GeoSmart Information

FloodSmart Plus

Flood Risk Assessment

Site Address

Almys Autos
The Common
West Drayton
London Borough of Hillingdon
UB7 7HQ

Grid Reference

505167, 178631

Report Prepared for

Almys Autos

Date

07-12-2023

Report Status

FINAL

Site Area

3.4 ha

Report Reference

80814R1

RISK – Very Low to Medium

The Site is located within Flood Zones 2 and 3, which equates to a Medium to High probability of flooding from rivers and the sea. Surface water (pluvial) flood risks are Very Low. Groundwater flood risks are Moderate and flooding risks from artificial sources (i.e. canals, reservoirs and sewers) are Low. Mitigation measures are recommended in this report to reduce the risks to an acceptable level over the lifetime of the development.

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GeoSmart Information

1. Executive summary

A review has been undertaken of national environmental data sets to assess the flood risk to the Site from all sources of flooding in accordance with the National Planning Policy Framework (NPPF) (2023) and National Planning Practice Guidance (NPPG) (Published in 2014 and updated in August 2022). A site-specific flood risk assessment, to assess the flood risk to and from the development Site, is provided within this concise interpretative report written by an experienced GeoSmart consultant. Baseline flood risk and residual risks that remain after the flood risk management and mitigation measures are implemented are summarised in the table below.

Site analysis

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

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

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

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

*N/A indicates where mitigation is not required.

Summary of existing and proposed development

The Site is currently used within a commercial capacity as a car dealership with associated access, ancillary storage and car parking. Development proposals comprise the erection of a new commercial unit (24m x 15m) with the retention of the existing access and parking. Site plans are included within Appendix A.

Summary of flood risks

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

- Historical flooding related to the nearby watercourses is understood to have previously occurred in the vicinity of the Site. The Site itself is not mapped as having experienced previous flooding.

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

- According to the Environment Agency's (EA) Flood Map for Planning Purposes, the Site is located within fluvial Flood Zones 2 (Medium Probability) and 3 (High Probability).
- The Site benefits from the presence of flood defences, positioned 10 m from the Site boundary, which are in 'fair' condition and are designed to provide a 1 in 100-year event standard of protection.
- According to the EA's Risk of Flooding from Rivers and Sea (RoFRS) map, which considers the type, condition and crest height of flood defences, the Site has a High risk of flooding.
- Baseline mapping indicates a High risk, however, a review of available flood model data indicates the risk is likely to be lower as the Site is not affected during the 1 in 50 year flood event.
- Modelled flood data obtained from the EA has been analysed in line with the most up to date guidance on climate change (EA, 2022), to confirm a maximum "design" flood level at the Site. During a 1 in 100 year plus 20% climate change allowance event the flood level at the Site would be 29.37 mAOD; during this event, flood depths in the area proposed for development could be up to 0.32 m. Flood mitigation measures are included in the next section.

Surface water (pluvial) flooding

- According to the EA's Risk of Flooding from Surface Water (pluvial) flood mapping, the Site has a Very Low risk of pluvial flooding.
- Flooding would not affect the area proposed for development in the 1 in 100 year plus climate change allowance event.
- As there is an increase in the built footprint at the Site and the area proposed for development is affected by the design flood level, this may displace flood water and floodplain compensation may be required. This is discussed further in Section 5 of this report.
- Baseline mapping indicates a Very Low risk, and a review of the flood model data indicates the risk is likely to be the same.

Groundwater flooding

- Groundwater Flood Risk screening data indicates there is a Moderate potential risk of groundwater flooding at the surface in the vicinity of the Site during a 1 in 100 year event.
- A review of the prevailing conceptual ground model also indicates that the groundwater flood risk is likely to be Moderate.

Artificial sources of flooding

- The risk of flooding from artificial (man-made) sources such as reservoirs, sewers and canals has been assessed:
    - The EA's Risk of Flooding from Reservoir map confirms the Site is at risk of reservoir flooding. However, the potential for a breach of a reservoir to occur and flooding affecting the Site is low.
    - Ordnance Survey (OS) data confirms there are no canals near to the Site.
    - The Strategic Flood Risk Assessment (SFRA)(Metis, 2023) confirms no recorded instances of sewer flooding at or within the vicinity of the Site.

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

Recommendations

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

- As there is a risk of flooding from fluvial sources, where flood depths could be up to 0.32 m in the area proposed for development, Finished Floor Levels (FFL) of the proposed development should be set to 24.27 mAOD[1]. Standard flood resilient design measures should also be incorporated. If possible, the development should be moved to the higher ground in the west of the Site, outside of modelled flood extents during the 1 in 100 year flood event.
- Where it is not possible to either move the proposed structure or raise FFL's to the recommended elevation, it may be appropriate to incorporate standard flood resistance and resilient design measures (see Section 7).
- As there is a risk of flooding from groundwater sources at the surface Finished Floor Levels (FFL) of the proposed development should be set at the same level proposed for fluvial flood risk, higher than surrounding ground levels; ground levels should also slope away from the proposed buildings. Risks to buried infrastructure should be considered

[1] 0.3 m above the 1 in 100 years plus climate change flood level of 23.97 mAOD.

along with water proofing of ground floor areas, standard flood resilient design and non-return valves on the sewer inlet. French drains and/or pumping systems may also be considered.

- A Flood Warning and Evacuation Plan (FWEP) is recommended to ensure persons using the Site can evacuate safely on receipt of a Flood Warning. Occupants of the Site should also be signed up to receive EA Flood Alerts and Flood Warnings.
- The ongoing management and maintenance of existing and any proposed drainage networks, under the riparian ownership of the developer, should be undertaken in perpetuity with the development.
- A business continuity plan is recommended to reduce risks to people, property and profit.
- An assessment of floodplain storage should be considered to ensure the proposed development does not displace flooding, particularly where ground level or finished floor level raising is proposed.

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

2. Introduction

Background and purpose

A site-specific flood risk assessment has been undertaken, to assess the flood risk to and from the development Site. This assessment has been undertaken by firstly compiling information concerning the Site and the surrounding area. The information gathered was then used to construct a 'conceptual site model', including an understanding of the appropriateness of the development as defined in the NPPF (2023) and the source(s) of any flood risk present, guided by the NPPG (published in 2014 and updated in August 2022). Finally, a preliminary assessment of the steps that can be taken to manage flood risk to the development was undertaken.

This report has been prepared with reference to the NPPF (2023) and NPPG (2022).

"*The National Planning Policy Framework set out the Government's planning policies for England and how these are expected to be applied*" (NPPF, 2023).

The NPPF (2023) and NPPG (2022) promote a sequential, risk-based approach to the location of development. This also applies to locating a development within a Site which has a variable risk of flooding.

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

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

Report scope

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

Information obtained from the EA and a review of the West London Strategic Flood Risk Assessment (SFRA) (Metis, 2023) is used to ascertain local flooding issues and, where appropriate, identify information to support a Sequential and/or Exception test required as part of the NPPF (2023).

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

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

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

Report limitations

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

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

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

Datasets

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

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

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

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

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

Local policy and guidance

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

West London Strategic Flood Risk Assessment (Metis, 2023):

Boroughs should adopt a sequential approach for planning and development to identify areas that are not susceptible to flood risk impacts posed by climate change. Development should be encouraged in these identified areas to make properties more resilient to increasing flood risk and reduce the reliance on property level protection methods.

Boroughs should apply the Sequential Test to Allocated Sites within the LPA area at an early stage in the Local Plan development process to help identify any lower flood risk areas that may not be suitable for development. This can be used to inform spatial planning and identify key growth locations, increasing the possibility of facilitating development which is not exposed to flood risk whilst meeting development objectives.

Boroughs should use their Local Plans to ensure developments within CDAs (as defined by SWMPs) provide increased surface water drainage requirements. Examples could include increased storage using SuDS to restrict off-site runoff rates to greenfield (or lower) conditions.

Developers must submit completed Flood Risk Assessments and Drainage Strategy (with supporting *Checklists*) to demonstrate compliance with requirements detailed in Sections 2 and 4 for all Major development proposals.

Where development is proposed for sites within Flood Zones 3a (surface water), evidence must be submitted to demonstrate that:

There will be no increase of flood risk to properties outside of the development boundary.

Consultation has been undertaken with the relevant LLFA to consider potential wider impacts or benefits the development could have on the local surface water catchment.

Relevant strategic documents (such as the Thames CFMP, LFRMS and SWMP) have been reviewed.

The LLFA has been consulted to determine if the development should contribute to any catchment wide flood alleviation.

Hillingdon Local Plan (2012)

Development proposed in Flood Zones 2 or 3 (medium and high probability) will need to provide evidence of the Sequential Test outlined in the NPPF. The Sequential Test will need to be applied to the subsequent Hillingdon Local Plan: Part 2 -Site Specific Allocations LDD. Development that is proposed in accordance with the Site Specific Allocations LDD and the Sequential Test will not be required to submit further evidence justifying why it is proposed in Flood Zone 2 or 3. Where development is not in line with the Site Specific Allocations LDD, it will need to submit clear evidence and justification that there are no other reasonably available sites in a lower risk flood zone.

All development proposals in Flood Zones 2, 3a and 3b (medium and high probability) should be accompanied by a Flood Risk Assessment (FRA) in accordance with the NPPF. Development of over 1 hectare or identified as being within a problem surface water area should also be accompanied by an FRA. The FRA should also provide evidence of the Exception Test where appropriate as outlined in the NPPF; however, the Sequential Test should be undertaken prior to the Exception Test for all new development proposed in Flood Zones 2 and 3, and areas identified as having surface water management problems.

SUDS should be designed to take into account the surface run-off quantity, rates and also water quality ensuring their effective operation up to and including the 1 in 100 year design standard flood including an increase in peak rainfall of up to 30% to account for climate change.

Guidance

Strategic Flood Risk Assessments are carried out by local authorities, in consultation with the Environment Agency, to assess the flood risk to the area from all sources both now and in the future due to climate change. They are used to inform planning decisions to ensure inappropriate development is avoided (NPPF, 2023).

