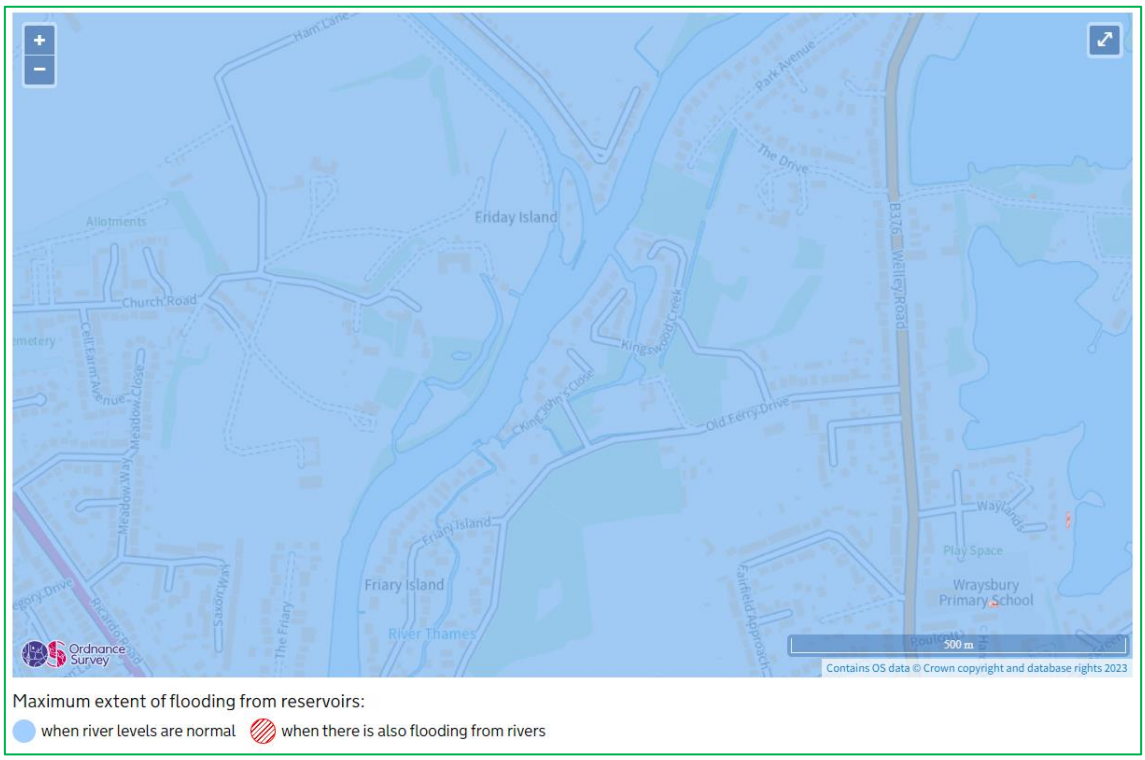

Figure 7 - Environment Agency Reservoir Flood Map

3.14 Summary of Site Specific Flood Risk

A summary of the sources of flooding and a review of the risk posed by each source at the Site is shown in Table 5.

The Site is unlikely to flood except in extreme conditions. The principal flood risk posed to the Site is from fluvial flooding from the River Thames. The Site is located within Flood Zone 3a and therefore has a 'high probability' of flooding, with a 1 in 100 or greater annual probability of river flooding (>1%) in any year.

The existing and proposed use for residential uses is classified as 'more vulnerable'. The Proposed Development will not increase the vulnerability of the Site to flooding or introduce a new 'more vulnerable' use in the floodplain. The proposals will not change the nature or times of occupation. 'More vulnerable' uses are appropriate within Flood Zone 3a after the completion of a satisfactory FRA.

The design flood level is the 1 in 100 year (+35%) water level at 17.85mAOD. Figures 4 and 5 show the Environment Agency modelled flood outlines. The ground level of the Site is 15.80mAOD to 16.40mAOD therefore, the Site may be inundated with floodwater. However, the proposed finished floor levels including the decking area will be located at 18.25mAOD which provides a freeboard of 0.40m above the 1 in 100 year (+35%) event. The proposed house will be flood free during the 1 in 100 year (+35%), 1 in 100 year (+70%) and 1 in 1000 year events.

The raised finished floor levels and flood voids will provide betterment compared to the existing situation as the existing house has lower finished floor levels at 17.25mAOD and does not utilise flood voids.

Given the scale and nature of the Proposed Development and the size and location of the fluvial flooding sources it has been concluded that fluvial flooding poses a low flood risk to the Site and the risk of fluvial flooding is considered to be of medium significance. A secondary flooding source has been identified which may pose a low significant risk to the Site. This is:

- Surface Water Flooding

The risk from these sources will be further mitigated by using a number of property level protection measures to manage and reduce the overall flood risk at the Site. The application is for a new, suitable flood-resilient design. The exposure of people and property will be reduced and minimised compared to existing Site conditions. The chance of flooding is low each year. This takes into account the effect of any flood defences that may be located within the vicinity of the Site as well property level protection measures.

Table 5 - Risk Posed by Flooding Sources

Sources of Flooding	Potential Flood Risk	Potential Source	Probability/Significance
Fluvial Flooding	Yes	River Thames	Medium
Tidal Flooding	No	None Reported	None
Groundwater Flooding	No	None Reported	None
Surface Water Flooding	Yes	Poor Permeability	Low
Sewer Flooding	No	None Reported	None
Flooding from Artificial Drainage Systems/Infrastructure Failure	Yes	Reservoirs	None

4.0 IMPLICATIONS OF THE DEVELOPMENT ON FLOOD RISK

4.1 Flood Voids

Currently, the house does not utilise flood voids and displaces floodwater. It is not possible to provide compensatory floodplain storage on a level-for-level basis through ground lowering on the Site due to the low ground levels. To ensure there will be no detriment to the flood storage capacity and the movement of floodwater across the site will not be impacted, flood voids will be constructed under the proposed house and decking area.

Betterment compared to the existing situation will be provided by the use of a void under the whole footprint of the proposed house and decking area will be used which will allow the finished floor level including the decking area to be raised, as per Environment Agency guidance, to 18.25mAOD which provides a freeboard of 0.40m above the 1 in 100 year (+35%) water level of 17.85mAOD. The underside of the void will be 17.85mAOD i.e. above the 1 in 100 year (+35%) water level. The flood voids will be completely open on all sides.

The proposed house will have a decking area. Decking is a permeable surface. Research has shown that wooden decking should be regarded as having a permeability of 104inches/hr[6,7,8]. The ground below the decking will be constructed from permeable surfaces.

Any new boundary fencing, or walls will be of an open construction. The ground levels (other than those necessary to support the structures within any void area beneath the building structures will not change as a result of the development.

It is noted that the Environment Agency suggest that voids are not considered appropriate for floodplain storage as they *'become blocked over time'* and *'maintenance agreements can be difficult to enforce'*. However, there is no reason that the void would be become blocked or ineffective provided the void is:

i. Constructed to the Environment Agency guidance (see above), as part of a planning condition; and

ii. Appropriately managed and maintained by the owner of the property.

Although not specifically mentioned in the NPPF and Planning Practice Guidance this approach was reinforced in the updated PPS25 Practice Guide (para 6.17), which states:

'Provided there is adequate flood warning available it may be reasonable to design development with parking or other flood-compatible uses at ground level and residential or other people-intensive use above the flood level. Where developments incorporate open space beneath the occupied level, measures such as legal agreements need to be in place to prevent inappropriate use or alteration of the ground floor that would impede flood conveyance or reduce flood storage'

The nature of flooding from the River Thames is long lasting and the catchment unresponsive, so even in a hypothetical 'worst case scenario' if the void openings had become partially

[6] Bruce K. Ferguson, Olivia Mickalonis & Benjamin K. Ferguson., (2011) Deck construction and performance for impervious surface reduction, Urban Water Journal, 8:3, 167-177, DOI: 10.1080/1573062X.2011.581296.
[7] Ferguson, Bruce K., (2005) Porous Pavements, Boca Raton: CRC Press US Army Corps of Engineers, 1984, Drainage and Erosion Control Mobilization Construction, EM 1110-3-136.
[8] Bruce K. Ferguson, Olivia Mickalonis, and Benjamin K. Ferguson (2009) Deck Construction and Performance for Impervious Surface Reduction, SUDSnet 2009 National Conference.

blocked, there would be significant period of time during which floodwater would permeate into the void and ensure it was fully utilised.

The use of flood voids has been approved in many similar schemes within the floodplain which utilise voids as part of the potential floodplain storage, consistent with the objectives of the NPPF, and which the Environment Agency has approved. These are subject to conditions and agreements to ensure the voids are maintained free of obstructions and that any entrance grilles are kept free of obstruction. Regular inspections and maintenance of the voids and grilles will be undertaken.

4.2 Calculation of Net Loss or Gain in Flood Storage Capacity / Impact of New Structures on Movement of Floodwater Across the Site

The effect of the existing situation and the proposed situation on flood risk has been assessed during the 1 in 100 year (+35%) event (i.e. the design event) as per Environment Agency advice, policy and guidance. The 1 in 100 year (+35%) event has a water level of 17.85mAOD. Consequently, this has enabled the effect of the Proposed Development on flood storage capacity to be assessed and calculated on a level for level basis.

To ensure there will be no detriment to the flood storage capacity and the movement of floodwater across the Site will not be impacted, flood voids will be constructed under the house and decking area with permeable surfaces to be located underneath.

The existing house is a solid structure with no flood voids and therefore displaces floodwater from the ground level of 15.80mAOD adjacent to the house up to the design flood level of 17.85mAOD. The existing house has a footprint area of 113.60m^2.

The existing garage/annex is deemed to be floodable structure and therefore, will not displace floodwater, and has not been included within the calculations of floodwater displacement during the 1 in 100 year (+35%) event. Table 6 shows that the existing house displaces 232.88m^3 of floodwater during the 1 in 100 year (+35%) event.

Table 6 - Existing Situation Floodwater Displacement: 1 in 100 Year + 35% Event

Level (mAOD)	Footprint Area of Existing House (m^2)	Floodwater Displacement (m^3)
17.80 – 17.85	113.60	5.68
17.60 – 17.80		22.72
17.40 – 17.60		22.72
17.20 – 17.40		22.72
17.00 – 17.20		22.72
16.80 – 17.00		22.72
16.60 – 16.80		22.72
16.40 – 16.60		22.72
16.20 – 16.40		22.72
16.00 – 16.20		22.72
15.80 – 16.00		22.72
Total	---	232.88

The proposed house will utilise flood voids, with a finished floor level of 18.25mAOD and the underside the void will be 17.85mAOD (i.e. above the design flood event). The proposed house and decking area will not therefore, displace floodwater from the ground level of 15.80mAOD

adjacent to the house up to the design flood level of 17.85mAOD by using flood voids. The proposed house will have a footprint area of 133m^2.

The ground levels (other than those necessary to support the structure and proposed decking staircases) within any void area beneath the building structures will not change as a result of the development.

The decking staircases will be of an open riser construction, the deck edge will be minimal as will the supporting structures. The decking and staircases will be floodable structures and will not have an impact on floodplain storage in fact by the raising the deck the floodplain storage will be increased.

By raising the level of the decking and keeping the supports, edge of the decking and balustrade to a minimum the proposed decking will pose less of a constriction to the conveyance of flow and reduce the risk of blockage due to debris.

Table 7 shows that the proposed house will not displace floodwater during the 1 in 100 year (+35%) event. Table 8 shows that there will be a nett gain in flood storage capacity due to the redevelopment of the site, this will provide betterment compared to the existing situation due to the use of flood voids. The proposed house will result in a total of an additional 232.88m^3 in floodplain storage capacity during the 1 in 100 year (+35%) event.

Table 7 - Proposed Situation Floodwater Displacement: 1 in 100 Year + 35% Event

Level (mAOD)	Footprint Area of Existing House (m^2)	Floodwater Displacement (m^3)
17.80 – 17.85	133	0.00
17.60 – 17.80		0.00
17.40 – 17.60		0.00
17.20 – 17.40		0.00
17.00 – 17.20		0.00
16.80 – 17.00		0.00
16.60 – 16.80		0.00
16.40 – 16.60		0.00
16.20 – 16.40		0.00
16.00 – 16.20		0.00
15.80 – 16.00		0.00
Total	---	**0.00**

Table 8 - Comparison of Floodwater Displacement: 1 in 100 Year + 35% Event

Level (mAOD)	Floodwater Displacement (m^3)		Total Floodplain Capacity Gained/Lost
	Existing Situation	Proposed Situation	
17.80 – 17.85	5.68	0.00	+5.68
17.60 – 17.80	22.72	0.00	+22.72
17.40 – 17.60	22.72	0.00	+22.72
17.20 – 17.40	22.72	0.00	+22.72
17.00 – 17.20	22.72	0.00	+22.72
16.80 – 17.00	22.72	0.00	+22.72
16.60 – 16.80	22.72	0.00	+22.72

16.40 – 16.60	22.72	0.00	+22.72
16.20 – 16.40	22.72	0.00	+22.72
16.00 – 16.20	22.72	0.00	+22.72
15.80 – 16.00	22.72	0.00	+22.72
Total	**232.88**	**0.00**	**+232.88**

The Proposed Development will offer significant improvements in floodwater storage and greatly reduced impedance of floodwater compared to the existing situation. The existing development is set significantly lower than the required height to mitigate the flood risk and does not utilise flood voids and therefore, acts as a barrier to floodwater as the existing development has many more support walls and solid construction to the ground acting further as a barrier to floodwater.

The floodplain storage capacity, overall direction of the movement of water will be maintained within the developed Site and surrounding area. The conveyance routes (flow paths) will not be blocked or obstructed. The topography of the Site will not be altered therefore; the overland flow routes will not be altered. The Proposed Development proposes minimal new structures and will therefore allow floodwater to pass through the Site with no effect on the conveyance routes.

The Proposed Development will have no detrimental impact on flood risk and will actually provide an increase in floodplain storage capacity while also improving the access to the river and its banks for maintenance.

5.0 SURFACE WATER DRAINAGE

5.1 Surface Water Management Overview

It is recognised that consideration of flood issues should not be confined to the floodplain. The alteration of natural surface water flow patterns through developments can lead to problems elsewhere in the catchment, particularly flooding downstream. For example, replacing vegetated areas with roofs, roads and other paved areas can increase both the total and the peak flow of surface water runoff from the development site. Changes of land use on previously developed land can also have significant downstream impacts where the existing drainage system may not have sufficient capacity for the additional drainage.

A SuDS Strategy for the site proposals has been developed to manage and reduce the flood risk posed by the surface water runoff from the site. An assessment of the surface water runoff rates has been undertaken, in order to determine the surface water options and attenuation requirements for the site. The assessment considers the impact of the development compared to current conditions. Therefore, the surface water attenuation requirement for the developed site can be determined and reviewed against existing arrangements.