3. Site analysis

Site information

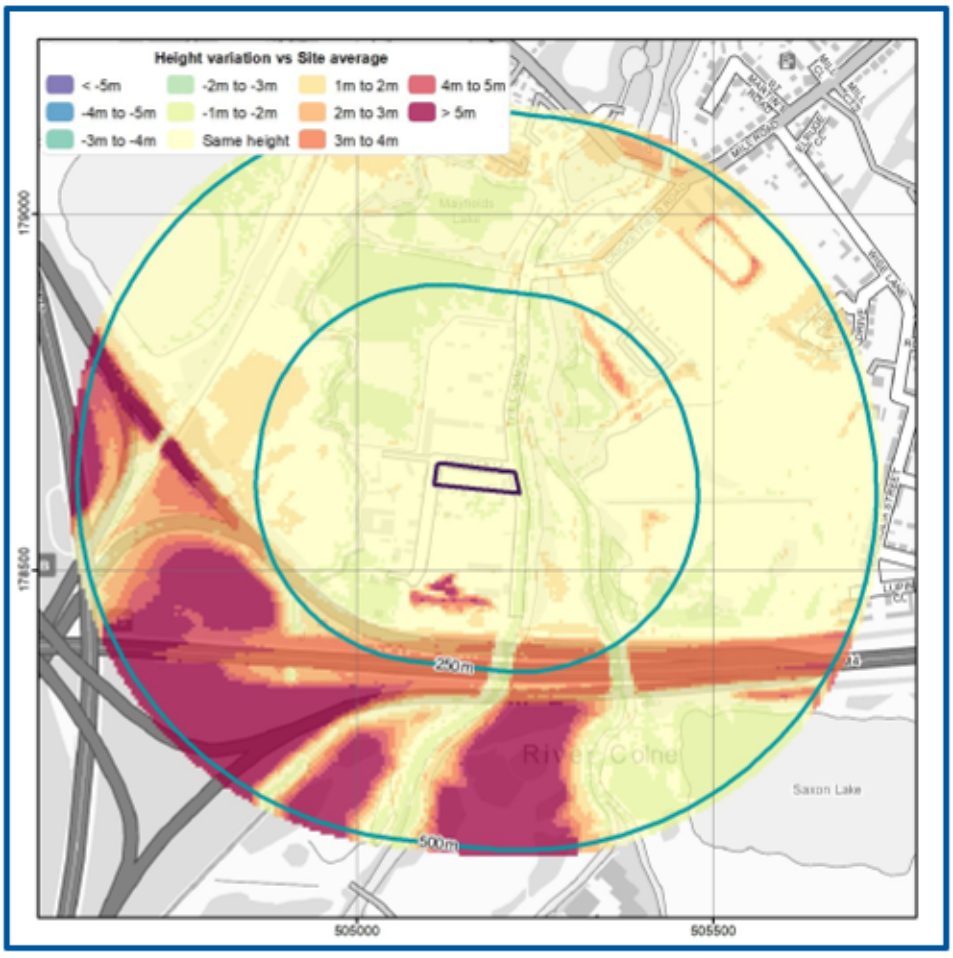
The Site is located in West Drayton, in a setting of commercial land use at National Grid Reference TQ 05205 78623.

Figure 1. Aerial imagery of the Site (Bluesky, 2023)

Figure 2 indicates that ground levels within 500m of the Site generally fall in an easterly direction.

The general ground levels on the Site are between 23.65 and 24.7 mAOD with the Site falling gradually in an easterly direction. This is based on EA elevation data obtained for the Site to a 1 m resolution with a vertical accuracy of ±0.15 m (Appendix D).

Figure 2. Site Location and Relative Elevations (GeoSmart, 2023)



Development

The Site is currently used within a commercial capacity as a car dealership with associated access, ancillary storage and car parking.

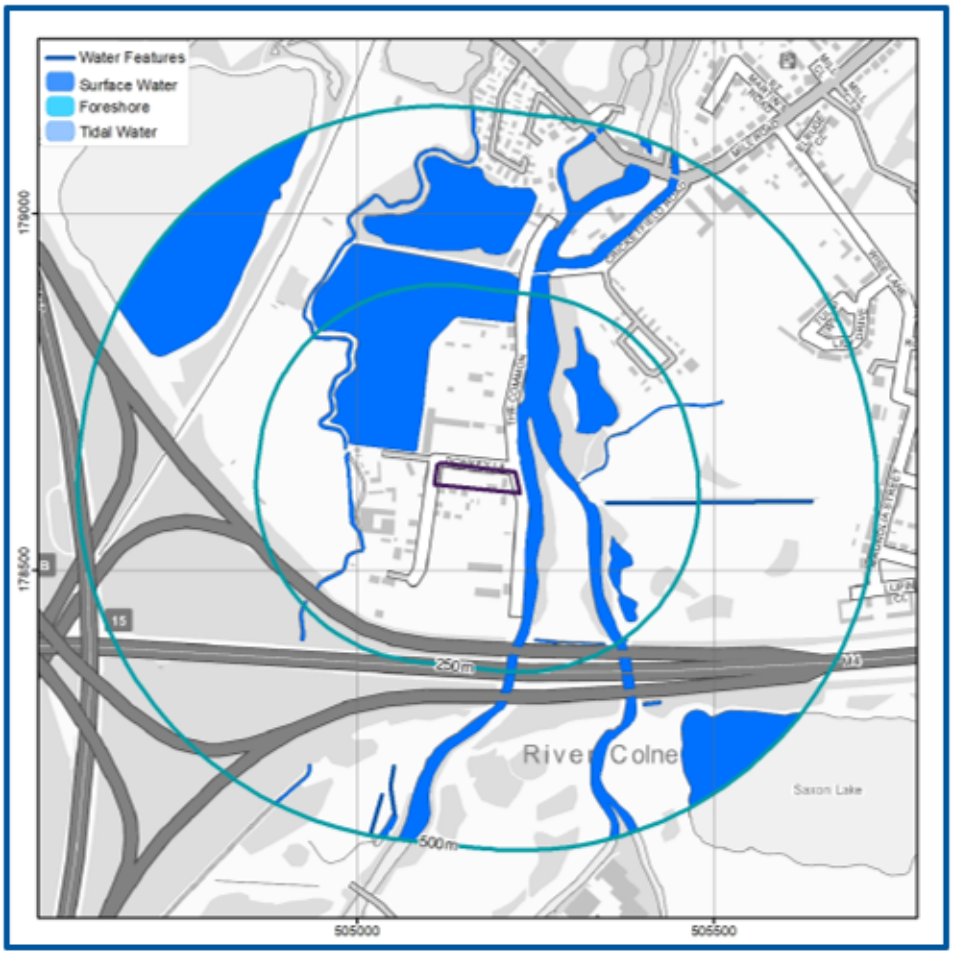
Development proposals comprise the erection of a new commercial unit (24m x 15m) and the retention of the existing access and parking. Site plans are included within Appendix A.

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

Hydrological features

According to Ordnance Survey (OS) mapping included in the following figure, there are numerous surface water features within 500 m of the Site.

Figure 3. Surface water features (EA, 2023)



The Wraysbury river is situated adjacent to the eastern boundary of the Site.

The River Colne is located approximately 60m east of the Site.

Bigley Ditch is located approximately 150m west of the Site.

Maryfields Lake is located approximately 100m northwest of the Site.

Saxon Lake is located approximately 400m southeast of the Site.

Thorney Pools are located approximately 350m north of the Site.

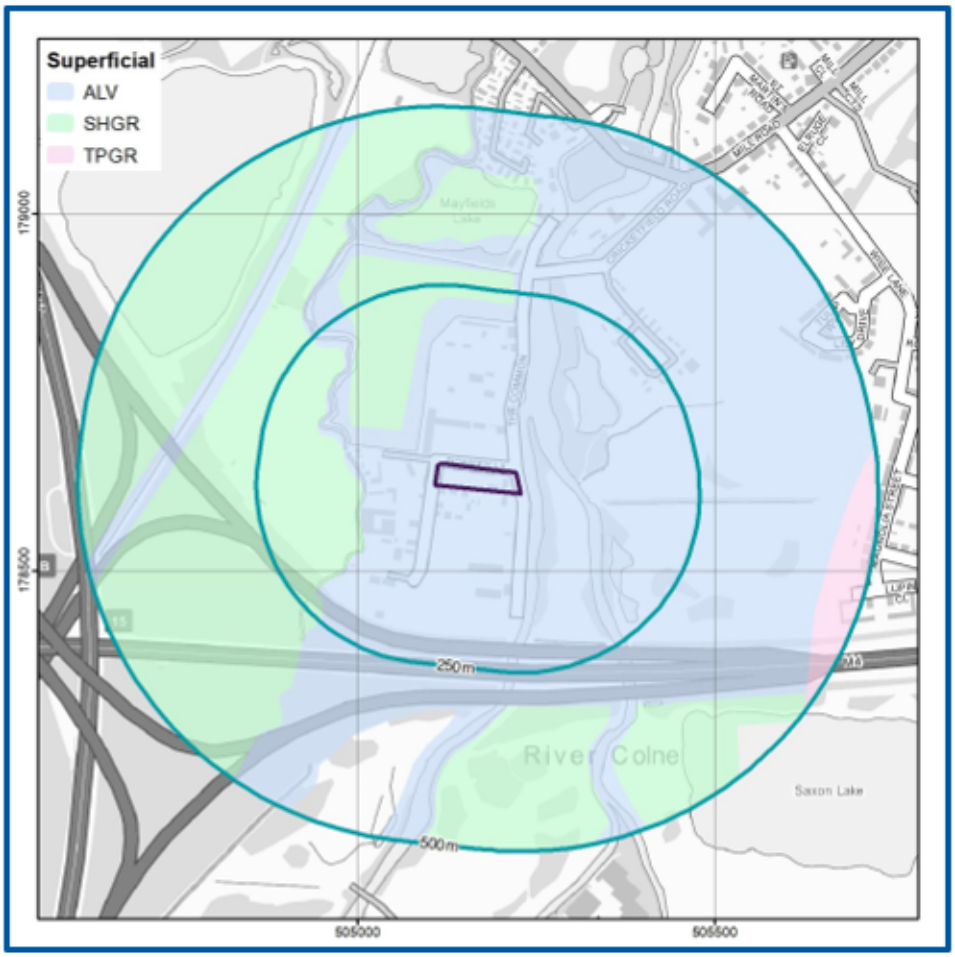
Proximity to relevant infrastructure

Bridges associated with the M4 cross both the River Colne and the Wraysbury river approximately 250m south / southeast of the Site.

Hydrogeological features

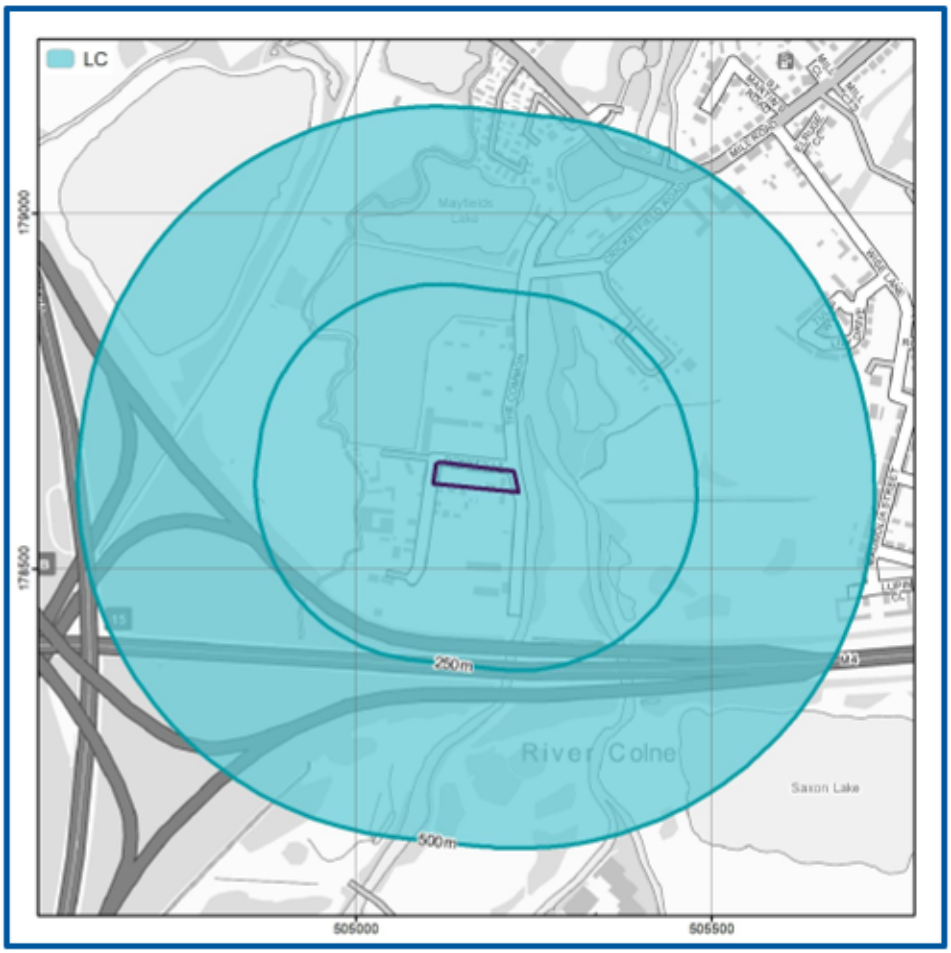
British Geological Survey (BGS) mapping indicates that the underlying superficial geology (Figure 4) consists of Alluvium (ALV) (BGS, 2023) which is classified as a Secondary (A) Aquifer (EA, 2023).

Figure 4. Superficial Geology (BGS, 2023)



BGS mapping indicates that the underlying bedrock geology (Figure 5) consists of the London Clay Formation (LC) (BGS, 2023) which is classified as an Unproductive Strata (EA, 2023).

Figure 5. Bedrock Geology (BGS, 2023)



Geological conditions

A review of the BGS borehole database (BGS, 2023) indicates that the nearest and most relevant borehole to the Site (ref: TQ07NW287) is located 140 m to the south west of the Site boundary at an elevation of 24.0 mAOD; the corresponding borehole log indicates that the underlying geology consists of alluvium to a depth of 1.50 m below ground level (bgl), overlying coarse sand and terrace gravels to a depth of 1.65 mbgl, overlying grey sand and flint gravel to a depth of 7.1 mbgl, overlying stiff London Clay to a depth of 20.0 mbgl, where the borehole terminated.

Groundwater

The groundwater level recorded at borehole ref: TQ07NW287 on the 25/03/1991 was 2.10 m bgl rising to 2.0 m bgl after 20 minutes. Given the similar geology mapped beneath the study Site and also the consistent ground levels between the Site and the BGS borehole, the groundwater level on-Site could also be of the order 2.0 m bgl, albeit subject to temporal variation.

4. Flood risk to the development

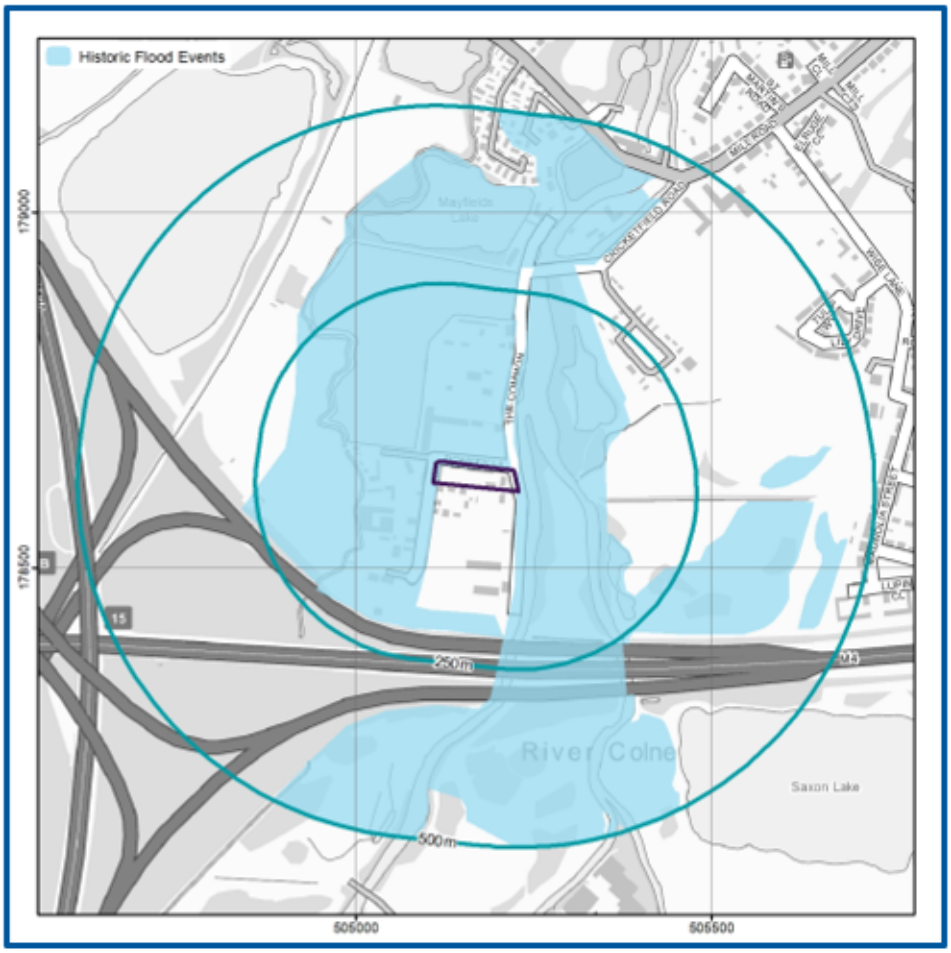
Historical flood events

According to the EA's Historical Flood Map (Figure 6) and the online mapping from the West London SFRA (Metis, 2023) there have been several flood events which have affected the Site locality (although not the Siet itself):

- The 2003 new year floods were caused by heavy rainfall and the channel capacity of the River Colne was exceeded.
- The January 2021 floods affected nearby access roads (Donkey Lane) although the cause of the flooding is unknown. It is likely that the channel capacity of the river was again exceeded.

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

Figure 6. EA Historical Flood Map (EA, 2023)



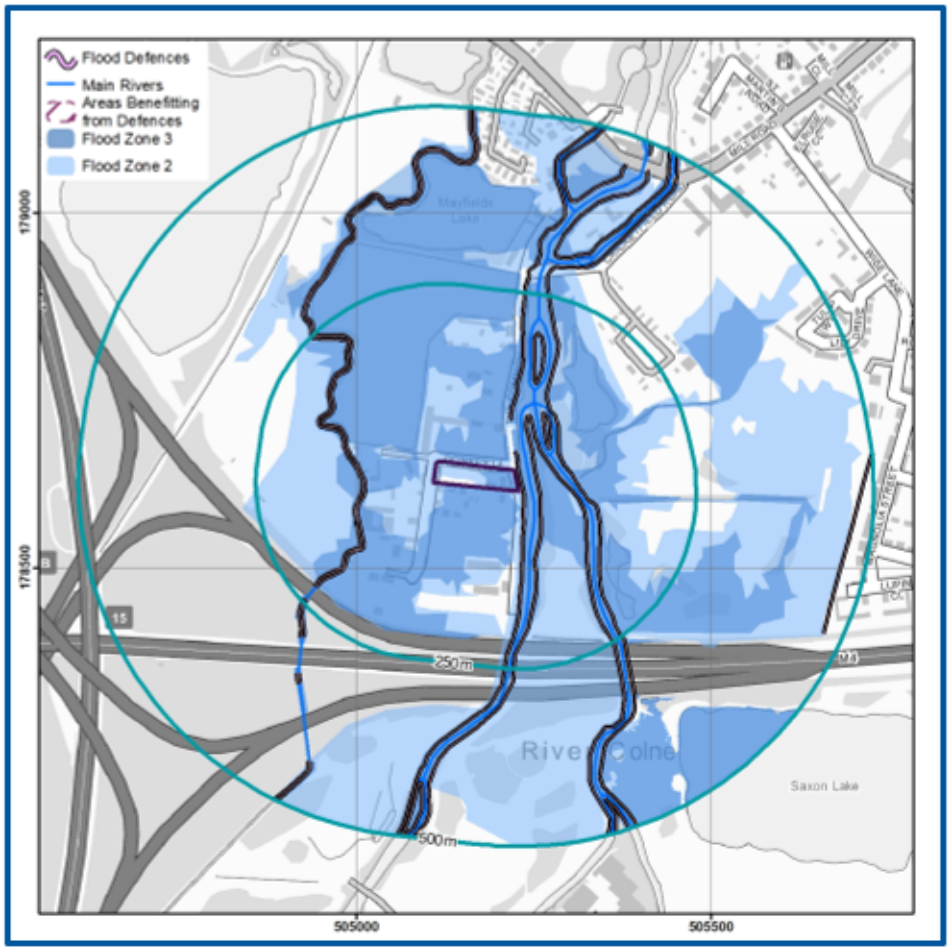
Rivers (fluvial) / Sea (coastal) / Estuarine (tidal) flooding

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

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

According to the EA's Flood Map for Planning Purposes (Figure 7), the Site is located in both fluvial Flood Zones 2 and 3 and is therefore classified as having a Medium to High probability of fluvial flooding from the nearby watercourses.