It should be acknowledged that the satisfactory collection, control and discharge of surface water runoff are now a principle planning and design consideration. This is reflected in recently implemented guidance as well as the Defra non-statutory technical standards for SuDS.

5.2 Climate Change

Projections of future climate change, in the UK, indicate more frequent, short-duration, high intensity rainfall and more frequent periods of long duration rainfall. Guidance included within the NPPF recommends that the effects of climate change are incorporated into Flood Risk Assessments. Recommended precautionary sensitivity ranges for peak rainfall intensities and peak river flows are outlined in the flood risk assessments: climate change allowances guidance[9].

The recommended precautionary sensitivity range for peak rainfall intensity are summarised in Table 9.

Table 9 - Peak Rainfall Intensity Allowance

Allowance Category	2050s	2070s
Upper	+40%	+40%
Central	+20%	+25%

5.3 Proposed SuDS Strategy

The objective of this SuDS Strategy is to ensure that a sustainable drainage solution can be achieved which reduces the peak discharge rate to manage and reduce the flood risk posed by the surface water runoff from the site. The SuDS Strategy takes into account the following principles:

- No increase in the volume or runoff rate of surface water runoff from the site.
- No increase in flooding to people or property off-site as a result of the development.

[9] https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#high-allowances

- No surface water flooding of the site.
- The proposals will take into account a 40% increase in rainfall intensity due to climate change during the next 100 years which is the lifetime of the development.

In line with adopting a 'management train' it is recommended that water is managed as close to source as possible. This will reduce the size and cost of infrastructure further downstream and also shares the maintenance burden more equitably.

It has been concluded that soakaways and other infiltration methods (e.g. permeable paving, infiltration basin, swales etc.) will not work at the site. It would not be practical to include a pond, or lagoon within the site and it has been deemed not sustainable to dig up the external areas of the site and install underground storage tanks, cellular storage etc. The SuDS Strategy will take the form of:

- Any new areas of hardstanding areas (car parks, driveways etc.) within the development shall be constructed of a permeable surface examples include:
    - Using gravel or a mainly green, vegetated area.
    - Directing water from an impermeable surface to a border rain garden or soakaway.
    - Using permeable block paving, porous asphalt/concrete.
- Downpipes connected to water butts.
- For larger events in other areas such as car parking and landscaping, provided that it will not cause damage or prevent access.

These methods will reduce peak flows, the volume of runoff, and slow down flows and will provide a suitable SuDS solution for this site. The adoption of a SuDS Strategy for the site represents an enhancement from the current conditions as the current surface water runoff from the site is uncontrolled, untreated, unmanaged and unmitigated. The SuDS Strategy will reduce the risk of flooding to the site and off-site locations.

In adopting these principles, it has been demonstrated that a scheme can be developed that does not increase the risk of flooding to adjacent properties and development further downstream.

6.0 RISK MANAGEMENT

6.1 Introduction

The flood risk at this location is considered suitable for 'more vulnerable' developments within the NPPF. In this flood zone, developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area through the layout and form of the development and the use of flood mitigation measures.

The flooding sources will be mitigated on the Site by using a number of techniques, and mitigation strategies to manage and reduce the overall flood risk at the Site. This will ensure the development will be safe and there is:

- Minimal risk to life;
- Minimal disruption to people living and working in the area;
- Minimal potential damage to property;
- Minimal impact of the Proposed Development on flood risk generally; and;
- Minimal disruption to natural heritage.

The flood risk at the Site will be reduced by mitigation measures; these are discussed in more detail below.

6.2 Finished Floor Levels

The proposed finished floor levels including the decking area will be located at 18.25mAOD which provides a freeboard of 0.40m above the 1 in 100 year (+35%) event. The proposed house will be flood free during the 1 in 100 year (+35%), 1 in 100 year (+70%) and 1 in 1000 year events.

The finished floor level of the house cannot be raised any higher as it would not be possible to safely access the house, there would not be the required headroom and other planning constraints mean that the finished floor level cannot be raised higher than 18.25mAOD. Therefore, in order to mitigate against this, it is recommended that the occupants of the proposed house sign up to receive flood warnings from the Environment Agency and implement a Flood Plan to a safe area away from the building during times of flood.

A combination of resistance (proofing) and resilience measures will be included to provide further protection. This is discussed below.

6.3 Flood Voids

Currently, the house does not utilise flood voids and displaces floodwater. It is not possible to provide compensatory floodplain storage on a level-for-level basis through ground lowering on the Site due to the low ground levels. To. To ensure there will be no detriment to the flood storage capacity and the movement of floodwater across the site will not be impacted, flood voids will be constructed under the proposed house and decking area.

Betterment compared to the existing situation will be provided by the use of a void under the whole footprint of the proposed house will be used which will allow the finished floor level including the decking area to be raised, as per Environment Agency guidance, to 18.25mAOD

which provides a freeboard of 0.40m above the 1 in 100 year (+35%) water level of 17.85mAOD. The underside of the void will be 17.85mAOD i.e. above the 1 in 100 year (+35%) water level.

6.4 First Floor Accommodation

Accommodation will be located on the first floor as well as the ground floor of the house. This will allow occupants to retreat to higher floor levels if needed. The levels of the first floor are located well above any floodwater levels. This provides a 'safe haven' above any floodwater levels. This will enable rapid escape should flooding occur which is unlikely.

The upper floors are accessed via internal stairs and are sufficient in size to safely house all occupants of the building. The 'safe haven' will only be required in very extreme events or if a flood warning has not been received.

6.5 Flood Resilience and Resistance

The development of the layout should always consider that the site is potentially at risk from an extreme event and as such the implementation of flood resilience and resistance methods should be assessed.

To make the building more resistant to seepage the following measures will be incorporated. Sealant will be used around external doors and windows. All external doors and windows will be constructed from durable materials and the walls of the buildings will be thick.

To improve the building resilience to flooding the following measures will be incorporated. All electrical wiring, switches, sockets, socket outlets, electrical, and gas meters etc. will be located a minimum of 450mm above the finished floor level of the house.

6.6 Flood Warning and Evacuation

The Site is located in a flood risk area therefore; the Site will participate in the Environment Agency flood warning telephone service. The Site will register contact details with the Environment Agency' Flood Warnings Service (Floodline 0845 988 1188) in order to receive Flood Warnings. The Environment Agency operate a free flood warning service providing alerts by phone, text or email when flooding is anticipated providing an opportunity for home owners to take necessary precautions, giving enough time for the building to be safely evacuated and mitigation measures to be put in place.

All occupants/visitors of the Site will be made aware of the Environment Agency Floodline telephone number (Call Floodline on 0345 988 1188 or 0845 988 1188 to get more information) and the three Flood Warning Codes and their meaning. The owner of the Site will carry out the role of Flood Warden for the Site and ensure they have an understanding of the flood mechanisms of the Site and will ensure that the safety of the occupants and visitors will not be compromised.

The Environment Agency uses three Flood Warnings Codes. They can be issued in any order, usually ending with an 'all clear'. They are issued by the Environment Agency through their website and Floodline Warning Service. The flood warning will be passed onto the occupier/visitors of the Site verbally, by telephone and/or in person. It will be ensured that everyone receives the flood warnings when required.

6.7 Flood Plan

A Flood Plan outlining the precautions and actions you should take when a flood event is anticipated to help reduce the impact and damage flooding may cause has been developed

(see Appendix 3). Sensible precautions would include raising electrical items, irreplaceable items and sentimental items off the ground or where possible moving them to a higher floor, rolling up carpets and rugs and turning off utilities. In addition, consider what actions you would take should the property need to be evacuated including access and egress routes and preparing a flood kit in advance containing warm clothing, medication, a torch, food and wellingtons.

The Flood Plan is a 'living' document and therefore should be periodically reviewed and updated to provide advice and guidance to occupants in the event of an extreme flood. The Flood Plan will therefore reduce the vulnerability of the occupants to flooding and makes them aware of the mechanisms of flooding at the Site.

Residual Risk

If flooding starts to affect the Site without any pre-warning i.e. in real time (e.g. through a failure of the flood warning delivery) the following actions will be taken:

- Occupants and visitors should consider evacuating the Site.
- If flood levels continue to rise, occupants and visitors are advised to evacuate before safe access is lost. Occupants and visitors should monitor the flood progression and evacuate.

The Flood Warden will monitor flood levels and keep occupants and visitors informed and will decide whether to initiate the Flood Plan. If required a 'safe haven' can also be maintained and may be required in very extreme events if a flood warning has not been received.

6.8 Safe Access and Egress Route

The NPPF requires that, where required, safe access and escape is available to/from new developments in flood risk areas. Access routes should be such that occupants can safely access and exit their houses in design flood conditions. These routes must also provide the emergency services with access to the development during a flood event and enable flood defence authorities to carry out any necessary duties during the period of flood.

A safe access and egress route, including emergency access can be maintained for vehicles and/or by foot. The Site is at such a ground level that it would only flood in the most extreme flood event. Likewise, the access and egress route will remain dry in all but these most extreme scenarios. A safe access and egress route with minimum water depths would be possible for many hours if not days. This would provide more than an adequate amount of time for the Site to be evacuated, if required.

The actual risk of flooding caused by overtopping of the river bank during a fluvial flood event on the River Thames will be reduced compared to the extent of flooding shown on the Environment Agency's Flood Zones.

The mechanism for flooding from the River Thames is generally prolonged episodes of heavy rainfall, which affords good time for flood warnings to be issued. The likelihood of a rapid river level rise within the River Thames and possible rapid inundation of urban areas within this area and posing a risk to life is considered to be minimal. This is primarily due to the large River Thames system and its substantial upper contributing catchment area which allows the Environment Agency, with its current flood warning system, to provide forewarning of two (2) days of a pending flood event.

The Site is located within a low risk area where the onset of flooding is very gradual (many hours) as per Flood Risk Assessment Guidance for New Development Phase 2, R&D Technical Report FD2320/TR2.

Facilities such as community centres, shops etc. are located to the west of the Site which may be used in the event of a flood event. There may also be large areas than those shown in Figure 4 that are flood free located nearer and within the vicinity of the Site. In the event of a Flood Warning, vital belongings, including waterproof clothing, necessary medication and essentials for infants and children will be collected. It should be ensured that all occupiers and visitors to the Site are accounted for, and then exit the Site using the routes shown in Figure 8.

The Safe Access and Egress Route shown in Figure 8 indicates the exit routes that all people (i.e. occupants and visitors) on Site should follow once a flood warning has been received. People should make their way to areas outside of the flood zone. Therefore, safe access and egress can be maintained in accordance with the NPPF and Environment Agency guidance.

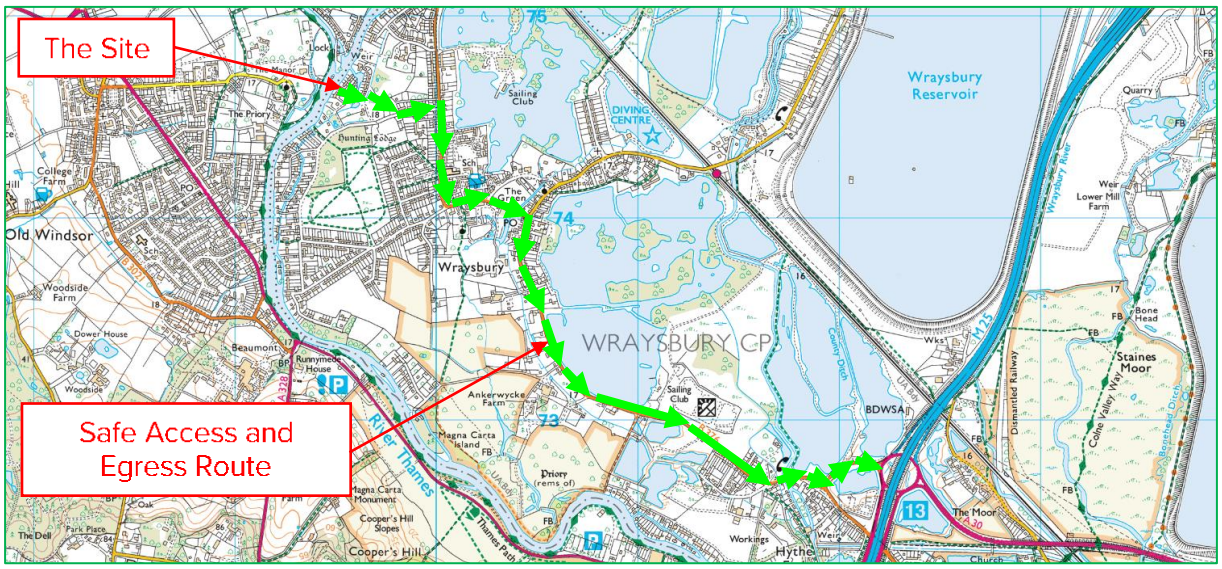

Figure 8 - Safe Access and Egress Route

6.9 Flood Warning Codes / Flood Evacuation Procedures

In order for the following evacuation procedures to be effective:

- The house will participate in the Environment Agency flood warning telephone service. The Site will register contact details with the Environment Agency' Flood Warnings Service (Floodline 0345 988 1188) in order to receive Flood Warnings/Alerts.
- The flood warning will be passed onto the visitors of the Site verbally, by telephone and/or in person. It will be ensured that everyone receives the flood warnings when required.

Flood Alert

'Flooding of low-lying land and roads is expected. Be aware, be prepared, watch out!'.

The Environment Agency will issue a Flood Alert status when flooding is possible, based upon weather and river/sea conditions. Be prepared to act on your Flood Plan. At this stage occupants and visitors should make themselves aware of the Flood Plan and evacuation routes. Prepare a flood kit of essential items. Monitor local water levels and the flood forecast.

'Flooding of homes and businesses is expected. Act now!'.

The Flood Warning alert will be issued when water levels are rising, and further rain is expected. The Site will be evacuated. Move family, pets and valuables to a safe place.

Safe access and egress, including emergency access can be maintained for vehicles and/or by foot. Water, electricity and gas supplies should be located and switched off before evacuating. The Environment Agency Floodline on 0345 988 1188 to get more information should be contacted to get more information, periodically and listen to and watch for weather and flood warnings on local radio and television stations.

Severe Flood Warning

'Severe Flooding is expected. There is extreme danger life and property. Act now!'.

If the Site has not already been evacuated, it will be evacuated immediately. Co-operate with the emergency services and call 999 if immediately in danger. Safe access and egress, including emergency access can be maintained for vehicles and/or by foot.

Warning No Longer in Force

'Flood Watches or Flood Warnings are no longer in force for this area'.

Occupants and visitors should contact the Council to check that it is safe to return to the Site. Please be careful water may be around for several days. If there is any doubt that appliances may be water damaged, they must be checked before switching the power or gas back on. Contact your insurance company as soon as possible to get their approval before arranging any clean-up or repairs.