Figure 7. EA Flood Map for Planning Purposes (EA, 2023)



Guidance

As defined in the NPPF (2023):

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

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

Flood defences

Guidance

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

Existing flood defences

- The Site is in an area which benefits from flood defences but is not within the EA's ABD. [2]
- There are formal flood defences adjacent to the Site.
- There are no proposed flood defences within 500 m of the Site.

Information from the EA relating to the existing flood defences is outlined below.

- According to the EA (2021) the flood defences in place for this area are designed to defend up to a 1 in 100-year flood event.
- The nearest and most applicable formal flood defences are raised, man-made embankments with a minimum crest level of 24.2 mAOD.
- The EA inspects the defences twice a year and classifies their current condition as "Fair (Condition Grade: 3)".

[2] The EA maps Areas which Benefit from the presence of Defences (ABD) in a 1 in 100 (1%) chance of flooding each year from rivers; or 1 in 200 (0.5 %) chance of flooding each year from the sea. If the defences were not there, these areas would flood in a 1 in 100 (1%)/ 1 in 200 (0.5 %) or larger flooding incident. The EA do not show all areas that benefit from all flood defences, some defences are designed to protect against a smaller flood with a higher chance of occurring in any year, for example a flood defence which protects against a 1 in 30 chance of flooding in any year. Such a defence may be overtopped in a flood with a 1 in 100 (1%)/ 1 in 200 (0.5%) chance of occurring in any year, but the defence may still reduce the affected area or delay (rather than prevent) a flood, giving people more time to act and therefore reduce the consequences of flooding.

Model data (Fluvial)

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

Defended modelled data from the Lower Colne Modelling Study (Mott Macdonald, 2012) has been extracted from the 2D floodplain data provided at the Site.[3]. The data is provided in the table below and also within Appendix B.

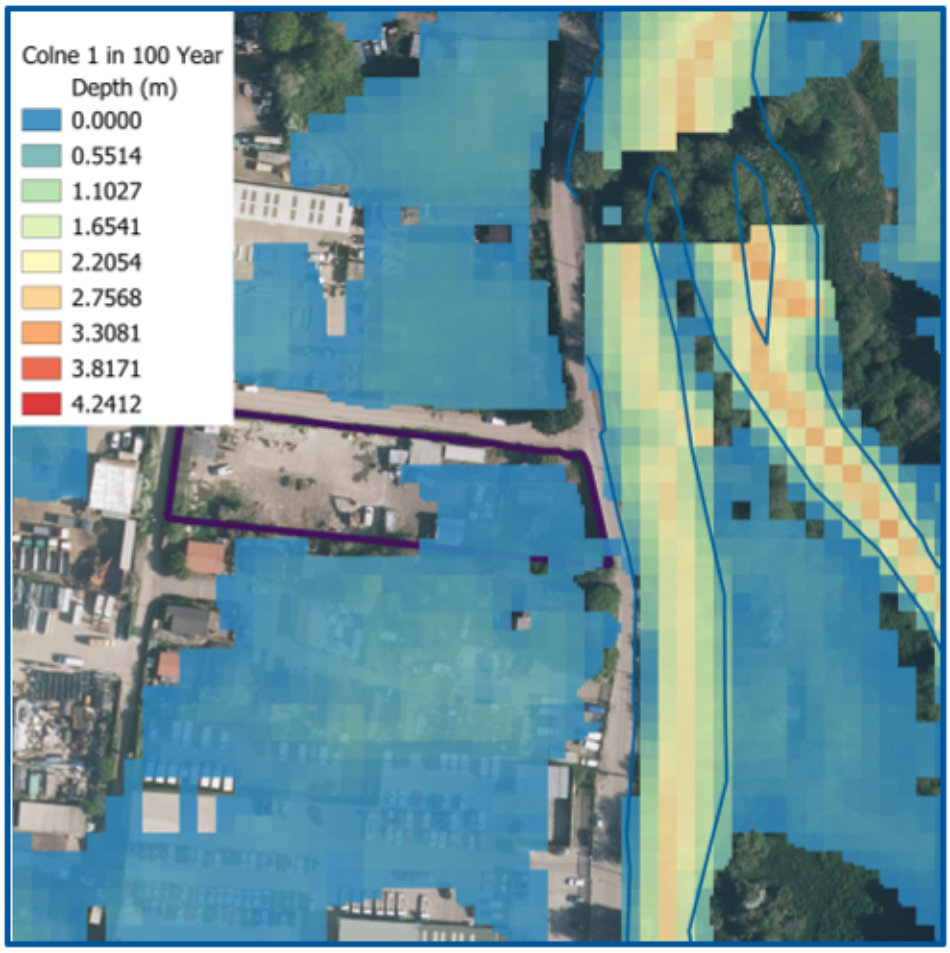
Table 2. EA present day modelled flood data

Ground levels on-Site (mAOD)	Modelled Flood Levels (mAOD)			
	1 in 20 year	1 in 50 year	1 in 100 year	1 in 1000 year
23.65 and 24.70	N/A	N/A	23.87	24.10
Flood depths (m)	No flooding	No flooding	Up to 0.22	Up to 0.45

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

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

Figure 8. Modelled present day flooding scenarios (Mott Macdonald, 2012)



Climate change factors

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

As the Site is located within the Colne Management Catchment, within the Thames and the proposed development is classed as Less Vulnerable, where the proposed lifespan is approximately 75 years, the Central (21%) allowance has been used to determine a suitable climate change factor to apply to river data.

The 20% climate change allowance has been provided in the Colne Modelling Study and has been used as a proxy for the 21% climate change. It is estimated that the flood depths are a minor underestimation of the 21% allowance but are the most accurate levels available.

Table 3. Flood levels plus climate change allowances

Ground levels on-Site (mAOD)	Modelled Flood Levels (mAOD)
	1 in 100 year plus 20% 2080 central allowance for climate change flood level (mAOD)
23.65 and 24.70	23.97
Flood depths (m)	Up to 0.32m

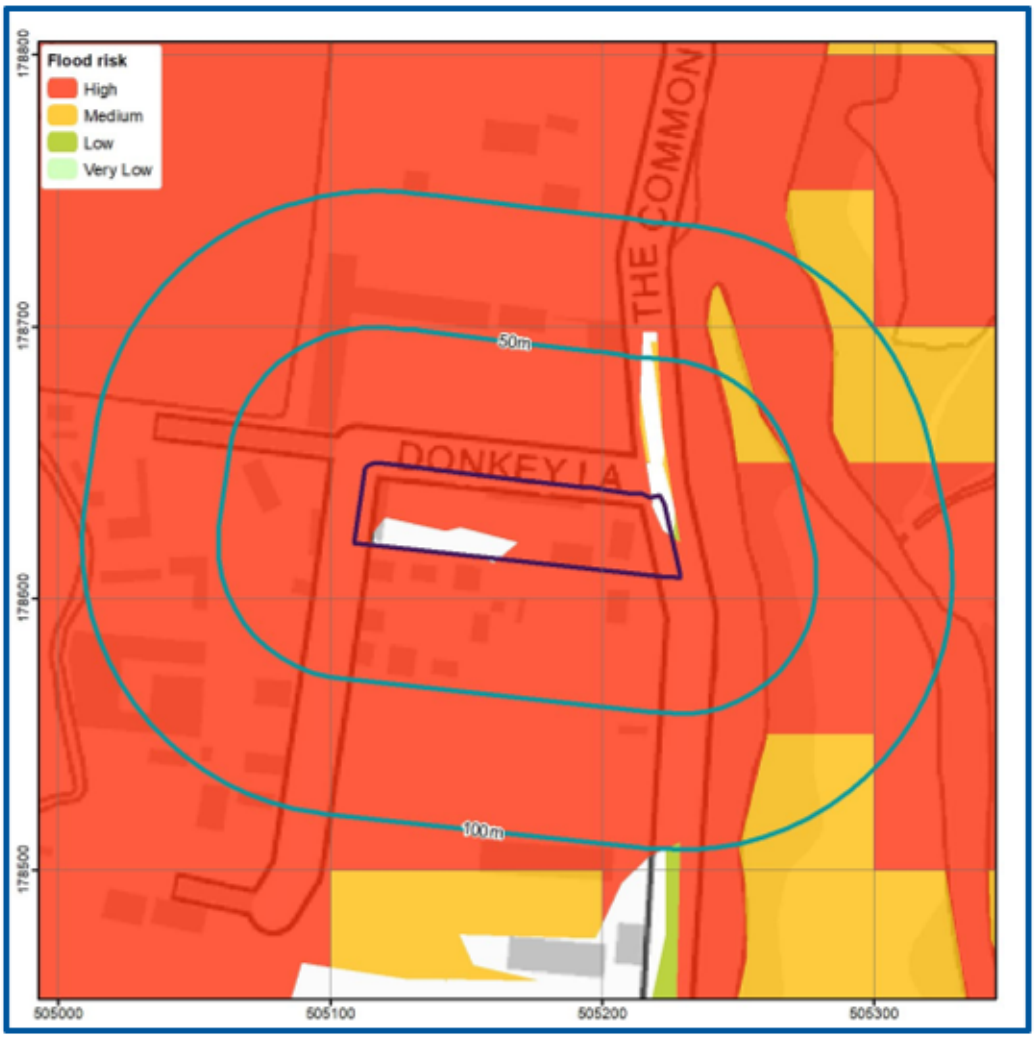
Flood risk including the benefit of defences

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

According to the EA's Risk of Flooding from Rivers and Sea (RoFRaS) map (Figure 9), which considers the type, condition and crest height of flood defences, the Site has a High risk of flooding from the nearby watercourses. The RoFRaS map identifies two areas on-Site with Very Low risk (i.e., the mapping suggests these areas are not affected by the 1 in 1000 year event), however, these areas are considered to be erroneous.