6.10 Buffer Strip

The proposed house will be rebuilt on the existing footprint and will be no nearer to the River Thames than the existing house.

6.11 Residual Risk

The mitigation measures detailed above show that the flood risk can be effectively managed and therefore the consequences of flooding are acceptable. The Site is unlikely to flood except in extreme conditions. This takes into account the property level protection measures.

7.0 SEQUENTIAL APPROACH

7.1 Sequential / Exception Tests

The risk-based Sequential Test in accordance with the NPPF aims to steer new development to areas at the lowest probability of flooding from all sources (i.e. Flood Zone 1). However, the proposal is for the replacement of the existing house with a new, suitably flood-resilient design which is preferable as the exposure of people or property to flooding will be minimised.

However, paragraph 168 of the NPPF confirms that: *'Applications for minor development and changes of use should not be subject to the Sequential or Exception Tests*[10] *but should still meet the requirements for site-specific flood risk assessments'.*

The existing and proposed use for residential uses is classified as 'more vulnerable'. The Proposed Development will not increase the vulnerability of the Site to flooding or introduce a new 'more vulnerable' use in the floodplain. The Proposed Development will reduce the vulnerability to flooding by using property level protection measures to protect the Site the Sites resilience, resistance to flooding will be improved. The development proposals should therefore be considered by the LPA to satisfy the Sequential and Exception Tests as set out in the NPPF.

[10] Except for any proposal involving a change of use to a caravan, camping or chalet site, or to a mobile home or park home site, where the Sequential and Exception Tests should be applied as appropriate.

8.0 SUMMARY AND CONCLUSIONS

8.1 Introduction

This report presents a FRA in accordance with the NPPF for the Proposed Development at 5 King Johns Close, Wraysbury, Staines, Middlesex, TW19 5EJ.

This FRA identifies and assesses the risks of all forms of flooding to and from the development and demonstrates how these flood risks will be managed so that the development remains safe throughout the lifetime, taking climate change into account.

8.2 Flood Risk

The Site is unlikely to flood except in extreme conditions. The principal flood risk posed to the Site is from fluvial flooding from the River Thames. The Site is located within Flood Zone 3a and therefore has a 'high probability' of flooding, with a 1 in 100 or greater annual probability of river flooding (>1%) in any year.

The existing and proposed use for residential uses is classified as 'more vulnerable'. The Proposed Development will not increase the vulnerability of the Site to flooding or introduce a new 'more vulnerable' use in the floodplain. The proposals will not change the nature or times of occupation. 'More vulnerable' uses are appropriate within Flood Zone 3a after the completion of a satisfactory FRA.

The design flood level is the 1 in 100 year (+35%) water level at 17.85mAOD. Figures 4 and 5 show the Environment Agency modelled flood outlines. The ground level of the Site is 15.80mAOD to 16.40mAOD therefore, the Site may be inundated with floodwater. However, the proposed finished floor levels including the decking area will be located at 18.25mAOD which provides a freeboard of 0.40m above the 1 in 100 year (+35%) event. The proposed house will be flood free during the 1 in 100 year (+35%), 1 in 100 year (+70%) and 1 in 1000 year events.

The raised finished floor levels and flood voids will provide betterment compared to the existing situation as the existing house has lower finished floor levels at 17.25mAOD and does not utilise flood voids.

Given the scale and nature of the Proposed Development and the size and location of the fluvial flooding sources it has been concluded that fluvial flooding poses a low flood risk to the Site and the risk of fluvial flooding is considered to be of medium significance. A secondary flooding source has been identified which may pose a low significant risk to the Site. This is:

- Surface Water Flooding

The risk from these sources will be further mitigated by using a number of property level protection measures to manage and reduce the overall flood risk at the Site. The application is for a new, suitable flood-resilient design. The exposure of people and property will be reduced and minimised compared to existing Site conditions. The chance of flooding is low each year. This takes into account the effect of any flood defences that may be located within the vicinity of the Site as well property level protection measures.

8.3 Implications of the Development on Flood Risk

Flood Voids

Currently, the house does not utilise flood voids and displaces floodwater. It is not possible to provide compensatory floodplain storage on a level-for-level basis through ground lowering on the Site due to the low ground levels. To ensure there will be no detriment to the flood storage capacity and the movement of floodwater across the site will not be impacted, flood voids will be constructed under the proposed house and decking area.

Betterment compared to the existing situation will be provided by the use of a void under the whole footprint of the proposed house and decking area will be used which will allow the finished floor level including the decking area to be raised, as per Environment Agency guidance, to 18.25mAOD which provides a freeboard of 0.40m above the 1 in 100 year (+35%) water level of 17.85mAOD. The underside of the void will be 17.85mAOD i.e. above the 1 in 100 year (+35%) water level. The flood voids will be completely open on all sides.

The proposed house will have a decking area. Decking is a permeable surface. Research has shown that wooden decking should be regarded as having a permeability of 104inches/hr. The ground below the decking will be constructed from permeable surfaces.

Any new boundary fencing, or walls will be of an open construction. The ground levels (other than those necessary to support the structures within any void area beneath the building structures will not change as a result of the development.

Calculation of Net Loss or Gain in Flood Storage Capacity / Impact of New Structures on Movement of Floodwater Across the Site

The proposed house will result in a total of an additional 232.88m^3 in floodplain storage capacity during the 1 in 100 year (+35%) event. The Proposed Development will offer significant improvements in floodwater storage and greatly reduced impedance of floodwater compared to the existing situation. The existing development is set significantly lower than the required height to mitigate the flood risk and does not utilise flood voids and therefore, acts as a barrier to floodwater as the existing development has many more support walls and solid construction to the ground acting further as a barrier to floodwater.

The floodplain storage capacity, overall direction of the movement of water will be maintained within the developed Site and surrounding area. The conveyance routes (flow paths) will not be blocked or obstructed. The topography of the Site will not be altered therefore; the overland flow routes will not be altered. The Proposed Development proposes minimal new structures and will therefore allow floodwater to pass through the Site with no effect on the conveyance routes.

The Proposed Development will have no detrimental impact on flood risk and will actually provide an increase in floodplain storage capacity while also improving the access to the river and its banks for maintenance.

8.4 SuDS Strategy

The SuDS Strategy ensures that a sustainable drainage solution can be achieved which reduces the peak discharge rate to manage and reduce the flood risk posed by the surface water runoff from the site. The SuDS Strategy takes into account the following principles:

- No increase in the volume or runoff rate of surface water runoff from the site.

- No increase in flooding to people or property off-site as a result of the development.
- No surface water flooding of the site.
- The proposals will take into account a 40% increase in rainfall intensity due to climate change during the next 100 years which is the lifetime of the development.

In line with adopting a 'management train' it is recommended that water is managed as close to source as possible. This will reduce the size and cost of infrastructure further downstream and also shares the maintenance burden more equitably.

It has been concluded that soakaways and other infiltration methods (e.g. permeable paving, infiltration basin, swales etc.) will not work at the site. It would not be practical to include a pond, or lagoon within the site and it has been deemed not sustainable to dig up the external areas of the site and install underground storage tanks, cellular storage etc. The SuDS Strategy will take the form of:

- Any new areas of hardstanding areas (car parks, driveways etc.) within the development shall be constructed of a permeable surface examples include:
    - Using gravel or a mainly green, vegetated area.
    - Directing water from an impermeable surface to a border rain garden or soakaway.
    - Using permeable block paving, porous asphalt/concrete.
- Downpipes connected to water butts.
- For larger events in other areas such as car parking and landscaping, provided that it will not cause damage or prevent access.

These methods will reduce peak flows, the volume of runoff, and slow down flows and will provide a suitable SuDS solution for this site. The adoption of a SuDS Strategy for the site represents an enhancement from the current conditions as the current surface water runoff from the site is uncontrolled, untreated, unmanaged and unmitigated. The SuDS Strategy will reduce the risk of flooding to the site and off-site locations.

In adopting these principles, it has been demonstrated that a scheme can be developed that does not increase the risk of flooding to adjacent properties and development further downstream.

8.5 Risk Management

The flood risk at the Site will be reduced by mitigation measures, discussed below.

Finished Floor Levels: The proposed finished floor levels including the decking area will be located at 18.25mAOD which provides a freeboard of 0.40m above the 1 in 100 year (+35%) event. The proposed house will be flood free during the 1 in 100 year (+35%), 1 in 100 year (+70%) and 1 in 1000 year events.

The finished floor level of the house cannot be raised any higher as it would not be possible to safely access the house, there would not be the required headroom and other planning constraints mean that the finished floor level cannot be raised higher than 18.25mAOD. Therefore, in order to mitigate against this, it is recommended that the occupants of the

proposed house sign up to receive flood warnings from the Environment Agency and implement a Flood Plan to a safe area away from the building during times of flood.

A combination of resistance (proofing) and resilience measures will be included to provide further protection. This is discussed below.

Flood Voids: Currently, the house does not utilise flood voids and displaces floodwater. It is not possible to provide compensatory floodplain storage on a level-for-level basis through ground lowering on the Site due to the low ground levels. To. To ensure there will be no detriment to the flood storage capacity and the movement of floodwater across the site will not be impacted, flood voids will be constructed under the proposed house and decking area.

Betterment compared to the existing situation will be provided by the use of a void under the whole footprint of the proposed house will be used which will allow the finished floor level including the decking area to be raised, as per Environment Agency guidance, to 18.25mAOD which provides a freeboard of 0.40m above the 1 in 100 year (+35%) water level of 17.85mAOD. The underside of the void will be 17.85mAOD i.e. above the 1 in 100 year (+35%) water level.

First Floor Accommodation: Accommodation will be located on the first floor as well as the ground floor of the house. This will allow occupants to retreat to higher floor levels if needed. The levels of the first floor are located well above any floodwater levels. This provides a 'safe haven' above any floodwater levels. This will enable rapid escape should flooding occur which is unlikely.

The upper floors are accessed via internal stairs and are sufficient in size to safely house all occupants of the building. The 'safe haven' will only be required in very extreme events or if a flood warning has not been received.

Flood Resilience and Resistance: To make the building more resistant to seepage the following measures will be incorporated. Sealant will be used around external doors and windows. All external doors and windows will be constructed from durable materials and the walls of the buildings will be thick.

To improve the building resilience to flooding the following measures will be incorporated. All electrical wiring, switches, sockets, socket outlets, electrical, and gas meters etc. will be located a minimum of 450mm above the finished floor level of the house.

Flood Warning and Evacuation: The Site is located in a flood risk area therefore; the building will participate in the Environment Agency flood warning telephone service. The Site will register contact details with the Environment Agency' Flood Warnings Direct Service (Floodline 0345 988 1188) in order to receive Flood Warnings.

Flood Plan: A Flood Plan outlining the precautions and actions you should take when a flood event is anticipated to help reduce the impact and damage flooding may cause has been developed.

Safe Access and Egress Route: A safe access and egress route, including emergency access can be maintained for vehicles and/or by foot. The Site is at such a ground level that it would only flood in the most extreme flood event. Likewise, the access and egress route will remain dry in all but these most extreme scenarios. A safe access and egress route with minimum water depths would be possible for many hours if not days. This would provide more than an adequate amount of time for the Site to be evacuated, if required.

The actual risk of flooding caused by overtopping of the river bank during a fluvial flood event on the River Thames will be reduced compared to the extent of flooding shown on the Environment Agency's Flood Zones.

The mechanism for flooding from the River Thames is generally prolonged episodes of heavy rainfall, which affords good time for flood warnings to be issued. The likelihood of a rapid river level rise within the River Thames and possible rapid inundation of urban areas within this area and posing a risk to life is considered to be minimal. This is primarily due to the large River Thames system and its substantial upper contributing catchment area which allows the Environment Agency, with its current flood warning system, to provide forewarning of two (2) days of a pending flood event.

The Site is located within a low risk area where the onset of flooding is very gradual (many hours) as per Flood Risk Assessment Guidance for New Development Phase 2, R&D Technical Report FD2320/TR2.

The Safe Access and Egress Route indicates the exit routes that all people (i.e. occupants and visitors) on-site should follow once a flood warning has been received. People should make their way to areas outside of the flood zone. Therefore, safe access and egress can be maintained in accordance with the NPPF and Environment Agency guidance.

Flood Warning Codes / Flood Evacuation Procedures: The flood evacuation procedures have been developed so that the Site can be safely evacuated. The property will participate in the Environment Agency flood warning telephone service. The Site will register contact details with the Environment Agency' Flood Warnings Direct Service (Floodline 0345 988 1188) in order to receive Flood Warnings. Flood warning will be passed onto the visitors of the Site verbally, by telephone and/or in person. It will be ensured that everyone receives the flood warnings when required.

Buffer Strip: The proposed house will be rebuilt on the existing footprint and will be no nearer to the River Thames than the existing house.

8.6 Sequential Approach

The development proposals should be considered by the LPA to satisfy the Sequential and Exception Tests as set out in the NPPF.

8.7 Conclusion

In conclusion, the Proposed Development would be expected to remain dry in all but the most extreme conditions. The Site is unlikely to flood except in extreme conditions.

Providing the recommendations made in this FRA are instigated, flood risk from all sources would be minimised, the consequences of flooding are acceptable, and the development would be in accordance with the requirements of the NPPF. This FRA demonstrates that the Proposed Development would be operated with minimal risk from flooding, would not increase flood risk elsewhere and is compliant with the requirements of the NPPF. The development should not therefore be precluded on the grounds of flood risk.

APPENDICES

APPENDIX 1 – Existing and Proposed Site Layout

River Thames

land slopes

land levels vary

Parking

FFL AOD 17.25

AOD 15.8

AOD 16.4

NO 5

AOD 16.4

retaining wall and steps to lower level

NO 3

Site Plan taken form Os map Only the house measured and Garage where accessable Note no change to boundary or Garage Plan

House

Existing

Oil tanks and supports removed

Garage/annex as existing

Existing/Proposed Site Plan

0 1 2 3 4 5

NO 9

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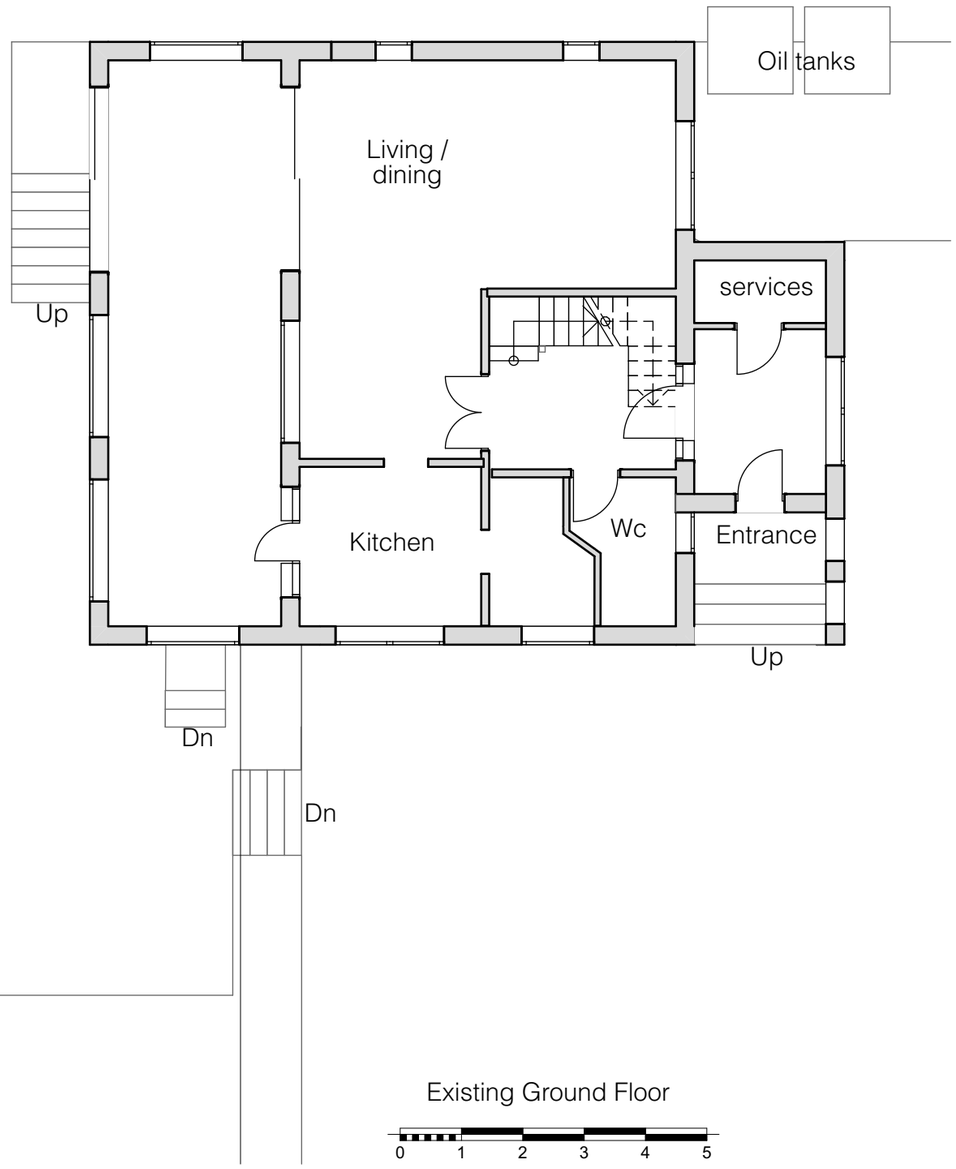
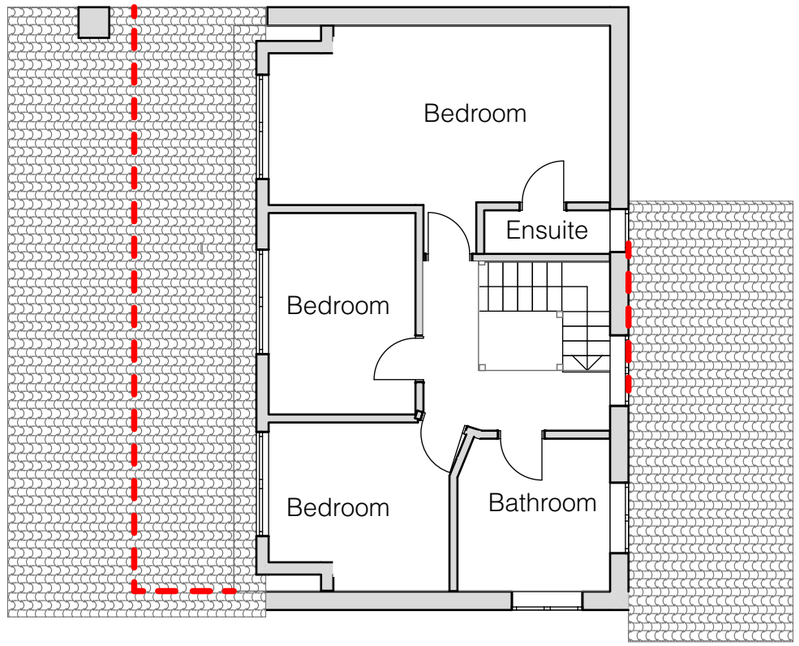
Client	**Redon Vishko**		
Project	**5 King Johns Close,Wraysbury, TW19 5EJ**		
Drawing	**Existing and Propsoed Site Plan showing only addiotnal 30m2 area**		
Scale	**1:200**	Page Size	**A3**
Date	**May 2023**	Number	**5KJ/PLN/01**



Existing Ground Floor

0 1 2 3 4 5



Existing First Floor

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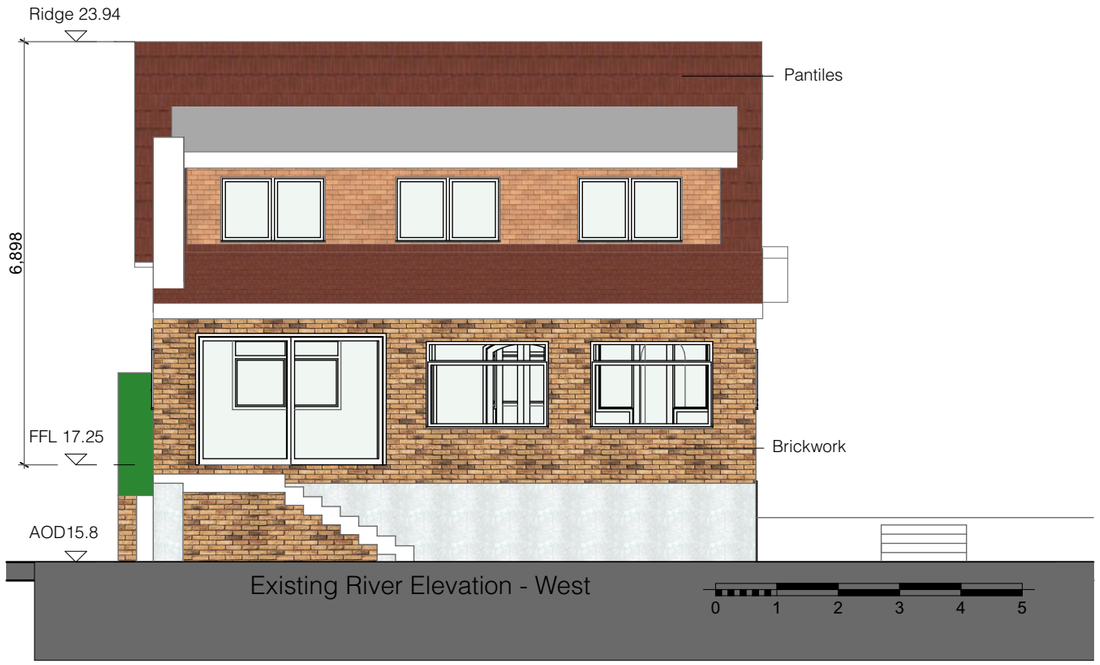
e-mail tegwynne@tegwynne-goldthorpe.co.uk

Client	**Redon Vishko**		
Project	**5 King Johns Close,Wraysbury, TW19 5EJ**		
Drawing	**Existing Ground and First Floor Plan**		
Scale	**1:100**	Page Size	**A3**
Date	**May 2023**	Number	**5KJ/PLN/02**



Existing River Elevation - West

Existing Side Elevation- South

Existing Elevation - East

Existing Side Elevation- North

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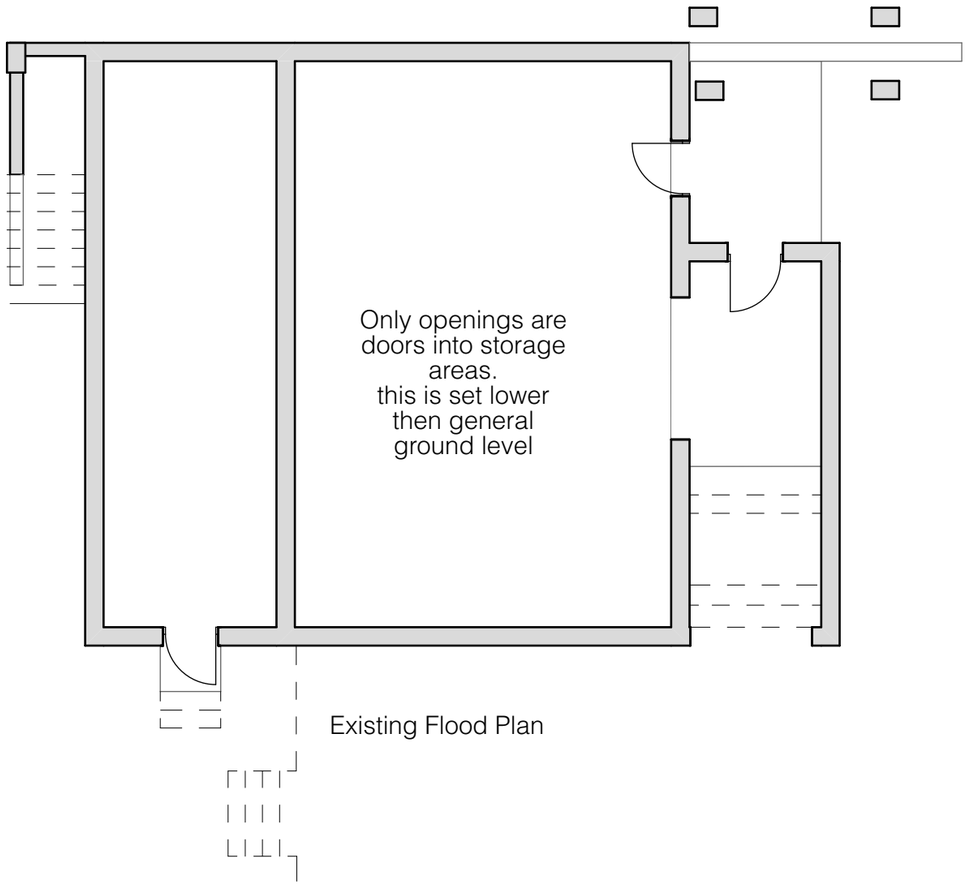
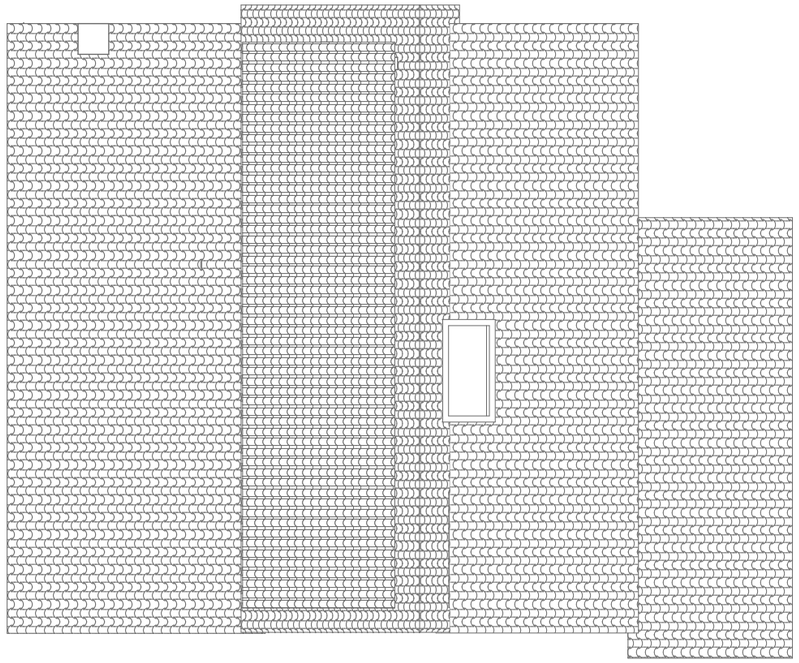
Client	**Redon Vishko**		
Project	**5 King Johns Close,Wraysbury, TW19 5EJ**		
Drawing	**Existing Elevations**		
Scale	**1:100**	Page Size	**A3**
Date	**May 2023**	Number	**5KJ/PLN/03**



Existing Flood Plan



Existing Roof Plan

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Client	**Redon Vishko**		
Project	**5 King Johns Close,Wraysbury, TW19 5EJ**		
Drawing	**Existing Flood plan and Roof Plan**		
Scale	**1:100**	Page Size	**A3**
Date	**May 2023**	Number	**5KJ/PLN/04**

River Thames

Land slopes

land levels vary

Parking

decking

steps to entrance ambulant disabled

decking

Grassed area no landscapechanges

overhang

Existing Gravel drive

NO 3

steps to decking

steps to lower level

Additional parking if required

retaining wall

Site Plan taken from Os map Only the house measured and Garage where accessable Note no change to boundary or Garage Plan