The RoFRaS map appears to present an overestimate of the flood risk, given that flood modelling indicates that areas of the Site are not affected by the 1 in 50 year flood event.

Figure 9. Risk of Flooding from Rivers and Sea map (EA, 2023)

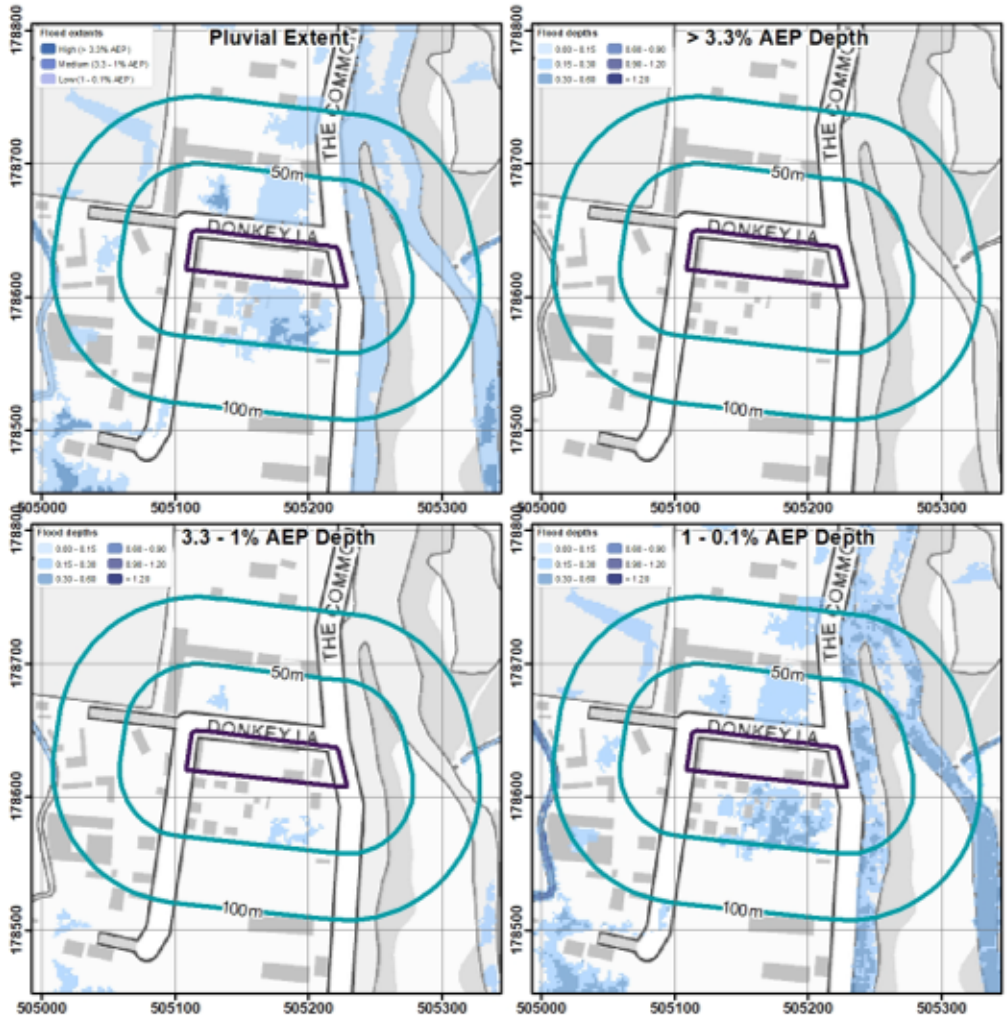


Surface water (pluvial) flooding

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

According to the EA's Risk of Flooding from Surface Water (pluvial) flood mapping (Figure 10), the Site has a Very Low risk of pluvial flooding.

Figure 10. EA surface water flood extent and depth map (EA, 2023)



Guidance

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

- Very Low risk - chance of flooding of less than 1 in 1000 (0.1%).

The SFRA does not indicate any reported incidents of historical surface water flooding within 100 m of the Site and confirms that the Site is not located within a Critical Drainage Area (CDA)[4] (Metis, 2023).

Climate change factors

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

As the Site is located within the Colne Management Catchment and the proposed development is classed as Less Vulnerable, where the proposed lifespan is approximately 75 years, the Central (25%) allowance is required to determine a suitable climate change factor to apply to rainfall data.

The 0.1% AP (1 in 1000 year) surface water flooding event has been used as a proxy in this instance for the 1% AP (1 in 100 year) plus climate change event; it is noted that no flooding is identified at the Site during the 1 in 1000 year event.

Surface water flooding flow routes

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

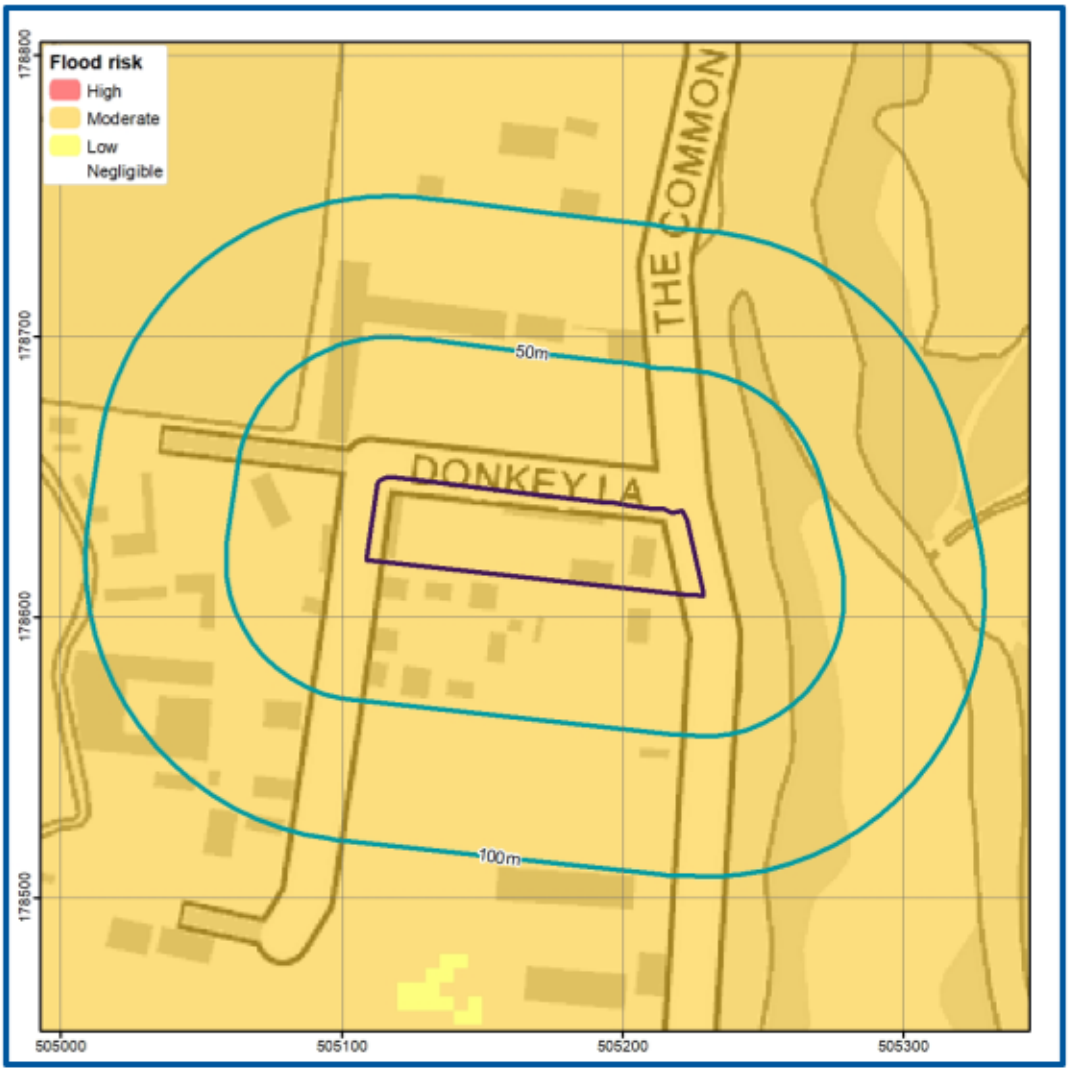
[4] A Critical Drainage Area (CDA) is an area that has critical drainage problems and which has been notified to the local planning authority as such by the Environment Agency in line with the National Planning Policy Framework (NPPF, 2023). CDA's are specific to Flood Zone 1, defined as areas where runoff can and may have historically contributed to flooding downstream, although they are not necessarily areas where flooding problems may occur. Where a Site is located in Flood Zone 1 and within a CDA, a Flood Risk Assessment (FRA) is required and the Council may also request Sustainable Drainage Scheme (SuDS) features to be included within the proposed development.

Groundwater flooding

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

Groundwater Flood Risk screening data (Figure 11) indicates that there is a Moderate risk of groundwater flooding at surface in the vicinity from permeable superficial deposits during a 1 in 100 year event.

Figure 11. GeoSmart GW5 Groundwater Flood Risk Map (GeoSmart, 2023)



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

would have significant adverse consequences. Mapping limitations and a number of local factors may reduce groundwater flood risk to land and property even where it lies within mapped groundwater flood risk zones, which do not mean that groundwater floods will occur across the whole of the risk area.

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

It is understood there are no existing basements and a basement is not proposed as part of the development. Note: the risks are higher for basements, buried infrastructure and soakaway systems which may be affected by high groundwater levels.