House

New Build 133m2

Garage/annex as existing

Proposed open decking 37m2

River

Gravel hard paving

Grass

Border planting

0 1 2 3 4 5

NO 9

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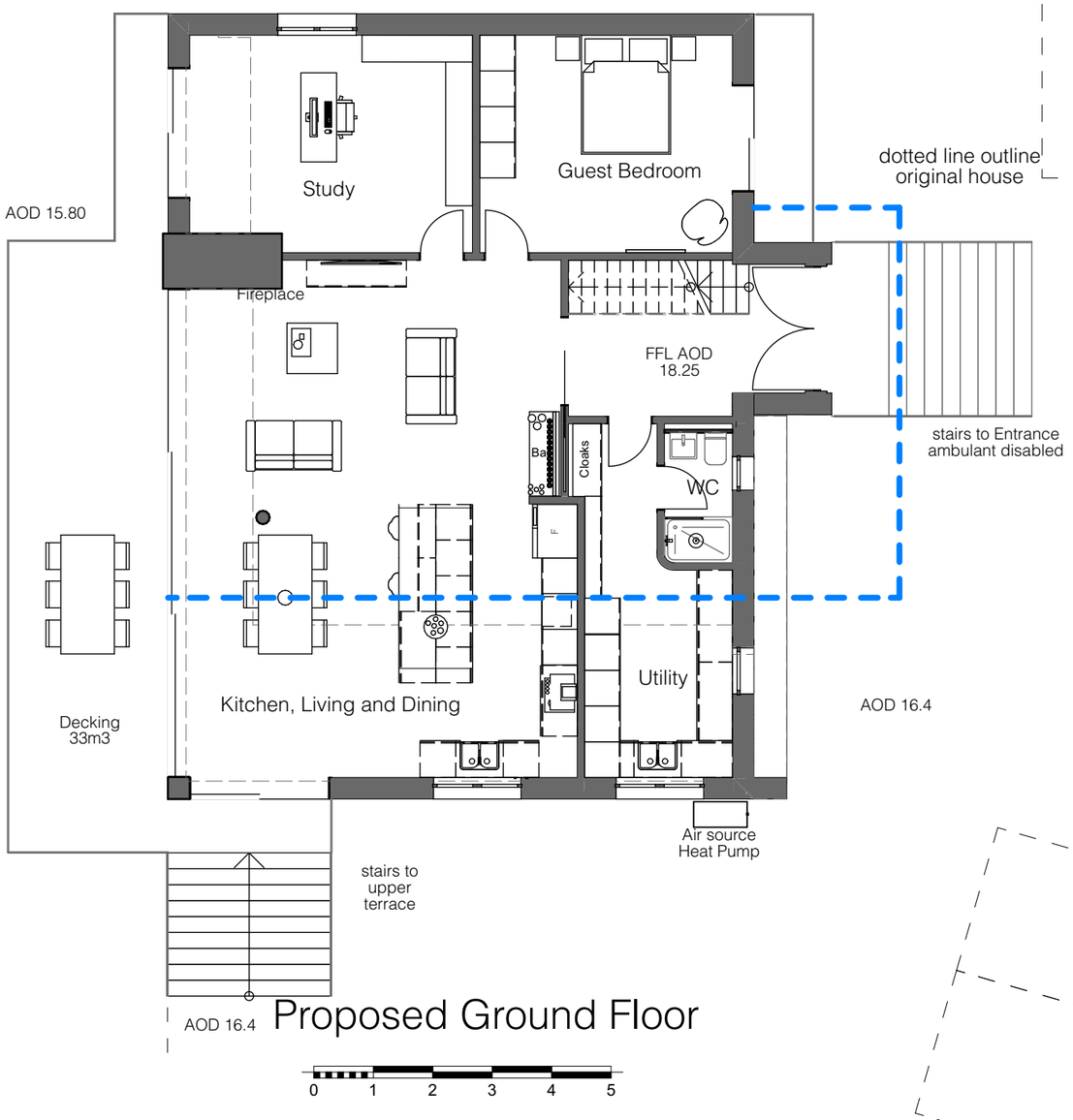
e-mail tegwynne@tegwynne-goldthorpe.co.uk

Client	**Redon Vishko**
Project	**5 King Johns Close,Wraysbury, TW19 5EJ**
Drawing	**Proposed Ground Floor Plan**
Scale	**1:200**
Page Size	**A3**
Date	**October 2023**
Number	**5KJ/PLN/04**



Proposed Ground Floor

Fence /Boundary

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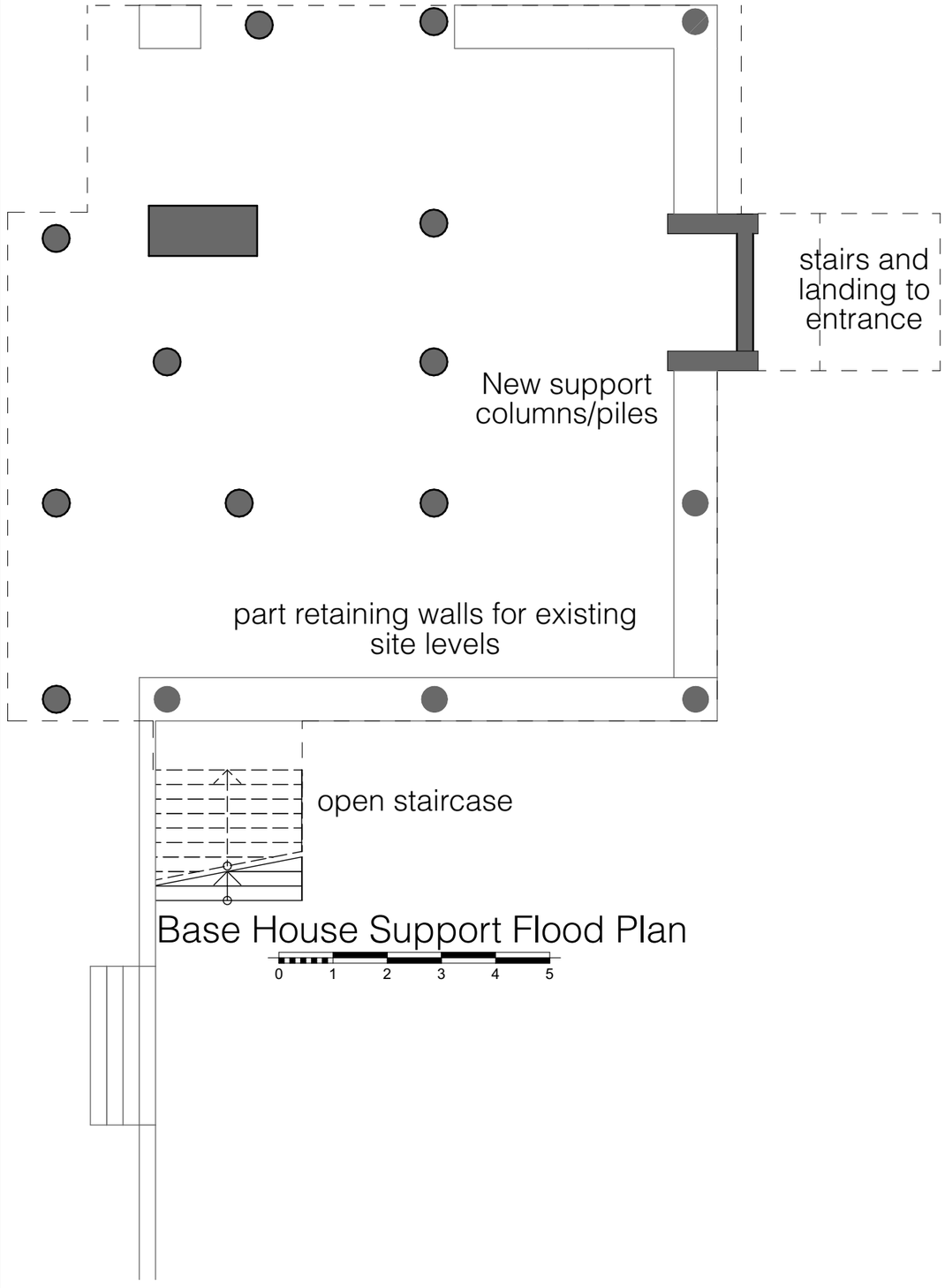
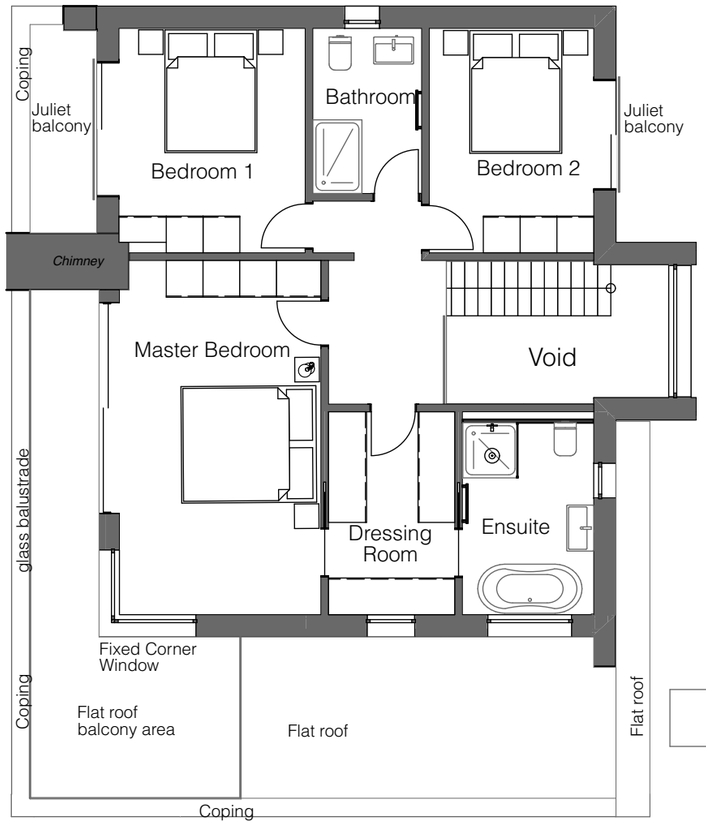
Client	**Redon Vishko**		
Project	**5 King Johns Close,Wraysbury, TW19 5EJ**		
Drawing	**Proposed Ground Floor Plan**		
Scale	**1:100**	Page Size	**A3**
Date	**October 2023**	Number	**5KJ/PLN/05**

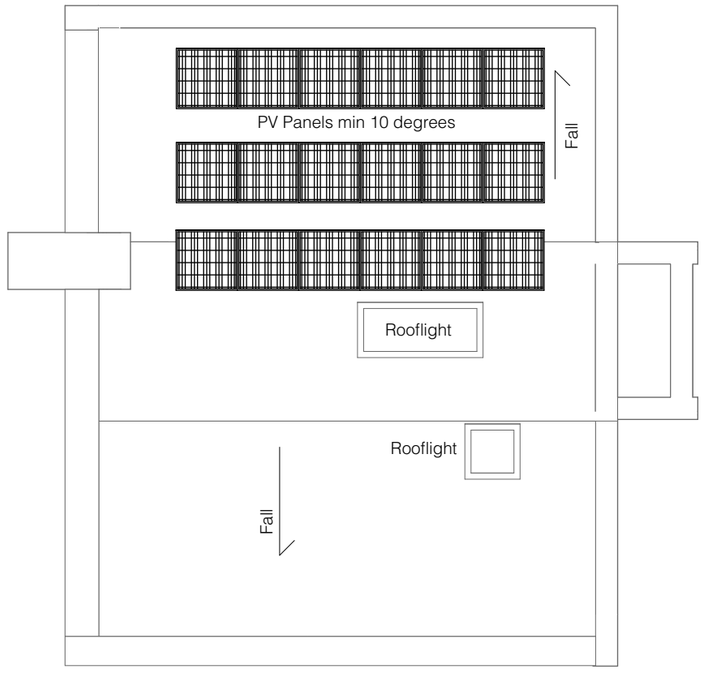


Base House Support Flood Plan

0 1 2 3 4 5



Proposed First Floor



Proposed Roof Plan

0 1 2 3 4 5

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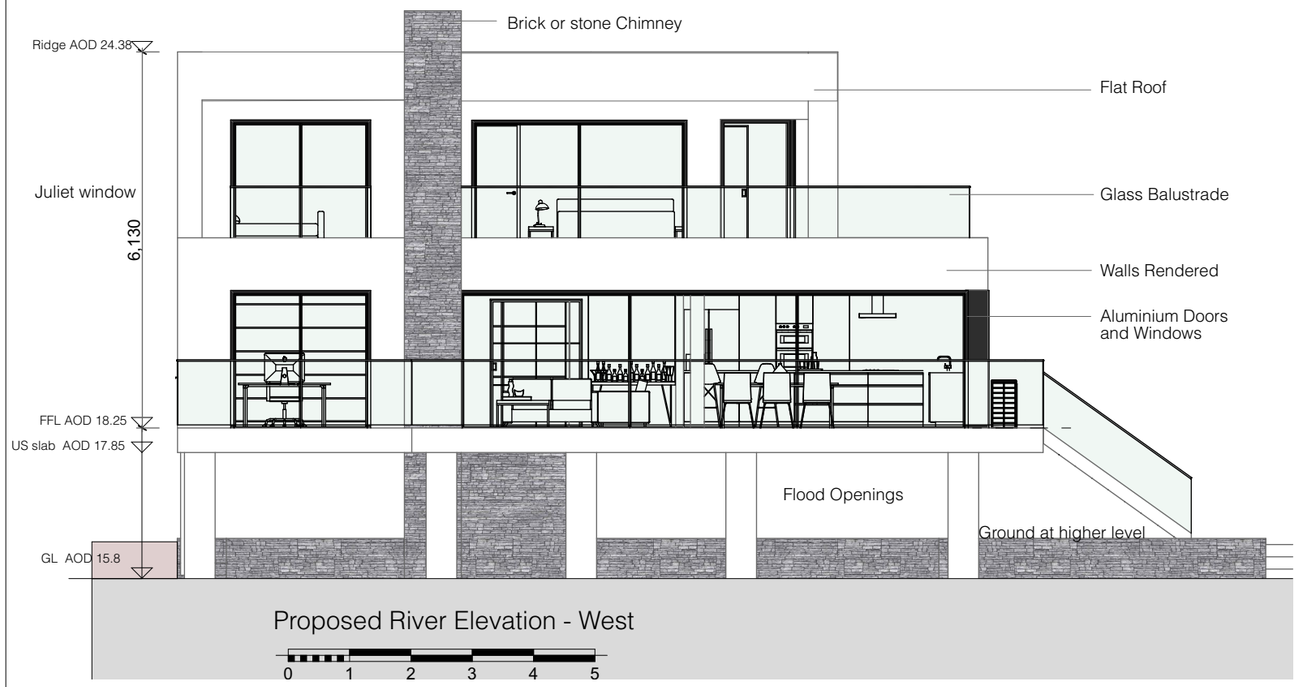
Client	**Redon Vishko**		
Project	**5 King Johns Close,Wraysbury, TW19 5EJ**		
Drawing	**Proposed Flood (base) First and Roof Plan**		
Scale	**1:100**	Page Size	**A3**
Date	**October 2023**	Number	**5KJ/PLN/06**