According to a review of the hydrogeology (Section 3), the Site is underlain by potentially permeable superficial deposits above low permeability bedrock. A shallow groundwater table is likely to exist within the superficial aquifer. Groundwater levels may rise in the superficial aquifer in a seasonal response to prolonged rainfall recharge which may cause an unusually high peak in groundwater levels during some years.

Groundwater levels may also rise in the superficial aquifer in response to high river events due to the potential hydraulic continuity with the nearby Wraysbury river and River Colne.

Despite the presence of an underlying aquifer the Site would only be at risk of groundwater flooding if the water table reaches the base of the Site development or the ground surface when groundwater seepage could lead to overland flow and ponding.

According to a review of the hydrogeology (Section 3), a nearby BGS borehole (ref: TQ08NW287) encountered groundwater at a depth of 2.0 m bgl within the permeable superficial deposits. Similar groundwater conditions may be present beneath the Site.

The online mapping from the West London SFRA identifies increased potential for elevated groundwater and >75% susceptibility to groundwater flooding (Metis, 2023).

Spring lines have not been identified in close proximity to the Site.

The hydrogeological characteristics suggest there is potential for a shallow groundwater table beneath the Site.

The baseline groundwater flood risk rating is Moderate; on the basis of the site-specific assessment the groundwater flood risk is considered to remain as Moderate.

Guidance
Moderate Risk - There will be a significant possibility that incidence of groundwater flooding could lead to damage to property or harm to other sensitive receptors at, or near, this location.

Climate change predictions suggest an increase in the frequency and intensity of extremes in groundwater levels. Rainfall recharge patterns will vary regionally resulting in changes to average groundwater levels. A rise in peak river levels will lead to a response of increased groundwater levels in adjacent aquifers subject to the predicted climate change increases in peak river level for the local catchment. Sea level rises of between 0.4m and 1m are predicted by 2100, leading to a rise in average groundwater levels in the adjacent coastal aquifer systems, and potential increases in water levels in the associated drainage systems. The 'backing up' of groundwater levels from both coast and tidal estuary locations may extend a significant distance inland and affect infrastructure previously constructed above average groundwater levels.

The impact of climate change on groundwater levels beneath the Site is linked to the predicted risk in both peak river levels and the variation in rainfall recharge which is uncertain.

Flooding from artificial sources

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

Sewer flooding

The online mapping from the West London SFRA identifies no instances of sewer flooding up to 2017; in addition, records held by Thames Water indicate that there have been no incidences of flooding related to the surcharging of public sewers at the Site (Thames Water, 2023; Appendix C).

Guidance

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

Canal failure

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

Water supply infrastructure

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

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

Culverts and bridges

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

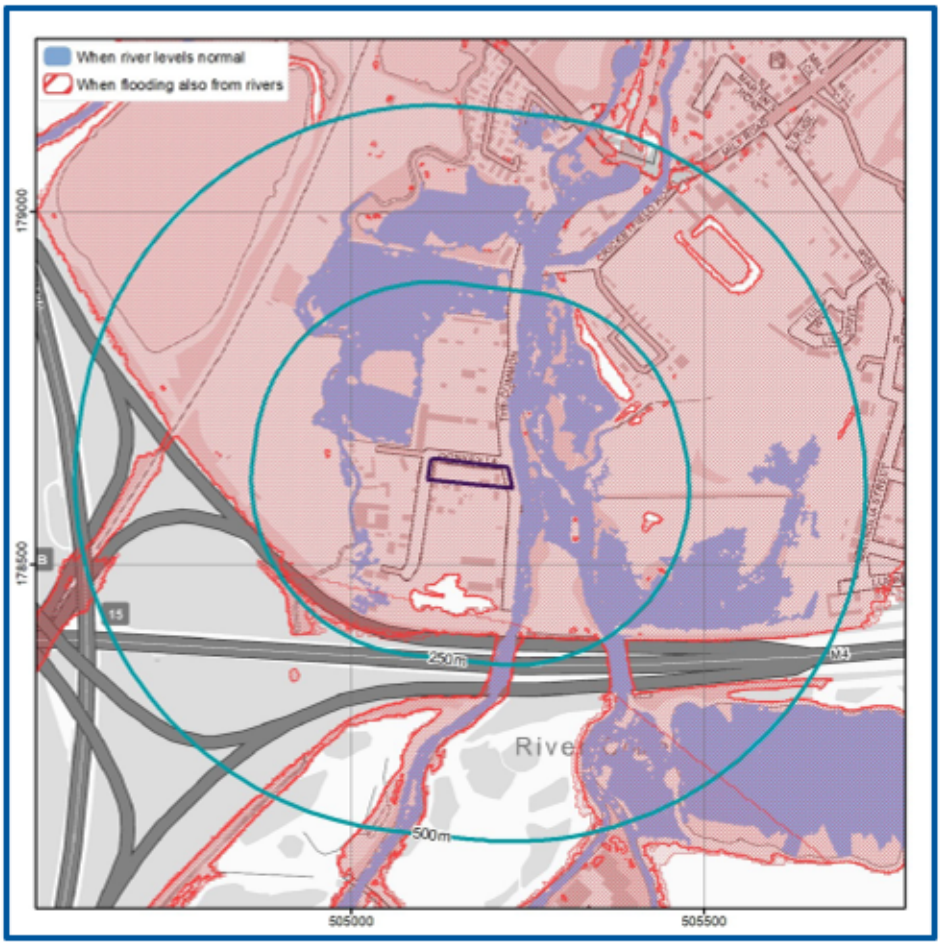
Culverts and bridges have not been identified within 50 m of the Site.

Reservoir flooding

According to the EA's Risk of Flooding from Reservoir mapping the Site is at risk of flooding from a number reservoirs (Figure 12) (EA, 2023), albeit only in combination with river flood events.

- George V FSA (TQ1280090400)
- Ruislip Lido (TQ0880089000)
- Wraysbury (TQ0250074500)
- Hilfield Park (TQ1570096000)

Figure 12. EA Risk of Reservoir Flooding (EA, 2023)



Guidance

The risk of reservoir flooding is related to the failure of a large reservoir (holding over 25,000 m^3 of water) and is based on the worst-case scenario. Reservoir flooding is extremely unlikely to occur (EA, 2023).

5. Flood risk from the development

Floodplain storage

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

The loss of floodplain storage is less likely to be a concern in areas benefitting from appropriate flood risk management infrastructure or where the source of flood risk is solely tidal.

The development is located within an area which would be impacted by a 1 in 100 year plus climate change fluvial flood event and involves an increase in building footprint. As the development would displace flood waters, compensatory flood storage is required for the loss in flood plain storage. Any losses in floodplain storage are likely to displace flooding and could potentially alter flood flow routes, increasing flood risk elsewhere.

Compensation for any reduction in floodplain storage and displacement of flood water (up to the 1 in 100-year event with allowance made for climate change) may be required to be provided. Compensatory flood storage should be provided through a level for level, volume for volume approach and may require an area at the edge of the floodplain to provide storage.

Where this is not possible, the EA and Lead Local Flood Authority (LLFA) may accept voids, stilts or undercroft parking as options for flood plain storage compensation. Whilst the use of stilts and voids below buildings may be an appropriate approach to mitigating flood risk to the buildings themselves, such techniques should not normally be relied upon for compensating for any loss of floodplain storage. This is because voids do not allow water to freely flow through them, trash screens get blocked, voids get silted up, they have limited capacity, and it is difficult to stop them being used for storing belongings or other materials.

These solutions should be discussed at an early stage and may require a management and maintenance plan, as they can become blocked over time leading to a gradual reduction in storage. More information is provided in the EA's "*Framework and Guidance for Assessing and Managing Flood Risk for New Development*" FD2320/TR2 publication (EA, 2005).

Scoping estimates of the storage requirements can be made by multiplying the increase in building footprint by the average flood depth at the development, during the 1 in 100 year flood event with a 21% allowance for climate change.

Drainage and run-off

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

6. Suitability of the proposed development

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

National policy and guidance

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

Guidance
Sequential test: The aim of this test is to steer new development towards areas with the lowest risk of flooding (NPPF, 2023). Reasonably available sites located in Flood Zone 1 should be considered before those in Flood Zone 2 and only when there are no reasonably available sites in Flood Zones 1 and 2 should development in Flood Zone 3 be considered. **Exception test:** In some cases, this may need to be applied once the Sequential Test has been considered. For the exception test to be passed it must be demonstrated that the development would provide wider sustainability benefits to the community that outweigh flood risk and a site-specific FRA must demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

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

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

As the Site is located within Flood Zone 3a and the proposed development is defined as Less Vulnerable; the proposals would be acceptable, but may be subject to the Sequential Test.

Where the Sequential Test is required it must be demonstrated that there are no alternative reasonably available Sites at lower risk of flooding within an area agreed with the Council e.g. Hillingdon Council NPPF (2023).

Table 4. Flood risk vulnerability and flood zone 'incompatibility (taken from NPPG, 2022)

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

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

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

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

Surface water management

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

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

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

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

Access and evacuation

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

Plans should show:

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

Floor levels

The following should be provided:

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

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

- average ground level of the site;
- adjacent road level to the building;
- estimated river or sea flood level.

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

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

- raise them as much as possible;
- consider moving vulnerable uses to upper floors;
- include extra flood resistance and resilience measures.

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

Extra flood resistance and resilience measures

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

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

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

The design should be appropriately flood resistant and resilient by:

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

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

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

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

7. Resilience and mitigation

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

Sea (coastal/tidal) flood mitigation measures

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

Rivers (fluvial) flood mitigation measures

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

Table 5. Flood levels compared to ground levels in the area proposed for development.

Ground levels on-Site (mAOD)	Modelled Flood Levels (mAOD)			
	1 in 20 year	1 in 50 year	1 in 100 year	1 in 100 year +20% CC
23.65 and 24.70	N/A	N/A	23.87	23.97
Flood depths (m)	No flooding	No flooding	Up to 0.22	Up to 0.32 m

Raising minimum floor levels

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

In this instance, in line with the EA's FRSA the recommended minimum Finished Floor Level (FFL) should be set at least 0.3 m above the 1 in 100 year plus 21% allowance for climate change flood level of 23.97 mAOD.