Proposed River Elevation - West

Proposed Side Elevation- South

Proposed Side Elevation- North

Proposed Elevation -East -Entrance

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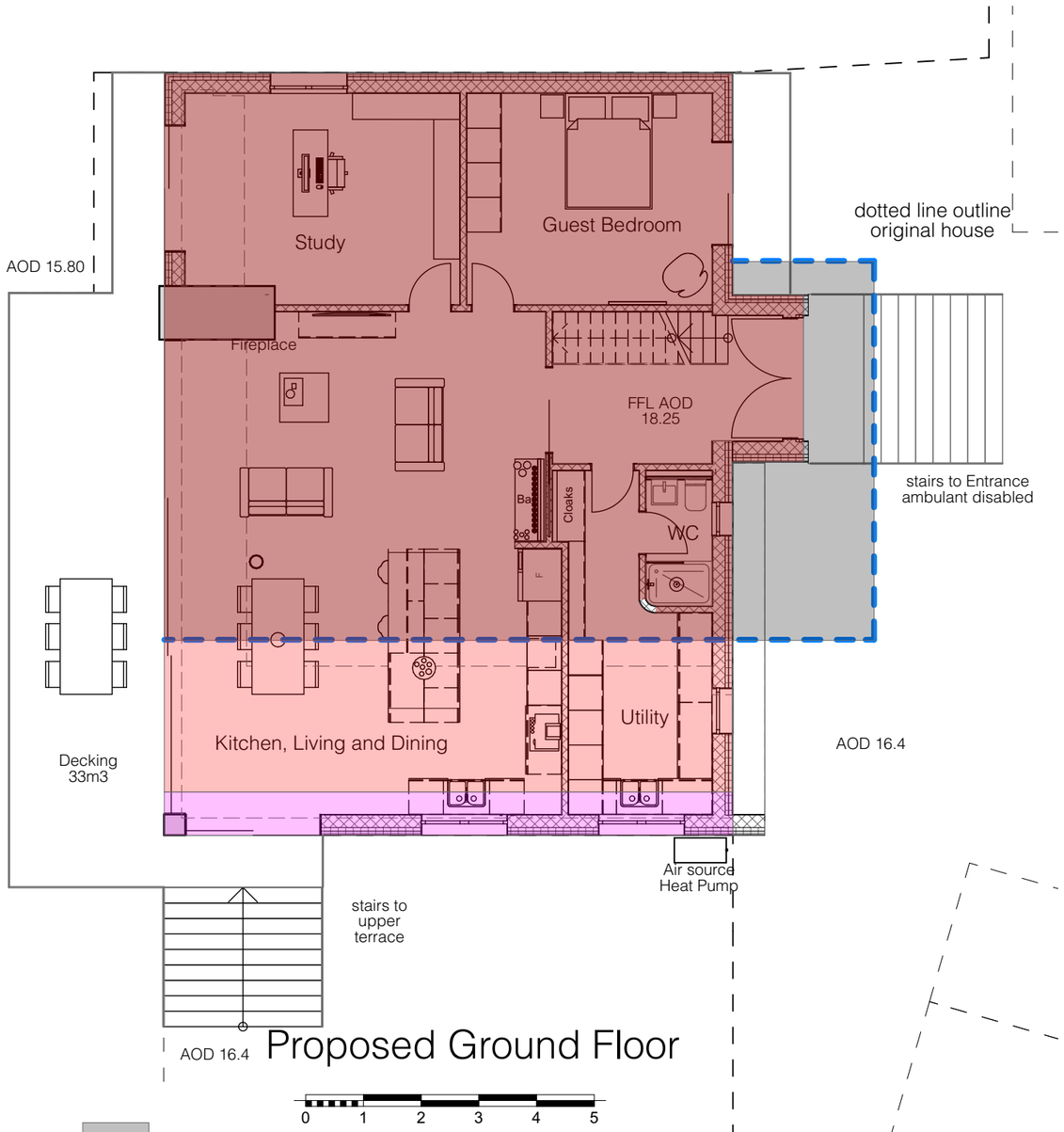
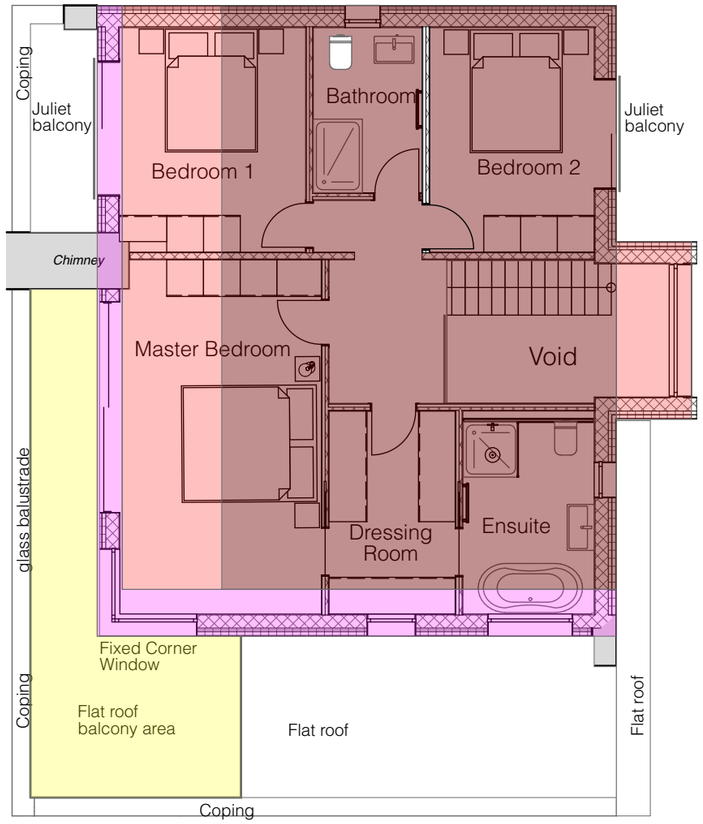
e-mail tegwynne@tegwynne-goldthorpe.co.uk

Client	**Redon Vishko**		
Project	**5 King Johns Close,Wraysbury, TW19 5EJ**		
Drawing	**Proposed Elevations**		
Scale	**1:100**	Page Size	**A3**
Date	**October 2023**	Number	**5KJ/PLN/07**



Proposed Ground Floor



Proposed First Floor

Existing Building

Approved Planning
23/01375

Additional Area for New build

First floor balcony

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e-mail tegwynne@tegwynne-goldthorpe.co.uk

Client	**Redon Vishko**		
Project	**5 King Johns Close,Wraysbury, TW19 5EJ**		
Drawing	**Proposed Ground Floor Plan**		
Scale	**1:100**	Page Size	**A3**
Date	**October 2023**	Number	**5KJ/PLN/08**

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e-mail tegwynne@tegwynne-goldthorpe.co.uk

Client	**Redon Vishko**		
Project	**5 King Johns Close,Wraysbury, TW19 5EJ**		
Drawing	**Perspectives 1:205.82,**		
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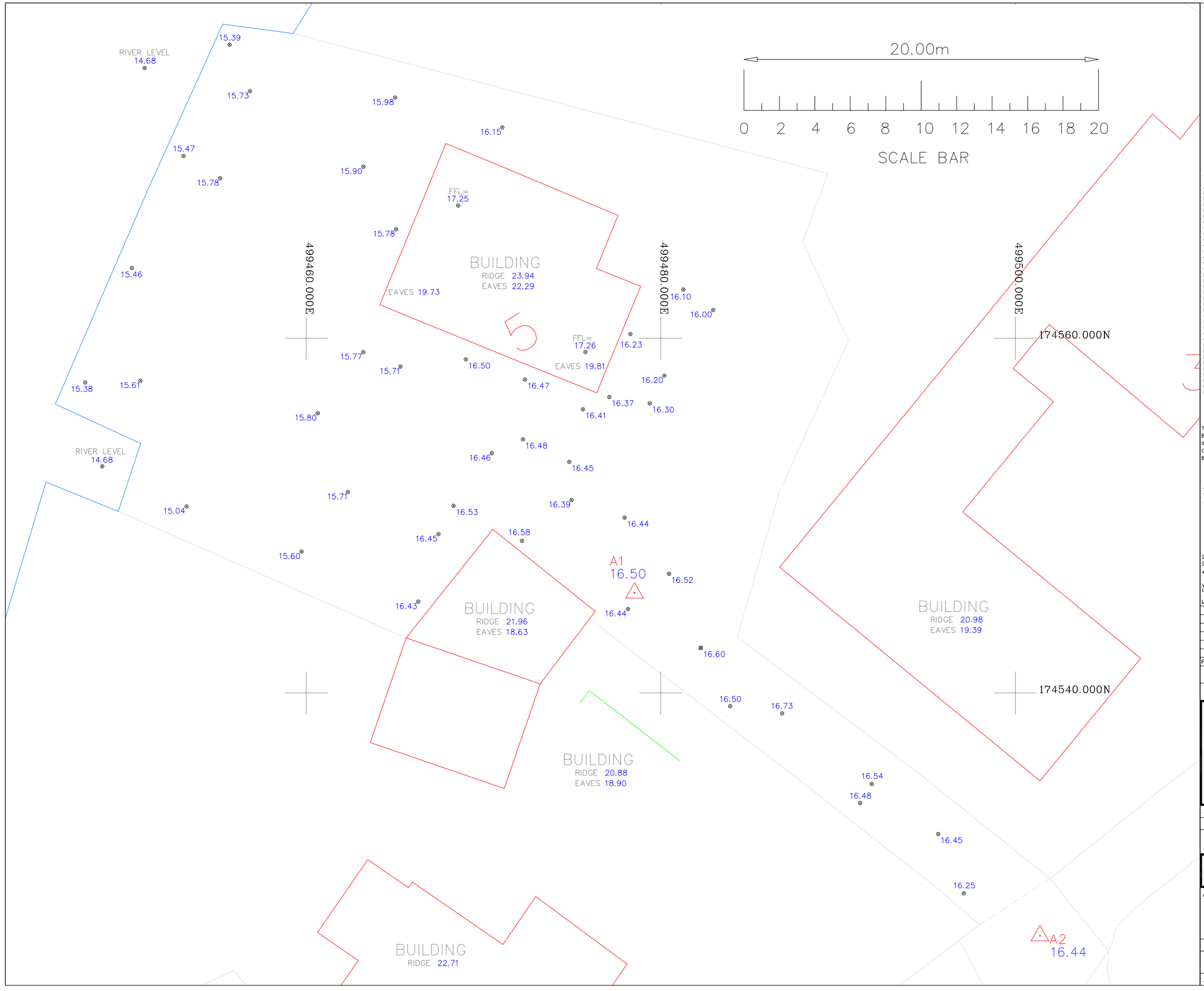
Date	**October 2023**	Number	**5KJ/PLN/09**



Topographical Abbreviations

A/R	Assumed Route	MKR	Marker
BH	Borehole	MT	Mercury Telecom Cover
BOL	Bollard	OHC	Overhead Cable
BT	British Telecom Cover	OHP	Overhead Pipe
BW	Barbed Wire Fence	OSBM	Ordnance Survey Bench Mark
BWK	Brickwork	PB	Post Box
CATV	Cable TV Cover	PGM	Permanent Ground Marker
CB	Close Boarded Fence	PR	Post & Rail Fence
CCTV	Closed Circuit TV	PW	Post & Wire Fence
CHLK	Chainlink Fence	PWM	Post & Wire Mesh Fence
CHPL	Chestnut Paling Fence	RE	Rodding Eye
CL	Cover Level	RG	Road Gully
CM	Cable Marker	RN	Road Name
CP	Catch Pit	RS	Road Sign
CPL	Catch Pit Base Level	RW	Retaining Wall
DIA	Diameter	RWP	Rain Water Pipe
DK	Drop Kerb	SAP	Sapling
DP	Down Pipe	SC	Stop Cock
EJB	Electricity Junction Box	SPR	Spread
EC	Electricity Cover	STA	Traverse Station
EP	Electricity Pole	SV	Stop Valve
ER	Earthing Rod	SVP	Soil Vent Pipe
FH	Fire Hydrant	SW	Storm Water
FIG	Feed Into Ground	TB	Telephone Box
FW	Foul Water	TBM	Temporary Bench Mark
GU	Gully	TFR	Taken From Records
GV	Gas Valve	THL	Threshold Level
H	Height	TJB	Telephone Junction Box
IC	Inspection Cover	TPT	Trial Pit
IL	Invert Level	TL	Traffic Light
IR	Iron Railing Fence	TP	Telephone Pole
KO	Kerb Outlet	UTL	Unable To Lift
LB	Litter Bin	UTT	Unable To Trace
LC	Lamp Column	VP	Vent Pipe
LP	Lamp Post	WKH	Water Key Hole
MH	Manhole	WM	Water Meter
		WV	Water Valve
		---	Approximate

THIS SURVEY DATA HAS BEEN PREPARED FOR THE CLIENT DETAILED BELOW TO AN AGREED SPECIFICATION. UNLESS OTHERWISE AGREED IN WRITING THE LIABILITY OF REED GEOMATICS LTD IS LIMITED TO THE CLIENT OR HIS APPOINTED AGENT AND DOES NOT EXTEND TO USE BEYOND THE LIMITATIONS OF THE SPECIFICATION.

Survey Station Information

STA No.	Easting	Northing	Level	Type
STN A1	499478.521	174545.635	16.50	Nail
STN A2	499501.394	174526.306	16.44	Nail

Notes

Grid: Survey is based on a modified Ordnance Survey National Grid (OSGB36), site centered (or centered on STN A1 where present) with a scale factor of 1 applied.

Values have been derived via GPS using the OS active network using the OSGM15 transformation and OSGM15 geoid model.

Level datum: Ordnance Datum Newlyn (ODN).

Rev	QA Check	Description	Date
5	-	-	-
4	-	-	-
3	-	-	-
2	-	-	-
1	-	-	-
0	GR	First Complete Issue	25-09-2023
Prelim	-	Preliminary - Not Complete	-

REEDgeomatics
SURVEYED BY
REED Geomatics Topographical Ltd
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TW17 9LD
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BRANDONS VENNS GATE
CHEDDAR
SOMERSET
BS27 3LW
TEL 01932 221358
CELL 07939 100008
E-MAIL info@reedgeomatics.com
www.reedgeomatics.com

SURVEYED	HR
DRAWN	HR
SCALE	1:200

CLIENT: Redon Vishko

Level Survey

ADDRESS:
5 KING JOHNS CLOSE
WRAYSBURY
STAINES, TW19 5EJ

JOB No	DRAWING NUMBER
RG23 2638	01

A3 Sheet

APPENDIX 2 – Environment Agency Data

Product 4 (Detailed Flood Risk) for 5 King Johns Close, Wraysbury, Staines ,Middlesex TW19 5EJ
Our Ref: THM327250

Product 4 is designed for developers where Flood Risk Standing Advice FRA (Flood Risk Assessment) Guidance Note 3 Applies. This is:

i) "all applications in Flood Zone 3, other than non-domestic extensions less than 250 sq metres; and all domestic extensions", and
ii) "all applications with a site area greater than 1 ha" in Flood Zone 2.

Product 4 includes the following information:

Ordnance Survey 1:25k colour raster base mapping;
Flood Zone 2 and Flood Zone 3;
Relevant model node locations and unique identifiers (for cross referencing to the water levels, depths and flows table);
Model extents showing *defended* scenarios;
FRA site boundary (where a suitable GIS layer is supplied);
Flood defence locations (where available/relevant) and unique identifiers; (supplied separately)
Flood Map flood storage areas (where available/relevant);
Historic flood events outlines (where available/relevant, not the Historic Flood Map) and unique identifiers;

Statutory (Sealed) Main River (where available within map extents);

A table showing:

i) Model node X/Y coordinate locations, unique identifiers, and levels and flows for *defended* scenarios.
ii) Flood defence locations unique identifiers and attributes; (supplied seperately)
iii) Historic flood events outlines unique identifiers and attributes; and
iv) Local flood history data (where available/relevant).

Please note:

If you will be carrying out computer modelling as part of your Flood Risk Assessment, please request our guidance which sets out the requirements and best practice for computer river modelling.