Table 6. Recommended Minimum Finished Floor Level Required

Ground Level in the area proposed for development (mAOD)	Flood Level (mAOD)	Freeboard required above Flood Level (m)	Recommended FFL (mAOD)
23.65 and 24.70	23.97	0.3 m	24.27

If finished floor levels can be raised to the recommended level, this could reduce the flood risk to the development from High to Low.

Alternative Mitigation

Where it is not possible to raise the minimum finished floor levels to the recommended elevation, it may be appropriate to adopt a water exclusion strategy for flood depths up to 0.3 m in line with the EA's Standing Advice. A water exclusion strategy, using avoidance and resistance measures, is appropriate where floods are expected to last for short durations. Potential water exclusion strategies include:

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

Avoidance and resistance measures are unlikely to completely prevent floodwater entering a property, particularly during longer duration flood events. Therefore, it is recommended that the following flood resilience measures are also considered.

- Flood resilient materials and designs:
    - Use of low permeability building materials up to 0.3 m such as engineering bricks (Classes A and B) or facing bricks;
    - Hard flooring and flood resilient metal staircases;
    - The use of internal lime plaster/render or where plasterboards are used these should be fitted horizontally instead of vertically and/or using moisture resistant plasterboard at lower levels;
    - Water, electricity and gas meters and electrical sockets should be located above the predicted flood level;

- Communications wiring: wiring for telephone, TV, Internet and other services should be protected by suitable insulation in the distribution ducts to prevent damage.

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

The development could also be moved to higher ground in the West of the Site, out of the 1 in 100 year extent.

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

Surface water (pluvial) flood mitigation measures

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

Groundwater flood mitigation measures

The Site has been identified as being at Moderate risk of groundwater flooding.

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

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

If these mitigation measures are implemented (or if finished floor levels are raised as per the fluvial flood mitigation recommendations) this could reduce the flood risk to the development from Moderate to Low.

Reservoir flood mitigation measures

There would be a relatively high rate and onset of flooding associated with a reservoir breach, it is therefore unlikely that safe access could be achieved unless a long warning period was provided. Therefore, occupants should get to the highest level of the building as possible and contact the emergency services.

Other flood risk mitigation measures

As the Site is not identified as at risk from other sources, mitigation measures are not required.

Residual flood risk mitigation measures

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

Further flood mitigation information

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

www.knowyourfloodrisk.co.uk

Emergency evacuation - safe access / egress and safe refuge

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

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

Flood warnings

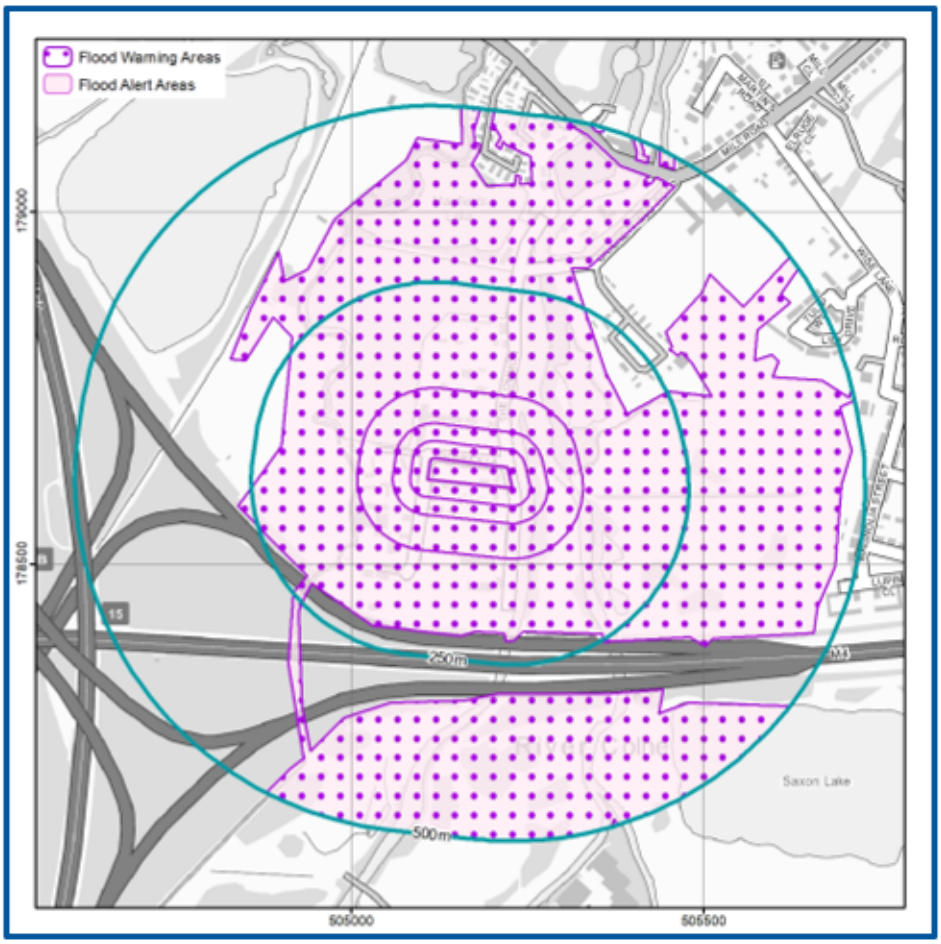
The EA operates a flood warning service in all areas at risk of flooding; this is available on their website: https://www.gov.uk/check-flood-risk. The Site is located within an EA Flood Alerts/Warning coverage area and so is able to receive alerts and warnings (Figure 13). All warnings are also available through the EA's 24 hour Floodline Service 0345 988 1188.

Flood Alert (ref: 062WAF28LowColne) quick dial code: **172703**

Flood Warning (ref: 062WAF28LowColne) quick dial code: **172702**

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

Figure 13. EA Flood Warning Coverage for the local area (EA, 2023).



Emergency evacuation

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

It is advised that evacuation from the premises would be the preferred option in a flood event if safe to do so. It is recommended that residents prepare to evacuate as soon as an EA Flood Warning is issued in order to completely avoid flood waters.

Other relevant information

A Business Continuity Plan (BCP) is recommended to reduce risks to people, property and profit.

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

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

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

8. Conclusions and recommendations

Table 7. Risk ratings following Site analysis

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

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

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

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

*N/A indicates where mitigation is not required.

The table below provides a summary of where the responses to key questions are discussed in this report. Providing the recommended mitigation measures are put in place it is likely that flood risk to this Site will be reduced to an acceptable level.

The Site is located in Flood Zone 3a and the development is classed as Less vulnerable which will require review and discussion of mitigation measures with the Local Authority.

Table 8. Summary of responses to key questions in the report

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

9. Further information

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

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

10. References and glossary

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GeoSmart Information

Glossary

General terms

BGS	British Geological Survey
EA	Environment Agency
GeoSmart groundwater flood risk model	GeoSmart's national groundwater flood risk model takes advantage of all the available data and provides a preliminary indication of groundwater flood risk on a 50m grid covering England and Wales. The model indicates the risk of the water table coming within 1 m of the ground surface for an indicative 1 in 100 year return period scenario.
Dry-Island	An area considered at low risk of flooding (e.g. In a Flood Zone 1) that is entirely surrounded by areas at higher risk of flooding (e.g. Flood Zone 2 and 3)
Flood resilience	Flood resilience or wet-proofing accepts that water will enter the building, but through careful design will minimise damage and allow the re-occupancy of the building quickly. Mitigation measures that reduce the damage to a property caused by flooding can include water entry strategies, raising electrical sockets off the floor, hard flooring.
Flood resistance	Flood resistance, or dry-proofing, stops water entering a building. Mitigation measures that prevent or reduce the likelihood of water entering a property can include raising flood levels or installation of sandbags.
Flood Zone 1	This zone has less than a 0.1% annual probability of river flooding
Flood Zone 2	This zone has between 0.1 and 1% annual probability of river flooding and between 0.1% and 0.5 % annual probability sea flooding
Flood Zone 3	This zone has more than a 1% annual probability of river flooding and 0.5% annual probability of sea flooding
Functional Flood Plain	An area of land where water has to flow or be stored in times of flood.
Hydrologic model	A computer model that simulates surface run-off or fluvial flow. The typical accuracy of hydrologic models such as this is ±0.25m for estimating flood levels at particular locations.
OS	Ordnance Survey
Residual Flood Risk	The flood risk remaining after taking mitigating actions.
SFRA	Strategic Flood Risk Assessment. This is a brief flood risk assessment provided by the local council

SuDS	A Sustainable drainage system (SuDS) is designed to replicate, as closely as possible, the natural drainage from the Site (before development) to ensure that the flood risk downstream of the Site does not increase as a result of the land being developed. SuDS also significantly improve the quality of water leaving the Site and can also improve the amenity and biodiversity that a Site has to offer. There are a range of SuDS options available to provide effective surface water management that intercept and store excess run-off. Sites over 1 Ha will usually require a sustainable drainage assessment if planning permission is required. The current proposal is that from April 2014 for more than a single dwelling the drainage system will require approval from the SuDS Approval Board (SABs).

Aquifer Types

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

NPPF (2023) terms

Exception test	Applied once the sequential test has been passed. For the exception test to be passed it must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk and a site-specific FRA must demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.
Sequential test	Aims to steer new development to areas with the lowest probability of flooding.
Essential infrastructure	Essential infrastructure includes essential transport infrastructure, essential utility infrastructure and wind turbines.

Water compatible	Water compatible land uses include flood control infrastructure, water-based recreation and lifeguard/coastal stations.
Less vulnerable	Less vulnerable land uses include police/ambulance/fire stations which are not required to be operational during flooding and buildings used for shops/financial/professional/other services.
More vulnerable	More vulnerable land uses include hospitals, residential institutions, buildings used for dwelling houses/student halls/drinking establishments/hotels and sites used for holiday or short-let caravans and camping.
Highly vulnerable	Highly vulnerable land uses include police/ambulance/fire stations which are required to be operational during flooding, basement dwellings and caravans/mobile homes/park homes intended for permanent residential use.

Data Sources

Aerial Photography	Contains Ordnance Survey data © Crown copyright and database right 2023 BlueSky copyright and database rights 2023
Bedrock & Superficial Geology	Contains British Geological Survey materials © NERC 2023 Ordnance Survey data © Crown copyright and database right 2023
Flood Risk (Flood Zone/RoFRS/Historic Flooding/Pluvial/Surface Water Features/Reservoir/ Flood Alert & Warning)	Environment Agency copyright and database rights 2023 Ordnance Survey data © Crown copyright and database right 2023
Flood Risk (Groundwater)	GeoSmart, BGS & OS GW5 (v2.4) Map (GeoSmart, 2023) Contains British Geological Survey materials © NERC 2023 Ordnance Survey data © Crown copyright and database right 2023
Location Plan	Contains Ordnance Survey data © Crown copyright and database right 2023
Topographic Data	OS LiDAR/EA Contains Ordnance Survey data © Crown copyright and database right 2023 Environment Agency copyright and database rights 2023

11. Appendices

GeoSmart Information

Appendix A

Site plans

A3

Revision	Stage Description	Drawn By

01 SITE PLAN - PROPOSED STEEL UNIT

SCALE 1:500

0 5 10 15 20 25m 50m

Scalebar - 1:500 @ A3

KEY: (GEA) (Volume):

1 -	15 sqm	35 cu.m
2 -	18 sqm	41 cu.m
3 -	360 sqm	1626 cu.m

Total GEA - 393 sqm Total - 1702 cu.m

N

Project
ROSEDALE

Location
ROSEDALE, THE COMMON
WEST DRAYTON
UB7 7HQ

Client
ALMYS AUTOS

JARCHITECTURE
59 Pinewood Park
Farnborough
GU14 9LB
+44 (0)7948 150262
jashidahmad4@gmail.com

Status
For Planning

Scale
1:500 @ A3

Drawn
JA

Date
SEP 2023

Drawing Name
SITE PLAN - PROPOSED STEEL UNIT

Project Number
2321

Drawing Number
PD 03

Revision

A3

Revision	Stage Description	Drawn By

01 SITE PLAN - PROPOSED FENCE

SCALE 1:500

0 5 10 15 20 25m 50m

Scalebar - 1:500 @ A3

KEY: (GEA)		(Volume):
1 -	210 sqm	630 cu.m
2 -	15 sqm	35 cu.m
3 -	100 sqm	300 cu.m
4 -	54 sqm	140 cu.m
5 -	18 sqm	41 cu.m
6 -	37 sqm	93 cu.m
7 -	142 sqm	469 cu.m
Total - 576 sqm		Total - 1708 cu.m

N

Project
ROSEDALE

Location
ROSEDALE, THE COMMON
WEST DRAYTON
UB7 7HQ

Client
ALMYS AUTOS

JARCHITECTURE
59 Pinewood Park
Farnborough
GU14 9LB
+44 (0)7948 150262
jashidahmad@gmail.com

Status
For Planning

Scale
1:500 @ A3

Drawn
JA

Date
SEP 2023

Drawing Name
SITE PLAN - PROPOSED FENCE

Project Number
2321

Drawing Number
PD 02

Revision

GeoSmart Information

Appendix B

Environment Agency data

Lower Colne Modelling and Mapping Study

Draft Report

April 2012

Environment Agency - Thames Region

Mott MacDonald

GeoSmart Information

Appendix C

Thames Water sewer flooding history

Sewer Flooding
History Enquiry

Property Searches

GeoSmart Information Ltd

Bellstone

Search address supplied	Rosedale The Common West Drayton UB7 7HQ
Your reference	80814
Our reference	SFH/SFH Standard/2023_4919638
Received date	**1 December 2023**
Search date	**1 December 2023**

Thames Water Utilities Ltd
Property Searches, PO Box 3189, Slough SL1 4WW

searches@thameswater.co.uk
www.thameswater-propertysearches.co.uk

0800 009 4540

Sewer Flooding

History Enquiry

Property Searches

Search address supplied: Rosedale,The Common,West Drayton,UB7 7HQ

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

TWUL, trading as Property Searches, are responsible in respect of the following:-

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

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

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

(iv) compensation payments

Thames Water Utilities Ltd
Property Searches, PO Box 3189, Slough SL1 4WW

searches@thameswater.co.uk
www.thameswater-propertysearches.co.uk

0800 009 4540

Sewer Flooding

History Enquiry

Thames Water Property Searches

History of Sewer Flooding

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

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

For your guidance:

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

Thames Water Utilities Ltd
Property Searches, PO Box 3189, Slough SL1 4WW

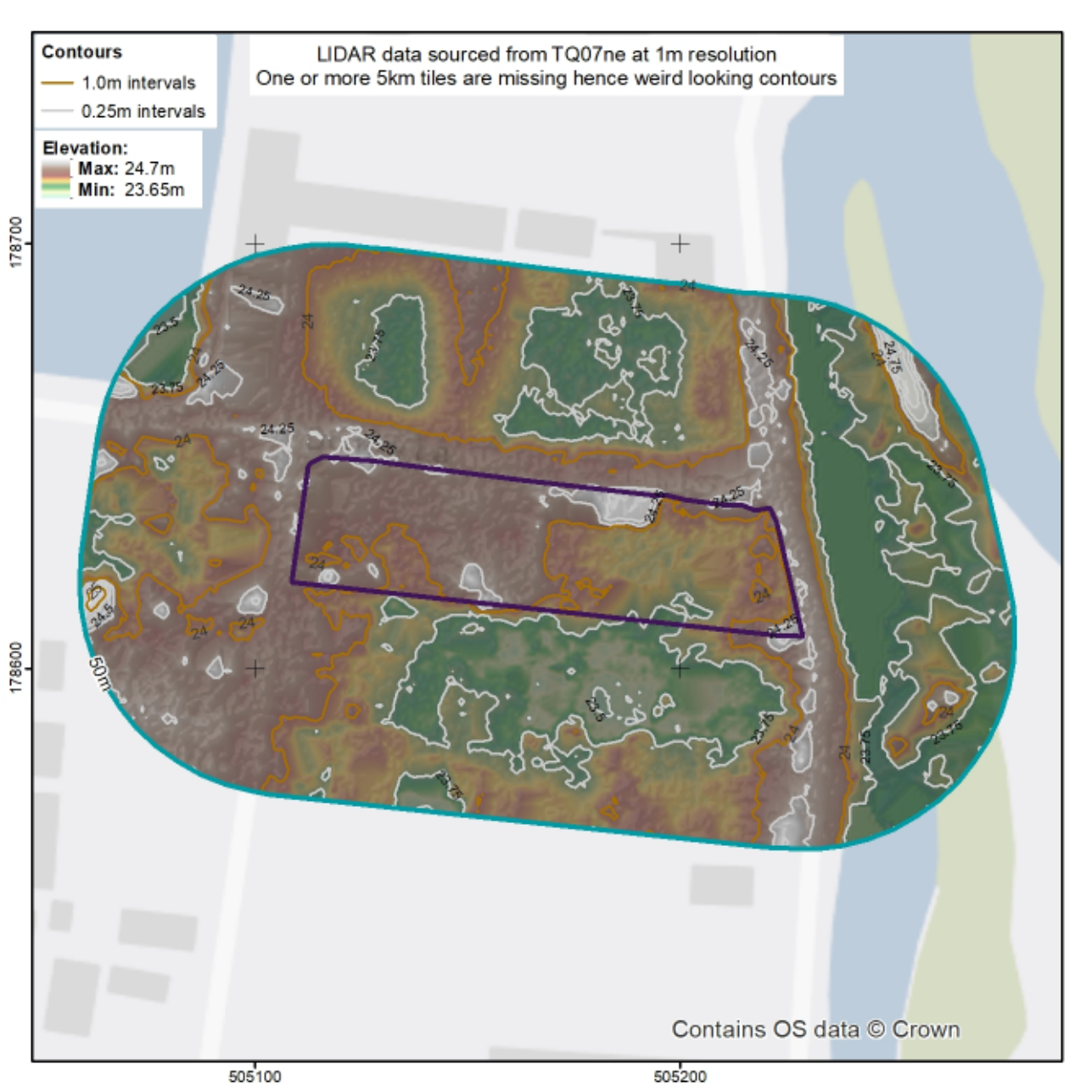
searches@thameswater.co.uk
www.thameswater-propertysearches.co.uk

0800 009 4540

GeoSmart Information

Appendix D

Environment Agency LiDAR ground elevation data


Contours
1.0m intervals
0.25m intervals
Elevation:
Max: 24.7m
Min: 23.65m
LIDAR data sourced from TQ07ne at 1m resolution
One or more 5km tiles are missing hence weird looking contours
178700
178600
505100
505200
50m
Contains OS data © Crown

Disclaimer

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

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

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

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

Important consumer protection information

This search has been produced by GeoSmart Information Limited, Suite 9-11, 1st Floor, Old Bank Buildings, Bellstone, Shrewsbury, SY1 1HU.

Tel: 01743 298 100

Email: info@geosmartinfo.co.uk

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

The Search Code:

- provides protection for homebuyers, sellers, estate agents, conveyancers and mortgage lenders who rely on the information included in property search reports undertaken by subscribers on residential and commercial property within the United Kingdom.
- sets out minimum standards which firms compiling and selling search reports have to meet.
- promotes the best practice and quality standards within the industry for the benefit of consumers and property professionals.
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Firms which subscribe to the Search Code will:

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

GeoSmart Information

Complaints

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

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

TPOs contact details:

The Property Ombudsman scheme

Milford House

43-55 Milford Street

Salisbury

Wiltshire SP1 2BP

Tel: 01722 333306

Fax: 01722 332296

Email: admin@tpos.co.uk

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

Complaints procedure

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

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

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

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

Martin Lucass

Commercial Director

GeoSmart Information Limited

Suite 9-11, 1st Floor,

Old Bank Buildings,

Bellstone, Shrewsbury, SY1 1HU

Tel: 01743 298 100

martinlucass@geosmartinfo.co.uk

12. Terms and conditions, CDM regulations and data limitations

Terms and conditions can be found on our website:

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CDM regulations can be found on our website:

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

Data use and limitations can be found on our website:

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