This information is based on that currently available as of the date of this letter. You may feel it is appropriate to contact our office at regular intervals, to check whether any amendments/ improvements have been made. Should you re-contact us after a period of time, please quote the above reference in order to help us deal with your query.

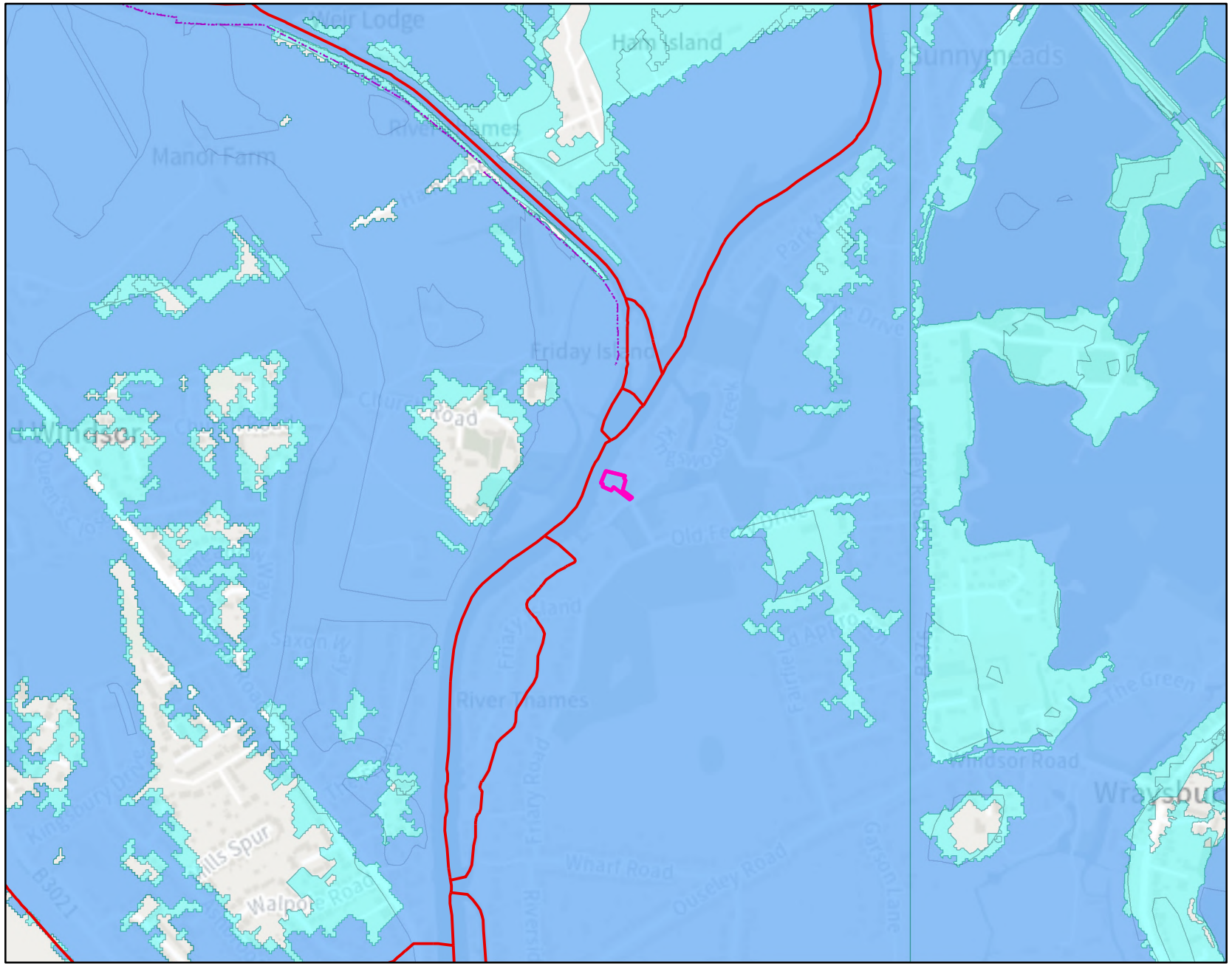
This information is provided subject to the enclosed notice which you should read.
This letter is not a Flood Risk Assessment. The information supplied can be used to form part of your Flood Risk Assessment. Further advice and guidance regarding Flood Risk Assessments can be found on our website at:

https://www.gov.uk/guidance/flood-risk-assessment-local-planning-authorities

If you would like advice from us regarding your development proposals you can complete our pre application enquiry form which can be found at:

https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion

Detailed flood map for planning centred on 5 King Johns Close, Wraysbury, TW19 5EJ
Created on 29/09/2023 REF: THM327250



Environment Agency

Kilometres

0 0.25 0.5

Legend

- Main River
- Site
- Flood Map - Flood defences
- Flood Map - Flood Storage Areas
- Flooding from rivers or sea (FZ3)
- Extent of extreme flood (FZ2)

Flooding from rivers or sea without defences (Flood Zone 3) shows the area that could be affected by flooding:
- from the sea with a 1 in 200 or greater chance of happening each year
- or from a river with a 1 in 100 or greater chance of happening each year.

The Extent of an extreme flood (Flood Zone 2) shows the extent of an extreme flood from rivers or the sea with up to a 1 in 1000 chance of occurring each year.

Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Defence information

THM327250

Defence Location:	No defences on Main River
Description:	This location is not currently protected by any formal defences and we do not currently have any flood alleviation works planned for the area. However we continue to maintain certain watercourses and the schedule of these can be found on our internet pages.

Model information

THM327250

Model:	Thames (Hurley to Teddington) 2019
Description:	The information provided is taken from the Lower River Thames Modelling Study which was completed in December 2019. The model was developed using ISIS-TUFLOW. The flood-frequency behaviour of the Lower Thames is assessed in this project using the multitude of river flow and level records that are available, concentrating mostly on the flow record at the Kingston/Teddington gauge site. Flow records are also available at other gauging sites along the modelled section of the River Thames. This model fully supersedes the following models: Thames (Lower) Reach 1 & 2 – 2007; Thames (Lower) Reach 3 – 2009; Thames (Lower) Reach 4 – 2010. And partially supersedes: Thames (Henley to Hurley) 2002 (lower extent only) This model includes the Jubilee River (part of the Maidenhead, Windsor and Eton Flood Alleviation Scheme). The design capacity for the Jubilee River is limited to approximately 180m3/s and is designed to remain in-bank irrespective of any increase in flows in the River Thames. Where appropriate this will need to be considered when assessing flood risk. There are several points along the Lower Thames where there are interactions between the main river and tributaries. At these point's, other local models will need to be additionally assessed to ensure the correct site specific values are being used. These locations include Chertsey Town, and along the extent of the Chalvey Ditches. The Lower Thames model explicitly modelled the tributary focused flood scenarios in particular the Battle Bourne in Old Windsor and Chertsey and its tributaries. These have been marked as - Battle Bourne/ Chertsey Bourne/ The Cut after the model name. Throughout the majority of the catchment, the model has replicated the flow and level variations observed from gauges during flood events with a high degree of accuracy (± 150mm), however at some sites this was not possible across the whole event. This reflects local variations rather than a fundamental issue with the model (e.g., Bray, Romney and Penton Hook Lock). MARLOW: the Thames (Hurley to Teddington) 2019 model (Marlow Domain) remains to be the best available modelling for Marlow, however please note that the Marlow model domain does not include representation of the recently completed Marlow Flood Alleviation Scheme. Since the completion of this model, the Marlow flood defence has been completed and as of January 2022 Marlow post-scheme modelling has been carried out, however the Environment Agency are still in the process of reviewing this modelling internally. All systems will be updated with this new modelling once the review process has been completed. Model design runs: 1 in 2 / 50% Annual Exceedance Probability (AEP); 1 in 5 / 20% AEP; 1 in 10; 10% AEP; 1 in 20 / 5% AEP; 1 in 30 / 3.3% AEP; 1 in 40 / 2.5% AEP; 1 in 50 / 2% AEP; 1 in 75% / 1.33% AEP; 1 in 100 / 1% AEP; 1 in 100+15% / 1% AEP plus 15%; 1 in 100+25% / 1% AEP plus 25%; 1 in 100+35% / 1% AEP plus 35%; 1 in 100+70% / 1% AEP plus 70%; 1 in 1000 / 0.1% AEP Mapped outputs: 1 in 5 / 20% AEP; 1 in 100 /1% AEP; 1 in 100+25% / 1% AEP plus 25%; 1 in 100+35% / 1% AEP plus 35%; 1 in 100+70% / 1% AEP plus 70% Model accuracy: Levels ± 150mm

Modelled in-channel flood flows and levels

THM327250

The modelled flood levels and flows for the closest most appropriate model node points for your site that are within the river channel are provided below:

				Flood Levels (mAOD)										
Node label	Model	Easting	Northing	20% AEP	5% AEP	3.3% AEP	1% AEP	1% AEP (+10% increase in flows)	1% AEP (+15% increase in flows)	1% AEP (+20% increase in flows)	1% AEP (+25% increase in flows)	1% AEP (+35% increase in flows)	1% AEP (+70% increase in flows)	0.1% AEP
061_00_2018_23a.007	Thames (Hurley to Teddington) 2019 - Thames Domain	499316	175076	17.42	18.09	18.23	18.43		18.54		18.63	18.69	18.75	18.72
061_00_2018_23a.002U	Thames (Hurley to Teddington) 2019 - Thames Domain	499486	174887	17.40	18.09	18.23	18.43		18.55		18.63	18.71	18.78	18.73
061_00_2018_22.101	Thames (Hurley to Teddington) 2019 - Thames Domain	499537	174722	16.54	17.20	17.32	17.51		17.66		17.77	17.89	18.00	17.92
061_00_2018_22.102	Thames (Hurley to Teddington) 2019 - Thames Domain	499542	174728	16.54	17.20	17.32	17.51		17.66		17.77	17.89	18.00	17.92
061_00_2018_22.083	Thames (Hurley to Teddington) 2019 - Thames Domain	499176	174093	16.20	16.88	17.02	17.27		17.46		17.58	17.72	17.85	17.77

				Flood Flows (m3/s)										
Node label	Model	Easting	Northing	20% AEP	5% AEP	3.3% AEP	1% AEP	1% AEP (+10% increase in flows)	1% AEP (+15% increase in flows)	1% AEP (+20% increase in flows)	1% AEP (+25% increase in flows)	1% AEP (+35% increase in flows)	1% AEP (+70% increase in flows)	0.1% AEP
061_00_2018_23a.007	Thames (Hurley to Teddington) 2019 - Thames Domain	499316	175076	43.05	78.37	86.18	97.90		105.61		113.40	123.01	132.99	126.87
061_00_2018_23a.002U	Thames (Hurley to Teddington) 2019 - Thames Domain	499486	174887	43.05	78.32	86.18	97.90		105.18		110.60	115.54	119.79	117.12
061_00_2018_22.101	Thames (Hurley to Teddington) 2019 - Thames Domain	499537	174722	315.61	417.97	453.35	505.05		533.22		552.89	572.28	584.28	576.61
061_00_2018_22.102	Thames (Hurley to Teddington) 2019 - Thames Domain	499542	174728	272.56	339.67	367.17	407.21		428.63		442.42	456.99	464.97	459.93
061_00_2018_22.083	Thames (Hurley to Teddington) 2019 - Thames Domain	499176	174093	314.85	380.64	396.83	421.50		432.70		438.54	448.17	454.88	450.45

Note:

Due to changes in guidance on the allowances for climate change, the percentage increase in river flows above should no longer to be used for development design purposes. The data included in this Product can be used for interpolation of levels as part of an intermediate level assessment.

For further advice on the new allowances please visit
https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

Modelled floodplain flood levels

THM327250

The modelled flood levels for the closest most appropriate model grid cells for your site are provided below:

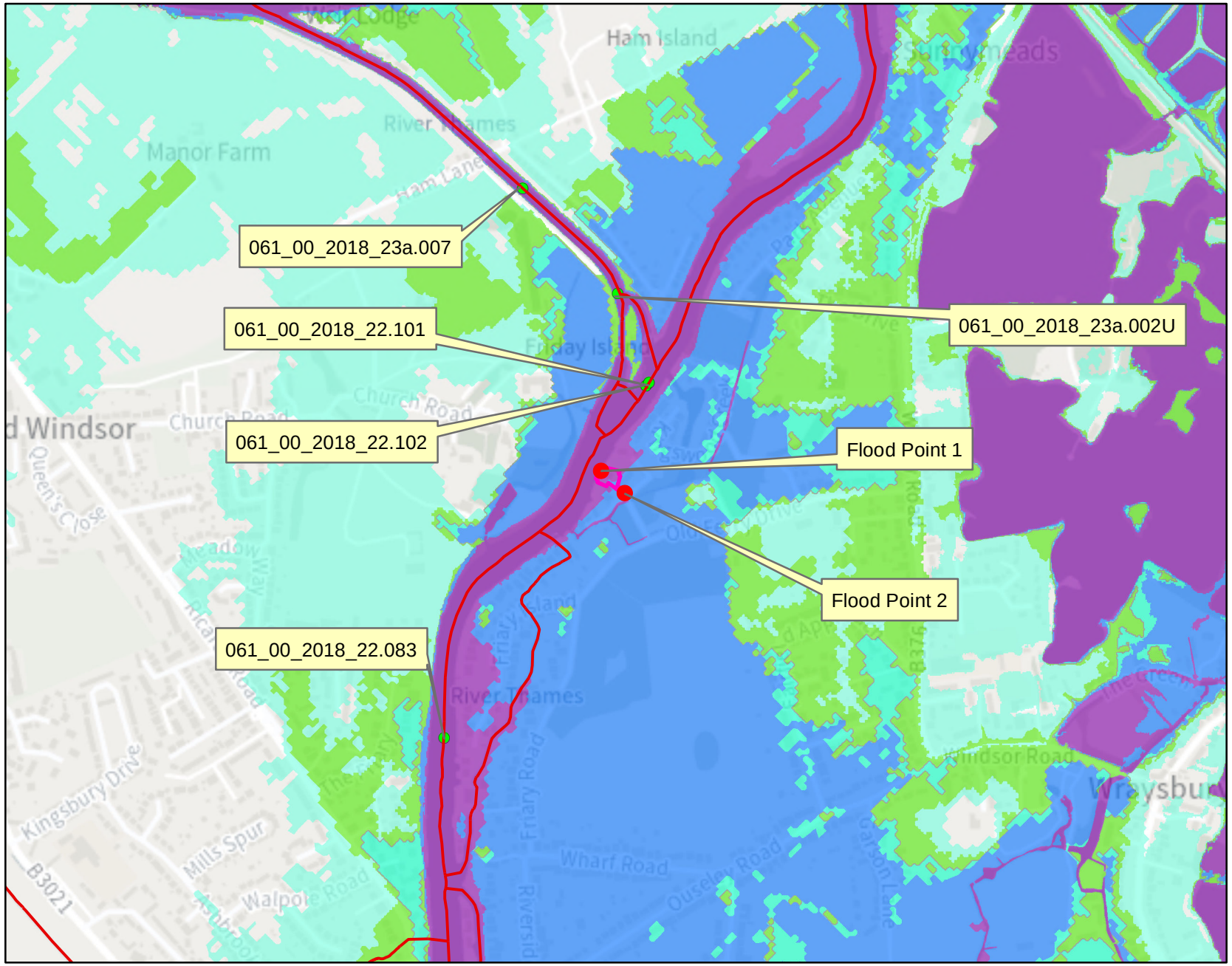
				flood levels (mAOD)										
2D grid cell reference	Model	Easting	Northing	20% AEP	5% AEP	3.3 AEP	1% AEP	1% AEP (+10% increase in flows)	1% AEP (+15% increase in flows)	1% AEP (+20% increase in flows)	1% AEP (+25% increase in flows)	1% AEP (+35% increase in flows)	1% AEP (+70% increase in flows)	0.1% AEP
Flood Point 1	Thames (Hurley to Teddington) 2019 - Thames Domain	499,460	174,573	16.46	17.13	17.25	17.46		17.62		17.73	17.85	17.96	17.89
Flood Point 2	Thames (Hurley to Teddington) 2019 - Thames Domain	499,499	174,530	No Data	17.10	17.22	17.31		17.59		17.71	17.83	17.95	17.87

This flood model has represented the floodplain as a grid.
The flood water levels have been calculated for each grid cell.

Note:
Due to changes in guidance on the allowances for climate change, the percentage increase in river flows above should no longer to be used for development design purposes. The data included in this Product can be used for interpolation of levels as part of an intermediate level assessment.

For further advice on the new allowances please visit
https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

Detailed FRA map centred on 5 King Johns Close, Wraysbury, TW19 5EJ
Created on 29/09/2023 REF: THM327250



Environment Agency

Kilometres

0 0.25 0.5

Legend

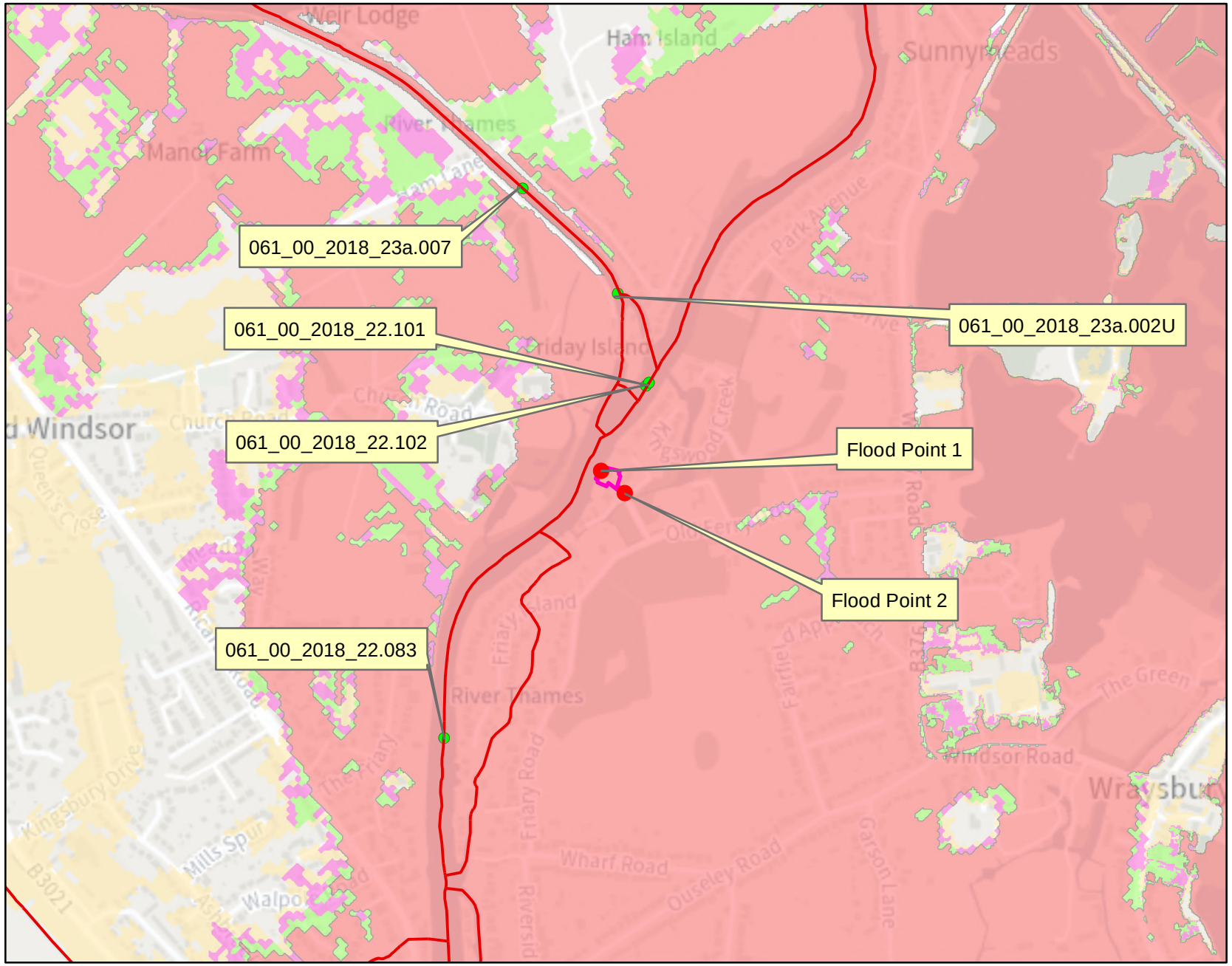
- Main River
- Site
- Nodes
- 20% AEP Defended Flood Outline
- 5% AEP Defended Flood Outline
- 3.3% AEP Defended Flood Outline
- 1% AEP Defended Flood Outline
- 0.1% AEP Defended Flood Outline

AEP = Annual Exceedance Probability
The probability of a flood of a particular magnitude, or greater, occuring in any given year

Where available climate change extents have been calculated with an additional flow added to an AEP event. An example of how this is written is 1%+20% AEP.

Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Detailed FRA map centred on 5 King Johns Close, Wraysbury, TW19 5EJ
Created on 29/09/2023 REF: THM327250



Environment Agency

Kilometres

0 0.25 0.5

Legend

- Main River
- Site
- Nodes
- 1%+15% CC AEP Defended Flood Outline
- 1%+25% CC AEP Defended Flood Outline
- 1%+35% CC AEP Defended Flood Outline
- 1%+70% CC AEP Defended Flood Outline

AEP = Annual Exceedance Probability
The probability of a flood of a particular magnitude, or greater, occuring in any given year

Where available climate change extents have been calculated with an additional flow added to an AEP event. An example of how this is written is 1%+20% AEP.

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Historic flood data

THM327250

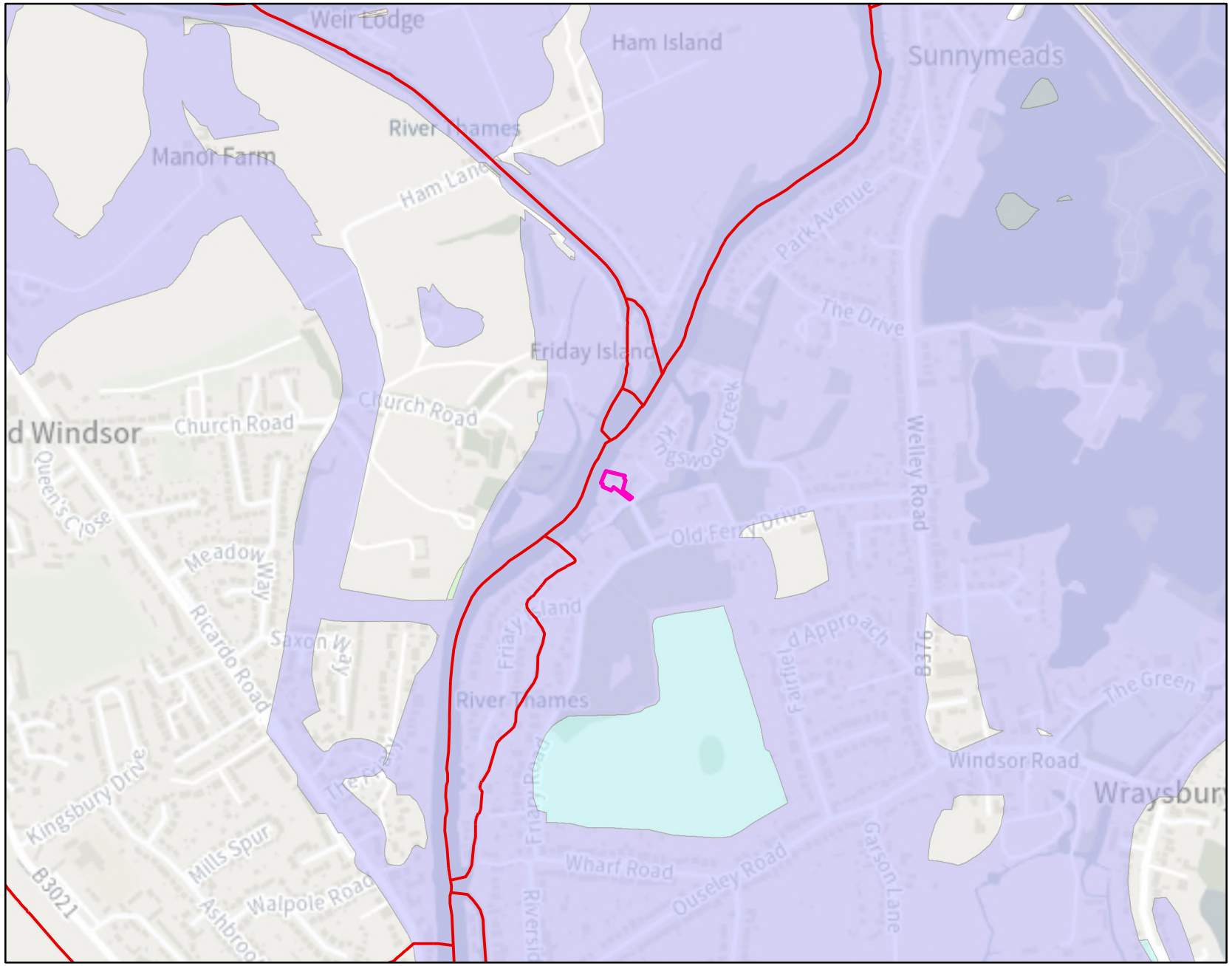
Our records show that the area of your site has been affected by flooding.
Information on the floods that have affected your site is provided in the table below:

Flood Event Code	Flood Event Name	Start Date	End Date	Source of Flooding	Cause of Flooding
EA0620001200274	06DecemberWinter2000	01/01/2000	12/12/2000	main river	channel capacity exceeded (no raised defences)
EA0619900200160	06FebruaryWinter1990	01/01/1990	12/12/1990	main river	channel capacity exceeded (no raised defences)
EA0620030100350	06JanuaryNewYear2003	23/12/2002	12/01/2003	main river	channel capacity exceeded (no raised defences)
EA061947March00001	06MarchSpring1947	01/01/1947	12/12/1947	main river	channel capacity exceeded (no raised defences)

Please note the Environment Agency maps flooding to land not individual properties. Floodplain extents are an indication of the geographical extent of a historic flood. They do not provide information regarding levels of individual properties, nor do they imply that a property has flooded internally.

Start and End Dates shown above may represent a wider range where the exact dates are not available.

Historic flood map centred on 5 King Johns Close, Wraysbury, TW19 5EJ
Created on 29/09/2023 REF: THM327250



Environment Agency

Kilometres

0 0.25 0.5

Legend

- Main River
- Site
- 1947
- 1990
- 2000
- 2002/03

Flooding from rivers or sea without defences (Flood Zone 3) shows the area that could be affected by flooding:
- from the sea with a 1 in 200 or greater chance of happening each year
- or from a river with a 1 in 100 or greater chance of happening each year.

The Extent of an extreme flood (Flood Zone 2) shows the extent of an extreme flood from rivers or the sea with up to a 1 in 1000 chance of occurring each year.

Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

APPENDIX 3 – Environment Agency's Personal Flood Plan

Personal flood plan

Name

Environment Agency

Are you signed up to receive flood warnings?
If not call Floodline on 0345 988 1188 to see if your area receives free flood warnings.

Let us know when you've completed your flood plan by calling Floodline on **0345 988 1188.** This will help us learn more about how people are preparing for flooding.

General contact list	Company name	Contact name	Telephone
Floodline	Environment Agency		0345 988 1188
Electricity provider			
Gas provider			
Water company	Thames Water	Customer Services	0800 316 9800
Telephone provider			
Insurance company and policy number			
Local council			
Local radio station	Radio Jackie 107.8		
Travel/weather info	BBC Weather		

Key locations

Service cut-off	Description of location
Electricity	
Gas	
Water	

Who can help/who can you help?

Relationship	Name	Contact details	How can they/you help?
Relative			
Friend or neighbour			

Be prepared for flooding. Act now

Personal flood plan

What can I do NOW?

Environment Agency

- Put important documents out of flood risk and protect in polythene ☐
- Check your insurance covers you for flooding ☐
- Look at the best way of stopping floodwater entering your property ☐
- Make a flood plan and prepare a flood kit ☐
- Find out where you can get sandbags ☐
- Identify who can help you/ who you can help ☐
- Identify what you would need to take with you if you had to leave your home ☐
- Understand the flood warning codes ☐

What can you do if a flood is expected in your area?

Actions	Location
Home	
• Move furniture and electrical items to safety	On top of cupboards
• Put flood boards, polythene and sandbags in place	
• Make a list now of what you can move away from the risk	Furniture, Electrical Items (TV, Computers, Phones, Game Consoles Etc), Valuable Items
• Turn off electricity, water and gas supplies	
• Roll up carpets and rugs	
• Unless you have time to remove them hang curtains over rods	
• Move sentimental items to safety	On top of cupboards
• Put important documents in polythene bags and move to safety	
Garden and outside	
• Move your car out of the flood risk area	Use safe access and egress route if required
• Move any large or loose items or weigh them down	
Business	
• Move important documents, computers and stock	
• Alert staff and request their help	
• Farmers move animals and livestock to safety	
Evacuation - Prepare a flood kit in advance	
• Inform your family or friends that you may need to leave your home	
• Get your flood kit together and include a torch, warm and waterproof clothing, water, food, medication, toys for children and pets, rubber gloves and wellingtons	

There are a range of flood protection products on the market to help you protect your property from flood damage. A directory of these is available from the **National Flood Forum** at **www.bluepages.org.uk**

Be prepared for flooding. Act now

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01686 668957 • info@krsenviro.com • www.krsenviro.com